The Economic Value of Natural Resources around the Kgalagadi Transfrontier Park and Implications for the Khomani San in South Africa

By

Johane Dikgang

University of Cape Town

Thesis Presented for the Degree of

DOCTOR OF PHILOSOPHY

In the
School of Economics
University of Cape Town
February 2013

Supervisor: Associate Professor Edwin Muchapondwa

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

University of Cape Town

Plagiarism Dedication

This thesis is my original work. Where other people's work is used, acknowledgements have been used. I declare that it has not been previously submitted for the award of a degree at any university.

Candidate: Johane Dikgang

Date: 8 February 2013

University of Cape Town

Preface

I am grateful to Kelly Scheepers, Christine du Plessis, Louise Swemmer, Wendy Annecke and Joep Stevens of SANParks (South African National Parks) for assistance with data and materials. I am also grateful to Peter Mokomele from Rural Development and Land Affairs in Kimberly for assistance with materials. I would like to acknowledge financial support from the Swedish International Development Cooperation Agency (SIDA) through the Environment for Development Initiative (EfD) of the Department of Economics, University of Gothenburg and the Carnegie Corporation of New York, in the United States of America. Additional funding from the National Treasury of South Africa through ERSA (Economic Research Southern Africa) and the Swedish Research Council Formas is also gratefully acknowledged.

I also want to thank my supervisor, Edwin Muchapondwa whose support, through insightful and valuable inputs, has been invaluable in shaping this thesis. The combination of patience, dedication, enthusiasm, friendship and sharp criticism made him the ideal supervisor. I am sincerely grateful.

The PhD specialization course in environmental valuation I took played a crucial role in the development and maturity of this thesis. For that I would like to express gratitude to all my teachers at the Department of Economics, University of Gothenburg. Many thanks to: Gunnar Köhlin, Wiktor Adamowicz, Dale Whittington and Francisco Alpizar.

Several others have kindly and enthusiastically participated in improving the chapters of this thesis, providing ideas, comments and, above all, their precious time. My gratitude goes out to Deirdre McCloskey, Elina Lampi, Gardner Brown, James Fenske, Jesper Stage, Lisa Chase, Mitesh Kataria, Paulo Nunes, Peter Berck, Precious Zikhali, Pushpam Kumar, Timothy Swanson, Razack Lokina, William Greene and Xiangping Liu.

I am also grateful for the comments I received from participants at the EfD annual meetings; park pricing workshops; Belpasso International Summer School on "*the Economics of*

University of Cape Town

Ecosystem Services and Biodiversity Conservation" in Italy, in 2010; 13th Annual Bioecon conference in Geneva, Switzerland, in 2011; 19th annual conference of the EAERE (European Association of Environmental and Resource Economists), Prague, Czech Republic, in 2012; XVITH WEHC (World Economic History Congress) in Stellenbosch, South Africa, in 2012; the University of Cape Town, School of Economics seminar in 2012 and 20th annual conference of the EAERE, Toulouse, France, in 2013.

I would also like to thank everyone at EPRU (Environmental-Economics Policy Research Unit), University of Cape Town for the most enjoyable, intellectually stimulating, fun, and rewarding time in my life. The research unit created a rich environment for growth and exploration. In particular, I would like to thank Mare Sarr, Tony Leiman, Martine Visser, Stephanie Giamporcarco and Jane Turpie for encouraging me in my research.

Special thanks to Fulbert Tchana Tchana, Albert Touna Mama and Amos Peters for their mentorship. My deepest acknowledgements go to fellow PhD candidates Kerri Brick, Sunday Adewara, Coretha Komba, Esther Kimani, Emmanuel Letete, Sidwell Hove, Byela Tibesigwa, Josephine Musango and Synman Sue. Together we shared the challenges required in completing a PhD thesis.

Furthermore, I am indebted to many of my fellow researchers and scholars at Rhodes University and University of Stellenbosch for their collaboration. In particular, Gladman Thondhlana, Lelani Mannetti, and Sheona Shackleton provided a forum for presenting my ideas. I would also like to thank all the research assistants for making it all possible.

Special thanks to Samson Mukanjari, Willem-Schalk Afrikaner, Serena Van Wyk, Patric Gatogang, Unathi Mercy Lutshaba, Dumisani Luzuko Bekwa, Shakiraah Smitsdorff, Gerhardus Afrikaner, Hendrik Martin Jors, Gerald William Engelbrecht, Shawayne Neels and Roeline Neels: you made my days in the field so much fun.

Thank you Hannetjie van der Westhuzen for your kind accommodation during my fieldworks. I am forever grateful. Thanks to SASI (South African San Institute) and the Bushman Council members for helping me get to know the Khomani San better. Special

University of Cape Town

thanks to David Grossman and Phillipa Holden. The Khomani San and Mier community took me in and made me welcome.

Also, many thanks to Brenda Adams, Letitia Sullivan and Paula Bassingthwaighte, who kindly helped me with various administrative difficulties.

I would like to thank my family and friends for their support through the years. My mother (Setlhokilwe Esther Seleka) and in-laws (Clive and Ursula Serfontein) have never ceased to encourage me through the long journey to this point. I want them to know how much they mean to me. In the same spirit, thanks to Reginah Dikgang, Gaogakwe Palelo, Galeboe Dikgang, Mmereki and Neo Dikgang, Ketso Kgakgamatso, Arnold Somolekae, Nteseng Seleka, Jason Serfontein, Craig and Natalie Bruinders.

Thank you Kabo and Lebogang Molapisi, John and Samantha Satisfied, Isaac Johane, Mfundo Ntamo, Mathews Pitso, Lone and Noloyiso Mokgosi, Patric Gatogang, Lenyatso Mudongo, Gaoboelwe Pelaelo, Gaolathe Seelo, Francis Wasswa, Hugo Ribeiro, Sam Mwashimba, Moses and Theodora Mlangeni, Genevieve Pereira, Noluntu Dyubhele, Ronney Ncwadi, Solomon and Ndaiziveyi Mudege, William Akoto, Requier Wait, Unathi Bekwa, and Eddie Kodisang as I always have been able to rely on your friendship. Your friendship together with support of my family means everything for me.

While an attempt has been made to mention names, this thesis has benefitted from specialised essential contributions from many other people and institutions too many to mention. Their valuable input is acknowledged with appreciation as well.

Finally, I have the source of my inspiration and the rock in my life from my lover, my friend, my partner and wife, all in one, Cindy. She has sacrificed as much as I have, professionally and emotionally, as we travelled the rough road of academia together. I can only hope that the rewards of the journey have been worth her sacrifice. I thank you from the bottom of my heart. Lastly, but most important, I would want to thank God for helping me put it all together.

University of Cape Town

Dedication

To my wife Cindy Lynn Dikgang, son Carter Dikgang, mother Setlhokilwe Esther Seleka and late brother Ishmael Mokgosi Dikgang.

University of Cape Town

Table of Contents

University of Cape Town

University of Cape Town

University of Cape Town

University of Cape Town

List of Tables

University of Cape Town

List of Figures

University of Cape Town

List of Acronyms

AFNP	Augrabies Falls National Park
ASC	Alternative Specific Constant
CB	Contingent Behaviour
CBD	Convention on Biological Diversity
CE	Choice Experiment
CL	Conditional Logit Model
CV	Compensating Variation
CVM	Contingent Valuation Method
DEAT	Department of Environmental Affairs and Tourism
EV	Equivalent Variation
IUCN	International Union for Conservation of Nature
IV	Instrument variable
KNP	Kruger National Park
KTP	Kgalagadi Transfrontier Park
LCM	Latent Class Model
MEA	Millennium Ecosystem Assessment
ML	Mixed Logit Models
MRS	Marginal Rates of Substitution
MWTP	Marginal Willingness to Pay
NOAA	National Oceanic and Atmospheric Administration
NWPTB	North West Parks and Tourism Board
OLS	Ordinary Least Squares
PES	Payment for Ecosystem Services
PNP	Pilanesberg National Park
RPL	Random Parameter Logit
SADC	Southern Africa Development Community
SANParks	South African National Parks
TCM	Travel Cost Method
UNESCHR	United Nations Economic and Social Council on Human Rights

University of Cape Town

WCMC	World Conservation Monitoring Centre
WTA	Willingness to Accept
WTP	Willingness to Pay

Chapter 1: Introduction

1.1. Introduction

The term 'bushmen' is used generically to refer to the Khoisan. Although the term is still used in several countries in the Southern African region (SADC), it is considered derogatory by some. Culturally the Khoisan are divided into the hunter-gatherer San (originally a derogatory term used by the Khoi), and the pastoral Khoi (Barnard, 1992).

Anthropologists from the West adopted the term 'San' extensively in the 1970's, and this is now the preferred term in academic circles. This is a study in economic anthropology which seeks to fully understand the complexity of the economics of a hunter gatherer people in the Kgalagadi area. Despite the change in the lifestyle and values of the San people, they have and continue to provide valuable information in the fields of anthropology and genetics (see Thomas, 1958, 1989, 2006; Lee, 1976, 1979; Barnard, 1992; Hogan, 2008).

Scientific evidence suggests that they are one of the oldest; if not the oldest, peoples in the world, from which all humans can ultimately trace their genetic heritage (Wells, 2003). The expansion of Bantu tribe into Bushman's land around AD 1, 000 is the main reason they occupied harsh environments such as the Kgalagadi desert (Mtyala, 2008).

In the case of South Africa, the opportunity cost of national parks has historically been borne, in some measure, by indigenous communities' displacement. The Khomani San people are one such community that was removed from their land to make way for the Kgalagadi Transfrontier Park (KTP). This occurred despite the fact that access to land is considered a critical factor to poverty[1] reduction, particularly in rural areas. According to Blanchflower and Oswald (1998) and Hoff (1996), asset ownership has an impact on subsequent economic success at a household level.

[1] Poverty generally refers to an inability to attain a minimum standard of living and is a reflection of deprivation of certain necessities of life, the best known being food (Reyes, 2002).

University of Cape Town

Land restitution is thus seen as a tool for empowering people. Under South Africa's restitution laws, all people who were forcefully removed or evicted after the 19th of June 1913 are eligible to reclaim their ancestral land. Land restitution is considered critical for political stability, economic growth and the protection of property rights in South Africa.

The land restitution programme and it's post settlement support to beneficiaries is a crucial component of South Africa's development strategy and is envisaged as the key driving force for rural development. The objective of this strategy is to create viable and sustainable local economies that can create job opportunities and generate rural income (van der Walt, 2006).

Land restitution in protected areas is a highly debated issue, and one that continues to challenge many affected governments, agencies, individuals and communities around the world (Kepe, 2008). The critical question is whether land restitution within protected areas will inevitably compromise conservation objectives. Out of the 22 national parks managed by South African National Parks (SANParks)[2], six have been affected by land claims from indigenous communities. SANParks are concerned about challenges at the post-restitution phase, and want to know how to move forward. The main challenge faced by land authorities under these arrangements is whether it is possible to achieve the twin objectives of conservation and development, particularly where the land claimants are indigenous people who rely heavily on natural resource extraction and use.

The finalization of the Khomani San and Mier community land claim in May 2002 resulted in a drastic change in land ownership and land use choices in the Kgalagadi area. Local communities were awarded land and resource rights both inside and outside the park. It was agreed by all stakeholders that the land acquired inside the park would be used for conservation purposes. This marked a significant step forward in conservation in the Kgalagadi area as communities then became co-owners of international parklands.

The key challenge facing the Kgalagadi area is how to balance conservation objectives and beneficiaries' rights to land and natural resources. The proposed research asks four research questions posed to help address the aforementioned challenge. The findings of this research

[2] SANParks (known as the National Parks Board prior to 1997) is the overarching government agency pertaining to national conservation in South Africa (Kruger Park Times, 2009).

University of Cape Town

are important, as they will provide the kind of information that is needed to aid policy makers to make well-informed decisions with regard to environmental issues. It is envisaged that providing such useful information will assist policy makers to implement policies that strike a balance between sustainable resource use and poverty reduction.

1.2. Background to the study

1.2.1. Indigenous people of Southern Africa

Indigenous people are unique all over the world as they have a unique way of living with much emphasis on their culture, tradition and access to nature (UNESCHR, 2005). According to the Kalahari Peoples Fund (2009), the population of San people is presently estimated to be approximately 100 000. They live in the SADC region, mostly in Botswana, Namibia and South Africa. Botswana has almost half the total population (46 000), with Namibia having a third (38 000). About 4 000 are in Angola, 3 000 in Zambia and a few hundred in Zimbabwe. South Africa has an estimated population of 6 500, of which 1 500 are the Khomani San community.

According to UNESCHR (2005), the various indigenous groups in South Africa are estimated to include 1 500 Khomani San, 1 100 Khwe San, 4 500 !Xun San, 10 000 Nama people and 300 000 Griquas. The groups differ from each other in terms of their demography, the institutions that they have adopted and the nature of their subsistence economy.

Although indigenous people are not officially recognized as such in South Africa, the 1996 constitution makes reference to the Khoi, Nama and San languages. Beginning in November 2004, the South African government has promised to amend the laws so that these people can officially be recognized as "vulnerable indigenous communities". There are six groups that identify themselves as indigenous in South Africa. The six ethnic groups are comprised of the three main San peoples (!Xun, Khwe and Khomani) and the various Nama communities (Griqua, Khoisan and Koranna) (UNESCHR, 2005).

The San people in the SADC have historically faced difficulties with regard to land and resource rights, human rights, capacity building and development (Geingos and Brormann, 2002). The group then known as "the Southern Kgalagadi San" were forcefully removed from what was then called the Kalahari Gemsbok National Park following its formation in

University of Cape Town

1931, and spread over the Southern Kgalagadi in a wide diaspora into South Africa, Botswana and Namibia (Chennells, 2002). The Southern Kgalagadi San were made up of disparate groups known as the Khomani, /Auni, and Namani speaking San (Crawhall, 2001).

The descendants of various San families came together and later decided to call themselves the Khomani San (Bosch, 2002). The Khomani were originally the largest of the Southern Kgalagadi San groupings, hence the descendants of various San families adoption of the name (Chennells, 2002). They are spread over an area of more than 1 000km in the Northern Cape Province. Most still live north of Gordonia, at Witdraai, Ashkam, Welkom, Rietfontein and the surrounding areas. Others live in Upington, Olifantshoek and the surrounding areas (Crawhall, 2001).

The area the Khomani San requested rights in was symbolic as it was where their past generations (ancestors) had practiced a nomadic way of life. According to Chennells (2001) the challenge facing the Khomani San activists was to establish the rights of the San to their ancestral land in a manner that could prove beyond doubt that there was a link between the living San individuals of the claimant culture and origin, to the land. Given that the members of the San people were dispersed, a simultaneous process of recapturing and recording the culture in a manner that bind and defined the community was required.

The Khomani San people who were displaced from the park were awarded land. Their claim was unique because they did not want ownership of the land but rather the rights to use it. In contrast to the San, the Mier community are mainly interested in the economic benefits (job creation and business venture opportunities) that come about because of owning land.

1.2.2. The Kgalagadi economy

Historically, the San economy was a gift economy, based on the giving of gifts on a regular basis rather than on markets (Zanzibar Tribal Art, 2008). However, this profile is not true of all the San people as some communities now have a more complex economic structure. For example, the economic structure of the Khomani San community has elements of a survivalist system, characterized by heavy dependence on the natural environment and resources with no cash economy, as well as elements of a dual economy.

University of Cape Town

Over time, some San people have acquired formal education and are therefore participating in the cash economy. Although the educated group accounts for a minority of the total Khomani San population, there is evidence of San people trading crafts and curios, and dressing up and posing for their photos to be taken by tourists in exchange for money. The implication is that the Khomani San people cannot entirely ignore the cash economy although there are still those who are more traditional hunters and gatherers. The community is not homogeneous and their value systems, resource use, and cultural preferences have changed, influenced by external factors. Younger generations have lost some of the group's traditional knowledge and have been more heavily influenced by western value systems.

Since the Khomani people acquired land and resource rights in the Kgalagadi, their leaders, have brought young and old people together to talk about their history and to learn traditional skills, which they can use to create new livelihoods. This has been accomplished with the assistance of non-government organisations (NGOs) such as the South African San Institute (SASI) and the Bushman Council. Other programmes set up to improve the livelihoods of the Khomani San community include a tracker-training programme for young people, the creation of jobs for youths in heritage tours and the development of cultural products for tourists.

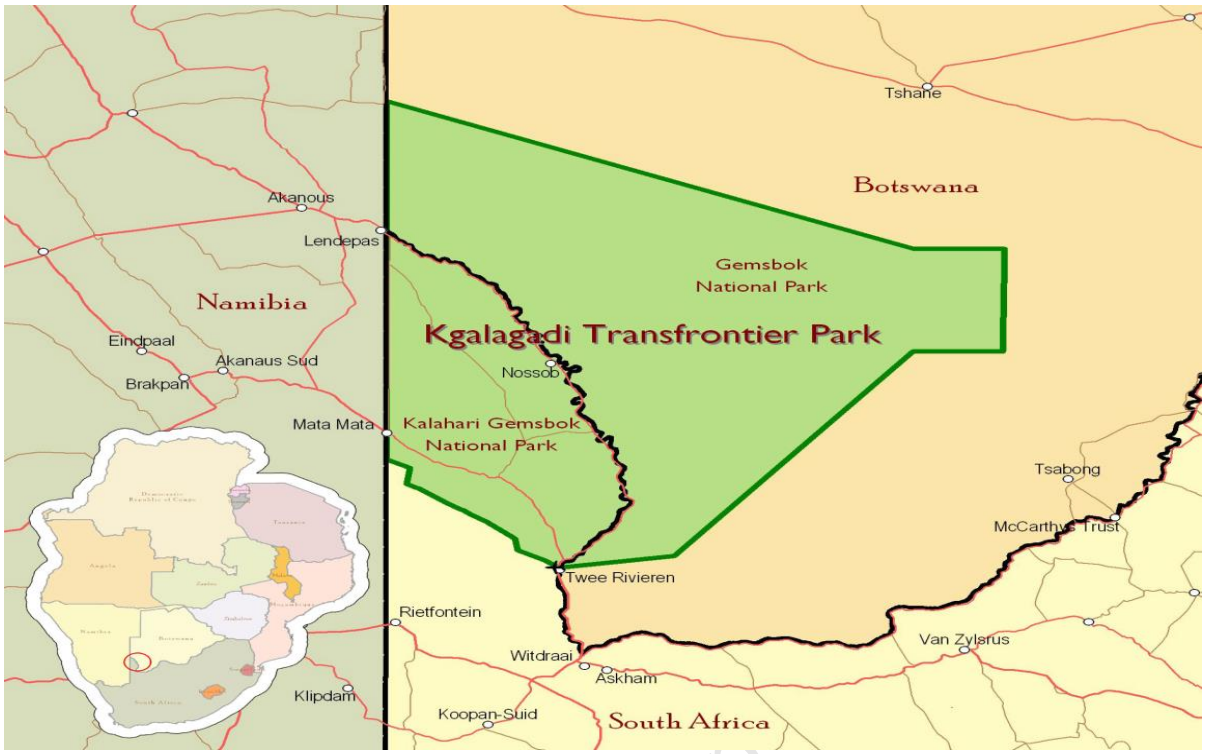
The Khomani San are engaged in some hunting and gathering, game farming, and sale of crafts. Some have wage employment and the community earns dividends from their guesthouse in the park (!Xaus Lodge).

University of Cape Town

1.3. The study area

The Kgalagadi area in question lies in the Siyanda District Municipality (comprising six local municipalities) of the Northern Cape province of South Africa, bordering Botswana and Namibia. The district is approximately 120,000 square kilometres and includes large areas in the Kgalagadi desert. The Mier Local Municipality (one of the six local municipalities) is located next to the KTP (see figure 1.1).

Figure 1.1: Map of the Kgalagadi area



Source: SANParks, 2012.

The population density of the Mier Local Municipality is low, with an estimated 8,000 Mier community households and 320 Khomani San households (located in Rietfontein, Askam and Witdraai – see figure 1.1).

The Mier Local Municipality region is semi-arid and has infrequent rainfall, mostly during summer (Seymour, 2001). The region is used predominantly for sheep and game farming, although an increasing number of cattle and goats are being introduced, despite the area not being best suited to such livestock.

While the Kgalagadi desert, including the area inside South Africa, is a physically harsh environment, the region has a rich biodiversity. The Kgalagadi area, including areas outside the park, is characterised by red sand dunes, saltpans, and open plains, as well as flat bushveld, grasslands, Camel thorn trees, scrub bush, and woodlands. According to Cooper et al., (2004), biodiversity is an environmental asset.

University of Cape

According to the DEAT (2008), because of the sparse vegetation and concentration of animals in the dry riverbeds of the Auob and Nossob Rivers, the KTP offers premium mammal viewing. More than 58 mammal species are found in the area. The area is also renowned for predator viewing (cheetah, leopard, brown and spotted hyena, and black-maned lion), which is the park's main attraction. The park is also home to a wide variety of birds, particularly birds of prey.

The total area of the park is 387,991 square kilometres, of which approximately 75 percent is on the Botswana side (Swatuk, 2006). On the South African side (the Kalahari Gemsbok National Park section), the KTP has been divided into areas representing five different ownership types: (i) belonging to SANParks and with no local community access, (ii) belonging to SANParks but with Khomani San access for symbolic cultural use, (iii) belonging to SANParks but with Khomani San access for commercial joint ventures, (iv) belonging to the Khomani San but managed as a contract park with SANParks, and (v) belonging to the Mier community but managed as a contract park with SANParks. SANParks has an obligation to maintain any infrastructure related to conservation and the integrity of the environment inside the Transfrontier Park on the South African side (Bosch and Hirschfeld, 2002).

The park is probably less accessible than most other parks in South Africa, with the closest airport located in Upington, which is 260km from the park. However, the park has a landing strip for small aircraft. The park is approximately 610km from the biggest city in the province (Kimberley), 904km from Johannesburg (the city in South Africa from which most visitors, domestic and foreign, are likely to visit the park) and around 1080km away from Cape Town (arguably the main tourist city in South Africa).

The two San communities own the !Xaus lodge inside the park jointly with SANParks. The lodge is on the border of the Mier contract park and the Khomani San contract park. A concession to run the lodge was given to a private firm called Transfrontier Parks Destination. The lodge has been in operation since 2007.

There is a need for more land in the highly fragile Kgalagadi ecosystem to be under conservation. The Mier Local Municipality has agreed in principle to expand the amount of

University of Cape Town

their land under conservation. The Khomani San have also agreed to use two of their farms (namely, Farm 24 and 26), which are adjacent to the park (near the Twee Rivieren entrance gate – see figure 1.1), for conservation purposes in addition to making use of the area for their cultural activities. Thus, these farms will act as a buffer zone protecting the Mier contract park, the Khomani San Contract Park, and the rest of the KTP (Bosch and Hirschfeld, 2002).

1.4. The research problem

The agreement with SANparks to co-manage the park with the Khomani and Meir communities suggest that the South African government, like the governments of many other countries, recognises that conservation cannot be guaranteed in the future unless it has the backing of the local communities (Cock and Koch, 1991). However, joint management of the park for multiple resource use as compared to the previous 'preservationist' approach to conservation has its difficulties and opportunities (SANParks, 2006).

In many settings, there is an ecological inter-linkage between areas inside and outside the protected areas. Hansen and DeFries (2007) observed that biodiversity[3] conservation targets are not being met inside protected areas, which are at the frontline of conservation, partly because of the increasingly adverse influences of activities undertaken outside protected areas. This seems to indicate that biodiversity conservation ought to take place outside protected areas as well.

The actions of local communities crucially influence the success or failure of biodiversity conservation for two reasons. First, local communities are usually in charge of some areas outside protected areas, using these outside areas to provide for their own livelihoods. In some cases, the existence of perverse incentives discourages them from prioritising activities which complement biodiversity conservation. Second, the same perverse incentives also encourage environmentally unsustainable practices by local communities whenever they get access to protected areas as a result of either land restitution or pure encroachment.

[3] According to the Convention on Biological Diversity, "biological diversity" means the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems (Abila et al., 2005).

University of Cape Town

Furthermore, failure to conserve biodiversity outside protected areas will lead to more pressure being put on the protected areas, especially where local communities also have resource rights inside these areas. Harvesting of natural resources inside protected areas could potentially have two impacts. First, it could compromise the integrity of biodiversity, compared to regimes of no use. Second, it could negatively affect the ability of the protected areas to attract tourists and generate revenues to plough back into conservation.

Thus, the challenge facing the Kgalagadi area is how the area can be managed as a whole in a manner that enhances conservation and complementary land-use practices (e.g. medicinal plant harvesting), and discourages conflicting practices (e.g. excessive stock farming). The implication of such an approach is that conservation also needs to spread to the communal and municipal lands adjacent to KTP.[4] To ensure the success of such an approach, there is a need to identify and deal with any factors that militate against sound conservation in the whole area.

1.5. Research objectives

The goal of the KTP is to conserve and enhance their scenic area, maintain the ecological integrity of their ecosystems and cultural heritage, and give the public the opportunity to understand and enjoy the special qualities of the conservation area. Nowadays, the Transfrontier Park also has a duty to foster the economic and social welfare of the local communities. Hence, the objectives of this research are to:

1) Establish the direction and magnitude of the impact that access to land and resources, as provided for under the Kgalagadi land restitution agreement, has had on the livelihoods of the Khomani San and conservation in the KTP.

2) Investigate the value that the Khomani San assign to modern conservation in a broad landscape comprising the KTP and the communities' farms.

[4] Communal and municipal land importance is not limited to its indigenous biodiversity; this is where the local communities live, harvests resources, and undertakes game and livestock farming (Norton, 2000). It is for this reason that communal and municipal lands can make a significant contribution to conservation of biodiversity (Kaval et al., 2007).

University of Cape Town

3) Estimate optimal park conservation fees for the KTP consistent with community and parks' agency objectives.

4) Identify and give a value to the ecosystem services found on the land belonging to the Khomani San inside and outside the KTP.

1.6. Proposed structure

This first chapter has established the nature of the study, provided a background to the study and study information, introduced the research issues and outlined the objectives of the thesis. The research issues shall be dealt with in four chapters. Chapter 2 is an attempt to test whether a positive correlation assumption between land restitution and poverty reduction among the beneficiaries (Khomani San people) holds in the Kgalagadi area in South Africa.

Chapter 3 investigates whether local communities get sufficient rewards from conservation and may therefore be expected to be good environmental stewards. Determination of economic values for biodiversity will assist to establish the best policy instruments for such stewardship.

Chapter 4 discusses the pricing of nature-based tourism in the KTP. The issue here is the pricing of tourist services, and conservation/entrance fees are used as a proxy for pricing of these services at national parks.

Chapter 5 puts a value on individual attributes of dryland ecosystems. The value of particular attributes can be used as a starting point in price negotiations between demanders and suppliers of the service. Without external beneficiaries, the value computed can be added to the value of resource extraction to derive a full natural income measure. Finally, chapter 6 presents the conclusion and policy recommendations from the four chapters.

University of Cape Town

References

Abila, R., Diafas, I., Guthiga, P., Hatfield, R., 2005. Economic valuation and environmental assessment, in Mburu, J. (Eds.), Training Manuel., Paper presented at ZEF/IUCN Workshop.

Barnard, A., 1992. *Hunters and Herders of Southern Africa: A Comparative Ethnography of the Khoisan Peoples*. New York; Cambridge: Cambridge University Press.

Blanchflower, D.G., Oswald, A.J., 1998. What Makes an Entrepreneur? *Journal of Labour Economics 16(1)*: 26-60.

Bosch, D., 2002. Land conflict management in South Africa: lessons learned from a land rights approach. http://www.fao.org/html/. (3 March 2009).

Bosch, D., Hirschfeld, E., 2002. *The !Ae!Hai Heritage Park bundle - including the agreement whereby the land claims of the Khomani San community and the Mier community are finalized and associated documents*. Pretoria, Commission on the Restitution of Land Rights.

Chennells, R., 2002. The Khomani San Land Claim. http://www.cpsu.org.uk/downloads/. (3 March 2009).

Chennells, R., 2001. Case Study 9 – South Africa: The Khomani San of South Africa. http://www.forestpeoples.org/documents/africa/s_africa_eng.pdf/. (Accessed March 3, 2009).

Cock, J., Koch, E., (eds). 1991. *Going Green: People, Politics and the Environment in South Africa* Oxford: Oxford University Press. Chapter 15.

Cooper, J.J., Fleming, G.J., Malungani, T.P., Misselhorn, A.A., 2004. Ecosystem Services in Southern Africa: A Regional Assessment, in: Scholes, R.J., Biggs, R. (Eds), A contribution to the Millennium Ecosystem Assessment. Council for Scientific and Industrial Research, Pretoria.

Crawhall, N., 2001. *Written in the Sand: Cultural Resources Auditing and Management with Displaced Indigenous People*. Cape Town, The South African San Institute (SASI) and UNESCO.

DEAT (Department of Environmental Affairs and Tourism)., 2008. Environmental management. http://www.info.gov.za/aboutsa/environment.htm. (21 February 2010).

University of Cape Town

Geingos, V., Brormann, M. San, Land Rights and Development: Can San survive without land. Paper submitted at, Indigenous Rights in the Commonwealth Project Africa Regional Expert Meeting, Working Group of Indigenous Minorities in Southern Africa (WIMSA), Cape Town, South Africa, October 2002.

Hansen, A.J., DeFries, R., 2007, Ecological mechanisms linking protected areas to surrounding lands. *Ecological Applications 17*: 974–988.

Hoff, K., 1996. Market Failures and the Distribution of Wealth: A perspective from the Economics of Information. *Politics and Society 24 (4)*: 411 - 432.

Hogan, C.M., 2008. "Makgadikgadi" at Burnham, A. (editor) *The Megalithic Portal.*

Kalahari Peoples Fund., 2009. The San Peoples. http://www.kalaharipeoples.org/Download1.html. (19 February 2009).

Kaval, P., Yao, R., Parminter, T., 2007. The Value of Native Biodiversity Enhancement in New Zealand: A Case Study of the Greater Wellington Area. Working Paper in Economics 7/22. Hamilton: University of Waikato, Department of Economics.

Kepe, T., 2008. Land Claims and Comanagement of Protected Areas in South Africa: Exploring the Challenges. *Environmental Management 41*: 311-321.

Kruger Park Times., 2009. So what exactly is SANPark's mandate and how does a national park differ from a special or national nature reserve. http://www.krugertimes.com/. (23 June 2009).

Lee, R. B., 1976. *Kalahari Hunter-Gatherers: Studies of the !Kung San and Their Neighbors,* Richard B. Lee and Irven DeVore, eds. Cambridge: Harvard University Press.

Lee, R. B., 1979. *The !Kung San: Men, Women, and Work in a Foraging Society.* Cambridge: Cambridge University Press.

Lee, C., Han, S., 2002. Estimating the use and preservation values of national parks' tourism resources using a contingent valuation method. *Tourism Management 23*: 531–540.

Mtyala, Q., 2008. History of Cape Town and its People: Khoi San? http://www.capetownmagazine.com/. (9 February 2009).

Norton, D.A., 2000. Conservation biology and private land: shifting the focus. *Conservation Biology 14*: 1221-1223.

Reyes, C.M., 2002. Impact of Agrarian Reform on Poverty. Discussion Paper Series No. 2002-02. Philippine Institute for Development Studies.

University of Cape Town

SANParks., 2006. Developing a system for sustainable resource use by the Khomani San in Kgalagadi Transfrontier Park and environs: potential project themes. South African National Parks.

SANParks., 2012. Where is the Kgalagadi Transfrontier Park. http://www.sanparks.org/conservation/transfrontier/kgalagadi.php. (16 January 2012).

Seymour, C., 2001. Kgalagadi xeric savanna. Report of WildWorld, World Wildlife. Peer review in process.

Swatuk, L.A., 2006. Peace Parks in Southern Africa. http://wilsoncenter.org/events/docs/swatuk.pdf. (25 March 2009).

Thomas, E.M., 1958, 1989. *The Harmless People.*

Thomas, E.M., 2006. *The Old Way: A Story of the First People.*

UNESCHR (Nations Economic and Social Council on Human Rights)., *Report of the Special Rapporteur on the situation of human rights and fundamental freedoms of indigenous people, Rodolfo Stavenhagen*, December 2005.

van der Walt, J.L., 2006. Collective Entrepreneurship As A Means For Sustainable Community Development: A Cooperative Case Study In South Africa. Paper prepared for the twenty second Cooperative Research Conference Paris, France. *Potchefstroom Business School, North-West University.*

Wells, S., 2003. The Journey of Man: A Genetic Odyssey. New Jersey, Princeton University Press.

Zanzibar Tribal Art., 2008. Ostrich Shell Jewellery. http://www.zanzibartribalart.com/ostrictshell.htm. (30 March 2010).

University of Cape Town

Chapter 2: The effect of the land restitution on poverty reduction among the Khomani San "bushmen" in South Africa

Abstract

This paper looks at the impact of land restitution involving the Khomani San "bushmen" in the Kgalagadi area of South Africa. It seeks to test whether there is a positive correlation between land restitution and poverty reduction among the beneficiaries. We run instrumental variable probit models on poverty and access to nature. Our results suggest that using restituted land by the claimants' has no positive effect on poverty alleviation. However, a positive link with greater access to nature is established. Therefore, land restitution should become part of a broader, carefully crafted rural developmental strategy for it to be effective. Otherwise land restitution risks enabling indigenous communities to continue with their "traditional" way of life and, in fact, keep them poor.

Keywords: access to nature, instrumental variable, Khomani San, land restitution, poverty.

University of Cape Town

Note: *An extract of this chapter has been submitted to the ERSA (Economics Research Southern Africa) Working Paper Series.*

2.1. Introduction

Land is a key instrument with which to empower and disempower people for a wide variety of reasons. For example, during apartheid in South Africa, land was used to disempower black people to achieve racial discrimination. No wonder why the country's first democratic election, which took place in 1994, carried with it the obligation to address the injustices of the past. The key injustice that the new government sought to tackle was land dispossession of blacks by the apartheid regime. This was to be addressed through a land reform programme comprising of land restitution, land redistribution and land tenure.[5]

According to Deininger and Binswanger (1999) these kinds of initiatives are pursued globally mainly because of inequality in land distribution. Justification for land reform is based on the assumption that there is a strong and positive correlation between access to land and welfare-generating potential for beneficiaries (Finan et al., 2005). The conventional measures of a household's economic well-being are money income and wealth, both of which reflect the financial resources available to the household. An alternative measure, reflecting the current standard of living prevailing in a household, is the household's food and services consumption expenditure (Jones et al., 2010).

Poverty is one of the main challenges faced by the South African government. The national poverty rate stood at 54% while the rural poverty rate stood at 77% in 2010 (Leibbrandt et al., 2010). Poverty is associated with both monetary and non-monetary dimensions. However, most poverty studies mainly focus on the monetary dimensions of well-being, income and consumption; hence, the literature on non-monetary measures is limited. The assessment of both measures of poverty is required to ensure that there is a wider understanding and acceptance of findings, and most importantly that poverty analyses resonate with social norms in areas where physical environmental resource dependence is high.

A vast literature dealing with land reform shows that land is a source of income (see Grootaert et al., 1997; Gunning et al., 2000; Scott, 2000). Among a wide variety of policies discussed to reduce poverty, there is a growing body of literature that strongly recommends

[5] Land restitution seeks to restore land ownership or compensate those forced off land prior to 1994; land redistribution, of mainly agricultural land, seeks to redress the discriminatory policies by providing the disadvantaged and poor with access to land; while land tenure reform, seeks to secure tenure for all South Africans, especially the more vulnerable, such as farm labourer tenants (Department of Land Affairs, 1997).

University of Cape Town

improved access to land for the rural poor (Carter, 2003; Deininger, 2003; de Janvry et al., 2001). Empirically, this can be seen in the increasing number of land reform programmes that have taken place in numerous countries around the world (de Janvry, 1981), and particularly in Africa.

This paper looks at the land reform programme in South Africa particularly the land restitution component. The land restitution programme in South Africa attempts to restore land rights lost after the 19th of June in 1913. According to Roux (2006), the 19th June 1913 cut-off date was agreed upon as it was the date when the Native Land Act, which allowed for systematic land dispossession by the apartheid state, was promulgated.[6] This particular Act ratified the colonial land grab of the previous two and a half centuries by dividing South Africa's land surface into racial areas.[7] The official explanation of the cut-off date was that the absence of adequate written documentation prior to 1913 and allowing the process to reach further back could potentially result in conflicting ethnic claims on the part of dispossessed tribes.[8]

A re-assurance was made that land redistribution, instead of land restitution, would be used to address the needs of those whose land claims were constrained by the cut-off date. The structure of the land restitution process was influenced by the international context in which the transition to democracy took place, during a time when socialism in Eastern Europe collapsed and the ascendancy of neo-liberal approaches to economic development. This, combined with the relative strength of the main negotiating parties, resulted in the land

University of Cape Town

[6] "The Native Land Act of 1913 apportioned 8% of the land area of South Africa as reserves for the Africans and excluded them from the rest of the country, which was made available to the white minority population. Land available for use by Africans was increased by 5% in 1936 bringing the total to 13% of the total area of South Africa, although much of the land remained in the ownership of the state through the South African Development Trust supposedly held in trust for the African people. Thus 80% of the population was confined to 13% of the land while less than 20% owned over 80% of the land. Black people were prohibited from buying land in areas outside the reserves. This apportionment of land remained until the end of apartheid in early 1990s and remains virtually unchanged" (Rugege, 2004).

[7] The cut-off date therefore prohibited claim of land lost after the main period of the colonial conquest was already over. This compromise was acceptable to the main negotiating parties, the National Party and the African National Congress (ANC). The compromise was acceptable to the National Party because it insulated most of the white minority group's ownership from the restitution process. On the part of the ANC, this was acceptable because it promised to stabilise the property rights order during the democracy period in the interest of the market-driven development, the economic model that was then beginning to be popular in the ANC's policy-making structures (Roux, 2006).

[8] This explanation is relevant to our specific study area as the Khomani San not only lost their land in the Kgalagadi area to colonial powers but also to other ethnic groups, including the Mier community (another community in the area).

restitution programme in South Africa being legally and conceptually subordinated to the protection of the private property rights (Roux, 2006).

According to the restitution legislation, the government has an option to award the successful claimants either alternative land or cash compensation in a case where it is not possible to award them their ancestral land. Most urban claims were settled financially. The Land Claims Commission is of the view that although this solves immediate survival problems, it ultimately widens the poverty gap in the long term hence the Commission's preference to restore or provide the land (Land Claims Commission, 2008).

The specific focus of this paper is on land restitution and its impact on poverty alleviation in the Kgalagadi area of South Africa. In this area, the Kruiper family -- a part of the Khomani San community in the area -- lodged a land claim with the Commission for the Restitution of Land Rights in 1995. The declaration of the claim as valid in 1996 was a catalyst for the complicated negotiations process that followed (Crawhall, 2001).[9] The Khomani San was initially thought to comprise of 50 adults of one ethnic origin (i.e. the Kruiper family) (Crawhall, 2001). However, further community research and outreach during negotiations with the Department of Land Affairs in 1998 led to the original claimants agreeing to allow for the claimants group to be expanded. They agreed to form a Communal Property Association (CPA) and it had 297 registered members[10] at the time the first agreement was concluded (SANParks, 2006).[11]

The first agreement saw the Khomani San being awarded 40 000 hectares on six farms adjacent to the Kgalagadi Transfrontier Park in 1999 (SANParks, 2006). The second agreement saw the Khomani San being granted 28 000 hectares of land inside the Kgalagadi Transfrontier Park and special user rights on another part of the park in May 2002

[9] The lodging of the land claim by the Khomani San led to many other communities in the country following suit. In fact, the Khomani San's land claim overlapped with that of the Mier community (Crawhall, 2001) who historically had occupied the Khomani San's land but eventually evicted by the colonial government to pave way for the creation of the current Kgalagadi Transfrontier Park.

[10] However, according to the Department of Land Affairs, about 320 households are registered as beneficiaries of the Khomani San land claim.

[11] An overlapping land claim was made by the Mier community just before the settlement of the Khomani San claim thereby re-opening the negotiations. Therefore, mediation later brought together three negotiating parties, namely the Khomani San, the Mier and the park agency, SANParks. The land claim was subsequently divided into two parts.

University of Cape Town

(SANParks, 2006).[12] The area in which the Khomani San got special user rights was symbolic as it was where their ancestors had practiced a nomadic way of life. SANParks was tasked with co-managing the acquired land inside the park on behalf of the local communities as contractual parks.

We contemplate that land restitution can potentially increase average household income, improve income distribution, consumption levels and result in more access to natural resources, and as a result reduce poverty and inequality. It is on this basis that land restitution is expected to contribute towards relieving rural poverty and in promoting broad-based sustainable development. This paper addresses the question of what has been the impact of the use of restituted land awarded to the Khomani San on poverty alleviation in the Kgalagadi area. This is done by using survey data collected from 200 Khomani San households in the Kgalagadi area. Instrumental variable probit models are estimated to investigate the impact of use of restituted land on "being poor" and "having access to nature". The approach adopted in this paper gives a broader view of the contribution of land restitution on the welfare indicators considered relevant to the local communities in South Africa.

Although some studies (see Lahiff, 2007; Lovo, 2011) have been carried out on how land reform/restitution affects the livelihoods of the beneficiaries, to the best of our knowledge no such study has been carried out with regard to the so-called "vulnerable indigenous communities" in South Africa. Thus, this study is the first study of its kind undertaken on the Khomani San in South Africa, which suggests that this study could potentially fill an important research gap.

This paper is organized into five sections. Section 2 briefly reviews literature on land reform. Section 3 presents the methodology used in the study while Section 4 presents the results and discussion. Section 5 concludes the paper.

[12] Under this agreement, the Mier community also got awarded 30 000 hectares of land inside Kgalagadi Transfrontier Park. The Mier community subsequently gave the Khomani San two farms adjacent to the park as a goodwill gesture for crowding out some land which the Khomani San might have won in the absence of their land claim.

University of Cape Town

2.2. Literature Review

There is a wide variety of reasons as to why countries embark on land reform programmes. These reasons range from augmenting productivity and lessening poverty to preventing social turmoil and allaying political pressure from peasants (Deininger and Binswanger, 1999).

The land reform programme is deemed a success if it increases the beneficiaries' income, consumption and wealth (Binswanger and Elgin, 1992). According to Deininger and van den Brick (2000) despite many land reform programmes being implemented in a manner that reduced their potential impact on equity and efficiency, there is growing evidence worldwide that redistributive land reforms have assisted in reducing poverty and increasing efficiency, and that it will lead to sustainable growth.

According to Aghion et al. (1999), Bardhan et al. (1999) and Piketty (1999), economic theory shows that there is a positive correlation between once-off redistribution of assets and permanent higher growth levels, under imperfect markets conditions. This is in contrast to earlier developmental models predictions by Lewis (1954), Kaldor (1955) and Kuznets (1956).

According to the World Development Report (2006), the history of land reforms has been mixed with some partial successes and failures. The prospects for land and resource rights restoration to indigenous people are positive in some parts of the world. For example, countries like Australia, Canada and New Zealand are making remarkable progress in this regard (Hitchcock et al., 2003). Elsewhere, empirical evidence and theoretical reasoning suggests that a land reform programme may provide equity and efficiency benefits (Binswanger et al., 1995). Empirical studies in different countries have identified a positive link between access to land and income (Jayne, et al., 2002; Carter and May, 1999; Bouis and Haddad, 1990).

India is a vital case study of land reform due to being home to a significant proportion of the poor in the third world (Thorner, 1976). A study in India found that land reforms had an impact on growth, rural poverty reduction and other aspects of the rural economy. Land reform was found to push up agricultural wages; this is an additional mechanism through

University of Cape Town

which these reforms can reduce poverty (Besley and Burgess, 1998), as well as some major improvements on productivity in the Indian state of West Bengal (Banerjee et al., 1998).

The Philippines land redistribution programme indicates that there are significant benefits for beneficiaries which include higher gains in productivity and incomes and propensity to invest in physical and human capital. Specifically, The land reform beneficiaries in the Philippines shows that they had invested more in their children's education than non-beneficiaries and that they increased their assets at about three times the levels of non-beneficiaries (Deininger et al., 1999).

In Brazil land redistribution has private intermediaries who carry a real credit risk, greater involvement of civil society which ensures that the programme is not driven by landlords, as well as a stronger focus on capacity building at community level, seems adequate to ensure that the programme will be sustainable in the long term. The assessment of the land reform programme in Brazil found that it was economically viable and had a scope of increasing the beneficiaries' income by up to five times (Buainain et al., 1998).

A consensus reached about land reform in Japan, Korea and Taiwan was that it significantly contributed to overcoming the legacy of colonial development (King, 1977). In these countries, land reform led to improvements in productivity and set the stage for an impressive rise in non-agricultural development (Jeon and Kim, 2000).

Most known successful cases such as the examples mentioned above used the land reform as part of a much wider economic change, particularly rapid urbanisation and industrialization – creating a sustainable demand for labour and commodities (Lahiff, 2007). Many developing countries have considered land reform as a tool of increasing agricultural production and alleviating poverty in rural areas. In addition, policy makers often expect that improved conditions in rural areas will stem the large number of immigrants into urban slums. However, empirical evidence with regard to land reform reveals that the impact of land redistribution in rural areas is highly variable (see Habib, 1989 for a detailed overview of case studies) (Moene, 1992). Justification for land reform programmes are based on the assumption that land has a strong welfare generating potential for beneficiaries. Yet, land reform programmes have often met with limited success in alleviating poverty, and a number

University of Cape Town

of recent studies have called into question the importance of land as a poverty-reducing tool (López and Valdés, 2000a).

Land reform initiatives come with key challenges; the programmes are controversial for a wide range of reasons. Some economists argue that the abolition of poverty can only come from development, not from redistribution (Boulding, 1968; Okun, 1975). The argument here is that reform amounts to inefficiency as the very same resources that are scarce are redistributed instead of increasing everyone's wealth. This argument may be true in some third world countries, but not necessarily so in the case of countries such as South Africa given the country's historical background.

Some argue that land tenure reforms in lieu of redistribution land restitution. The counter argument is that land tenure reform makes no significant contribution. The case in favour of redistributive reform is that it is not based on the existence of defective tenure agreements (contracts) but rather on the concentration of land ownership rights and the inefficiency, inequality and principle of land restitution is thus a redistribution of property rights in productive land (Adhikari and Bjørndal, 2009).

Some land reforms in Latin America failed to meet their objectives, hence they remain incomplete in many respects (de Janvry and Sadoulet, 1989). One of the main reasons for their minimal impact was that reforms were often motivated by short-term political considerations. Moreover, "agrarian" emphasis on full-time farming increased their cost while reducing the number of potential beneficiaries and the reforms' impact on poverty (Deininger, 2003).

Although there is little doubt that land is a source of income (see Scott, 2000; Gunning et al., 2000; Grootaert et al., 1997; Carter and May, 1999), in many studies, this positive correlation actually translates into marginal income gains for the range of land endowments provided by land reform programmes (Finan et al., 2005). For example, McCulloch and Baulch (2000) simulated the effects of a policy giving two hectares of land to households in rural Pakistan with less than this amount to find that it has virtually no impact on income poverty.

University of Cape Town

A study by López and Valdés (2000b) and their co-authors found in previous studies for eight Latin American countries that the income generating potential of land is also quite marginal. For instance, their estimates of income to land elasticities imply that landholdings in rural areas of Colombia would have to quadruple in order for the poorest 40% of farm households to reach just the poverty line. This led them to recommend looking into approaches other than access to land in order to attack rural poverty.

In Southern Africa (SADC), some land reform have been driven by political considerations and based on untested assumptions about the positive correlation between land reform and poverty reduction. A land reform based on this possible misconception can potentially result in more poverty than was the case before (Chimhowu, 2006). For example, Zimbabwe's "fast track" land reform programme led to adverse consequences to the beneficiaries and the economy as a whole.

This study attempts to test whether there is a positive correlation between the land restitution and poverty reduction among the active beneficiaries in the Kgalagadi area of South Africa. Indeed, greater access to land in South Africa has the potential to increase household resources. As a result, it has the potential to contribute directly and indirectly towards poverty alleviation efforts and addressing South Africa's heavily skewed distribution of income. Of course, the extent to which greater access to land impacts poverty alleviation is dependent on a variety of factors which includes post-settlement support, institutional arrangements and capacity building. In a poor rural economy like the Kgalagadi, this implies improving the terms on which the poor have access to land.

University of Cape Town

2.3. Methodology

2.3.1. Programme background and assessment

Even though about 320 households are registered as beneficiaries of the Khomani San land claim, only less than half of them actually use the restituted land. By awarding land, it was hoped that this would be a catalyst for economic development. We reckon that the effect of the Khomani San land restitution on welfare can crudely be measured by comparing the levels of welfare between those who use restituted land and those who do not. Of course, we realise that this is only a crude measure as a proper evaluation of the effect of land restitution on welfare would require that the split between people who make use of restituted land and

those who do not was purely random. A number of methods can help discern the required impact under the current situation. For example, the propensity score matching method would be an option. However, such a method requires a large sample which our circumstances cannot raise given the small pool of registered beneficiaries. Furthermore, we suspect that the problem with our circumstances is not about lack of randomness in the decision to use restituted land but rather about the simultaneity between use of restituted land and welfare. Thus, we reason that use of restituted land affects welfare but, in turn, welfare affects whether or not one uses restituted land. Therefore, the method that we prefer is instrumental variable (IV) regression.[13] The basic empirical model is:

$$Y = \beta_0 + \beta_1 T_i + x'_i y + \varepsilon_i \qquad \textbf{(2.1)}$$

where *Y* represents a welfare measure (i.e. per capita income or per capita consumption or access to nature), *T* is an endogenous variable (i.e. use of restituted land), *x* are exogenous regressors (i.e. socioeconomic variables that are expected to impact on household welfare).

A question of whether or not to include too many rather than few variables may arise during a case of uncertainty of the right specification. One of the possible reasons why over-parameterized models should be avoided is that although the inclusion of non-significant variables does not necessarily bias the estimates, it has the potential to increase their variance (Bryson et al., 2002). Heckman et al. (1997a); Dehejia, and Wahba (1999) show evidence that omission of vital variables can lead to an increase in the bias of the resulting estimates. Thus, only variables that influence the outcome variable should be included.

On the other hand, it is highly recommended that 'trimming' models in the name of parsimony should be avoided. It is argued that a variable should only be excluded from the analysis if there is an agreement that, that particular variable is either not linked to the outcome or not a proper covariate. In a case of any doubt concerning these two points, it is

[13] Although IV techniques are commonly applied to estimate systems of simultaneous equations and to counteract bias from measurement error, there is an ever-increasing number of studies for application to omitted variables bias in estimates of causal relationships. Studies of this nature are mainly concerned with estimating a narrowly defined causal relationship, such as the effect of schooling or training on income, or impact of smoking on health. An IV allows for the estimation of the coefficient of interest consistently and free from asymptotic bias from omitted variables, without actually having the data on the omitted variables (Angrist and Krueger, 2001).

University of Cape Town

explicitly advised that the variable in question should be included in the estimation (Rubin and Thomas, 1996). The arguments raised so far suggest that the choice of variables should be based on economic theory and previous empirical findings in addition to some formal statistical tests.

Only the variables that are unaffected by participation or the anticipation of it should be the ones to be included in the model. This can be achieved if one ensures that variables are either fixed over time or measured before participation. Heckman et al. (1998b) emphases this point by stressing that the data for participants and non-participants should stem from the same source such as the use of the same questionnaire. Some randomness is required to ensure that the individuals with identical characteristics can be observed in both states.

The socioeconomic variables expected to influence welfare include gender, age, education, marital status and employment status of the household head. Additional controls suitable for our study area include having migrants in the household, having food deficits, easy access to potable water, involvement in livestock farming, access to electricity and ownership of household goods. Given that South Africa is a welfare state, we also control for the presence of both child support and old-age pension grants.

An appropriate instrumental variable z for use of restituted land is one that directly influences use of restituted land but not the welfare measure except indirectly through its impact on use of restituted land (Maddala, 1997).

University of Cape Town

2.3.2. Empirical strategy

The main objective of this study is to provide empirical evidence of the effects of land restitution on the welfare of those who use restituted land. The land endowment is captured by a dummy variable which takes the value 1 when a household uses restituted land. Our approach is similar to that of Lovo (2011). The IV probit models are applied to estimate the impact of use of restituted land on "being poor" and "having access to nature".

Since a household decision to "use restituted land" is likely endogenous, we use proximity of the household's dwelling to the Kgalagadi Transfrontier Park as an instrument. The instrument seems appropriate because it is correlated with use of restituted land but not with

welfare variables. Those living closer to the park are naturally closer to the restituted land which is adjacent to it. The restituted land consists of 40 000 hectares on six farms and is 60 km away from Kgalagadi Transfrontier Park. Our sample is restricted to the Khomani San spread in an area of 1 000km. Given that the Khomani San are in the same political or economic zone with low population density, proximity to the Kgalagadi Transfrontier Park is not expected to have large effects on welfare measures other than through use of restituted land.

2.3.3. Data

According to the department of Land Affairs estimates, about 320 households are registered as beneficiaries of the Khomani San land claim. However, only 120 households were using the restituted land at the time of the survey. We conducted a face-to-face survey in the Kgalagadi area with 100 Khomani San households who used restituted land and another 100 households who did not. However, the total sample of 200 households comes from the 320 registered beneficiaries of the Khomani San land claim. Thus, we restricted the sample to the Khomani San who could plausibly have taken up the offer to use restituted land. The survey was conducted between March and April 2011. The collected data included detailed information on household income,[14] consumption expenditure,[15] access to nature,[16] housing services, farming activities, land-use and migration patterns.

2.3.4. Descriptive statistics

Table 2.1 provides an overview of the descriptive statistics of the main variables of interest.

University of Cape Town

[14] The challenge with income is that households at times do not reveal their true income. In a predominantly rural economy such as in the Kgalagadi area, much of the income comes from agriculture and informal activities such as selling of firewood and crafts. Therefore, determining actual household income may be complex. Moreover, income is vulnerable to shocks and is potentially volatile. Nonetheless, income is seen as a potential welfare measure.

[15] Consumption expenditure is considered a more reliable estimate of well-being as it better reflects a household's long-term welfare even though it actually measures a household's welfare in terms of meeting the current basic necessities. Thus, household food consumption can be deemed as realised welfare (Finan et al., 2005). In the context of third world countries, particularly in rural areas, food consumption expenditure rather than income is preferred in poverty studies (Deaton, 1997).

[16] Collection of medicinal plants, firewood, wild fruits; hunting; and accessing ancestral sites within the restituted land is used as a proxy for access to nature.

Table 2.1: Descriptive statistics of variables used in the analysis

	Khomani San - with Access to Land (n=100)		**Khomani San – No Access to Land (n=100)**	
Household size	4.85	(2.42)	4.03	(1.64)
Age of household head	52.26	(15.32)	51.28	(15.15)
Male headed households (%)	80	(0.40)	59	(0.49)
Married household heads (%)	61	(0.49)	67	(0.47)
Years of education of household head	3.84	(4.04)	4.48	(4.81)
Years staying at current residence	8.28	(5.94)	12.69	(16.69)
Households where members have migrated (%)	36	(0.48)	21.21	(0.41)
Migrants who send remittances (%)	51.85	(50.92)	90	(30.78)
Employed household heads (%)	29	(0.46)	36.36	(0.48)
Social Grants (Rands/Per Month)	1002.57	(609.61)	1391.63	(1302.89)
Monthly Total Household Income (Rands)	3678.76	(9282.25)	3783.71	(4691.74)
Frequency Adult goes to Bed without Food (%)	20	(0.40)	11	(0.31)
Monthly Food expenditure (Rands)	761.60	(416.98)	747.86	(517)
Brick Structures (%)	44	(0.50)	34	(0.48)
Households with electricity (%)	22	(0.42)	49	(0.50)
Households with livestock (%)	56	(0.50)	11	(0.31)
Households that collect firewood (%)	90	(0.30)	47.47	(0.50)
Households that collect wild fruits/bush food (%)	33	(0.47)	10.10	(0.30)
Households that hunt (%)	23	(0.42)	8	(0.27)
Households that use medicinal plants (%)	79	(0.41)	21	(0.41)
Households selling crafts (%)	32	(0.47)	6	(0.24)
Number of poor people % – (Poverty line R515 per capita per month)[17]	67	(47.26)	36	(48.24)

Note: Any monetary KTPs shown in Table 2.1 are in South African Rands, 2011 prices. Standard deviations are reported in the parentheses.

It can be seen from a comparison of those who are using the land with those who are not, that the former group has a slightly higher average family size, are older, have a lower level of education and greater incidence of male heads. Given that those living in the acquired land only moved after the first stage of the land claim were agreed in 1999, it came as no surprise that they had lived in their current residence for a significantly shorter period relative to those

[17] We created a poverty dummy variable showing whether a household is poor or not. The income threshold for poverty was obtained from Leibbrandt et al., (2010).

University of Cape Town

who live in other areas. Those with access to the land have a higher number of migrants per household. Interestingly, about 86% of household's members without access to the land who migrated sent some money back to their households on a monthly basis compared to 39% who did so among the group using the land.

The methods of generating income between those using the land and the control group are similar. Interestingly, both Khomani San subgroups are much closer in terms of total household income despite the control group having substantially higher monthly wages. The treatment group have a higher unemployment rate, and receive less both in self-employment and social grants. However, they make substantially more income from livestock farming and selling crafts. Half of the employed land beneficiaries using the land were employed 'full-time', while the other half is part time workers.

Around 17 percent of Khomani San households using land indicated that they are self-employed. Of those who are self-employed, an overwhelming majority (71%) are selling crafts. Only 12% of the self-employed said that they are selling firewood.[18] The only source of firewood 'Camel thorn tree' is considered an endangered tree, hence harvesting for commercial purposes is prohibited. This is perhaps the reason for the reluctance of many households to declare their involvement. Given the nature of self-employment in this area, it generally does not lead to any job creation, as family members tend to assist. A majority of this group (74%) are receiving government grants, mainly old-age and child support grants.

In contrast, an overwhelming majority of 87% of the control group are employed 'full-time'. Despite the lower unemployment rate, this group seem to take longer to find a job. Similarly, they have a higher number of households (80%) that are receiving government grants.

The differences in food consumption expenditure levels between the two-subgroups are negligible. Both sub-groups purchased their food in their respective areas. About 14% of those using the land indicated that they are sometimes forced to sell their household possessions to generate income. In contrast, none of the other group's households indicated that they ever found themselves in that situation.

[18] We expected this number to have been significantly higher than the reported figure.

University of Cape Town

Those with access to land are more likely to live in a house or brick structure, as these structures are common in private farms that they ended up owning as part of the land restitution programme. However, in terms of basic infrastructure, they are lagging behind with regard to among other things; refuse collection and access to electricity. Therefore those who are not using restituted generally live in a better environment, as they are more likely to have access to electricity and toilets. Having access to electricity suggests that on average the control group have better quality household durable goods that use electricity than their treatment group counterparts. Access to electricity enables the latter subgroup to benefit from the 'free 50Kwh' that the government gives every month to each South African household. The former subgroup cannot benefit from such government services due to not having electricity.

The Khomani San households who are not using restituted land are less equipped for livestock farming, as they do not have more land available. This is reflected by the 11% involvement in livestock farming by this group. Approximately 25% of the households using the restituted land and have livestock indicated that they sold some of their livestock 12 months prior to the period that we collected the data. In contrast, almost all the farmers not using restituted land (92%) involved in livestock farming sold their livestock during the same period. This further demonstrates that if implemented appropriately and targeting the individuals that are likely to use the land, the land restitution programme can contribute to poverty reduction. However, given that those living on the restituted land represent a minority of the Khomani San population as a whole, suggests that there are distributional problems involved – skewed distribution of income.

A comparison of the income poverty between the San using restituted land and those not using the land reveal that the former group's poverty rates are significantly higher than the latter group's poverty rates.

In terms of access to nature, the group living on restituted land have a higher wellbeing in most categories. There have much more access to natural resources as there now live on the restituted land, with the exception of firewood collection, which seems to be a common activity in South Africa particularly in rural and poorer households. The greater access to resources by those with access to restituted land is mainly as a result of using the land.

University of Cape Town

A significant number of those using restituted land have residential houses located in Andriesvale (31 percent), which is not surprising given that this particular farm was set aside specifically for housing development. Distance from Andriesvale (which is 60 km from the Kgalagadi Transfrontier Park) is used as a proxy for distance from the Khomani San restituted land because of its central location, and the fact that it was earmarked for community development. The distance from restituted land shows that Khomani San using the land are on average 15.91 km from Andriesvale.

The difference in income-generating activities and food consumption expenditure between those households using restituted land and those who do not are negligible. However, when one looks at access to nature, a different picture emerges; with the beneficiaries using restituted land having greater access.

The differences between the family size, greater incidence of male heads, years staying at current residence, number of migrants per household, migrants who send remittances, receiving of social grants, access to electricity, livestock farming, selling crafts, poverty rates and access to nature (firewood, wild plants, hunting, medicinal plants) are statistically significant. These differences were validated by t-tests.

2.4. Results and discussion

We start by estimating an OLS model on use of restituted land (i.e. binary variable) on proximity to the Kgalagadi Transfrontier Park. A point to note is that the land dummy shows whether one uses restituted land or not. The results from this model are reported in Table 2.2.

University of Cape Town

Table 2.2: Ordinary Least Squares estimates of the effect of proximity to Kgalagadi Transfrontier Park on use of restituted land[19]

OLS Model	
Dependent Variable: Use of restituted land	
Proxity to Kgalagadi Transfrontier Park	-0.005*** (-78.13)
Cons	1.344*** (79.10)
Sample size	200
Adjusted R^2/ Pseudo R^2	0.956

t statistics in parentheses

legend: * p<0.1; ** p<0.05; *** p<0.01

The negative coefficient of the proximity to the park implies that proximity to the Kgalagadi Transfrontier Park is negatively correlated with whether a household uses restituted land or not. This means that those households' located further away from the park tend not to use restituted land. The significance of the whole regression means that proximity to the park is a good instrument for use of restituted land.

In Table 2.3, we run a regression of the poverty dummy variable on explanatory variables that we believe influence whether a household is poor or not in our context. The explanatory variables in this study are similar to those in many studies of this nature. The variables in question include age, gender, household-size, education, infrastructure as well as regional variables. However, the regional variables are different as the study area is unique, with unique physical attributes as well as the people concerned. The findings from this study, together with the one analysing resource use in livelihoods (by Thondhlana et al., 2012) will make it possible to compare the effect of the land restitution along historical lines and along spatial lines.

The regression also includes the predicted values of the land dummy in Table 2.2 above. In running the current regression we use the probit model. Thus we are effectively running an

[19] Proximity to the Kgalagadi Transfrontier Park is correlated with "use of restituted land" but not with "being poor", hence we only use one instrument.

University of Cape Town

instrumental variable probit model. We also run a similar regression but using "having access to nature" as a dependent variable.

Table 2.3: IV Probit estimates of the determinants of poverty and access to nature

Dependent Variable:	*Poverty Dummy - Model 1*	*Access to Nature – Model 2*
Marital status (1=Married)	0.843*** (2.93)	-0.058 (-0.22)
Household size	0.317*** (4.80)	0.113 (1.83)
Age of HH Head	-0.030*** (-3.23)	0.006 (0.74)
Whether HH Head is Male	-0.742** (-2.54)	0.053 (0.19)
Education attainment of HH Head	-0.054 (-1.67)	-0.009 (-0.32)
Migration by any member	0.191 (0.78)	-0.256 (-0.98)
Wage Income	-0.396 (-1.62)	0.322 (1.35)
Receive government grant	-0.425 (-1.39)	0.269 (0.92)
Go without food	0.229 (0.75)	0.245 (0.80)
Sell household possessions	0.164 (0.36)	-0.315 (-0.66)
Fetch-water (portable water)	0.277 (0.95)	-0.012 (-0.04)
Livestock production	-0.433 (-1.54)	0.727** (2.52)
Access to electricity	-0.516 (-1.91)	-0.640**(-2.34)
Own household goods	-0.924** (-2.55)	-0.771**(-2.03)
Use of restituted land	**1.268*** (3.48)**	**1.281***(3.41)**
Cons	1.066 (1.32)	-0.429 (-0.52)
Sample size	198	198
Pseudo	0.358	0.320

Note: Absolute value of t-statistics in parentheses.

legend: * p<0.1; ** p<0.05; *** p<0.01

University of Cape Town

The results show that use of restituted land has a statistically significant effect on poverty and access to nature. However, use of restituted land does not reduce poverty even though it increases access to nature. Therefore, the land restitution involving the Khomani San has only achieved one of its objectives i.e. providing them with access to nature. There is a need for the land restitution to do more on the developmental side in order to reduce poverty among the Khomani San. Greater involvement of the Khomani San in conservation in the Kgalagadi Transfrontier Park could be the panacea. However, there needs to be an assessment of whether the Khomani San can be good environmental stewards and what mechanisms could be implemented to help reduce their poverty.

We observe that household characteristics such as marital status, age of household head, gender of household head, household size and ownership of household goods greatly impact towards the poverty level of a household.

The coefficient for marital status is positive, implying that those who are married are most likely to be poor. This result is logical given that married couples share resources, which has an effect of lowering the per capita income when one party has no income. A similar explanation holds for household size. Poverty levels are lower for households who reported owning assets.

Government grants are not significant in determining the poverty level despite most household's indication that they received some sort of grant. In addition, education is not a significant determinant of poverty levels. This may be due to the general low education levels in the study area. An overwhelming majority of the respondents in this area spent just over 4 years in school, on average.

Households headed by females are most likely to be poor. The Kgalagadi environment is harsh and it is not surprising that there is a negative relationship between female heads and poverty levels as there are certain things that women are physically unable to perform, such as tracking and hunting. Households with younger heads tend to be poor. Involvement in livestock production seems to have positive effects on access to nature only. The result that having access to electricity is a determinant of access to nature is surprising, as there is not much collection activities that we know of that involve having access to electricity that can possibly be linked to access to nature.

University of Cape Town

2.5. Conclusion

This study attempts to test whether there is a positive correlation between land restitution and poverty reduction among the Khomani San active beneficiaries in the Kgalagadi area of South Africa. We run instrumental variable probit models of "being poor" and "having access to nature" using proximity to the Kgalagadi Transfrontier Park as an instrument. Our results suggest that using restituted land by the claimants' has no positive effect on poverty

alleviation. However, a positive link with greater access to nature is established.[20] The policy implication of the results from this study is that land restitution should become part of a broader, carefully crafted rural developmental strategy for it to be effective. Otherwise land restitution risks enabling indigenous communities to continue with their "traditional" way of life and, in fact, keep them poor.

References

Adhikari, C. B., Bjørndal, T., 2009. Can Land Reform Be An Effective Approach to Alleviate Poverty and Inequality in Nepal? Working Paper No. 30/09. Bergen: Institute for Research in Economics and Business Administration.

Aghion, P., Caroli, E., Garcia-Penalosa, C., 1999. Inequality and Economic Growth: The Perspective of the New Growth Theories. *Journal of Economic Literature 37*: 1615-1660.

Angrist, J.D., Krueger, A.B., 2001. Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments. *The Journal of Economic Perspectives 15 (4)*: 69-85.

Banerjee, A., Gentler, P., Ghatak, M., 1998. Empowerment and Efficiency: The Economics of Agrarian Reform, mimeo, Department of Economics, MIT.

Bardhan, P., Bowles, B., Gintis, H., 1999. Wealth Constraints and Economic Performance. In Handbook on Income Distribution (A, Atkinson., and Bourguignon, F., Eds).

Besley, T., Burgess, R., 1998. Land Reform, Poverty Reduction, and Growth: Evidence from India. London. London School of Economics STICERD Discussion Paper No DEDPS 13.

Binswanger, H.P., Deininger, K., Feder, G., 1995. Power, Distortions, Revolt and Reform in Agricultural Land Relations. In: J. Behrman and T. N. Srinivasan (Eds.), *Handbook of Development Economics*, Volume III, Elsevier, Amsterdam.

Binswanger, H.P., Elgin, M., 1992. What are the Prospects for Land Reform? In Eicher and Staatz (eds). Agricultural Development in third World (2nd ed). London: 342 – 344.

[20] The importance of access to nature to indigenous people is corroborated by the findings of a study by Dikgang and Muchapondwa (2012) that suggests that most Khomani San households are significantly willing-to-pay (WTP) for biodiversity which reflects their value for biodiversity conservation, implying that most households would gain significantly from conservation on their 'restituted land'.

University of Cape Town

Bouis, H., Haddad, L., 1990. Effects of Agricultural Commercialisation on Land Tenure, Household Resource Allocation, and Nutrition in Philippines. International Food Policy Research Institute, Washington DC.

Boulding, E. K., 1968. Beyond Economics: Essays on Society, Religion, and Ethics. The University of Michigan Press, Ann Arbor.

Bryson, A., Dorsett, R., Purdon, S., 2002. The use of propensity score matching in the evaluation of labour market policies. Working Paper No. 4, Department for Work and Pensions.

Buainain, A. M., Da Silveira, J.M., Souza, H.M., Magalhaes, M.M., Community-based Land Reform Implementation in Brazil: A new way of Reaching Out to the Marginalized? Paper Presented at the GDN Launch Workshop Bonn, 1998.

Carter, M.R., 2003. Designing Land and Property Rights Reform for Poverty Alleviation and Food Security. Land Reform, Land Settlement and Cooperatives, FAO, Rome.

Carter, M., May, J., 1999. Poverty, Livelihood and Class in Rural South Africa. *World Development 27*: 1-20.

Chimhowu, A.O., 2006. Tinkering on the Fringes? Redistributive Land Reforms and Chronic Poverty in Southern Africa. Working Paper 58. University of Manchester: Chronic Poverty Research Centre.

Crawhall, N., 2001. *Written in the Sand: Cultural Resources Auditing and Management with Displaced Indigenous People*. Cape Town, The South African San Institute (SASI) and UNESCO.

Deaton, A., 1997. The Analysis of Household Surveys: A Microeconometric Approach to Development Policy. The Johns Hopkins University Press, Baltimore.

Dehejia, R.H., Wahba, S., 1999. Causal effects in nonexperimental studies: reevaluating the evaluation of training programs. *Journal of the American Statistical Association 94(448)*: 1053–1062.

Deininger, K., 2003. Land policies for growth and poverty reduction, World Bank Policy Research Report series. World Bank, New York.

Deininger, K., Binswanger, H.P., 1999. The Evolution of the World Bank's Land Policy: Principles, Experience, and Future Challenges. *World Bank Research Observer 14 (2)*: 247 - 76.

University of Cape Town

Deininger, K., van den Brick, R., How land reform can contribute to economic growth and poverty reduction: Empirical evidence from international and Zimbabwean experience. World Bank; Hans Hoogeven (Free University, Amsterdam): and Sam Moyo, SARIPS, April 26, 2000.

de Janvry, A., 1981. *The Agrarian Question and Reformism in Latin America*. Baltimore: The Johns Hopkins University Press.

de Janvry, A., Cordillo, G., Platteau, J., Sadoulets, E., 2001. Access to Land, Rural Poverty, and Public Action. Oxford University Press, Oxford.

de Janvry, A., Sadoulet, E., 1989. "A Study in Resistance to Institutional Change: The Lost Game of Latin American Land Reform." *World Development* 17 (9): 1397-407.

Department of Land Affairs., 1997. White paper on South African land policy. http://www.polity.org.za/polity/govdocs/white_papers/landwp.html (07 February 2013).

Dikgang, J., Muchapondwa, E., 2012. The valuation of biodiversity conservation by the South African Khomani San "bushmen" community. *Ecological Economics 84: 7 – 14*.

Hitchcock, R. K., Biesele, M., Lee, R.B., The San of Southern Africa: A Status Report, 2003.

Finan, F., Sadoulet, E., de Janvry, A., 2005. Measuring the Poverty Reduction Potential of Land in Rural Mexico. *Journal of Development Economics 77*: 27-51.

Grootaert, C., Ravi, K., Gi-taik, O., 1997. The Dynamic of Welfare Gains and Losses: An African Case Study. *Journal of Development Studies 33 (5)*: 635–57.

Gunning, J.W., Hoddinott, J., Kinsey, B., Owens, T., 2000. Revisiting Forever Gained: Income Dynamics in the Resettlement Areas of Zimbabwe, 1983-96." *Journal of Development Studies 36 (6)*: 131–54.

Habib, A., 1989. Land Reforms and Their Effects. Case Studies, Centre for Applied Research. Working Paper No. 44. Department of Economics, University of Oslo.

Heckman, J., Ichimura, H., Todd, P., 1997a. Matching as an econometric evaluation estimator: evidence from evaluating a job training programme. *Review of Economic Studies 64(4)*: 605–654.

Heckman, J., Ichimura, H., Todd, P., 1998b Matching as an econometric evaluation estimator. *Review of Economic Studies 65(2)*: 261–294.

Jayne, T.S., Yamano, T., Weber, T., Tschirley, M.T., Benfica, D., Chapoto, R., Zulu, A., Neven, B.D., 2002. Small Holder Income and Land Distribution in Africa: Implications for Poverty Reduction Strategies. MSU International Development.

University of Cape Town

Jeon, Y.D., Kim, Y.Y., 2000. Land Reform, Income Redistribution, and Agricultural Production in Korea. *Economic Development and Cultural Change 48 (2)*: 253-68.

Jones, C.A., Milkove, D., Paszkiewics, L., 2010. Farm Household Well-Being: Comparing Consumption- and Income-Based Measures. Economic Research Report No 91. United States Department of Agriculture.

Kaldor, N., 1955. Alternative Theories of Distribution. *Review of Economic Studies 23(2)*:94-100.

King, R., 1977. Land Reform: A World Survey. G. Bell and Sons: London.

Kuznets, S., 1956. Economic Growth and Income Inequality. *American Economic Review 45(1)*:1-28.

Lahiff, E., 2007. Redistributive Land Reform and Poverty Reduction in South Africa. Working Paper for the Research Project on 'Livelihoods after Land Reform'. Programme for Land and Agrarian Studies, University of the Western Cape.

Land Claims Commission., 2008. Land claims in South Africa. http://www.krugerrealestate.co.za/landclaims. (1 June 2009).

Leibbrandt, M., Finn, A., Argent, J., Woolard, I., 2010. Changes in Income Poverty over the Post-Apartheid Period: An Analysis Based on Data from the 1993 Project for Statistics on Living Standards and Development and the 2008 Base Wave of the National Income Dynamics Study. *Journal of Studies in Economics & Econometrics* 34(3): 25 - 43.

Lewis, A.W., 1954. Economic Development with Unlimited Supplies of Labour. Manchester School of Economics and Social Studies 22(2):139-191.

López, R., Valdés, A., 2000a. "Fighting Rural Poverty in Latin America: New Evidence of the Effects of Education, Demographics, and Access to Land". *Economic and Development and Cultural Change 49(1)*: 197-211.

López, R., Valdés, A., Eds. 2000b. *Rural Poverty in Latin America*. New York: St. Martin's Press.

Lovo, S., 2011. Analysing the welfare-improving potential of land in the former homelands of South Africa. Unpublished manuscript. Department of Economics, University of Sussex. UK.

Maddala, G.S., 1977. *Econometrics.* New York: McGraw-Hill.

University of Cape Town

McCulloch, N., Baulch, B., 2000. Simulating the impact of policy upon chronic and transitory poverty in rural Pakistan. *Journal of Development Studies 36 (6)*: 100–130.Moene, K.O., 1992. Poverty and Landownership. *The American Economic Review 82 (1)*: 52-64.

Okun, A.M., 1975. Equality and Efficiency: The Big Trade-off. Brookings Institution, Washington DC.

Piketty, T., 1999. Theories of Persistent Inequality and Intergeneration Mobility, Chapter 6 of Handbook on Income Distribution (A, Atkinson., and F, Bourguignon, Eds).

Roux, T., 2006. Land Restitution and Reconciliation in South Africa. Cambridge: Cambridge UP.

Rubin, D.B., Thomas, N., 1996. Matching using estimated propensity scores: relating theory to practice. *Biometrics 52(1)*: 249–264.

Rugege, S., 2004. Land Reform in South Africa: An overview. 32 Int'l J. Legal Info. 283.

SANParks., 2006. Developing a system for sustainable resource use by the Khomani San in Kgalagadi Transfrontier Park and environs: potential project themes. South African National Parks.

Scott, C.D., 2000. Mixed Fortunes: A Study of Poverty Mobility among Small Farm Households in Chile, 1968-86. *Journal of Development Studies 36 (6)*: 155 – 80.

Thondhlana, G., Vedeld, P., Shackleton, S., 2012. Natural resource use, income and dependence among San and Mier communities bordering Kgalagadi Transfrontier Park, southern Kalahari, South Africa. *International Journal of Sustainable Development & World Ecology 19 (5)*: 460 – 470.

Thorner, D., 1976. Agrarian Prospect in India. New Delhi: Allied Publishers.

World Development Report., 2006. Equity and Development. Washington DC: The World Bank

University of Cape Town

Appendix: Living standards and development questionnaire

(A) NAME OF PERSON ADMINISTERING QUESTIONNAIRE (NOT RESPONDENT): _____

(B) DATE INTERVIEW CONDUCTED: _____

(C) LOCATION INTERVIEW CONDUCTED: _____

RESPONDENT DETAILS:

FULL NAME	
COMMUNITY	
SETTLEMENT/VILLAGE/TOWN/CITY	
TELEPHONE NUMBER	
PREFERRED LANGUAGE AT HOME	

SECTION A: HOUSEHOLD ROSTER

INTERVIEWER READ OUT: *WE WOULD LIKE TO START BY ASKING YOU QUESTIONS ABOUT THE PEOPLE WHO ARE PART OF YOUR HOUSEHOLD.*

1. HOW MANY PEOPLE ARE IN YOUR HOUSEHOLD _____?

INTERVIEWER: READ OUT THE MEMBERSHIP CRITERIA BEFORE PROCEEDING.

MEMBER	**HH HEAD**	**1**	**2**	**3**	**4**	**5**	**6**
1.1 NAME OF HOUSEHOLD MEMBER							
1.2 RELATIONSHIP TO HH (SEE LIST)							
1.3 WAS THE HOUSEHOLD HEAD BORN IN THIS VILLAGE [1=YES & 2=NO]							
1.4 IF **'NO':** HOW LONG HAS THE HOUSEHOLD HEAD LIVED IN THE VILLAGE							
1.5 WHERE DID HE/SHE COME FROM							
1.6 WHAT IS ____ MARITAL STATUS? (SEE LIST)							
1.7 WHO TAKES AND MAKES THE DECISION IN YOUR HOUSEHOLD							
1.8 IF THE HEAD OF THE HOUSEHOLD IS AWAY, WHO MAKES MOST OF THE DOMESTIC DECISIONS (SEE LIST)							
1.9 DATE OF BIRTH							
1.10 GENDER (MALE = 1; FEMALE = 2)							
1.11 QUALIFICATIONS (SEE LIST)							

University of Cape Town

MEMBERSHIP CRITERIA

YOU ARE A HOUSEHOLD MEMBER IF:

(i) YOU HAVE LIVED UNDER THIS "ROOF" OR WITHIN THE SAME COMPOUND/HOMESTEAD/STAND **AT LEAST 15 DAYS** DURING THE LAST 12 MONTHS OR YOU ARRIVED HERE IN THE LAST 15 DAYS AND THIS IS NOW YOUR USUAL RESIDENCE,

(ii) WHEN YOU ARE TOGETHER YOU SHARE FOOD FROM A COMMON SOURCE WITH OTHER HOUSEHOLD MEMBERS,

(iii) YOU CONTRIBUTE TO OR SHARE IN A COMMON RESOURCE POOL.

2. IF THE CHILDREN ARE NOT ATTENDING SCHOOL, WHAT ARE THE REASONS FOR NOT ATTENDING?

.....

SECTION B: MIGRATION

1. HAVE ANY MEMBERS OF THIS HOUSEHOLD LEFT THE AREA FOR OVER A MONTH **IN THE PAST YEAR**? .....

YES / NO

IF 'NO': GO TO SECTION C

NAME OF MIGRANT DESTINATION TIME INTERVAL (MONTHS) ACTIVITY / MOTIVATION AND DURATION SPENT AWAY

.....

2. IS THE MIGRANT EXPECTED TO SEND HOME FOOD OR MONEY (REMITTANCES) OR CAN HE USE ALL HIS EARNINGS FOR PERSONAL EXPENSES?

.....

3. IF YES, SPECIFY THE AMOUNT OR LIST THE ITEMS THAT THEY NORMALLY SEND HOME INCLUDING THEIR VALUES IF YOU CAN?

.....

SECTION C: HEALTH

1. DOES ANY MEMBER OF THE HOUSEHOLD HAVE ANY ILLNESS OR DISABILITY.....?

2. IF YES, WHAT ILLNESS OR DISABILITY.....

University of Cape Town

3. WHAT ARE THE FIVE MOST COMMON DISEASES IN YOUR HOUSEHOLD?

HEALTH PROBLEM	**CODE**	**TICK**
HEART RELATED DISEASES	1	
MISUSE OF ALCOHOL	2	
HIGH BLOOD PRESSURE	3	
MALARIA	4	
TB	5	
DRUG ABUSE	6	
DIARRHOEA	7	
MALNUTRITION	8	
SEXUALLY TRANSMITTED DISEASE	9	
SIGHT IMPAIRMENT	10	
HIV	11	
AIDS	12	
MENTAL DISABILITY	13	
CHRONIC RESPIRATORY (ASTHMA, BRONCHITIS)	14	
OTHER	15	

SPECIFY OTHER: _____

4. HAS ANY MEMBER OF THIS HOUSEHOLD, WHO USUALLY LIVED HERE FOR AT LEAST FOUR NIGHTS A WEEK, DIED IN THE LAST 12 MONTHS _____?(**IF NOT, SKIP TO SECTION D**).

MEMBER	**HH HEAD**	**1**	**2**	**3**	**4**	**5**	**6**
NAME OF THE DECEASED HOUSEHOLD MEMBER – STARTING WITH THE MOST RECENT DEATH							
RELATIONSHIP TO HH (SEE LIST IN SECTION A)							
WHAT WAS THE GENDER (MALE = 1; FEMALE = 2)							
DATE OF DEATH							
WHAT WAS THE AGE WHEN THEY DIED							
WHAT CAUSED THE DEATH (1=NATURAL, 2=ACCIDENT & 3=VIOLENCE)							

University of Cape Town

SECTION D: INCOME AND EMPLOYMENT STATUS

1. PLEASE SUPPLY THE FOLLOWING GENERAL INFORMATION ABOUT THE EMPLOYMENT /UNEMPLOYMENT AND INCOME GENERATION OF YOUR HOUSEHOLD MEMBERS.

MEMBER	**HH HEAD**	**1**	**2**	**3**	**4**	**5**	**6**
A. EMPLOYMENT STATUS **(1=EMPLOYED, 2=SELF EMPLOYED & 3=UNEMPLOYED) SKIP TO *B* IF UNEMPLOYED; *C* IF SELF EMPLOYED AND/OR EMPLOYED**							
IF YES, STATE THE NATURE OF THE JOB							
NAME OF EMPLOYER							
IS THE JOB FULL TIME OR PART TIME (1=FULL TIME & 2=PART TIME)							
IF EMPLOYED, PLEASE INDICATE **INCOME PER MONTH:** WAGES/SALARIES (**TAKE HOME PAY) (R)**							
HOW DID YOU GET THE JOB (SEE LIST)							
B.IF UNEMPLOYED INDICATED HOW LONG YOU HAVE BEEN UNEMPLOYED (YRS)?							
REASON FOR NOT WORKING							
WOULD YOU ACCEPT A JOB OFFER IF IT WAS OFFERED (1=YES OR 0=NO)							
MINIMUM WAGE REQUIRED TO TAKE A JOB **PER MONTH (R)**							
C. MONTHLY INCOME FROM SELF EMPLOYMENT (R)							
NATURE OF THE SELF EMPLOYMENT ACTIVITY							
DO YOU EMPLOY ANY OTHER PEOPLE (1= YES & 2=NO)							
IF YES, HOW MANY OTHER PEOPLE DO YOU EMPLOY							

University of Cape Town

2. PLEASE INDICATE (A) WHETHER THE HOUSEHOLD MEMBER HAS BEEN SEEKING EMPLOYMENT IN THE LAST 30 DAYS. (B)PLEASE INDICATE THE MAIN REASON FOR NOT LOOKING FOR WORK FOR ALL MEMBERS OF THE HOUSEHOLD.

MEMBER OF HH	(A)		STUDENT OR TOO YOUNG	TOO OLD	FAMILY DUTIES	SEASONAL WORK	NO WORK AVAILABLE	ILL HEALTH	OTHER PLEASE SPECIFY
	YES	NO							
HEAD OF HH									
1									
2									
3									
4									
5									
6									

3. PLEASE INDICATE WHETHER YOU OR ANY MEMBER OF YOUR HOUSEHOLD:

	YES	NO	APPROXIMATE TOTAL AMOUNT PER MONTH
RECEIVES A DISABILITY GRANT			
RECEIVES AN OLD AGE GRANT			
RECEIVES A PENSION			
RECEIVES A CHILD GRANT			
RECEIVES ANY OTHER GRANT (NOT MENTIONED ABOVE)			
RECEIVES INTEREST ON AN INVESTMENT			
OTHER INCOME SOURCE (SUCH AS POSING FOR PHOTOS - SPECIFY BELOW)			

SECTION E: HOUSEHOLD CONSUMPTION

1. WHERE DO YOU DO YOUR SHOPPING FOR FOOD, CLOTHING, AND OTHER GOODS _____? (EXAMPLE: COMMUNITY SHOP/SPAZA, STREET VENDOR, DEPARTMENTAL STORE, MEAT MARKET OR VEGETABLE MARKET)

CODES FOR QUESTION 2 & 3; (1=NEVER, 2=SELDOM, 3=SOMETIMES, 4= OFTEN, 5=ALWAYS & 0=NOT APPLICABLE)

2. IN THE PAST 12 MONTHS, HOW OFTEN DID ANY ADULT IN THIS HOUSEHOLD GO TO BED HUNGRY BECAUSE THERE WAS'NT ENOUGH FOOD_____?

University of Cape Town

3. HOW MUCH MONEY DOES YOUR HOUSEHOLD SPEND ON AVERAGE PER MONTH ON EACH OF THE FOLLOWING CONSUMABLE ITEMS? ENTER 0 IF NONE. (B) WHERE DO YOU USUALLY BUY THESE ITEMS, IN YOUR OWN TOWN OR IN ANOTHER TOWN?

PRODUCT	**RAND PER MONTH**	**IN YOUR TOWN** ✓	**OUTSIDE/ OTHER TOWNS** ✓
MAIZE MEAL			
BREAD			
MEAT / CHICKEN			
VEGETABLES			
MILK			
WILD MEAT			
CLEANING MATERIALS (SOAP & WASHING POWDER)			
CIGARETTES, TOBACCO, HOMEMADE BEER, BEER & SPIRITS			
OTHER			

4a) LIST THE FOOD ITEMS THAT YOU CONSIDER BASIC FOR SURVIVAL

.....

4b). WHAT IS THE COST OF A NUTRITIONAL BASKET CONSIDERED MINIMAL FOR THE HEALTHY SURVIVAL OF THIS HOUSEHOLD?.....

5. ON AVERAGE, HOW MUCH MONEY (AMOUNT IN RAND) DOES YOUR HOUSEHOLD SPEND PER MONTH ON EACH OF THE FOLLOWING? ENTER 0 IF NONE. INDICATE WHETHER YOU SPEND THE MONEY INSIDE YOUR AREA OR IN AREA TOWN(S)?

ITEM	**RAND PER MONTH**	**IN YOUR AREA**	**OUTSIDE / OTHER AREAS**
WATER			
CLOTHING			
SCHOOL			
MEDICAL EXPENSES			
LICENCES (E.G. TV, VEHICLE)			
TELEPHONE			
CELL PHONE			
FURNITURE			
OTHER: SPECIFY			

6· WHICH TYPES OF EXPENDITURE HAVE INCREASED MOST SHARPLY OVER TIME?
.....

7. ARE YOU SOMETIMES FORCED TO SELL POSSESSIONS BECAUSE YOU NEED THE CASH? ..... YES / NO.....

University of Cape Town

8a) LIST THE NON-FOOD ITEMS THAT YOU CONSIDER BASIC FOR SURVIVAL

.....

.....

8b. WHAT IS THE COST FOR NON-FOOD NEEDS CONSIDERED MINIMAL FOR THE HEALTHY SURVIVAL OF THIS HOUSEHOLD.....

SECTION F: HOUSEHOLD SERVICES

INTERVIEWER READ OUT: WE WOULD NOW LIKE TO ASK YOU QUESTIONS ABOUT YOUR DWELLING, YOUR ACCESS TO SERVICES AND YOUR HOUSEHOLDS' INCOME.

1. HOUSING

1. TYPE OF DWELLING?

HOUSE OR BRICK STRUCTURE ON SEPARATE STAND	
TRADITIONAL DWELLING/HUT/STRUCTURE MADE OF TRADITIONAL MATERIALS	
TOWN/CLUSTER/SEMI-DETACHED	
HOUSE IN BACK YARD	
INFORMAL DWELLING/SHACK IN BACK YARD	
INFORMAL DWELLING/SHACK NOT IN BACK YARD	
ROOM NOT IN BACK YARD BUT ON SHARED PROPERTY	
CARAVAN OR TENT	
OTHER (SPECIFY)	

2. WHAT ARE THE MAIN MATERIALS USED FOR THE ROOF, WALL AND FLOOR?

	2(A)ROOF	2(B)WALLS	2(C)FLOOR COVERING
BRICKS			
CEMENT BLOCKS			
GRASS			
CORRUGATED IRON			
WOOD			
PLASTIC			
CARDBOARD			
MIXTURE OF MUD AND CEMENT			
WATTLE AND DAUB			
TILE			
CARPET			
MUD			
THATCHING			
OTHER (SPECIFY)			

3. HOW MANY BEDROOMS DOES THE DWELLING HAVE?----------

4. IS THIS HOME OWNED, RENTED OR OCCUPIED FREE? ----------

5. (IF OWNED) WHO IN THE HOUSEHOLD ACTUALLY OWNS THE PROPERTY?

.....

6. WHEN DID--------BECOME THE OWNER OF THE PROPERTY? (ENTER YEAR)----------

University of Cape Town

7. DID THIS HOUSEHOLD OBTAIN A PLOT OR LAND FOR RESIDENCE OR FARMING THROUGH THE LAND RESTITUTION PROCESS?

OR

DID THIS HOUSEHOLD RECEIVE A GOVERNMENT-HOUSING SUBSIDY TO OBTAIN THIS DWELLING ANY OTHER DWELLING?

OR

DID THIS HOUSEHOLD RECEIVE A GOVERNMENT LAND GRANT TO OBTAIN A PLOT OF LAND FOR RESIDENCE OR FOR FARMING?

2. WATER

IN THIS SECTION, WE ARE GOING TO TALK ABOUT WATER USED BY THIS HOUSEHOLD FOR DRINKING, COOKING, BATHING, OR WASHING CLOTHES AND OTHER HOUSEHOLD PURPOSES LIKE THESE.

1. DOES THE WATER USED FOR DRINKING COME FROM THE SAME SOURCE AS THE WATER USED FOR OTHER PURPOSES LIKE BATHING OR WASHING CLOTHES?

MOSTLY YES .....
SOMETIMES .....
MOSTLY NO .....

2. WHAT IS THE SOURCE OF WATER USED MOST OFTEN IN THIS HOUSEHOLD FOR THINGS LIKE DRINKING OR BATHING AND WASHING CLOTHES?

PIPED - YARD TAP .....
PIPED- TAP
COMMUNAL .....
BOREHOLE ON SITE .....
WATER-CARRIER/TANKER .....
OTHER (SPECIFY) .....

3. DOES THE HOUSEHOLD HAVE TO FETCH AND CARRY WATER TO THE HOUSE EACH DAY AND HOW FAR IS THE WATER SOURCE FROM THE DWELLING?

YES .....
NO .....

3. SANITATION

1. WHAT KIND OF TOILET DOES THE HOUSEHOLD USE?

FLUSH-TOILET .....
TRADITIONAL OR
VENTILATED PIT
LATRINE .....
NONE .....

University of Cape Town

2. WHERE IS THE TOILET?

INSIDE DWELLING

OUTSIDE DWELLING – ON SAND

OUTSIDE DWELLING – OFF SAND

4. ENERGY

IN THIS SECTION, WE ARE GOING TO TALK ABOUT THE DIFFERENT KINDS OF ENERGY THAT THIS HOUSEHOLD USES FOR DIFFERENT PURPOSES.

1. IS THIS HOUSE CONNECTED TO AN ELECTRICAL SUPPLY?

YES

NO

ENERGY

2. WHICH OF THE FOLLOWING DOES THE HOUSEHOLD USE AS ITS PRIMARY ENERGY FOR COOKING, LIGHTING AND HEATING?

	COOKING	HEATING	LIGHTING	AVERAGE COST PER MONTH
ELECTRICITY				
PARAFFIN				
GAS				
WOOD				
COAL/CHARCOAL				
CANDLES				
OTHER (SPECIFY)				

5. HOUSEHOLD DURABLES

1. DOES YOUR HOUSEHOLD OWN_____?

	CIRCLE APPROPRIATE CHOICE	**VALUE OF HOUSEHOLD POSSESSIONS (RANDS)**
BICYCLES		
RADIO		
ELECTRIC STOVE		
GAS STOVE		
PRIMUS STOVE		
FRIDGE		
TV		
GEYSER		
ELECTRIC KETTLE		
TELEPHONE:LANDLINE		
:CELLPHONE		
COMPUTERS		
MOTOR VEHICLE IN A RUNNING CONDITION		
DONKEY CART		
FURNITURE (BED, CHAIRS AND TABLES)		
SOLAR PANEL		
OTHER		
NONE OF THE ABOVE		

University of Cape Town

SECTION G: INFRASTRUCTURE

1. PLEASE INDICATE WHETHER THE FOLLOWING FACILITIES ARE AVAILABLE IN YOUR COMMUNITY?

SERVICES AND FACILITIES	HOW MANY [ ] SERVE THIS COMMUNITY (WRITE 5 WHEN 5 OR MORE)	HOW FAR IS THE NEAREST [..]? (KM) (DISTANCE FROM CENTER OF COMMUNITY)
CLINIC/MOBILE CLINIC/ HEALTH POST/HOSPITAL		
POLICE STATION		
POST OFFICE		
DAILY PERMANENT MARKET		
PERIODIC MARKET		
PUBLIC PHONES		
CELL PHONE SIGNAL		
RADIO AND TV SIGNAL		
SCHOOL		
CRAFT SHOP		
TOURISM ATTRACTION		
STREET LIGHT		

2. WHAT IS THE DISTANCE TO THE NEAREST MAIN ROAD USED FOR TRANSPORT TO NEARBY TOWNS, CITIES, AND BUSINESS DISTRICTS? (THIS INCLUDES A HIKING SPOT IF PUBLIC TRANSPORT IS NOT AVAILABLE) _____ KM.

3. IS THERE PUBLIC TRANSPORT IN YOUR AREA _____?

4. IS YOUR REFUSE OR RUBBISH REMOVED AT LEAST ONCE A WEEK BY LOCAL AUTHORITIES_____?

5. IF NOT, HOW DO YOU DISPOSE YOUR WASTE?.....

SECTION H: AGRICULTURE

INTERVIEWER READ OUT:

WE WOULD LIKE TO ASK SOME QUESTIONS ABOUT AGRICULTURAL PRODUCTION BY YOUR HOUSEHOLD IN THE LAST 12 MONTHS. THE QUESTIONS ARE ABOUT ANY ANIMALS THAT YOU HAVE KEPT OR TAKEN CARE OF ON LAND YOU HOUSEHOLD HAS ACCESS TO.

GENERAL

1. PLEASE INDICATE WHETHER YOU OR ANY OTHER MEMBER OF YOUR HOUSEHOLD HAS PARTICIPATED IN ANY OF THE FOLLOWING ACTIVITIES: **(IF NO, SKIP TO 4)**

	YES	NO
GROWING FOOD OTHER THAN AS PART OF PAID EMPLOYMENT		
ARE THESE AGRICULTURAL ACTIVITIES ALL PART OF A COMMERCIAL FARMING		

INTERVIEWER READ OUT: *NOW WE WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT EVERYTHING THIS HOUSEHOLD GREW IN THE LAST 12 MONTHS EVEN IF YOU DID NOT SELL ANY OF IT. THIS INCLUDES THINGS YOU GREW IN YOUR GARDEN.*

University of Cape Town

2. PRODUCTION OF LIVESTOCK

TYPE OF ANIMAL	IF YES, INDICATE THE NUMBER	HOW MANY [..] DID THE HOUSE-HOLD SELL?	WHAT IS THE TOTAL AMOUNT YOU GOT FROM SELLING	HOW MANY DID THE HOUSEHOLD SLAUGHTER OR USE FOR OWN OR CONSUMPTION?
CATTLE				
SHEEP				
GOATS				
CHICKENS				
PIGS				
HORSES				
DONKEYS				
OTHER				

3. ARE THERE ANY PROBLEM REGARDING LIVESTOCK PRODUCTION? ***YES [ ] NO [ ]***

IF Y, FILL OUT TABLE

PROBLEMS	**TICK**	**POSSIBLE SOLUTION**
1. LACK OF WATER		
2. DISEASES/LACK OF DIPPING CHEMICALS		
3. THEFT		
4. LACK OF A RELIABLE MARKET		
5. OTHER SPECIFY:		

A1.MILK

1. HOW MUCH MILK DOES YOUR HOUSEHOLD GET FROM YOUR (COWS) AND (GOATS) PER DAY? IF NONE, MOVE ON TO NEXT

COWS: _____GOATS:_____

A2.SKINS

1. WHAT DOES YOUR HOUSEHOLD DO WITH THE SKINS OF SLAUGHTERED ANIMALS?

LIVESTOCK	**KEEP**	**SELL (RANDS)**	**THROW AWAY**	**CRAFTS**
CATTLE				
GOATS				
SHEEP				
OTHER				

University of Cape Town

2. IF THE SKIN IS KEPT WHAT DO YOU USE IT FOR:_____

LIVESTOCK	**USE(S)**
CATTLE	
GOATS	
SHEEP	
OTHER;	

A3.TRANSPORT

1. DO YOU EVER USE YOUR LIVESTOCK FOR TRANSPORT? *YES [ ] NO [ ] IF NOT, GO TO*

2. FOR WHAT PURPOSES EXPLAIN _____

A4. CEREMONIES/RITUALS

1. DOES YOUR HOUSEHOLD EVER SLAUGHTER CATTLE/GOATS FOR CEREMONIAL OR RITUAL PURPOSES?
YES [ ] NO [ ]

IF YES. HOW OFTEN? CATTLE_____GOATS_____
FOR WHAT CEREMONIES/RITUALS DO YOU DO THIS?
_____

University of Cape Town

SECTION I: NATURAL RESOURCES

A. ACCESS TO LAND

B. NATURAL RESOURCE BASE AND CONSUMPTIVE USE

B1. FIREWOOD

DOES YOUR HOUSEHOLD COLLECT FIREWOOD?		*Y/N*
WHERE? [*UITKOMS; MIERSHOOP PAN; ANDRIESVALE; SCOTTY'S FORT; WITDRAAI; ERIN]*		
HOW MANY TRIPS A WEEK/MONTH DO YOU DO?		
QUANTITIES COLLECTED *(LOCAL MEASURE E.G. FULL WHEEL BURROW; SCOTCH CART ETC)*		
DOES YOUR HOUSEHOLD NOW SPEND MORE OR LESS TIME ON GETTING FIREWOOD THAN YOU DID 5 YEARS AGO? *CODES: M=MORE; S=ABOUT THE SAME; L=LESS*		
IF DECLINED (CODE 'D' ON THE QUESTION ABOVE), HOW HAS THE HOUSEHOLD RESPONDED TO THE DECLINE IN THE AVAILABILITY OF FIREWOOD? *PLEASE RANK THE MOST IMPORTANT RESPONSES, MAX 3.*	RESPONSE	RANK 1-3
	INCREASED COLLECTION TIME (E.G., FROM FURTHER AWAY FROM HOUSE)	
	BUYING (MORE) FUELWOOD AND/OR CHARCOAL	
	BUYING (MORE) COMMERCIAL FUELS (GAS OR ELECTRICITY)	
	REDUCED THE NEED FOR USE OF FUELS, SUCH AS USING IMPROVED STOVE	
	MORE CONSERVATIVE USE OF FUELWOOD FOR COOKING AND HEATING	
	REDUCED NUMBER OF COOKED MEALS	
	INCREASED USE OF NON-WOOD WILD PRODUCTS (E.G. TWIGS)	
	RESTRICTING ACCESS/USE TO OWN RESOURCES	
	10. CONSERVING STANDING TREES FOR FUTURE	
	11.OTHER;SPECIFY	
7. LIST THE NAME OF MOSTLY USED/MOST IMPORTANT SPECIES.	NAME	RANK 1-5

8. WHO IS INVOLVED IN COLLECTION OF FIREWOOD? _____

9. METHOD OF TRANSPORTATION _____

10. ARE THERE ANY RESTRICTIONS ON FIRE WOOD USE? *YES [ ] NO [ ]*

IF YES, EXPLAIN

_____

B2.WILD PLANTS (FOOD)

1.DO YOU COLLECT ANY WILD PLANTS? *YES [ ] NO [ ]*

IF YES, WHERE ? [UITKOMS [ ] MIERSHOOP PAN [ ] ANDRIESVALE [ ] SCOTTY'S FORT [ ] WITDRAAI [ ] ERIN [ ]

2.IF YES, WHO IS INVOLVED IN COLLECTION OF WILD PLANTS? _____

University of Cape Town

3. HOW OFTEN DO YOU GO OUT TO COLLECT FOOD PLANTS?

_____/WEEK _____MONTH OTHER SPECIFY_____

4. IF NOT, WHAT ARE THE REASONS FOR NOT HARVESTING WILD FRUITS?_____

_____

SPECIES MAINLY USED	SEASON/MONTH HARVESTED	USED AT HOME *(QUANTITY)*	SELL *(QUANTITY)*	PRICE
BULB/TUBERS;				
LEAVES;				
SEEDS;				
OTHER;E.G. WILD MELONS				
HOODIA				

5. NAME AND GIVE REASONS FOR MOST IMPORTANT SPECIES

_____

6. ARE ANY SPECIES BECOMING SCARCER? *YES [ ] NO [ ]*

IF YES, NAME THEM AND GIVE REASONS

_____

7. IS THERE SHORTAGE OF PLANTS AT CERTAIN TIMES OF YEAR? *YES [ ] NO [ ]*. IF Y,EXPLAIN,

_____

B3.ANIMAL HUNTED

1. DO YOU HUNT ANY WILD ANIMALS FOR FOOD? YES [ ] NO [ ].

IF Y, WHERE? [UITKOMS [ ] MIERSHOOP PAN [ ] ANDRIESVALE [ ] SCOTTY'S FORT [ ] WITDRAAI [ ] ERIN [ ]

2. IS GAME-MEAT AN IMPORTANT PART OF THE HOUSEHOLD DIET? _____

3. WHO IS INVOLVED IN HUNTING?_____

4. HOW OFTEN DO YOU GO OUT TO HUNT?

_____/WEEK _____MONTH OTHER SPECIFY_____

University of Cape Town

5. IF NOT, WHAT IS THE REASON FOR NOT HUNTING?
_____

SPECIES HUNTED	SEASON/MONTH HUNTED	DOES YOUR HOUSEHOLD CONSUME ALL THE MEAT	SELL *(QUANTITY)*	PRICE
SPRINGBOK				
WILDEBEEST				
ELAND				
GEMSBOK				
SPRING HARES				
GUINEA FOWL				
OTHER				

6. NAME AND GIVE REASONS FOR MOST IMPORTANT SPECIES
_____

7. ARE ANY SPECIES BECOMING SCARCER? *YES [ ] NO [ ]* IF *Y* NAME THEM AND GIVE REASONS
_____

8. ARE THERE ANY ANIMALS THAT ARE NOT HUNTED FOR CULTURAL REASONS?
YES [ ] NO [ ] IF *Y* NAME THEM AND EXPLAIN FURTHER
_____

B4.MEDICINAL PLANTS

1. DOES THIS HOUSEHOLD USE MEDICINAL PLANTS_____?

2. DO YOU COLLECT ANY WILD PLANTS/ANIMALS FOR MEDICINE? *YES [ ] NO [ ]*
IF Y, WHERE ? [UITKOMS [ ] MIERSHOOP PAN [ ] ANDRIESVALE [ ] SCOTTY'S FORT [ ] WITDRAAI [ ] ERIN [ ]

3. WHO IS INVOLVED IN COLLECTION OF PLANTS/ANIMALS?
_____

4. ARE THE PLANTS NEEDED FOR MEDICINAL OR ANY OTHER PURPOSES EASILY ACCESSIBLE IN YOUR AREA?
_____

5. HOW OFTEN DO YOU/THEY/HE GO OUT TO COLLECT?
_____/WEEK _____MONTH OTHER SPECIFY_____

SPECIES COLLECTED/HUNTED	SEASON/MONTH	DO YOU USE ALL AT HOME	SELL	PRICE

6. NAME AND GIVE REASONS FOR MOST IMPORTANT SPECIES
_____

7. ARE ANY SPECIES BECOMING SCARCER? *YES [ ] NO [ ]* IF *Y*, NAME THEM AND GIVE REASONS
_____

University of Cape Town

C. CRAFTS FOR SALE

1. WHAT TYPES OF CRAFT MATERIALS DO YOU MAKE? WHAT RESOURCES DO YOU USE? HOW MUCH ARE CRAFTS SOLD AT?

NAME OF CRAFT PRODUCED	HOW MANY PRODUCED *(PER/WEEK/ MONTH)*	MATERIAL AND PART USED (*PLANT/ANIMAL)*	HOW MANY SOLD *(PER/WEEK/MONTH)*	SELLING PRICE *(R/ITEM)*
BRACELETS				
BEADS				
BOW AND ARROW				
ARTIFACTS FOR HANGING				
OTHER:				

DO YOU BUY ANYTHING TO MAKE YOUR CRAFTS? *YES/ [ ] NO [ ]*

IF *YES*, WHAT AND FOR HOW MUCH? FILL OUT THE TABLE.

MATERIAL BOUGHT	FOR WHAT	COST

4. ARE ANY SPECIES BECOMING SCARCER? *YES/ [ ] NO [ ]*

IF YES, NAME THEM AND GIVE REASONS

_____

5. HOW MUCH TIME DO YOU SPEND ON MAKING THESE ITEMS IN A DAY/WEEK/MONTH _____

6. WHICH PARTICULAR TIME OF THE YEAR DO YOU HAVE MORE SALES? _____

7. ARE THERE ANY PROBLEMS ENCOUNTERED IN THE CRAFTS INDUSTRY? YES [ ] NO [ ]

8. IF *YES*, NAME THEM

_____

9. WHAT CAN BE DONE TO AMELIORATE THE PROBLEMS?

_____

University of Cape Town

D. CULTURAL VALUES OF PLANTS, ANIMALS AND SITES

1. ARE THERE ANY CULTURAL VALUES ASSOCIATED WITH PLANTS AND ANIMALS USE? YES [ ] NO [ ]

IF Y, WHAT PLANTS, ANIMALS AND SITES ARE IMPORTANT TO YOU CULTURALLY

SPECIES (LOCAL NAME)	CULTURAL USE *(PLEASE NAME THE USES) E.G. ACTUAL USE IN RITUALS, SACRED SPECIES. WHY DOES THIS HAVE CULTURAL IMPORTANCE?*	OVERALL RANKING OF PLANTS, ANIMALS, SITES *(1=VERY IMPORTANT; 2= IMPORTANT; 3= SLIGHTLY IMPORTANT; 4=NOT IMPORTANT)*
PLANTS:		
ANIMALS:		
SITES:		

2. ARE THERE ANY ANNUAL SPECIAL CEREMONIES ASSOCIATED WITH PLANTS AND ANIMALS? YES [ ] NO [ ]
IF *YES*, EXPLAIN? _____

3. ARE THERE ANY TRADITIONAL PRACTICES/RULES/TABOOS ASSOCIATED WITH PLANT AND ANIMAL USE? YES [ ] NO [ ]
IF *YES*, IDENTIFY AND EXPLAIN?
_____

4. IS COMPLIANCE WITH TRADITIONAL LAWS AS STRONG IN THESE DAYS AS IT WAS IN THE OLD DAYS? YES [ ] NO [ ]
IF NO, WHY NOT? _____

5. IS THIS KNOWLEDGE RESTRICTED TO A CERTAIN AGE GROUP OR GENDER? YES [ ] NO [ ]
IF YES WHICH?

	FEMALES	MALES
ELDERLY		
ADULTS		
CHILDREN		

7. HOW DO YOU SHARE THE KNOWLEDGE
_____

8 WOULD YOU BE PREPARED TO SPEND MONEY TO PRESERVE YOUR CULTURE AND SPIRITUAL VALUES (TRADITIONAL KNOWLEDGE WITH REGARD TO PLANT USE AND HANDCRAFT MAKING)?

YES ☐ NO ☐

9. IF YOUR ANSWER IS YES, HOW MUCH ARE YOU PREPARED TO PAY TO PRESERVE YOUR CULTURE? (PLEASE SPECIFY YOUR AMOUNT) R.....

University of Cape Town

SECTION J. INSTITUTIONAL ARRANGEMENTS AND POWER RELATIONS

1. ARE YOU OR ANY MEMBER OF YOUR HOUSEHOLD A MEMBER OF ANY ORGANISATION? YES [ ] NO [ ] IF *YES* TICK BOX

LIVESTOCK COMMITTEE	
JMB	
WARD COMMITTEE	
BURIAL SOCIETY	
OTHER	

2. DOES SOMEONE IN YOUR HOUSEHOLD ATTEND THE MEETINGS? *YES [ ] NO [ ]*
IF 'NO', GO TO 5.

3. IF 'YES': WHO NORMALLY ATTENDS THE MEETINGS? ……

4. ARE THERE ANY FORMAL RULES AND REGULATIONS FOR ACCESS TO RESOURCES IN THE FARMS? *YES [ ] NO [ ]*
IF *YES*, EXPLAIN
_____

5. ARE THESE RULES FOLLOWED? *YES [ ] NO [ ]*
IF *YES*, HOW AND BY WHOM?
_____

IF *NO*, WHY NOT?_____

6. DO YOU PARTICIPATE IN ANY? *YES [ ] NO [ ]* IF *Y*, NAME _____

7. IF YOU DON'T PARTICIPATE IN ANY ORGANISATION, WHY

REASON	TICK
NO ORGANISATION EXISTS IN THE VILLAGE	
I'M NEW IN THE VILLAGE	
ORGANISATION MEMBERS GENERALLY BELONG TO A PARTICULAR FAMILY GROUP (S)	
CANNOT AFFORD TO CONTRIBUTE THE TIME	
CANNOT AFFORD TO CONTRIBUTE THE REQUIRED CASH PAYMENT	
MEMBERSHIP WILL RESTRICT MY USE OF THE RESOURCES, AND I WANT TO USE THE RESOURCES AS I NEED	
I DON'T BELIEVE ORGANISATIONS ARE VERY EFFECTIVE IN MANAGING THE NATURAL RESOURCES	
LACK OF NATURAL RESOURCES	
NOT INTERESTED IN THE ACTIVITIES UNDERTAKEN BY ORGANISATIONS	
CORRUPTION IN PREVIOUS ORGANISATIONS	
INTERESTED IN JOINING BUT NEEDS MORE INFORMATION	
ORGANISATIONS EXIST IN VILLAGE, BUT HOUSEHOLD IS UNAWARE OF THEIR PRESENCE	
OTHER, SPECIFY:	

University of Cape Town

8. HAS THE PRESENCE OF THE ABOVE MENTIONED ORGANIZATIONS HAD ANY IMPACT ON THE ACCESSIBILITY OF RESOURCES? *YES [ ] NO* [ ]

IF YES, TO WHAT EXTENT

LARGE NEGATIVE EFFECT [ ] SMALL NEGATIVE EFFECT [ ]NO EFFECT [ ]SMALL POSITIVE [ ]

9. DO YOU SHARE YOUR KNOWLEDGE AND IDEAS OF HOW RESOURCES SHOULD BE MANAGED? *YES [ ] NO [ ]*
IF YES, HOW AND WHY? _____

IF NO, WHY _____

10. DO YOU THINK YOUR VIEWS ARE CONSIDERED BY COMMUNITY REPRESENTATIVES/ ORGANISATIONS?
YES [ ] NO [ ]
IF YES OR NO EXPLAIN?
_____

11. DO YOU THINK THE PARK MANAGEMENT RESPECTS YOUR VIEWS? *YES [ ] NO [ ]*
IF YES OR NO EXPLAIN?
_____

12. WHAT IS YOUR GENERAL COMMENTS/FEELINGS/OPINIONS ABOUT ACCESS TO NATURAL RESOURCES IN THE PARK AND THE SURROUNDS?
_____

University of Cape Town

Chapter 3: The valuation of biodiversity conservation by the South African Khomani San "bushmen" community

Abstract

The restitution of parkland to the Khomani San "bushmen" and Mier "agricultural" communities in May 2002 marked a significant shift in conservation in the Kgalagadi Transfrontier Park and environs in South Africa. Biodiversity conservation will benefit from this land restitution only if the Khomani San, who interact with nature more than do other groups, are good environmental stewards. To assess their attitude toward biodiversity conservation, this study used the contingent valuation method to investigate the values the communities assign to biodiversity conservation under three land tenure arrangements in the Kgalagadi area. For each community and land tenure arrangement, there are winners and losers, but the winners benefit by more than the cost that losers suffer. The net worth for biodiversity conservation under the various land tenure regimes ranged from R928 to R3,456 to R4,160 for municipal land, parkland, and communal land respectively for the Khomani San, compared to R25,600 to R57,600 to R64,000 for municipal land, parkland, and communal land respectively for the Mier. Both communities have the highest preference for the implementation of the biodiversity conservation programme on communal land. There are no significant differences in the WTP between the two communities when adjusted for annual median household income; hence, the Khomani San can be trusted to become good environmental stewards. However, in order for all members of the local communities to support biodiversity conservation unconditionally, mechanisms for fair distribution of the associated costs and benefits should be put in place.

Keywords: biodiversity, contingent valuation, Khomani San, land restitution.

Note: *An extract of this chapter has been published as a journal article (Dikgang, J., Muchapondwa, E., 2012. The valuation of biodiversity conservation by the South African Khomani San "bushmen" community. Ecological Economics 84: 7 – 14).*

University of Cape Town

3.1. Introduction

In South Africa, land degradation is perceived to be positively correlated with distribution of communal rangelands (DEAT, 2010). Many communal lands in four provinces are severely degraded. For example, the main challenge in the Kgalagadi area of the Northern Cape Province is that the current levels of harvesting of medicinal plants, wood collection, grazing, and hunting are highly likely to result in the depletion of the resources. Such a situation is generally bad for the area's conservation because of the inter-linkages between the broader Kgalagadi area and the KTP. Given the intimate connection between the land inside and outside the KTP, conservation of biodiversity needs to be undertaken in the broader Kgalagadi landscape and not just inside the park. The Khomani San "bushmen" are an important stakeholder in this regard.

The KTP, located between Botswana and South Africa, encompasses part of the ancestral site of the Khomani San. As part of South Africa's land restitution programme, the Khomani San community was awarded land inside and outside the KTP in May 2002, together with the adjacent Mier community.[21] SANParks was tasked with co-managing the acquired land inside the park on behalf of the local communities as contractual parks[22].

It is clear from the way land restitution claims within protected areas have been handled so far in South Africa that sustainability and biodiversity conservation are critically important. The government has taken the view that land claims by individuals and groups must be achieved in the national interest by "taking into consideration the intrinsic biodiversity value of the land, and seeking outcomes which will combine the objectives of restitution with the conservation and sustainable use of biodiversity" (Callicott, 1986; De Villiers, 1999; Wynberg and Kepe, 1999; Hall-Martin and Carruthers, 2003). This notion of intrinsic value implies that biodiversity has a value in and of itself.

University of Cape Town

[21] In addition, the Khomani San people were awarded additional and special rights in the remainder of the park because they lost more land in comparison to the Mier communities during the establishment of the Park (Bosch and Hirschfeld, 2002).

[22] A contract park is a protected area developed on land belonging to the government, private individuals, or a community. These parks are co-managed by the park authority in conjunction with the private individuals or communities through a joint management board (JMB). Contractual parks are common in South Africa and Australia (see Reid et al., 2004).

The primary objective of this paper is to investigate the value that the Khomani San assign to modern conservation under various land tenure arrangements and to assess whether they may generally be expected to be good environmental stewards. This is done by determining the economic value assigned by the Khomani San to biodiversity conservation on communal land, municipal land, and park land, in a contingent valuation study of a plant conservation programme in the Kgalagadi.

Another objective of this study is to investigate the factors which influence the values assigned. From a policy point of view, the identification of such factors sheds some light on the type of appropriate compensation incentive schemes that may be suitable for enhancing biodiversity conservation in the landscape in question.

Lastly, the paper seeks to compare the valuation of biodiversity conservation by a typical pristine indigenous[23] community to that of an average South African rural community, the adjacent Mier community. The Mier community (another local community in the area) are traditionally livestock farmers and are a fair reflection of South Africa's rural general population. This paper is important because the Khomani San's attitudes towards modern conservation have not been evaluated until now. Furthermore, there is a dearth of literature comparing the values of environmental resources between indigenous people and the general population. Based on the economics of hunter-gatherer literature, we hypothesize that: "*The value assigned to biodiversity conservation by the Khomani San people differs from valuation by the adjacent Mier community.*" This paper will test whether such a hypothesis is supported by evidence from the Kgalagadi area in South Africa.

In the next section of this paper, we discuss the economic rationale for valuing biodiversity. The third section presents the survey, while the fourth section presents the descriptive statistics and results. We discuss our findings in the final section.

University of Cape Town

[23] In South Africa, the term "indigenous people" refers to all African ethnic groups. In this paper, the term "indigenous people" is used to refer to vulnerable indigenous communities in South Africa. The exposure of the Khomani San to the cash economy and external factors, particularly the influence of western value systems, is likely to have resulted in changes to their value systems, resource use, and cultural preferences.

3.2. Economic valuation of biodiversity

Ecosystems provide provisioning services, regulation services, support services, and cultural services (MEA, 2005). These services directly enter into economic processes (WCMC, 1992). As such, it is economically rational to conserve biodiversity because of its contribution to human well-being (Clough, 2000).

Successful conservation outside protected areas usually requires the integration of the protected land with other land uses, rather than its separation (Hartley, 1997; Kneebone, 2000; Kneebone et al., 2000; Norton, 2000). There is a need to accommodate the most economically beneficial use of the land and minimise the negative impact on biodiversity (Kneebone, 2000). However, landowners often lack information and evidence about the correct value to assign to biodiversity when making land-use decisions (CBD, 2010). Therefore, in order for biodiversity conservation to be successful outside protected areas, landowners should become informed about the correct value of biodiversity and subsequently use this information in land-use decisions.

One of the main concerns raised by policymakers is that, although they are aware of the importance of conserving biodiversity, their efforts are undermined by its undervaluation or lack of valuation, which ultimately results in overexploitation. The estimation of the value of biodiversity is an essential precondition to the internalisation of this value in decision-making (CBD, 2010). This is worthwhile because it may assist in convincing decision-makers of the need to conserve biodiversity (Vorhies, 2010). This study provides this value by taking into consideration both winners and losers from the implementation of a proposed biodiversity conservation project.

The rationale behind environmental valuation is to understand people's preferences about environmental goods and services. In addition, by raising awareness of the value of biodiversity among societal actors, valuation can also act as an incentive measure in its own right (CBD, 2010).

The estimation of the value of biodiversity conservation does not only provide this particular value, but also highlights issues that need to be addressed to achieve sustainable resource use. Inadequate or non-existent economic incentives have been identified as the main reasons for

University of Cape Town

biodiversity loss.[24] Economic incentives refer to mechanisms that change the behaviour of actors with respect to economic choices by altering their economic conditions (Knowler, 1999). Economic incentives play a pivotal role in nature conservation at all levels of society, particularly at community levels (Emerton, 2001).

The use of economic incentives is an attempt to induce effective and sustainable use of natural resources. It is highly likely that local communities, particularly those that live within close proximity to national parks, will be willing and able to use natural resources in a sustainable way only if they were to have significant tangible economic benefits accruing to them. Economic incentives require identifying and overcoming broader economic conditions and forces that influence people to degrade the environment.

It is vital that conservation is economically desirable to local communities in a way that will improve household welfare as well as nature. This raises the "public goods" market failure. Public goods, such as communal lands, are defined as non-rival (one user's use of the good does not preclude another's) and non-excludable (no one can be excluded from using the good). While users of public goods have no difficulty in capturing their benefits, providers have difficulty in getting their costs covered due to non-excludability. This is the reason why under-supply is notorious with public goods. This implies that as a public good biodiversity is underprovided by the market. Nonetheless, economic incentive schemes have evolved over time.

Furthermore, it is vital to understand the point at which the market failure affects the participants' ability to capture the full economic benefits of conservation. Property rights frequently are applied as economic incentives for local communities that normally use natural resources or live in biodiversity landscapes (Emerton, 2000).

Most environmental valuation techniques entail the elicitation of willingness to pay (WTP). This is commonly done using the contingent valuation method (CVM), in which respondents are asked about their WTP for a hypothetical good or service. The use of dichotomous choice

[24] The tools of institutional economics are highly applicable to the problems involved in the present analysis. Future research should explore that approach in greater detail.

University of Cape Town

(binary or closed-ended) questions has gained popularity over open-ended questions following the NOAA panel recommendations (Arrow et al., 1993).

However, there are circumstances where some variant of the open-ended question format might perform better, for example when the sample size is limited. The payment card method seems to be a good compromise between the closed-ended and open-ended formats. According to Mitchell and Carson (1989), the payment card method gives respondents some assistance in searching for their valuation. It avoids the starting-bid bias of the closed-ended format and maintains the positive features of an open-ended format. A recent study by Hanley et al. (2008) used the payment card to elicit the WTP for landscape change in a national park.

Most CVM studies deal with environmental public goods. As a result, they restrict WTP to being non-negative. However, some environmental amenities manifest themselves as costs to some and benefits to others. When valuing an increase in the quality of a public "bad," an appropriate consumer surplus measure must be chosen which can measure the loss of utility due to an increase in its provision (Clinch and Murphy, 2001). [25]

There exist two measures when the policy change decreases utility, namely Compensating Variation (CV) and Equivalent Variation[26] (EV) (Hicks, 1939; Hicks, 1943). The CV measures the agents' maximum WTP for carrying out a proposed measure, the payment that would cause them to remain on their original indifference curve (original welfare level) although the measure they approve is carried out. The EV measures how much the agents who do not approve of the proposed measure would be prepared to pay for its prevention, a payment that transfers them to the same (lower) indifference curve to which the undesired proposed measure would have transferred them.

A given welfare level is maintained in the first notion, but not in the second, so there is an asymmetry. On normative grounds, the second case could be justified by the assumption that the people concerned do not deserve the former higher welfare level, so their levels should be

[25] The most commonly used approach to account for welfare losses in a contingent valuation study has been to make assumptions concerning the negative tail of the WTP distribution, after eliciting the WTP for a change in the provision of a public good/bad.

[26] Compensating variation is measured by WTA, while equivalent variation is measured by WTP.

University of Cape Town

reduced. This suggests that they have no property right to enjoy the situation without the suggested measure.

Ordinarily, those who lose from an increase in the environmental good provision would want to be compensated and would expect to be asked about their willingness to accept (WTA) compensation. However, the NOAA panel strongly recommends against the use of WTA scenarios in CVM studies (Arrow et al., 1993). It is widely noted in the contingent valuation literature (Mitchell and Carson, 1989) that, in comparison to WTP, WTA appears more prone to producing inaccurate estimates of value. In cases where the WTP-WTA gap is closed through repetition and learning, most of the changes occur in the WTA estimates (Shogren et al., 1994). According to Munro (2007), this implies that the estimates obtained from a one-shot WTP measure may be a better estimate of true WTA than a one-shot WTA estimate.

Thus, the elicitation format should allow respondents who experience a welfare loss because of the proposed environmental change to state a negative WTP (Hanley et al., 2008; Muchapondwa et al., 2008), in a manner that we will show later. Otherwise, the exclusion of negative WTP may result in an erroneous conclusion with regard to the net social benefits of the proposed change when the total values are estimated (Hanley et al., 2008).

Allowing respondents to state a positive WTP (their EV) is one way to include the negative WTP (Clinch and Murphy, 2001). An assumption is that WTP to prevent the proposed changes can be considered as a proxy of the negative WTP (cost in the welfare terms) for the proposed changes. Thus, WTP to prevent the proposed change is assumed symmetric to the WTA to tolerate the proposed change (in the sense of the minimum compensation payment needed to restore people to their utility levels prior to the introduction of the project). Of course, this can only hold as a workable approximation for marginal changes, when the environmental good of interest is easily substitutable and income effects are marginal (Clinch and Murphy, 2001; Hanley et al., 2008).

Conservation of biodiversity, particularly on communal and municipal lands in a developing country such as South Africa, is likely to be viewed as good by some people and bad by others; i.e., it produces both winners and losers. The current study will allow respondents to state their EV as a way to include the negative WTP. One potential shortcoming in our study

University of Cape Town

is uncertainty about whether the asymmetry between WTP and WTA is negligible. The fact that nature is so vital for indigenous people implies that considerable income effects are imaginable upon different assignments of property rights. Moreover, one might doubt that natural resources such as pasture grounds are easily substitutable for money, particularly in traditional societies. Thus, there may be differences in WTA and WTP for the same quantity of resources. Nonetheless, determination of the value of biodiversity from the perspectives of various stakeholders will assist in establishing the best policy response where biodiversity is under threat (OECD, 1999). Given appropriate and adequate economic incentives, landowners can become effective stewards of land as well as the biodiversity linked with it (Kneebone et al., 2000).

3.3. The survey

3.3.1. The survey

A contingent valuation survey was conducted in the Mier Local Municipality. The data were gathered through face-to-face interviews from August to October 2009 and March to April 2011[27] respectively. Sample size determination took into consideration the elicitation format, as well as the budget constraints. One hundred randomly selected households, divided equally between the Khomani San and the Mier communities, were interviewed.

The respondents initially were given background information on biodiversity and the possible costs and benefits associated with biodiversity conservation. The potential benefits include: a) raw materials that directly enter the economic process as inputs; b) other resources such as food (wild fruits) that are directly consumed; c) non-food resources such as medicinal plants; d) culturally determined services such as the fulfilment of demands for aesthetic services; g) improved scenery. The direct and indirect costs include: a) maintenance costs such as wages, running costs, monitoring, and policing costs; b) costs to other livelihood options such as traditional hunting and gathering; c) opportunity costs in the form of alternative land uses.

The biodiversity conservation programme proposal was as follows: “The government proposes to introduce a biodiversity conservation programme where as many native trees, shrubs and grasslands as necessary would be planted and protected with the aim of achieving

[27] The figures in our analysis are not deflated across the survey periods because we do not believe that there was significant inflation in the study area.

University of Cape Town

a reduction in the current biodiversity loss by 10% in terms of the quantities of each of the species under threat[28]. The conservation programme would entail increasing the total amount of land under conservation in the Kgalagadi area. The proposed programme can be undertaken on either communal land or municipal land or park[29] land with similar successful outcomes. In view of budget constraints, the programme will be undertaken on only one type of land."

Thereafter, a two-stage approach was used. First, respondents were asked how their households weighed the costs and benefits of the proposed programme on each land type, by considering only those benefits and costs applicable to them. On the one hand, those respondents who indicated that the potential benefits were greater than the potential costs (B>C) were expected to have a non-negative WTP for the biodiversity conservation programme. On the other hand, those respondents who indicated that the potential benefits were exceeded by the potential costs (B<C) were expected to have a non-positive WTP for the biodiversity conservation programme. Our approach so far enables the respondents to be classified into distinct categories based on their perceived assessment of the potential benefits and costs associated with the introduction of a biodiversity conservation project in their area.

Secondly, depending on their preferences for the programme on each land type, the respondents were asked about the highest amount their household was willing to pay as an annual conservation levy to ensure that such a programme was undertaken, in the case of those for whom B>C, or avoided, in the case of those for whom B<C, on the communal, municipal, or park land. The permissible highest amount the household was willing to pay in respect of each programme structure had to be chosen from a predesigned payment card with 13 random amounts carefully selected following a pilot study in the study area.[30] The respondents had to give three WTP answers relating to three types of land. On the one hand, for those for whom B>C, the type of land with the highest stated WTP is the type of land on which the respondents would most like the proposed project to be implemented. On the other hand, for those for whom B<C, the type of land with the highest stated WTP is the type of

[28] Respondents were also told about the trends of biodiversity loss. Biodiversity will continue to be lost for a variety of reasons: of all the potential loss, we aim to prevent only 10% and let the other 90% of the loss go on.
[29] In this context, park land refers to either of the contract parks.
[30] As is standard with this method, the 13th slot gave provision for respondents who had WTP amounts not shown on the card.

University of Cape Town

land on which he respondents would least like the proposed project to be implemented. The logic behind the WTP of those against the proposed programme is that, by paying to prevent the biodiversity conservation programme, they would continue to undertake their current land use activities without any restrictions, as effective biodiversity conservation would require some restrictions on their use of land. In fact, the respondents were told that, if they did not want the proposed biodiversity conservation programme, it would have to be undertaken elsewhere and that they would contribute to the costs of its implementation there (i.e. preventing its adoption in their area). Thus, they would be paying for remote conservation, as it were, as opposed to local conservation.

WTP questions were followed up with debriefing questions to understand the motives behind the chosen amounts. In particular, the debriefing questions were intended to identify protest bids for omission from the analysis, as is standard procedure in CVM studies; this refers to all zero bids that are cited for reasons other than budget constraints.

3.3.2. Descriptive statistics from the survey

The descriptive statistics of the surveyed households are presented in tables 3.1 and 3.2.[31] Where the respondents were household members other than the heads, their responses were interpreted as coming from the heads themselves.

University of Cape Town

[31] This sub-section splits the analysis by ethnic groups, namely the Khomani San people and the Mier Communities. The reason for splitting by ethnic groups was due to the two groups being distinct. Splitting will therefore give us valuable insights into the kind of economic incentives schemes that may be appropriate to each group.

Table 3.1: Descriptive statistics from the survey (socio-economic profile)

	Khomani San	*Khomani San*	*Mier*	*Mier*	*Full Sample*	*Full Sample*
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Household size	5.37	3.09	5.59	3.03	5.48	3.057
Age of household head	46.84	15.15	47.79	14.35	47.32	14.73
Gender of household head (1=M, 0=F)	0.60	0.49	0.63	0.49	0.62	0.49
Years Lived at Property	10.10	9.14	16.49	12.83	13.30	11.57
Education Years of Household Head	4.98	3.62	5.9	3.97	5.44	3.82
Household Head works for wages[32](1=Y, 0=N)	0.32	0.47	0.21	0.41	0.27	0.44
Household Head Self Employed (1=Y, 0=N)	0.23	0.42	0.54	0.50	0.39	0.49
Household Income (R[33])	26 400.00	28 462.98	43 500.00	80 977.30	34 950.00	61 144.84
No. of Observations	100	100	100	100	200	200

University of Cape Town

[32] Codes; 1 = yes & 0 = no (applies to Table 3.1 and Table 3.2).
[33] R = South African Rands; US1 = R8.2980 at the time the paper was revised.

Table 3.2: Descriptive statistics from the survey (other information)

	Khomani San	*Khomani San*	*Mier*	*Mier*	*Full Sample*	*Full Sample*
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Ever visited the park (1=Y, 0=N)	0.77	0.42	0.73	0.45	0.75	0.43
Knowledgeable about the effects of biodiversity loss (1=Y, 0=N)	0.58	0.50	0.67	0.47	0.63	0.48
Collects firewood from communal land (1=Y, 0=N)	0.80	0.40	0.33	0.47	0.57	0.50
Uses medicinal plants from communal land (1=Y, 0=N)	0.77	0.42	0.25	0.44	0.51	0.50
Collects bush food from communal land (1=Y, 0=N)	0.54	0.50	0.20	0.40	0.37	0.48
Involved in Livestock Farming (1=Y, 0=N)	0.46	0.50	0.96	0.21	0.56	0.50
Involved in Game Farming (1=Y, 0=N)	0.06	0.24	0.13	0.34	0.10	0.29
Undertakes activities on municipal land (1=Y, 0=N)	0.14	0.35	0.41	0.49	0.28	0.45
Undertakes activities inside the Contract Park (1=Y, 0=N)	0.65	0.48	0	0	0.33	0.47
Will stay in area despite substantial reduction in biodiversity (1=Y, 0=N)	0.75	0.44	0.76	0.43	0.76	0.43
No. of Observations	100	100	100	100	200	200

University of Cape Town

The livelihoods of the majority of the Khomani San are based on the natural environment and on social grants from the government. Given their general lack of access to electricity, it is not surprising that all Khomani San respondents are involved in the collection of firewood. The most harvested tree is the Camel thorn tree, which is the only large tree in the area. Even though harvesting of this tree for commercial purposes is prohibited, some locals continue to harvest it for such purposes due to unemployment or lack of alternative income-generating activities in their area.

The Khomani San do not pay entrance fees to the KTP because of their possession of special "resource" rights inside the park. In fact, they have their own gate into the park to enable

them to easily attend their meetings and other activities inside the park. About 77% of the Khomani San respondents had visited the park sometime in the past. This is important because it means that most respondents had an idea of what biodiversity conservation aimed to achieve. Their main reason for visiting the park was to undertake traditional and cultural activities. Harvesting of medicinal plants was the second most popular activity that took place in the area. The traditional doctors were the major harvesters of medicinal plants in the contract park portion of the KTP.

In contrast to the Khomani San, the Mier community has access to electricity. This explains why only 33% of Mier respondents were involved in firewood collection. Given their heavy dependence on livestock farming, lack of grazing land was their major challenge.

Unlike the Khomani San, the Mier pay an entrance fee whenever they visit the park. About 73% of the Mier respondents had visited the park sometime in the past. Their reason for visiting the park was mainly for recreational reasons.

We carried out two-tailed tests assuming unequal variances and a 5 percent significance level to see if the means for each attribute are different. We conclude that the difference between years lived at property, household head self-employment, household income, collects firewood from communal land, uses medicinal plants from communal land, involvement in livestock farming, involvement in game farming and undertakes activities on municipal land are statistically significant. It is clear from the discussions above that both ethnic groups are to varying degrees dependent on nature for their livelihoods.

University of Cape Town

3.4. Results and discussion

3.4.1. For whom is the proposed biodiversity conservation programme good or bad?

We would naturally want to know who consider themselves winners (B>C) or losers (B<C) from the proposed biodiversity conservation programme. Unravelling the characteristics of the people in each of these two categories requires a discrete choice model. The logit and probit models are the two most used discrete choice models (Capps and Cramer, 1985). For example, a number of studies have used the probit model to model winners and losers in non-market valuation studies similar to the current one (e.g., Clinch and Murphy, 2001; Muchapondwa et al., 2008). Knowledge of the characteristics of the people who consider the

proposed biodiversity conservation programme good (B>C) or bad (B<C) could assist in designing appropriate incentive schemes to enhance biodiversity conservation in the Kgalagadi area.

A binary decision of whether the respondents considered the proposed biodiversity conservation programme good or bad is used as the dependent variable. Because we have respondents at a household level, household characteristics such as income and household resource use activities are expected to be vital in explaining the households' attitudes towards the proposed biodiversity conservation programme.

Table 3.3 sets out the binary probit model results of whether the proposed biodiversity conservation programme of planting trees, shrubs, and grasslands to avert a 10% biodiversity loss in the Kgalagadi area is good or bad.[34]

University of Cape Town

[34] The problem of multicollinearity occurs when a strong linear relationship exists among the explanatory variables. A strong association between the explanatory variables makes it increasingly difficult to assess the impact of individual variables on the dependent variable. There are various techniques to check for the presence of multicollinearity. We checked for multicollinearity using the Variance Inflation Factors for each of the models, and it was not found to be a problem.

Table 3.3: Binary Probit model on the determinants of supporting the proposed biodiversity conservation programme on different land types

VARIABLES	Communal Land	Municipal Land	Contract Park
Household is from the Mier community	-0.0776	1.203***	0.773***
	(0.311)	(0.369)	(0.296)
Log of income	-0.0971	-0.277*	-0.230*
	(0.146)	(0.144)	(0.131)
Undertakes collection activities on communal land	1.148***	0.781**	1.126***
	(0.307)	(0.355)	(0.270)
Practises livestock or game farming	0.290	0.595**	0.418*
	(0.281)	(0.269)	(0.235)
Undertakes activities on municipal land	-0.965***	-0.637**	-0.789***
	(0.306)	(0.299)	(0.270)
Believes community has primary responsibility for conservation	0.0210	0.645**	0.754***
	(0.340)	(0.274)	(0.268)
Will stay in area despite substantial reduction in biodiversity	0.317	0.638**	0.705***
	(0.301)	(0.274)	(0.257)
Household was sampled in the second wave during 2011	-1.356***	0.525**	0.261
	(0.294)	(0.259)	(0.235)
Constant	2.269	1.575	0.849
Observations	200	200	200

***, **, * indicate 1%, 5% and 10% levels of significance respectively

Robust standard errors in parentheses

The two variables related to resource use are (1) the collection of medicinal plants, bush food, and wild fruits from communal land, and (2) grazing and harvesting activities on municipal land. Both variables are significant in all the three models. Given the heavy dependence by local communities on nature, it is not surprising that households that collect medicinal plants, bush food and wild fruits from communal land are more likely to view the proposed biodiversity conservation programme as good.

University of Cape Town

Households that undertake grazing and harvesting activities on municipal land are less likely to support the proposed programme on any land type. Perhaps those involved in activities on municipal land have experienced restrictions, especially on the harvesting of Camel thorn trees. It would therefore be rational for them to have a negative attitude toward the proposed biodiversity conservation programme, as it brings with it some restrictions about resource use.

The other variables which are only significant in the municipal land and contract park models are income, the household practice of farming, respondent's belief that the community has primary responsibility for conservation, and the household's intention to stay in the area despite substantial reduction in biodiversity. Households with higher incomes have a higher probability of viewing implementation of the proposed biodiversity conservation programme on municipal land and contract park as bad. This result seems to suggest that households with higher incomes are relatively less reliant on nature, hence their lower incentives to support the proposed biodiversity conservation programme.

Those households that practice livestock or game farming are more likely to support implementation of the proposed programme on municipal land and contract park. This result is plausible, as livestock and game farmers tend to have a symbiotic relationship with nature and therefore have a long-term incentive to conserve it.

The households who will stay in the area despite substantial reduction in biodiversity have a higher probability of supporting the implementation of the proposed programme on municipal land and contract park. Such households reveal their preferences to stay in the area in the long run and therefore naturally prefer to see sustainable biodiversity conservation into the long run.

Households that believe that the community has primary responsibility for conserving biodiversity have a higher probability of seeing the proposed programme as desirable on the municipal land and contract park. This result is logical, as is shows that those who identify themselves as conservationists would support conservation.

University of Cape Town

The motivation for having the Mier dummy variable is to check for any systematic differences between the preferences of Khomani San and the Mier over biodiversity conservation. The results show that the Mier people are more likely than the Khomani San to support the implementation of the proposed programme on both municipal land and contract park. The result is plausible, as the Mier community tends to be more integrated into municipal activities than the Khomani San, who tend to focus on their communal activities and interaction.

Given that respondents in the sample were interviewed in two different time periods, we also included a dummy variable to check if there are systematic differences between first and second wave respondents. Our results show that respondents interviewed in the second wave have random differential preferences over the proposed biodiversity conservation programme. They have a lower likelihood of supporting its implementation on communal land, while they have a higher likelihood of supporting its implementation on municipal land when compared to respondents from the first wave. However, they are equally indifferent to the implementation of the proposed biodiversity conservation programme on the contract park.

3.4.2. The determinants of willingness to pay for implementing the proposed biodiversity conservation programme of planting trees, shrubs, and grasslands in the Kgalagadi area

The objective of stated preference surveys is to elicit respondents' valuation of the projects described to them in scenarios. The reliability of each survey is typically measured through the estimation of a bid function relating WTP responses to a variety of covariates collected in the survey.

The WTP function for individual k is denoted as (Carlsson, 2008):

$$WTP_k = \int (Z_K,\ a, \varepsilon_k) \qquad \textbf{(3.1)}$$

Where z is a vector of socio-economic characteristics, while a is a vector of experiment related characteristics and ε is an error term. As is common procedure in these types of studies, WTP is censored since it is zero for a significant number of observations. Given the nature of our data, a standard OLS (Ordinary Least Squares) model would yield biased

University of Cape Town

coefficients estimates. The censored regression application leads us to a Tobit type I model. Thus, the true latent WTP function is:

$$WTP_k^* = \beta z_k + \epsilon_k \quad \textbf{(3.2)}$$

We observe the following:

$$WTP_k = max(0, WTP_k^*)\varepsilon_k \sim N\ (0, Ó_k^2) \quad \textbf{(3.3)}$$

Thus the dependent variable is a censored variable. These types of models are called a Tobit type 1 model. It is worth noting that the Tobit model assumes that DGP that explains the zeros also explains the positive values. However, failure to distinguish between the zero and positive responses could lead to a miss-specification.

The value of the censored variable is of particular interest. This implies that there is a need to find the expected value of a censored normal variable. The expected value is as follows (Greene, 2000):

$$E\ [WTP_k] = \Phi\left(\frac{\beta z_k}{Ó}\right)\ [\beta z_k + Ó\ \frac{Ø(\beta z_k/Ó)}{Ó(\beta z_k/Ó)}] \quad \textbf{(3.4)}$$

Where $\Phi(z)$ and $Ø(z)$ are the standard normal distribution function and standard normal density function respectively. It is worth noting that in the case of the Tobit type 1 model, WTP can in principle take on a negative or positive values and an assumption made is that zero values are a result of non-observability.

Secondly, we often wish to interpret the coefficients of the WTP function not only with regard to their sign and significance, but also with regard to their magnitude. In a case of a continuous variable, this is commonly referred to as the marginal effect. In a case of a standard OLS model, the marginal effect is simply equal to the coefficient. This is not the case for limited variable models. This implies that we cannot interpret Tobit and Probit coefficients as marginal effects. The marginal effects for a Tobit type 1 model can be expressed as follows:

University of Cape Town

$$\frac{\partial E\,[WTP_k]}{\partial z} = \beta * P\,[WTP^* > 0] = \Phi\left(\frac{\beta z_k}{\acute{o}}\right) \quad \textbf{(3.5)}$$

The goal is to assess the extent to which expectations from (i) economic theory, (ii) prior intuition, and (iii) observed empirical regularities are fulfilled. The analysis of those variables that can potentially affect WTP can shed light on the robustness of the survey design and implementation of the study (Hanley and Splash, 1993; Köhlin, 2001; Muchapondwa, et al. 2008). Accordingly, the determinants of WTP for implementing the proposed biodiversity conservation programme of planting trees, shrubs, and grasslands in the Kgalagadi area are presented in Table 3.4.[35]

Table 3.4: Marginal effects of the Tobit model on the determinants of WTP for the proposed biodiversity conservation programme on different land types

VARIABLES	Communal Land	Municipal Land	Contract Park
Household is from the Mier community	37.03	35.32	-0.533
	(50.74)	(30.10)	(10.79)
Household size	-10.24	3.683	-0.298
	(8.423)	(4.958)	(1.760)
Gender of the Household Head	15.55	8.574	22.79**
	(54.09)	(33.29)	(11.44)
Education years of the Household Head	21.63***	4.636	2.534*
	(6.733)	(4.016)	(1.441)
Log of income	150.9***	28.96*	12.03**
	(27.15)	(16.04)	(5.764)
Respondent is knowledgeable about the effects of biodiversity loss	67.30	67.24**	20.97*
	(55.31)	(33.20)	(11.45)
Household was sampled in the second wave during 2011	-112.9*	-138.2***	-26.94**
	(57.31)	(35.60)	(12.23)
Observations	174	163	153

***, **, * indicate 1%, 5% and 10% levels of significance respectively

Robust standard errors in parentheses

[35] Ordinarily, we would have wanted to run a separate set of models for the determinants of willingness to pay for preventing the proposed biodiversity conservation programme on the three land types in the Kgalagadi area. However, the number of observations for that set of models is unlikely to produce credible results.

University of Cape Town

The reported WTP amounts for implementing the proposed biodiversity conservation programme are at least zero. The Tobit model is more efficient for such circumstances. Household income and the dummy for the respondents interviewed in the second wave are significant in the models of all the three land types. As expected, household income positively influences WTP for the proposed biodiversity conservation programme, and this is the same for all the land tenure arrangements (communal, municipal, and park). It is logical that households with higher income are willing to pay relatively higher amounts. However, the marginal effects of income on WTP fall as one moves from communal land to municipal land to parkland. The result with respect to the dummy for the respondents interviewed in the second wave indicates that respondents in the second wave have relatively lower WTP. This implies that the level of benefits they envisage from the proposed biodiversity conservation programme is consistently lower than that expected by their peers interviewed earlier. Perhaps this also points to increasingly unfulfilled expectations regarding access to natural resources in the area.

The results of the set of tobit models also show significant marginal effects for the gender of the household head, education years of the household head, and respondents' knowledge about the effects of biodiversity loss. Male-headed households have a higher WTP than female-headed households for the proposed biodiversity conservation programme in the contract park. Education years of the household head positively influence the WTP for both the communal land and contract park. Perhaps highly educated households' heads participate more in platforms where communities have more land rights, i.e. communal land and contract park, and therefore benefit more. Those who are knowledgeable about the effects of biodiversity loss have higher WTP in both the municipal land and contract park.

Most importantly, the results demonstrate that there is no systematic difference between the WTP of the Khomani San and the Mier communities. Thus, the drivers of the value that Khomani San attach to modern conservation across the three land types are statistically not different from those of other indigenous communities such as the Mier. Our findings suggest that the Mier and San who have positive valuation are the same.

University of Cape Town

3.4.3. The welfare measures of willingness to pay for implementing or preventing the proposed biodiversity conservation programme of planting trees, shrubs, and grasslands in the Kgalagadi area

The WTP results are presented in Table 3.5 according to the community group, the attitude towards the proposed biodiversity conservation programme, and the land tenure arrangement. Eventually, a table showing the benefit-cost analysis for implementation of the proposed biodiversity conservation programme will be presented.

Table 3.5: Annual WTP for implementing and preventing proposed biodiversity conservation programme on communal land, municipal land, and parkland

	(B>C) Support Conservation				(B<C) Against Conservation			
	WTP for implementing Proposed Biodiversity Conservation Programme				WTP for preventing Proposed Biodiversity Conservation Programme			
	KHOMANI SAN		*MIER*		KHOMANI SAN		*MIER*	
	Mean WTP	Median WTP	*Mean WTP*	*Median WTP*	Mean WTP	Median WTP	*Mean WTP*	*Median WTP*
Communal Land	60.60 (n=92)	15.00 (n=92)	146.45 *(n=83)*	*25.00 (n=83)*	70.63 (n=8)	10.00 (n=8)	85.59 *(n=17)*	*75.00 (n=17)*
Municipal Land	38.42 (n=79)	5.00 (n=79)	70.06 *(n=88)*	*5.00 (n=88)*	7.31 (n=21)	5.00 (n=21)	15.83 *(n=12)*	*10.00 (n=12)*
Contractual Parkland	30.89 (n=79)	15.00 (n=79)	40.27 *(n=74)*	*15.00 (n=74)*	7.00 (n=21)	5.00 (n=21)	55.96 *(n=26)*	*15.00 (n=26)*

Note: The absolute numbers above are in South African Rands.

Ninety-two percent of the Khomani San respondents supported implementation of the proposed biodiversity conservation programme (i.e. B>C) on communal land while 79% of the respondents supported implementation of the same programme (i.e. B>C) on either municipal land or inside the park. In contrast, 83% of the Mier respondents supported implementation of the biodiversity conservation programme (i.e. B>C) on municipal land, while 88% of the respondents supported implementation of the programme on communal land, and 74% of the respondents supported implementation of the programme (i.e. B>C) inside the park. Therefore, the overall ranking of preferred implementation location is communal land, municipal land, and parkland in decreasing order of preference. This seems to point toward preference for carrying out programmes in locations where respondents have greater control; local communities generally have greatest control on communal lands.

University of Cape Town

The Khomani San's mean WTP amounts for implementing the proposed biodiversity conservation programme on communal land, municipal land, and inside the park, for those for whom B>C, are R60.60, R38.42 and R30.89 respectively. These amounts represent about 0.23%, 0.15%, and 0.12% respectively of Khomani San mean annual income. For those Khomani San for whom B<C, the mean WTP amounts for preventing the proposed biodiversity conservation programme in their area on communal land, municipal land, and inside the park are R70.63, R7.31 and R7.00 respectively. These amounts represent about 0.27%, 0.03%, and 0.03% respectively of Khomani San mean annual income. Given that more Khomani San respondents support than oppose the implementation of the proposed biodiversity conservation programme on any one of the land types, the above figures imply that the Khomani San people generally derive net positive benefits from the proposed biodiversity conservation programme and that, as a result, the majority of them would vote for its implementation.

The median WTP figures for the Khomani San are lower than their mean WTP figures for all land types. However, the general message still carries through, even on the basis of the median WTP figures: the Khomani San people generally derive net positive benefits from the proposed biodiversity conservation programme. The median WTP amounts for implementing the proposed biodiversity conservation programme on communal land, municipal land, and inside the park, for those for whom B>C, are R15.00, R5.00, and R15.00 respectively. These amounts represent about 0.05%, 0.02%, and 0.05% respectively of Khomani San median annual income. For those for whom B<C, the median WTP amounts for preventing the proposed biodiversity conservation programme in their area on communal land, municipal land, and inside the park are R10.00, R5.00, and R5.00 respectively. These amounts represent about 0.04%, 0.02%, and 0.02% respectively of Khomani San median annual income.

As for the Mier, the mean WTP amounts for implementing the proposed biodiversity conservation programme on communal land, municipal land and inside the park, for those for whom B>C, are R146.45, R70.06, and R40.27 respectively. These amounts represent about 0.34%, 0.16%, and 0.09% respectively of Mier mean annual income. For those Mier for whom B<C, the mean WTP amounts for preventing the proposed biodiversity conservation programme in their area on communal land, municipal land, and inside the park are R85.59, R15.83, and R55.96 respectively. These amounts represent about 0.20%, 0.04%, and 0.13%

University of Cape Town

respectively of Mier mean annual income. We can reach a similar conclusion for the Mier as we did for the Khomani San. Thus, given that more Mier respondents support than oppose the implementation of the proposed biodiversity conservation programme on any one of the land types, the Mier people generally derive net positive benefits from the proposed biodiversity conservation programme. Consequently, the majority of them would vote for its implementation.

Even though the median WTP figures for the Mier are lower than their mean WTP figures for all land types, they point to the same conclusion as the mean WTP figures. The median WTP amounts for implementing the proposed biodiversity conservation programme on communal land, municipal land, and inside the park, for those for whom B>C, are R25.00, R5.00, and R15.00 respectively. These amounts represent about 0.03%, 0.01%, and 0.02% respectively of Mier median annual income. For those for whom B<C, the median WTP amounts for preventing the proposed biodiversity conservation programme in their area on communal land, municipal land, and inside the park are R75.00, R10.00 and R15.00 respectively. These amounts represent about 0.09%, 0.01%, and 0.02% respectively of Mier median annual income.

Comparing the Khomani San and Mier, it is clear that the majority of respondents from both communities support the implementation of the proposed biodiversity conservation programme on communal land, municipal land, and inside the park. Both communities have highest preference for the implementation of the biodiversity conservation programme on communal land, i.e. the mean and median WTP and numbers supporting implementation (as opposed to prevention) are highest for the communal land. The Mier generally have higher WTP than the Khomani San. This is likely an effect of differences in incomes between the two communities, as the Mier generally have higher incomes. For example, the Mier respondents have almost a double median WTP (R25) than the Khomani San (R15) in the category of those in favour of the proposed biodiversity conservation programme on communal land. However, when adjusted for annual median household income, there are no significant differences in the WTP between the two communities. Thus, the Khomani San

University of Cape Town

"bushmen" equally care about modern biodiversity conservation as other indigenous communities in their area.[36]

The results discussed above are encouraging, as they show a desire for intimate involvement in biodiversity conservation by the two indigenous communities. Given the ecological symbiosis between the land inside and outside the park, if the local communities are good environmental stewards, as the results suggest, then the land restitution that took place in the Kgalagadi area will not necessarily be detrimental to biodiversity conservation.

The nature of the proposed biodiversity conservation programme is such that it has winners (B>C) and losers (B<C). Thus, winners will enjoy net benefits with its implementation, while losers would suffer net costs with its implementation. It is therefore important to balance out the net benefits of winners against the net costs of losers to determine the net worth of implementation of the proposed biodiversity conservation programme. A decision needs to be made first about which summary WTP values to use from the mean and median WTP figures reported above.

The median WTP values are preferred because of the presence of outliers in the data. As Hanley and Splash (1993) suggest, the problem of outliers is often addressed by using the median WTP rather than mean WTP. On the basis of median WTP, we estimate the total WTP for respondents in support and against the implementation of the proposed biodiversity conservation programme. Using this information as well as population statistics, we conducted a cost-benefit analysis to determine the net worth of the proposed biodiversity conservation programme for each community under the various land tenure arrangements (see Table 3.6).

University of Cape Town

[36] For those for whom B<C when the proposed programme is implemented on communal land, the Mier's median WTP as a proportion of Mier median income is two and a half times that of a similar measure for the Khomani San. This implies that the proposed biodiversity conservation programme potentially imposes a larger negative externality on the Mier's livestock activities than on the Khomani San hunter-gatherer activities.

Table 3.6: The benefit-cost analysis for implementation of the proposed biodiversity conservation programme for 320 Khomani San and 8,000 Mier households

	Programme Preferences	*Sample Size (N)*	*Sub-population*	*Median WTP*	*Benefit-Cost Analysis*
KHOMANI SAN					
Communal Land	B>C	92	0.92*320= 294.4	15.00	R 4,416.00
	B<C	8	0.08*320= 25.6	-10.00	-R 256.00
	Overall	100	320.0		R 4,160.00
Municipal Land	B>C	79	0.79*320= 252.8	5.00	R 1,264.00
	B<C	21	0.21*320= 67.2	-5.00	-R 336.00
	Overall	100	320.0		R 928.00
Contractual Park	B>C	79	0.79*320= 252.8	15.00	R 3,792.00
	B<C	21	0.21*320= 67.2	-5.00	-R 336.00
	Overall	100	320.0		R 3,456.00
MIER					
Communal Land	B>C	83	0.83*8000= 6640.0	25.00	R 166,000.00
	B<C	17	0.17*8000= 1360.0	-75.00	-R 102,000.00
	Overall	100	8000.0		R 64,000.00
Municipal Land	B>C	88	0.88*8000=7040.0	5.00	R 35,200.00
	B<C	12	0.12*8000= 960.0	-10.00	-R 9,600.00
	Overall	100	8000.0		R 25,600.00
Contractual Park	B>C	74	0.74*8000=5920.0	25.00	R 88,800.00
	B<C	26	0.26*8000=2080.0	-15.00	-R 31,200.00
	Overall	100	8000.0		R 57,600.00

University of Cape Town

For each community and land tenure arrangement, the results in Table 3.6 suggest that the winners benefit from the proposed biodiversity conservation programme by more than the cost that losers suffer. Thus, the net worth of the proposed biodiversity conservation programme is positive for both communities and all three land types. For both communities, the net worth of the proposed biodiversity conservation programme is highest when implemented on communal land, followed by implementation inside the park, with implementation on municipal land in third place. It is not surprising that the net worth of the proposed biodiversity conservation programme for both communities is significantly less for

municipal land than for other land types, as neither community has any substantial rights in municipal land.

Overall, when considering the Khomani San and Mier jointly, significantly more people benefit than lose from biodiversity conservation programmes in the Kgalagadi area, irrespective of land tenure arrangements. The fact that the majority of households in this area are in favour of the proposed biodiversity conservation programme is a good outcome for the prospects of biodiversity conservation in the Kgalagadi landscape as a whole. However, the presence of people who stand to lose from the proposed programme points toward the need for incentive schemes which address the potential conflicts between biodiversity conservation and other livelihood activities of local communities.

3.5. Conclusion

The Khomani San "bushmen" and Mier "agricultural" communities in the Kgalagadi area are heavily dependent on natural resources, but their area is threatened by biodiversity loss due to natural ecological causes and the overexploitation of natural resources. There have been changes in land ownership in the Kgalagadi area following land restitution to the local communities in 2002. Biodiversity conservation will benefit from the land restitution only if the local communities, especially the Khomani San who interact more with nature, are good environmental stewards. To assess their attitudes towards biodiversity conservation, this study used the CVM to investigate the values assigned by the Khomani San and Mier communities to biodiversity conservation under three land tenure arrangements: communal land, municipal land, and parkland.

The study was designed in a way that allows the identification of winners and losers from the proposed biodiversity conservation programme, in which as many native trees, shrubs, and grasslands would be planted and protected as necessary to achieve a reduction in the current biodiversity loss by 10% of each of the species under threat. For each community and land tenure arrangement, there are winners and losers from the proposed programme. However, in each case, the winners benefit by more than the cost that losers suffer. The net worth for biodiversity conservation under various land tenure regimes by the Khomani San ranged from R928 to R3,456 to R4,160 for municipal land, parkland, and communal land respectively, compared to the Mier's R25,600 to R57,600 to R64,000 for municipal land, parkland, and

University of Cape Town

communal land respectively. The majority of respondents from both communities support the implementation of the proposed biodiversity conservation programme on communal land, municipal land, and inside the park. Both communities have the highest preference for the implementation of the biodiversity conservation programme on communal land.

References

Arrow, K., Solow, R., Portney, P.R., Leamer, E.E., Radner, R., Schuman, H., 1993. Advance notice of proposed rulemaking, extension of comment period and release of contingent valuation methodology report'. *Federal Register*. *58*: 4601±14.

Bosch, D., Hirschfeld, E., 2002. *The !Ae!Hai Heritage Park bundle - including the agreement whereby the land claims of the Khomani San community and the Mier community are finalized and associated documents*. Pretoria, Commission on the Restitution of Land Rights.

Callicott, J. B., 1986, "On the intrinsic value of nonhuman species", in "*The preservation of species: the value of biological diversity"*, B. G Norton (ed), Princeton, NJ: Princeton University Press.

Carlsson, F., 2008. "Chapter 2 Analysis of open-ended data", unpublished manuscript.

Capps, O., Cramer, R.A., 1985. Analysis of Food Stamp participation using qualitative choice models. *American Journal of Agricultural Economics 67*: 49-59.

CBD (Convention on Biological Diversity). 2010. Introduction. Economics, Trade and Incentive Measures. http://www.cbd.int/default.shtml. (2 February 2010).

Clinch, J.P., Murphy, A., 2001. Modelling Winners and Losers in Contingent Valuation of Public Goods: Appropriate Welfare Measures and Econometric Analysis. *The Economic Journal 111*: 420-443.

Clough, P., 2000. Encouraging Private Biodiversity –Incentives for Biodiversity Conservation on Private Land. Treasury Working Paper 00/25. Nzier: New Zealand Treasury.

DEAT (Department of Environmental Affairs and Tourism), 2010. Land degradation. http://soer.deat.gov.za/283.html. (18 April 2010).

De Villiers, B., 1999. *Land Claims and National Parks: The Makuleke Experience*. Human Sciences Research Council, Pretoria.

University of Cape Town

Emerton, L., 2000. *Using Economic Incentives for Biodiversity Conservation, a Mimeograph*, the World Conservation Union, Gland.

Emerton, L., 2001. Community-Based Incentives for Nature Conservation. IUCN-The World Conservation Union Eastern Africa Regional Office and Economics Unit. http://economics.iucn.org. (29 April 2009).

Greene, W., 2000. *Econometric Analysis.* Upper Saddle River, NJ: Prentice-Hall Inc.

Hall-Martin, A., Carruthers, J., 2003. *South African National Parks: A Celebration*. SANParks, Johannesburg.

Hanley, N., Splash, C.L., 1993. Valuing Environmental Goods: The Contingent Valuation Method. Edward Elgar Publishing Limited, Great Britain.

Hanley, N., Colombo, S., Kriström, B., Watson, F., 2008. Accounting for Negative, Zero and Positive Willingness to Pay for Landscape Change in a National Park. *Journal of Agricultural Economics 60*: 1-16.

Hartley, P., 1997. *Conservation strategies for New Zealand*. New Zealand Business Roundtable, Wellington.

Hicks, J.R. 1939. The Foundations of Welfare Economics. *The Economic Journal 49 (196)*: 696-715.

Hicks, J.R. 1943. The Four Consumer's Surpluses. Review of Economic Studies, XI: 31-41.

Kneebone, J., 2000. *Biodiversity and private land*. Ministry for the Environment, Wellington.

Kneebone, J., Lindsay, J.R., Prime, K., Christensen, M., 2000. *Bio-what?* Ministry for the Environment, Wellington.

Knowler, D., 1999. Incentive systems for natural resources management: the role of indirect incentives. FAO Rome. Report No. 99/023 IFAD-RAF.

Köhlin, G., 1995. Contingent valuation in project planning and evaluation: the case of social forestry in Orissa, India. *Environment and Development Economics 6*: 237–258.

MEA (Millennium Ecosystem Assessment). 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, D.C.

Mitchell, R.C., Carson, R.T., 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method Resources for the Future*. Washington DC.

Muchapondwa, E., Carlsson, F., Köhlin, G., Wildlife Management in Zimbabwe: Evidence from a Contingent Valuation Study. *South African Journal of Economics 76*: 4 December 2008.

University of Cape Town

Munro, A, 2007. When is some number really better than no number? On the optimal choice between non-market valuation methods. Munich Personal RePEc Archive Paper: 8978. Japan: National Graduate Institute for Policy Studies.

Norton, D.A., 2000. Conservation biology and private land: shifting the focus. *Conservation Biology 14*: 1221-1223.

OECD (Organisation for Economic Co-operation and Development). 1999. OECD Environment & Sustainable Development, Handbook of Incentive Measures for Biodiversity: Design and Implementation. Paris: OECD Publishing.

Reid H, Fig D, Magome H, Leader-Williams N. 2004. Co-management of Contractual National Parks in South Africa: Lessons from Australia. *Conservation Society 2*: 377 – 409.

Shogren, J. F., Shin, S. Y., Hayes, D. J. and Kliebenstein, J. B.: 1994, Resolving differences in willingness to pay and willingness to accept, *The American Economic Review 84(1)*: 255-270. Vorhies, F., 2010. Environmental Economics *Explained:* How Economic Valuation can help pay for Conservation. Unpublished.

WCMC (World Conservation Monitoring Centre). 1992. *Global Biodiversity: Status of the Earth's Living Resources.* Chapman and Hall, London.

Wynberg, R. Kepe, T., 1999. *Land Reform and Conservation Areas in South Africa: Towards a Mutually Beneficial Approach. IUCN, Johannesburg.*

University of Cape Town

Appendix: Environmental questionnaire – community issue on the economic benefits of biodiversity conservation

This questionnaire assesses the land use choices in the Kgalagadi area. We would like to know your views regarding conservation projects on communal land, inside the Kgalagadi Transfrontier Park and on public land. Your views have important implications for the eventual form of economic incentive to be provided to the local people.

NB: There are no right or wrong answers to this survey. We want to know how you feel about conservation programmes.

(A)NAME OF PERSON ADMINISTERING QUESTIONNAIRE (NOT RESPONDENT): _____
(B) DATE INTERVIEW CONDUCTED_____
(C)LOCATION INTERVIEW CONDUCTED (CONSULT MAP) _____

1. RATE THE RELATIVE IMPORTANCE YOU ATTACH TO THE FOLLOWING ATTRIBUTES/ATTRIBUTES:
EXTREMELY IMPORTANT = 5, SOMEWHAT IMPORTANT=4, IMPORTANT=3, INDIFFERENT=2 & UNIMPORTANT = 1

ACTIVITIES/ ATTRIBUTES					
MEDICINAL PLANT HARVESTING	5	4	3	2	1
BUSH-FOOD RESOURCES	5	4	3	2	1
HUNTING	5	4	3	2	1
STOCK FARMING	5	4	3	2	1
GAME FARMING	5	4	3	2	1
AGRICULTURE	5	4	3	2	1
GRASS AND TIMBER AS BUIDING MATERIAL	5	4	3	2	1
WALKABOUTS INSIDE THE PARK	5	4	3	2	1
FIREWOOD	5	4	3	2	1
BIRD WATCHING	5	4	3	2	1
VIEWING ANIMALS (ACTIVELY)	5	4	3	2	1
PRESERVATION OF UNIQUE FEATURES	5	4	3	2	1
COMMERCIAL – ALL BUSINESS ACTIVITIES- USING PARK PROXIMITY	5	4	3	2	1
PASSIVE USE- VIEWING CO-INCIDENTLY OR ENJOYMENT NOT RELATED TO ACTIVE USE.	5	4	3	2	1
IT IS ___ TO ME TO BE RICH. I WANT TO HAVE A LOT OF MONEY AND EXPENSIVE THINGS.	5	4	3	2	1
BUILDING MY SKILLS IS _____TO MY FUTURE SUCCESS. I LIKE TO BE ONE OF THE BEST I CAN.	5	4	3	2	1
KNOWING THAT MY FAMILY AND ME ARE SAFE AND AT PEACE IS ____TO ME. I WOULD NOT RISK MY HEALTH FOR ANY OPPORTUNITY	5	4	3	2	1
THE OPINIONS AND VIEWS OF MY ELDERS ARE _____ TO ME. I RESPECT THEM EVEN THOUGH I DON'T AGREE WITH THEIR VIEWS	5	4	3	2	1
CULTURAL CEREMONIES AND CUSTOMS ARE _____TO ME. I ACCEPT THE IDEAS ABOUT MY LIFE MY CULTURE PROVIDES.	5	4	3	2	1

University of Cape Town

2. RACE OF RESPONDENT (**THIS QUESTION IS OPTIONAL**, YOU DO NOT HAVE TO ANSWER THIS QUESTION IF YOU FEEL UNCOMFORTABLE ABOUT IT)

RACE	
BLACKS	1
WHITES	2
COLOUREDS	3
INDIANS	4
OTHER	5

3a). HAVE YOU EVER VISITED THE KGALAGADI TRANSFRONTIER PARK □ YES □ NO

b) IF NOT WHY HAVE YOU NOT VISITED THE PARK

CAN NOT AFFORD THE ENTRANCE FEE	
THE PARK IS TOO FAR, I DO NOT HAVE MY OWN TRANSPORT	
GET NO OR NEGLIGIBLE VALUE FROM VISITING THE PARK	
OTHER: PLEASE SPECIFY	

4. WHICH ETHNIC GROUP DO YOU BELONG TO

COMMUNITY NAME	
KHOMANI SAN	1
MIER	2
AFRIKANS	3
TSWANA	4
OTHER: PLEASE SPECIFY	5…….

5. DATE OF BIRTH …**……..**

6. GENDER OF RESPONDENT

MALE	1
FEMALE	2

7. IN WHICH SETTLEMENT OR VILLAGE IS YOUR HOME? _____

8. WHAT TYPE OF HOME DO YOU LIVE IN (TICK ALL THAT APPLY)

SINGLE DWELLING	
UNIT	
SHARED UNIT	
OTHER: PLEASE SPECIFY	.....

9. HOW LONG HAVE YOU LIVED AT THIS PROPERTY_____ YEARS

10. DO YOU OWN THE PROPERTY THAT YOU CURRENTLY OCCUPY □ YES □ NO

11. DO YOU CURRENTLY WORK FOR WAGES? □ YES □ NO

12. ARE YOU SELF EMPLOYED? □ YES □ NO

University of Cape Town

13. WHAT IS YOUR OCCUPATION? (PLEASE TICK ALL THAT APPLY)

STUDENT	
FARMER	
INFORMAL VENDOR	
OTHER	

14. IF YOU PARTICIPATE IN ONE OR MORE COMMUNITY ORGANISATIONS, PLEASE SPECIFY THE NAME OF THE ORGANISATION, PLEASE LIST _____

15. IF YOU HAVE A PARTNER AND/OR FELLOW HOUSEHOLD MEMBER IN YOUR HOME, AND PLANS WERE MADE TO PARTICIPATE IN A CONSERVATION PROJECT SUCH AS PLANTING OF TREES OR MONITORING OF PLANT HARVESTING ACTIVITIES, WHO WOULD DECIDE WHETHER YOUR HOUSEHOLDS PARTICIPATES

YOU	
THEM	
BOTH/ ALL	

16. WHAT IS YOUR EDUCATION LEVEL

EDUCATION LEVEL	**TICK THE APPROPRIATE**	**SPECIFY THE HIGHEST GRADE COMPLETED**
NEVER ATTENDED SCHOOL		
PRIMARY SCHOOL		
HIGH SCHOOL		
CERTIFICATE		
DIPLOMA		
DEGREE		
POSTGRADUATE		
ANY OTHER FORMAL TRAINING RECEIVED		

17. LAST YEARS HOUSEHOLD INCOME BEFORE TAXES

PRE TAX INCOME (RAND)	
0 – 10 000	1
10 001- 30 000	2
30 001 –50 000	3
50 001 – 100 000	4
100 001 – 150 000	5
150 001 – 200 000	6
200 001 – 250 000	7
250 001 – 350 000	8
350 001 – 500 000	9
500 001+	10

University of Cape Town

18. WHAT ACTIVITIES TAKE PLACE WHERE YOU CURRENTLY LIVE (IN THE FARM OR YOUR RESIDENCE ARE)

STOCK FARMING (LIVERSTOCK)	
AGRICULTURE	
GAME FARMING	
HUNTING	
MEDICINAL PLANT HARVESTING	
BUSH-FOOD HARVESTING	
FIREWOOD COLLECTION	
OTHER -SPECIFY	

19a). DO YOU PERFORM ANY OF THESE ACTIVITIES AT OTHER AREAS WITHIN THE COMMUNAL AREA BESIDES WHERE YOUR HOUSEHOLD IS CURRENLTY SITUATED (OTHER FARMS BESIDES THE ONE YOU CURRENTLY OCCUPY) **- IF NOT – SKIP TO QUESTION 20.**

YES	1
NO	2

b). IF YES, PLEASE SPECIFY THE ACTIVITIES THAT YOU UNDERTAKE OR PERFORM AT THE OTHER COMMUNAL AREAS/FARMS

STOCK FARMING (LIVERSTOCK)	
AGRICULTURE	
GAME FARMING	
HUNTING	
MEDICINAL PLANT HARVESTING	
BUSH-FOOD HARVESTING	
FIREWOOD COLLECTION	
OTHER -SPECIFY	

c). WHAT ARE THE REASONS FOR UNDERTAKING THESE ACTIVITIES IN THE OTHER AREAS/FARMS

……

20. ARE YOU AWARE OF WHAT OTHER ACTIVITIES TAKE PLACE IN OTHER AREAS/FARMS THAT YOU OR ANY MEMBER OF YOUR HOUSEHOLD DO NOT TAKE PART IN

STOCK FARMING (LIVERSTOCK)	
AGRICULTURE	
GAME FARMING	
MEDICINAL PLANT HARVESTING	
BUSH-FOOD HARVESTING	
HUNTING	
FIREWOOD COLLECTION	
OTHER -SPECIFY	

21a). DO YOU PERFORM ANY OF THE ACTIVITIES (**MENTIONED IN QESTION 18**) ON PUBLIC LAND - **IF NOT, SKIP TO QUESTION 22.**

YES	1
NO	2

University of Cape Town

b). IF YES, PLEASE SPECIFY THE ACTIVITIES THAT YOU UNDERTAKE OR PERFORM ON PUBLIC LAND

STOCK FARMING (LIVERSTOCK)	
AGRICULTURE	
GAME FARMING	
HUNTING	
MEDICINAL PLANT HARVESTING	
BUSH-FOOD HARVESTING	
FIREWOOD COLLECTION	
OTHER -SPECIFY	

c). WHAT ARE THE REASONS FOR UNDERTAKING THESE ACTIVITIES ON PUBLIC LAND

……

2. ARE YOU AWARE OF WHAT OTHER ACTIVITIES TAKE PLACE ON PUBLIC LAND THAT YOU OR ANY MEMBER OF YOUR HOUSEHOLD DO NOT TAKE PART IN

STOCK FARMING (LIVERSTOCK)	
AGRICULTURE	
GAME FARMING	
MEDICINAL PLANT HARVESTING	
BUSH-FOOD HARVESTING	
HUNTING	
FIREWOOD COLLECTION	
OTHER -SPECIFY	

23. WHAT ACTIVITIES DO YOU OR ANY MEMBER OF YOUR HOUSEHOLD PERFORM INSIDE THE PARK (IN THE SECTION OF THE PARK WHERE YOUR COMMUNITY HAS BEEN AWARDED THE LAND AND RESOURCE RIGHTS)

HUNTING	
MEDICINAL PLANT HARVESTING	
WALKABOUTS	
TRADITION AND CUSTOMS RITUAL PERFORMANCES	
OTHER -SPECIFY	

24. DO YOU CONSIDER YOUR HOME A PART OF THE NATURAL ENVIRONMENT

□ YES □ NO

25. DO YOU PARTICIPATE IN ACTIVITIES THAT CONSERVE OR PROTECT THE NATURAL ENVIRONMENT □ YES □ NO

26. WHAT PRO-ENVIRONMENTAL ACTIVITIES DO YOU TAKE PART IN YOUR HOME

MAINTENANCE	
CLEANING	
NONE	

27. DO YOU CONSIDER YOUR COMMUNITY A PART OF THE NATURAL ENVIRONMENT

□ YES □ NO

University of Cape Town

28. WHAT PRO-ENVIRONMENTAL ACTIVITIES DO YOU TAKE PART IN THE COMMUNAL LAND

REPLANTING	
PLANT HARVESTING MONITORING	
GRAZING MONITORING	
ECOLOGICAL MONITORING	
MONITORING HUNTING	
NONE	

29. WHAT PRO- ENVIRONMENTAL ACTIVITIES DO YOU TAKE PART IN THE KGALAGADI TRANSFRONTIER PARK

REPLANTING	
SURVEILLANCE	
ECOLOGICAL AND BIRD MONITORING	
NONE	

30. WHAT PRO-ENVIRONMENTAL ACTIVITIES DO YOU TAKE PART IN THE PUBLIC LAND

REPLANTING	
PLANT HARVESTING MONITORING	
GRAZING MONITORING	
ECOLOGICAL MONITORING	
MONITORING HUNTING	
NONE	

31. DO YOU THINK YOUR CONTRIBUTIONS TO CONSERVING THE ENVIRONMENT ARE

VERY EFFECTIVE	
SOMEWHAT EFFECTIVE	
INDIFFERENT	
NOT EFFECTIVE	
DON'T KNOW	

32. ARE YOU REWARDED IN ANY WAY FOR TAKING PART IN THESE ACTIVITIES

MONETARY COMPENSATION	1
NON-MONETARY COMPENSATION (SPECIFY)	2
VOLUNTER	3

33. IF YOU RECEIVE MONETARY COMPENSATION TO PERFORM ACTIVITIES THAT CONSERVE OR PROTECT THE NATURAL ENVIRONMENT IS THIS AMOUNT ENOUGH TO SUSTAIN YOUR LIVELIHOOD

YES	1
NO	2
AMOUNT RECEIVED IN RANDS	R

34a). WOULD YOU PHYSICALLY VOLUNTEER YOUR OWN LABOUR TO TAKE PART ON ANY CONSERVATION INITIATIVES IN THE COMMUNITY ON COMMUNAL LAND **(IF YES, SKIP TO 35)** □ YES □ NO

b). IF NOT, STATE THE REASON

TOO OLD	
NO TIME	
DO NOT OWN THE PROPERTY	
OTHER, SPECIFY	

University of Cape Town

35a). WOULD YOU PHYSICALLY VOLUNTEER YOUR OWN LABOUR TO TAKE PART ON ANY CONSERVATION INITIATIVES ON PUBLIC LAND **(IF YES, SKIP TO 36)** □ YES □ NO

b). IF NOT, STATE THE REASON

TOO OLD	
NO TIME	
IT IS NOT A COMMUNITY LAND	
OTHER, SPECIFY	

36a). WOULD YOU PHYSICALLY VOLUNTEER YOUR LABOUR TO TAKE PART ON ANY CONSERVATION INITIATIVES INSIDE THE PARK **(IF YES, SKIP TO 37)** □ YES □ NO

b). IF NOT, STATE THE REASON

TOO OLD	
NO TIME	
DO NOT OWN THE ENTIRE PARK	
OTHER, SPECIFY	

37. WOULD YOU COMPROMISE YOUR LIVING SITUATION TO CONSERVE OR PROTECT THE ENVIRONMENT □ YES □ NO

38. WOULD YOU COMPROMISE YOUR WORKING SITUATION TO CONSERVE OR PROTECT THE ENVIRONMENT □ YES □ NO

39. NEGATIVE CHANGES TO THE NATURAL ENVIRONMENT CAN COMPROMISE THE WAY I MAKE A LIVING

TRUE	1
FALSE	2

40. ARE YOU AWARE OF WHAT MIGHT HAPPEN IF THERE IS A SIGNIFICANT DEGRADATION OF THE ENVIRONMENT IN THE KGALAGADI AREA DUE TO OVEREXPLOITATION OR EXCESSIVE HUNTING?

PERSON IS WELL INFORMED –KNOWS MORE THAN 3 OF THE IMPACTS LISTED BELOW	1
PERSON HAS PARTIAL KNOWLEDGE - KNOWS 1-3 OF THE IMPACTS LISTED BELOW	2
PERSON IS POORLY INFORMED – KNOWS 0 OF THE IMPACTS LISTED BELOW	3

University of Cape Town

FILL IN THE GAPS IN THE PERSON'S KNOWLEDGE – IMPACTS TO BE READ TO THE RESPONDENT

1. FOOD INSECURITY
2. LOSS OF INCOME GENERATING ACTIVITIES
3. DISRUPTION OF THE SOCIAL FABRIC
4. LAND DEGRADATION
5. LOSS OF UNIQUE HABITATS
6. CAN COMPROMISE MY HEALTH
7. NO CHANGE

FOR QUESTION 41 – 44, PLEASE NOTE: CONSERVATION OF BIODIVESITY GENERALLY HAS THE FOLLOWING IMPLICATIONS:

- ***PROVIDES THE BENEFITS SUCH AS a) RAW MATERIALS THAT DIRECTLY ENTER THE ECONOMIC PROCESS AS INPUTS. b) OTHER RESOURCES SUCH AS FOOD (WILD FRUITS AND MEAT), WHICH ARE DIRECTLY CONSUMED. c) NON-FOOD RESOURCES SUCH AS MEDICINAL PLANT HARVESTING. d) TOURISM. e) RESEARCH OPPORTUNITIES.***
  E) CULTURAL DETERMINED SERVICES SUCH AS THE FULFILMENT OF DEMANDS FOR AESTHETIC SERVICES.
- ***PROVIDES COSTS SUCH AS a) MAINTANENCE COSTS SUCH AS WAGES, RUNNING COSTS AND MONITORING AND POLICING COSTS. b) COSTS TO OTHER LIVERLIHOOD OPTIONS, SUCH AS CONDITIONAL HUNTING c) OPPORTUNITY COSTS IN THE FORM OF ALTERNATIVE LAND.***

NB: ALL FUNDING WOULD GO TOWARDS THE INTENDED PROGRAMME AND NOT ADMINISTRATIVE FEES.

41a). CONSIDERING THE BENEFITS AND COSTS OF THE CONSERVATION PROJECT THAT ARE APPLICABLE TO YOUR HOUSEHOLD, HOW DO YOU THINK THE BENEFITS OF CONSERVING BIODIVERSITY COMPARE WITH THE ASSOCIATED COSTS IN A COMMUNAL LAND?

i) BENEFITS > COSTS (***GO TO QUESTION b***)
ii) BENEFITS < COSTS (***GO TO QUESTION c***)

University of Cape Town

b.) WHAT AMOUNT IN USER FEES PER YEAR ARE YOU WILLING-TO-PAY (WTP), SPECIFICALLY FOR A BIODIVERSITY CONSERVATION PROJECT IN THE COMMUNAL LAND. ***IF ANSWER IS NOT ZERO, THEN SKIP TO 42.***

AMOUNT WILLING TO PAY (RAND) PER YEAR	
0	0
1 – 10	1
11 - 20	2
21 – 30	3
31- 50	4
51 – 100	5
101 - 200	6
201 – 500	7
501 – 1000	8
1001 – 2000	9
2001 – 3000	10
3001 – 4000	11
4001 + (SPECIFY)	12

c). WHAT AMOUNT IN USER FEES PER YEAR ARE YOU WTP, SPECIFICALLY TO PREVENT THE CONSERVATIVE INITIATIVE PROJECT IN THE COMMUNAL LAND. ***IF ANSWER IS NOT ZERO, THEN SKIP TO 42.***

AMOUNT WILLING TO PAY (RAND) PER YEAR	
0	0
1 – 10	1
11 - 20	2
21 – 30	3
31- 50	4
51 – 100	5
101 - 200	6
201 – 500	7
501 – 1000	8
1001 – 2000	9
2001 – 3000	10
3001 – 4000	11
4001 + (SPECIFY)	12

d). IF YOUR ANSWER TO EITHER **b)** OR **c)** ABOVE IS ZERO, WHAT ARE YOUR REASONS (YOU MAY HAVE MORE THAN ONE)

REASON	
CANNOT AFFORD THE FEES	1
GET NO OR NEGLIGIBLE VALUE FROM THE FARMS/AREA	2
ABUNDANCE OF OTHER AREA OPTIONS – NO SCARCITY, THEREFORE WHY PAY	3
LACK OF CONFIDENCE IN AGENCIES COLLECTING THE USE FEES	4
PAYING ENOUGH TAXES, FEES ETC ALREADY	5
OTHER REASONS (SPECIFY)	6

University of Cape Town

42a). ARE YOU WTP THE SAME AMOUNT TO SUPPORT A SIMILAR CONSERVATION INITIATIVE INSIDE THE PARK AS IN THE COMMUNAL LAND. **(IF OPTED FOR PREVENTING THE CONSERVATION PROJECT, SKIP TO b)**

AMOUNT WILLING TO PAY (RAND) PER YEAR	
0	0
1 – 10	1
11 - 20	2
21 – 30	3
31- 50	4
51 – 100	5
101 - 200	6
201 – 500	7
501 – 1000	8
1001 – 2000	9
2001 – 3000	10
3001 – 4000	11
4001 + (SPECIFY)	12

b) ARE YOU WTP THE SAME AMOUNT TO PREVENT A SIMILAR CONSERVATION INITIATIVE INSIDE THE PARK AS IN THE COMMUNAL LAND

AMOUNT WILLING TO PAY (RAND) PER YEAR	
0	0
1 – 10	1
11 - 20	2
21 – 30	3
31- 50	4
51 – 100	5
101 - 200	6
201 – 500	7
501 – 1000	8
1001 – 2000	9
2001 – 3000	10
3001 – 4000	11
4001 + (SPECIFY)	12

c). IF YOUR ANSWER TO EITHER **a)** OR **b)** IS ZERO, WHAT ARE YOUR REASONS (YOU MAY HAVE MORE THAN ONE)

REASON	
CANNOT AFFORD THE FEES	1
GET NO OR NEGLIGIBLE VALUE FROM THE KGALAGADI TRANSFRONTIER PARK	2
ABUNDANCE OF OTHER AREA OPTIONS – NO SCARCITY, THEREFORE WHY PAY	3
LACK OF CONFIDENCE IN AGENCIES COLLECTING THE USE FEES	4
PAYING ENOUGH TAXES, FEES ETC ALREADY	5
HAVE NEVER VISITED A PARK, SO WHY PAY	
OTHER REASONS (SPECIFY)	6

University of Cape Town

d). IF YOU ARE WTP A DIFFERENT AMOUNT FOR EITHER **a)** OR **b)** INSIDE THE PARK, WHAT ARE YOUR REASONS

REASON	
FEEL THAT IT IS ALREADY ALLOCATED FUNDS BY THE GOVERNMENT, HENCE I AM WILLING-TO-PAY LESS	1
WILLING-TO-PAY ALREADY FOR THE PROJECT ON THE COMMUNAL LAND, HENCE I AM WILLING-TO-PAY LESS	2
I AM CURRENTLY GETTING LESS BENEFITS FROM THE PARK, HENCE PAY LESS	3
OTHER REASONS (SPECIFY)	4

……

43a). IF YOU ARE WTP FOR A CONSERVATION INITIATIVE ON THE COMMUNAL LAND AND INSIDE THE PARK, ARE YOU WTP THE SAME AMOUNT TO SUPPORT A SIMILAR INITIATIVE ON PUBLIC LAND.

AMOUNT WILLING TO PAY (RAND) PER YEAR		
0	0	
1 – 10	1	
11 - 20	2	
21 – 30	3	
31- 50	4	
51 – 100	5	
101 - 200	6	
201 – 500	7	
501 – 1000	8	
1001 – 2000	9	
2001 – 3000	10	
3001 – 4000	11	
4001 + (SPECIFY)	12	

b). IF YOU ARE WTP TO PREVENT A CONSERVATION INITIATIVE ON THE COMMUNAL LAND, ARE YOU WTP THE SAME AMOUNT TO PREVENT A SIMILAR CONSERVATION INITIATIVE ON PUBLIC LAND

AMOUNT WILLING TO PAY (RAND) PER YEAR		
0	0	
1 – 10	1	
11 - 20	2	
21 – 30	3	
31- 50	4	
51 – 100	5	
101 - 200	6	
201 – 500	7	
501 – 1000	8	
1001 – 2000	9	
2001 – 3000	10	
3001 – 4000	11	
4001 + (SPECIFY)	12	

University of Cape Town

c). IF YOUR ANSWER TO EITHER **a)** OR **b)** ABOVE IS ZERO, WHAT ARE YOUR REASONS (YOU MAY HAVE MORE THAN ONE)

REASON	
CANNOT AFFORD THE FEES	1
GET NO OR NEGLIGIBLE VALUE FROM PUBLIC LAND	2
ABUNDANCE OF OTHER AREA OPTIONS – NO SCARCITY, THEREFORE WHY PAY	3
LACK OF CONFIDENCE IN AGENCIES COLLECTING THE USE FEES	4
PAYING ENOUGH TAXES, FEES ETC ALREADY	5
OTHER REASONS (SPECIFY)	6

d). IF YOU ARE WTP A DIFFERENT AMOUNT ON PUBLIC LAND, WHAT ARE YOUR REASONS

REASON	
GOVERNMENT RESPONSIBILITY, HENCE I AM WILLING-TO-PAY LESS	1
WILLING-TO-PAY MORE ONLY WHERE THE COMMUNITY HAS LAND AND RESOURCE RIGHTS, HENCE I AM WILLING-TO-PAY LESS	2
I AM CURRENTLY GETTING LESS BENEFITS FROM PUBLIC LAND, HENCE PAY LESS	3
OTHER REASONS (SPECIFY)	4

……

44. WHO IS PRIMARILY RESPONSIBLE FOR CONSERVING THE NATURAL ENVIRONMENT

THE GOVERNMENT – WITH REGARD TO PUBLIC LAND	
SOUTH AFRICAN NATIONAL PARKS (PARKS & PROTECTED AREAS)	
THE COMMUNITY	
DONORS	
ALL STAKEHOLDERS (COMMUNITY, NGO's, SANPARKS, GOVERNMENT)	
OTHER, SPECIFY	

45. WHAT STATEMENT DEFINES BEST YOUR RELATIONSHIP TO THE NATURAL ENVIRONMENT

THE NATURAL ENVIRONMENT IS AT THE SERVICE OF MAN	
MAN IS THE STEWARD/CARE TAKER OF THE NATURAL ENVIRONMENT	
MAN AND THE NATURAL ENVIRONMENT ARE INDEPENDENT OF EACH OTHER	
MAN AND THE NATURAL ENVIRONMENT HAVE EQUAL RIGHTS	

46. IF THE ENVIRONMENT IN THE KGALAGADI AREA WAS TO DEGRADE SUBSTANTIALLY

I WOULD STILL LIVE IN THE AREA	1
I WOULD RELOCATE TO ANOTHER AREAS INSTEAD	2

47. DO YOU HAVE ANY OTHER COMMENTS YOU WOULD LIKE TO CONTRIBUTE ON THIS COMMUNITY ISSUE:

_____

_____

University of Cape Town

Chapter 4: Conservation fees in the Kgalagadi Transfrontier Park between Botswana and South Africa in the presence of land restitution

Abstract

This paper estimates the visitation demand function for Kgalagadi Transfrontier Park (KTP) in order to determine the conservation fee to charge South African residents to maximise park revenue. We conducted contingent behaviour experiments at KTP and three other national parks, which we assume are either substitutes or complements for visitors to KTP. Our random effects Tobit model shows that there is a wide variation in the own-price elasticities of demand between the parks but they are generally not elastic. The cross-price estimates indicate that there is limited substitutability in visitation demand among the four parks. The study uses the unitary elasticity rule to demonstrate that there is a possibility of raising conservation fees to revenue-maximising levels at KTP as well as the other parks, using methods such as a mandatory conservation fee increment or a community-bound voluntary donation above the regular conservation fee. Sharing conservation revenue with communities surrounding parks could demonstrate the link between ecotourism and local communities' economic development, promote a positive view of land restitution involving national parks, help address South Africa's heavily skewed distribution of income and act as an incentive for the local communities to participate in conservation even more.

Keywords: contingent behaviour, conservation fee, demand, land claim, national park.

University of Cape Town

Note: *An extract of this chapter has been submitted to the EfD (Environment for Development) Discussion Paper Series*.

4.1. Introduction

Charges for visiting protected areas in South Africa are set by statutory bodies. For example, (SANParks)[37] sets the fees at all the national parks that they manage. Even though the primary mandate of SANParks is conservation, it also operates a tourism business. The organization's tourism business is expected to generate revenue each year as part of the corporate budget, as national parks are only partly funded by the National Treasury through the Public Finance Management Act. According to SANParks (2010) conservation fees[38] account for approximately 23 percent of total revenue generated from tourism, retail, concession and other retail activities. It should be noted that SANParks utilizes per diem fees. Given how park pricing contributes to total revenue, it is vital that all parks are priced.

Since 1994, remedial policy has been a key priority for the post-apartheid South African government. The most important remedial policy, particularly from the point of view of the national parks agency and indigenous communities, has been that relating to land restitution. According to Fay (2009), while the duties linked with land ownership under land restitution expand considerably, the land claimants' land rights are quite limited as they do not usually include a share of tourism revenue and are merely limited to rental income in cases where contract parks are established.

In our view, for the land restitution not to compromise conservation objectives, Kgalagadi Transfrontier Park (KTP) should contribute to improving the lives of surrounding communities who now have land rights inside the park. The core research question is therefore to find out whether, and how, KTP can serve as a driver in generating economic benefits to land restitution beneficiaries and contribute positively to their livelihoods. One way in which the local communities could benefit from KTP is through sharing of revenues from conservation fees.

Because the park agency seems to be ploughing all conservation fees currently generated back into conservation (SANParks, 2010), it would need to be able to generate additional revenues for any benefit-sharing with local communities to be possible. In this spirit, the aim

[37] SANParks (formerly known as the National Parks Board prior to 1997) is the overarching government agency pertaining to national conservation in South Africa (Kruger Park Times, 2009).

[38] The term 'conservation fee' was officially adopted effective 2 April 2003 in place of 'admission/ entrance fee' because the former better describes the park agency's mission more appropriately (McKinsey, 2005).

University of Cape Town

of this study is to estimate optimal[39] conservation fees which should be charged at KTP to maximise revenue. This is done with the help of the contingent behaviour methodology. Therefore, this is a valuation study, asking those who come to the park what they would do with varying prices. According to Chase et al. (1998) developing countries have little experience with regard to designing the right levels of pricing for protected areas.

More research on the right levels of conservation fees is required so that policy makers can be better advised, which may ultimately result in the optimal use of scarce natural resources. It is for this reason that an assessment of the possibility of increasing conservation fees in the case of South Africa is essential for the development and implementation of appropriate policies that could result in sustainable resource use and poverty reduction. Furthermore, charging appropriate conservation fees at national parks could mitigate the adverse effects of the dwindling tax-based government funding for conservation.

Once it is shown that there is scope for generating more revenue, park pricing policy can be crafted to achieve a number of different objectives, which might include generating additional revenue for sharing with the local communities. Co-ownership of the park by local communities and the park agency, and the need for the park to contribute towards local communities' livelihoods, are the main reasons this paper promotes revenue maximization as the primary park pricing policy goal at the KTP. Of course, park pricing policy can also be used to achieve other objectives such as increasing environmental education and reducing congestion[40].

To the best of our knowledge, no previous studies on optimal park pricing for national parks have been carried out in South Africa. Thus this paper contributes immensely to empirical work on optimal park pricing by expanding on this scant literature. Most importantly, in light of "massive" restitution of land to the original owners, particularly given that the restituted

[39] In the discussions of other monopolistic behaviour we normally assume that the socially optimal price, at least for domestic consumers, is one where the price is equal to the marginal cost. In the literature on park fees, revenue (or rather profit) maximization is seen as a goal for fees facing international tourists, but usually not the domestic tourists.

[40] This paper promotes revenue maximization as a basis for estimating optimal conservation fees because of the perceived need to generate benefits to share with the local communities. Obviously, such a narrow objective might ignore concerns about the ecological carrying capacity or congestion at the park that could be generated from the resultant conservation fee levels. Although environmental degradation is generally a serious challenge in the Kgalagadi area, the bulk of the area inside the park is still in a pristine state.

University of Cape Town

land impinges on the quality of the remaining park, our study could aid policy makers with regard to developing effective pricing policies. Given the restitution, the fundamental question is how the co-ownership can be managed efficiently. The paper attempts to contribute to a topical and policy relevant question in South Africa. The results from the analysis can provide very useful input into the process of setting and reviewing conservation fees, particularly in Southern Africa, where historical imbalances with regard to land ownership make the issue of land rights and access to benefits from use of land a pertinent policy issue. There is a strong and rising concern about the expropriation of land for national parks use, not only in South Africa, but also in the United States of America (see Jones, 1981) and elsewhere (see MacEachern, 2001; McNamee, 2010), i.e. native claims. Thus, this paper potentially fills an important research gap.

The rest of the paper is structured as follows: Section 2 give a background on the structure of the South African park system and KTP. Section 3 briefly reviews literature on pricing in national parks. Section 4 outlines the methodology used in the study. Section 5 presents the research findings and discussion while Section 6 concludes.

University of Cape Town

4.2. Background on the Kgalagadi Transfrontier Park

4.2.1. Structure of the South African parks system

For nature-based tourism in South Africa, there is a choice between national parks[41] managed by SANParks with reasonable charges (low prices), nature reserves managed by provincial conservation agencies, and private game reserves which are often luxurious and offer exclusive game viewing.[42] National parks, provincial nature reserves and private game reserves co-exist within the same broad system, and are substitutes in a sense. The fundamental difference is not in conservation but rather in the tourist services they provide. This study's general focus is on national parks for a variety of reasons: they manage the majority of protected areas and get the most visitors; they get government funding, hence have social responsibilities; and they are largely the ones affected by land claims.

[41] The National Environmental Management Act (Act No. 107 of 1998) defines a national park as a protected area of national or international importance, a viable representative sample of South Africa's natural system or scenic areas, or the ecological integrity of one or more ecosystems.

[42] The latter are expensive relative to national parks and nature reserves, and therefore mainly target international and affluent local visitors (Peacock, 2009).

South Africa has experienced a significant increase in domestic and international visitors over the years, due in large part to the uniqueness and attractiveness of its national parks. This was achieved despite incremental increases in conservation fees over the years. Unlike many other African countries that boast of a relatively more significant international tourism market, South Africa has a relatively larger domestic market. As such, the domestic tourism market is SANParks' core market. South African residents account for approximately 80 percent of total number of visitors to national parks, with international visitors making-up the remaining portion (SANParks, 2010). Though small, the South African international tourism market is mature, and accounts for a disproportionately large share of net revenue. According to Stevens (2013), a breakdown of the SANParks 2009/10 total conservation fee net revenue indicates that conservation fees generated from domestic tourists accounted for around 53.82 percent of the total R168 092 459. Revenue generated from SADC and international tourists conservation fees accounted for 0.42 percent and 36.49 percent respectfully. The remaining 6.98 percent and 2.28 percent was income generated from the Wild Card Programme and entrance fee respectfully.

The imposition of conservation fees at national parks was introduced when the first national park, Kruger National Park, was proclaimed in 1926.[43] Although conservation fees were introduced that long ago, it is only as recent as 2 April 2003 that SANParks adopted a new pricing structure (Pienaar, 1990). The recommendations of business consultants, McKinsey & Company, were adopted to implementing a new system of differential pricing for entry into all parks (McKinsey & Company, 2005).

SANParks have in principle adopted a pricing policy that seeks to strike a balance between various pricing objectives, with effect from when it revised its pricing strategy in 2003. Following the implementation of the revised pricing policy, conservation fees now distinguish between South African residents, SADC residents and residents of the rest of the world; and vary between parks. One of the motivations for a nationality-based price discriminatory strategy in favour of domestic nationals was that domestic residents contribute towards taxes from which SANParks receives state funding. With the revised pricing policy, price is no longer only a function of the preferences of these tourists for the park itself, but

[43] The records from the park show that the three cars that visited the park in 1927 were the first to be charged conservation fees of £1 (equivalent to R2 at the time) each.

University of Cape Town

also a function of prices for other parks. The variation in fees between parks seems to have been rationalised mostly by appealing to a combination of both differences in their physical size and popularity.

On the one hand, physical size of a park could be a proxy for the running costs required to manage it as bigger parks are likely to incur higher costs compared to smaller parks. On the other hand, physical size could be a proxy of the level of biodiversity and tourist facilities as more facilities are likely to be required to enhance visitor experience at bigger parks compared to smaller parks. Furthermore, conservation fees are now payable daily even though, for easier administration, they are actually paid for every night spent inside the park. Nonetheless, it is unclear what criterion is used to determine conservation fees. Despite a few price increases at South African national parks, there seem to be few or no formal criteria with regard to determination of conservation fees.

4.2.2. The Kgalagadi Transfrontier Park

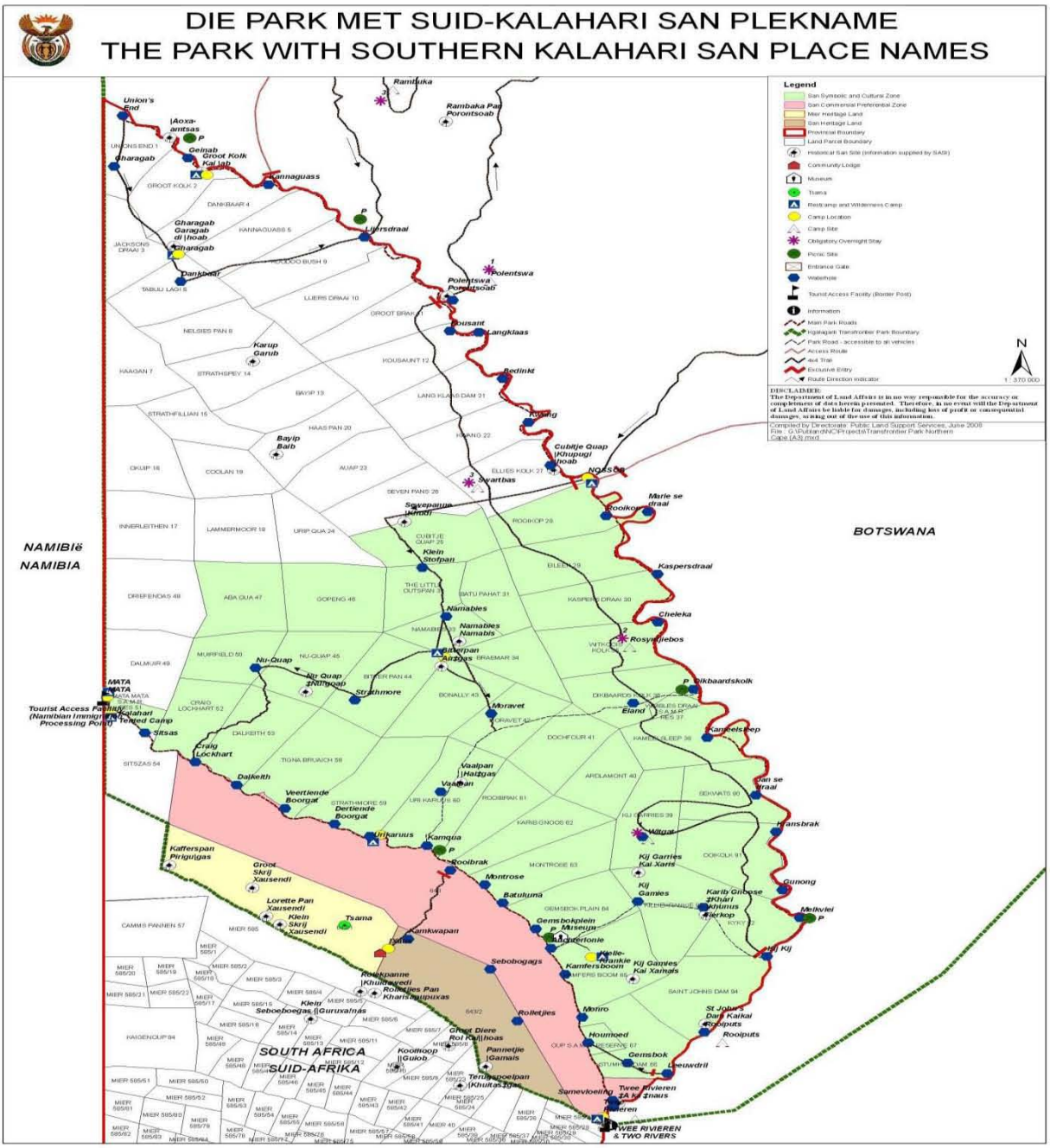
The Botswana and South African governments signed a bilateral agreement on 7 April 1999 to merge the Gemsbok National Park in Botswana with the Kalahari Gemsbok National Park in South Africa into a single ecological area now called KTP. This merger made it possible for wildlife to move freely between the two countries. KTP is located in the Kgalagadi District on the south-western border of Botswana and the Northern-Cape border of South Africa. It can be accessed through five gates in three different countries, namely South Africa, Botswana and Namibia (SANParks, 2010). The park boasts an area of 3.8 million hectares and this makes it one of the biggest conservation areas in the world (SANParks, 2006). KTP is classified as a category 2 park according to the IUCN classification of protected areas (IUCN, 1994a; Sandwith et al., 2001).

KTP encompasses part of the ancestral site of the Khomani San "bushmen" community. As part of South Africa's land restitution programme, the Khomani San community, together with the adjacent Mier community, was awarded land inside and outside KTP in May 2002. The government transferred ownership of land on the South African side of KTP for heritage purposes to the Khomani San community (28 000 hectares) and the Mier community (30 000 hectares) (SANParks, 2006). SANParks was tasked with co-managing the transferred land

University of Cape Town

inside the park on behalf of the local communities as contractual parks. Figure 4.1 shows the map of KTP indicating the different uses and areas of jurisdiction[44] after the restitution.

Figure 4.1: Map of the Kgalagadi Transfrontier Park



Source: Hirshveld, 2009.

[44] The Khomani San people were awarded exclusive rights in the remainder of the park because they lost more land in comparison to the Mier community during the establishment of the Park. The special rights include commercial development and undertaking of cultural activities (Bosch and Hirschfeld, 2002).

The brown area is the Khomani San contractual park; the yellow area is the Mier contractual park; the pink area is the Venture-zone (where the Khomani San have rights for preferential commercial joint ventures with SANParks); the olive area is the Symbolic-zone (where the Khomani San have rights for exercising their symbolic and cultural rites); and the white area is the rest of the park including the Botswana side.

The household income for the Khomani San is very low, with high unemployment rates. They have not really benefitted from the land restitution (Dikgang and Muchapondwa, 2013) and are heavily dependent on natural resources (Dikgang and Muchapondwa, 2012). Therefore they can become a threat to conservation in their area by overexploitation of natural resources. To discourage overexploitation, the park agency urgently needs to generate benefits to share with the Khomani San.

Despite KTP being one of the three renowned national parks in South Africa, it accounts for a small proportion of total visits than 1 percent (SANParks, 2010). The visitation rate should be understood in the context of the park's remote location.

The land ownership structure in the Kgalagadi area has changed drastically as local communities are now co-owners of international parkland. The main challenge faced under these arrangements is how to achieve both conservation and development, particularly as the Khomani San are indigenous people who rely heavily on natural resource extraction and use. The primary goal is to find the optimal share. Thus, the key challenge facing the Kgalagadi area, particularly the KTP, is how to balance the integrity of conservation and beneficiaries' rights to benefit from land and natural resources. SANParks are concerned about challenges at the post-restitution phase, and want to know how to move forward. It is clear that KTP should contribute to improving the lives of surrounding communities who now have land rights inside the park. Barring actual resource extraction and use inside the park, one way in which the local communities could benefit from KTP is through sharing of revenues from conservation fees. However SANParks would have to generate new revenues for any benefit-sharing with local communities to be possible. In addition, charging appropriate conservation fees at KTP could mitigate the adverse effects of the dwindling tax-based government funding for conservation.

University of Cape Town

Furthermore, appropriate park pricing takes into account the correct economic value of park visitation because conservation fees are a proxy of the valuation placed on recreation by park visitors (Lee and Han, 2002).

We implicitly assume that revenue maximizing fee level is the optimal one. We are aware that in discussions of other monopolistic behaviour we normally assume that the socially optimal price, at least for domestic consumers, is one where the price is equal to the marginal cost. In the literature on park fees, revenue (or rather profit) maximization is seen as a goal for fees facing international tourists, but usually not the domestic tourists. We are aware that increasing conservation fees for domestic residents may generate political resistance given the high level of poverty in South Africa.[45] This suggests that optimal fees are likely to impact on equity, *inter alia*. However, it should be noted that park visitors to remote sites like KTP do not ordinarily constitute poor people but middle to high-income earners. In fact, the main reason poor domestic households do not visit remote parks such as KTP is not high conservation fees but excessive travel and accommodation costs.

The profile of park visitors at remote parks is likely to remain the same until there is a significant reduction in travel and accommodation costs, which are barriers to the ability of poor people to access such recreational sites. Failure to implement an optimal fee strategy would theoretically imply that poorer domestic households would continue subsidizing those who are able and willing to pay, as poor households pay taxes which partly fund national parks that they themselves do not utilize. Thus we argue that as long as the current travel and accommodation costs remain high then domestic visitors who use the park should be charged optimal fees. Higher optimal fees are not a concern for the Khomani San in the Kgalagadi area because they do not have to pay conservation fees to get inside the park as they have concessionary free entry through a designated entry point.[46]

University of Cape Town

[45] South African national poverty stood at 54 percent while rural poverty stood at 77 percent in 2010 (Leibbrandt et al., 2010).

[46] Even though the Mier people are also co-owners of KTP, the same privileges are not extended to them, and they are required to pay conservation fees to enter the park as tourists. Perhaps the same privileges should be extended to the Mier community as well so that any imposition of optimal fees would not impact negatively on their ability to access the park. If the Mier were also given free entry into the park by virtue of being co-owners, the estimated optimal fees would have no bearing on the local community's ability to visit the site.

4.3. Literature review

A significant number of tourist destinations face budget constraints for their maintenance and management. The budget constraints bind even more during periods characterised by sharp rises in tourist numbers (Eagles et al., 2002). This is mainly because the tourist charges are usually kept quite low, leaving park agencies scrambling for more financial resources from governments to breakeven. There is a growing volume of literature that emphasizes the role of charging conservation fees in the management of national parks (Chase et al., 1998). A general consensus among economists regarding how to address the significant increase in demand for recreation is to adopt appropriate pricing (Baumol and Oates, 1975; Rosenthal et al., 1984; Cullen, 1985). However, determining the appropriate pricing for park visitation is complicated because demand elasticities are often not readily available. Nevertheless, pricing is considered efficient relative to other rationing concepts such as lottery and queuing (see Fractor (1982) for a detailed discussion).

There are generally four pricing objectives that are evident in protected areas such as national parks. Charging at parks aims to impute value to visitation, manage parks at economically efficient levels, operate within ecological carrying capacity limits and achieve social equity. According to Laarman and Gradersen (1996), national parks are valued for their existence and their use. The demand for preservation is captured by the existence values, while the demand for visiting a recreational site is explained by the use values. The choice of whether or not to visit a recreational site is influenced by an individual's willingness to pay for it, bearing in mind the competing uses of a visitor's income.

Should a market exist for the good in question, then it is possible to assess the value attached to the site in monetary units (Bull, 1995). According to Hanley et al. (1997), to achieve a monetary value in the absence of a market, the consumers' willingness to pay for the site should be measured. As in a market situation, the principle behind the willingness to pay for such non-market goods and services is based on the same principles of rational choice and utility maximisation.

To emphasise this point, if a person is of the view that a change in a non-market good (for example, due to environmental improvements or co-ownership of the park) will make him better off in some way or feels that the change is justifiable, that individual may wish to pay

University of Cape Town

higher amounts in order to secure this change or to reflect his endorsement of the change, and so his willingness to pay would be a reflection of his economic valuation of the good in question (Hanley et al., 1997).

Most of the studies that have being undertaken with regard to setting park fees reveal that the actual conservation fees that are currently being charged to park visitors are significantly below what visitors are willing to pay, as well as what is required to cover operational costs (e.g. Laarman and Gragersen, 1996; Schultz et al., 1998; Scarpa et al., 2000; Naidoo and Adamowicz, 2005). This implies that most parks visits are under-priced. Such a perverse outcome suggests that relatively poor countries are subsidizing visits of people from developed nations, who make up for the majority of visitors at national parks in most developing countries.

Although many studies have been undertaken on visitors' preferences for national parks, most have focused on estimating visitors' willingness to pay for the recreational experience in an attempt to measure the value assigned to national parks. However, in order to determine the "optimal" conservation fees to be charged at any national park, one needs to know the preferences of the visitors to that park and other substitute and complementary parks. This information can be extracted from the visitation demand functions of national parks. Visitation demand functions can be estimated based on historical or experimental data.

Historical data would be appropriate where the preferences of tourists are stable over time. However, the usability of historical data depends on the satisfaction of stringent conditions. The park agencies would have needed to collect the data for a sufficiently long period of time, there would have to be sufficient variation in the prices charged over that period of time, and the researcher would also need to know the income of visitors. Given such demands, it is no wonder that there have not been many studies using historical data to estimate visitation demands functions. To the best of our knowledge, it is only the study by Alpizar (2006) that used historical data to compute the "optimal" entrance fees, for national parks in Costa Rica. Alpizar (2006) found that price discrimination between residents and non-residents could successfully maximise social welfare and even meet a set revenue target.

University of Cape Town

Similarly, there have not been many studies attempting to estimate optimal conservation fees using experimental data (see Chase et al., 1998; Naidoo and Adamowicz, 2005). The Travel Cost Method (TCM) and the Contingent Valuation Method (CVM) are the primary techniques which have been used in these kinds of studies. While the TCM studies could provide useful information pertaining to the value placed on ecotourism in protected areas, they have mostly focused on estimating consumer surplus rather than estimating optimal conservation fees (Chase et al., 1998). TCM estimates a demand function when done correctly.

In comparison, the CVM technique is more flexible relative to the TCM as it allows for different values to be generated under varying scenarios. Most importantly, the CVM allows for both use and non-use values to be incorporated into the estimated value of a recreational good as a whole. While these conventional approaches can provide useful information for estimating willingness to pay, a study on Costa Rican parks by Schultz et al. (1998) noted constraints including limitations with sampling methods and locations, biases associated with variations in cultural backgrounds and the frequent lack of specific information usually provided in hypothetical questions.

An alternative approach widely seen as addressing some of the limitations associated with framing in the conventional CVM approaches is the Contingent Behaviour (CB) approach. Grijalva et al. (2002) state that there is a growing number of studies in recreational demand models that use the CB trip data for predicting quantity under hypothetical scenarios. While potentially avoiding some criticisms levelled against CVM and measurement of non-use values, the CB approach potentially still remains controversial due to its inherent hypothetical nature.[47]

A CB method asks those who come to the park what they would do under hypothetical circumstances (with varying prices). According to Alberini and Longo (2006), CB questions can be used alone or combined with observed behaviours within the TCM, to assist in placing a value on specified (non-market) public goods. In our case, we use CB questions alone to help estimate value at South African national parks.

[47] One can test the validity of CB data by making use of generalized Negative Binomial and Poisson regression models. Despite the growing use of CB applications, targeted CB validity studies are rare (see Grijalva et al., 2002).

University of Cape Town

The CB approach is commonly applied to evaluate quality or price changes at recreational sites. Implementation of such a technique entails respondents being asked to reveal their intended behaviour to a site (e.g. visitation) given the proposed change in site (e.g. quality, access or price). In contrast to conventional CVM which elicits a statement of value, the CB approach elicits changes in behaviour or levels of use for a nonmarket good (Grijalva et al., 2002). The technique makes it possible to generate variation in conservation fees by asking respondents, park visitors in our case, how they would vary their visitation rates (e.g. the number of days spent visiting a specific park in a year) if the conservation fees were to be increased by any specified amount at this or another park.

Chase et al. (1998) used the CB approach to investigate the optimal entrance fees at the time Costa Rican national parks had introduced differentiated fees. Using a similar approach, a study by Naidoo and Adamowicz (2005) simulated fee increases and estimated entrance fees that maximized tourism revenue to Mabira Forest Reserve in Uganda. Determination of optimal fees using experimental data adds value to research on park pricing as it can be designed to mimic the real market. Furthermore, introducing substitutes embraces micro theory in a richer fashion.

Price discrimination has the potential to increase revenue as compared to imposing a single conservation fee, in addition to satisfying equity issues from the social point of view, and bringing about local community stability. Price discrimination among users can enable resource use in different sites, among different time periods and among different user profiles (South African residents and non-residents).

Discriminatory pricing as applied by SANParks, is based on the fundamental principle described in detail in the context of ecotourism applications by Baldares and Laarman (1990) and Lindberg (1991). The rationale for charging different fees is based on the fact that parks are unique and have different degrees of appeal to users. This uniqueness is reflected by the visitor's preferences for some parks over others; hence some parks are more popular than others.

These differences are reflected by the difference in individual visitors' visitation demand functions and demand elasticities. Own- and-cross price elasticity are critical components for

national park pricing policy. Optimal park pricing is dependent on the reliability of the demand elasticities (Chase et al., 1998). The park agency is able to engage in price discrimination because the market can fairly easily be segmented – which enables visitors with varying elasticities of demand to be identified and subsequently treated differently.

The potential benefits of charging optimal fees to access national parks are significant. According to Mendes (2003), transferring some conservation fee revenue to local communities is an incentive for them to accept and truly adhere to conservation practices, as the transfer of fees would demonstrate that protected areas such as national parks may be synonymous with wealth rather than with lost developmental opportunities. The estimation of optimal conservation fees at the KTP is important as it may contribute toward developing effective pricing strategies in the context of South Africa's national park system. It is for this reason that this study is critical as it unravels ways in which conservation fees can be set at optimal levels to the benefit of the local communities surrounding parks, who often incur the highest cost of conservation and yet experience the least benefit.

4.4. Methodology

4.4.1. The Contingent Behaviour Method

The available historical data for South African national parks are not suitable to characterise recreational demand due to lack of sufficient variation in conservation fees over the years. Furthermore, cross-price elasticities cannot be estimated because many parks always have the same fees and fee changes in all parks are generally linearly related. This is a most common situation with parks in Africa. Accordingly, non-market valuation methods should be used to better understand the fees that park visitors should be charged to enter parks. For the purposes of this study, the CB approach is considered to be the most appropriate method due to its ability to take substitution effects into consideration when generating experimental data for estimating visitation demand functions. This paper adopts the CB formulation by Chase et al. (1998) to estimate the optimal conservation fees at KTP as well as three other parks within a South African park system framework.

In a CB setting, the park visitor is assumed to maximize a utility function u=U(X,Q), subject to P_xX+P_QQ=M where X is an n-vector of private goods, Q are the recreational goods (i.e. visits to parks), P_x is an n-vector of market prices of private goods, P_Q is the vector of virtual

University of Cape Town

prices of recreational goods (i.e. conservation fees), and M is the individual's disposable income (for example, see Freeman (1993)). In this formulation, different parks are assumed to have different degrees of appeal to users and some parks might be considered as substitutes. Solving the maximization problem gives a set of Marshallian demand functions and aggregation of these demand functions yields a market demand function for Q: Q=Q(M, P_x, P_Q). Based on previous studies,[48] aggregate demand at parks is expected to be a function of each park's conservation fee as well as fees at other substitute and complementary parks, income, socio-economic characteristics and trip related expenditure.[49] The symmetrical demand functions for each of the, say, four parks can be written as follows:

$$Q_i = f(P_1, P_2, P_3, P_4; M; Z) \qquad \text{i=1,.., 4 parks} \qquad \textbf{(4.1)}$$

Where Q_i is the park visitation rate (e.g. days per year) by all tourists at park i; P_i is the conservation fee at park i; M is the visitors' disposable income and Z captures the socio-economic and trip-related characteristics (Chase et al., 1998).[50] The visitation demand functions for the parks will be estimated using experimental data generated from the CB survey conducted on visitors at KTP as well as Kruger, Augrabies Fall and Pilanesberg national parks which were considered to be substitutes and/or complements for KTP.

KTP only has two of the 'big five' large animals – dessert lions and leopards. However, it is well known for its huge population of gemsbok and arid biodiversity. Kruger has all of these animals, has the biggest accommodation facilities, tarred roads and an international airport. The Kruger national park is the flagship of SANParks managed parks and by-far the largest park in South Africa. A visitor intercepted at Kruger is 1 500 km from KTP. The park has a wide variety of attractions comparable only with the best in Africa.

The close proximity of Augrabies Fall national park to the KTP is the reason its visitation is also of interest in this study. The main attraction is the 56 metre high Augrabies Falls,

[48] The main approach that is applied for estimating the demand for public goods such as many environmental amenities is survey-based and was first implemented by Bergstrom et al. (1982), who estimated elasticities of demand for public schools in the United States (Khan, 2007).

[49] However, given that KTP is in a remote arid location, income is not expected to be a significant factor as visitors already incur high travel costs to visit the park.

[50] The demand function represented by equation (1) assumes that individuals allocate their disposable income between recreational goods and a composite commodity with a numeraire price.

University of Cape Town

considered to be one of the most impressive falls in South Africa. SANParks managed parks offer a variety of lodging types, ranging from camping, huts, safari tents, bungalows, cottages, and guest houses to luxury lodges. Although Pilanesberg Game Reserve is managed by the North West Parks and Tourism Board (NWPTB), it is of interest in this study given its popularity, status, similarity and location. We will refer to it as Pilanesberg National Park. The park is located in the crater of a long extinct volcano, and is the fourth biggest park in South Africa. It is also home to the 'big five', has world class accommodation, tarred roads and an airport nearby. The visitor usually sees all the parks in a few years' time.

Table 4.1 shows a chart similar to the one used to capture data regarding visitors' responses to actual and hypothetical own-price and cross-price scenarios at the parks.

Table 4.1: Sample of contingent behaviour chart visitation questions posed to respondents

Name of Park	**Actual**		**Hypothetical Increases**[51]							
	Fee[52]	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***
Kgalagadi Transfrontier Park	R45		R56		R45		R45		R45	
Kruger National Park	R45		R45		R56		R45		R45	
Augrabies Fall National Park	R25		R25		R25		R31		R25	
Pilanesberg[53] **Game Reserve**	R45		R45		R45		R45		R56	

The respondents were shown the chart, with a blank piece of paper covering all but the first block of three columns. The respondents were asked, "During your current trip, for how many days will you visit KTP at the current daily entrance fee of R45 per person per day?" The question was repeated for Kruger National Park, Augrabies National Park, and Pilanesberg National Park.

After filling out the relevant column with the appropriate number of "days visited" for each park, the interviewer explained that there would be a set of hypothetical questions next, in

[51] We did not use the same range for fee increases range for all respondents (25percent - 125 percent increase, 25 percent intervals). These were then divided to give five blocks, allocation of respondents to a particular block were randomized.
[52] US$ 1 = South African Rand (R) 7.85 at the time the paper was written.
[53] In addition to the gate fee shown above, Pilanesberg charges R20 for each car that goes inside the reserve.

University of Cape Town

which the fee would be raised at only one park. The first hypothetical question raises the entrance fee at KTP only. The interviewer therefore asked, "If the fee were increased to Rw_j only at KTP, how would that affect your plans to visit KTP and the other parks (Kruger, Augrabies and Pilanesberg)?" The second hypothetical question raises the entrance fee at Kruger National Park only. The interviewer therefore asked, "If the fee were instead increased to Rx_j only at Kruger, how would that affect your plans to visit Kruger and the other parks (KTP, Augrabies and Pilanesberg)?" The third hypothetical question raises the entrance fee at Augrabies National Park only.

The interviewer therefore asked, "If the fee were instead increased to Ry_j only at Augrabies, how would that affect your plans to visit Augrabies and the other parks (KTP, Kruger and Pilanesberg)?" The fourth hypothetical question raises the entrance fee at Pilanesberg National Park only. The interviewer therefore asks, "If the fee were instead increased to Rz_j only at Pilanesberg, how would that affect your plans to visit Pilanesberg and the other parks (KTP, Kruger and Augrabies)?" Even though each respondent answers visitation questions about five entrance fee plans (actual fee, hypothetical fee 1, hypothetical fee 2, hypothetical fee 3, hypothetical fee 4), there would have to be a variation in the hypothetical price plans across respondents in order to generate sufficient variability for estimable demand functions i.e. k groups of the respondents should answer hypothetical price plan questions about the k fee levels (w_j,x_j,y_j,z_j; j=1,…,k).

4.4.2. Data Collection

A face-to-face questionnaire survey was conducted with randomly picked park visitors (only park goers, and those who already paid to get to the park) at the four parks. The survey was conducted during the week and over weekends during the months of March and April in 2011. Due to the vast size of the four parks, the surveys were mainly carried out at the gates, accommodation facilities and designated resting sites inside the park. A total of 385 domestic overnight visitors and 78 international overnight visitors were surveyed.[54] Our sample composition is in line with the visitor profile at national parks in South Africa, where

[54] Although SANParks distinguishes between three categories of visitors, our sample only consists of domestic (i.e. South African) and international visitors. We did not get any respondents from the SADC region. This is expected since visits from SADC residents make up a very small proportion of total visits. Furthermore, South African national parks cater to both day and overnight visitors, and charge the same conservation fees for both categories. We could not get enough day visitors to do any meaningful analysis for that category.

domestic visitors account for an overwhelming majority. The data gathered from the CB approach consists of five observations for each of the respondents. This corresponds to the visitation versus fee answer pairs from questions that were posed about the five entrance fee plans (i.e. actual fee, hypothetical fee 1, hypothetical fee 2, hypothetical fee 3, and hypothetical fee 4).

In addition to data from the CB approach, the survey collected data on visitor demographics, trip expenditure and duration at the park. Furthermore, data on visitors' willingness to pay either additional fees or voluntary donations over and above the current actual fees was collected.[55] On this question, respondents were informed that fee increments or voluntary donations would be a way in which the park could fulfil its social responsibility of uplifting the local communities so they could continue supporting conservation. Therefore, additional revenues from visitors were one way to facilitate the park's effort to capture and share ecotourism benefits with the local communities.[56] In this question, respondents were also asked about their willingness to pay under two different management scenarios: one, the proceeds from a fee increment would be managed by SANParks/NWPTB on behalf of the local surrounding communities; two, the proceeds from a voluntary donation would be managed by an independent organisation which would ensure that it is channelled towards development needs of the communities surrounding parks. This question was presented after the CB questions to prevent an embedding effect on the CB approach. Finally, visitor's sentiments regarding what constitutes 'a fair conservation fee' were also gathered.[57]

One of the criticisms levelled against a CB survey format such as the one in table 1 is that respondents might not know much about their intended visitation especially when they do not know anything about the alternative parks (Cicchetti and Peck, 1989). This difficulty was not encountered in this study as a significant number of respondents were either regular visitors and/or familiar with the four parks. The interviewers also described the parks in detail to respondents who did not know other parks besides the one they were interviewed at. Thus,

[55] The survey used the payment card method to elicit the visitor's willingness to pay a fee increment.
[56] Assurances associated with revenue management were made to respondents to minimize protest against fee increases.
[57] Although what constitutes a 'fair' conservation fee is a political decision, it is still important that the views of visitors in this regard are known. Despite the facts that politically driven rather than economically driven decisions are often adopted, studies such as the one we have undertaken may provide policy makers with alternative strategies. It is hoped that by providing such useful information, we can let decision makers know that sound alternative strategies exist and as that they can make informed decisions.

University of Cape Town

respondents had little difficulty in revealing their intended visitation. The fact that SANParks fee structure does not distinguish between peak and off-peak period's means that seasonal bias due to the timing of our survey might not be a huge problem. Furthermore, most visitors visited the parks during both summer and winter.

4.4.3. Descriptive Statistics

The study focuses on domestic overnight visitors as we could not get significant numbers of international tourists to do any meaningful analysis for that category.

University of Cape Town

Table 4.2: A selection of descriptive statistics of the 385 domestic overnight visitors interviewed

Variable	Kgalagadi Park	Kruger Park	Augrabies Park	Pilanesberg Park
Annual Visitation Frequency to Park	2.48 (1.86)	2.65 (1.85)	2.69 (1.94)	2.58 (1.91)
This is First Visit to this Park	35.58% (47.92%)	14.66% (35.40%)	40.82% (49.25%)	18.10% (38.54%)
This Trip Arranged by Travel Agent	2.88% (1.68%)	6.03% (23.83%)	8.16% (27.44%)	0.86% (9.25%)
This Visit is Part of a Multi-trip	23.08% (42.17%)	9.48% (29.32%)	57.14% (49.59)	15.52% (36.24)
Household Size	3.40 (1.70)	3.31 (1.74)	3.16 (1.15)	4.03 (1.89)
Conservation Fee Paid at this Park	R45.00	R45.00	R25.00	R45.00
Daily Fees for Household [58]	R295.82 (R231.75)	R256.98 (R231.20)	R286.93 (R282.63)	R51.61 (R50.21)
Total Household Fee Expenses During this Visit	R949.62 (R982.14)	R1008.41 (1 770.60)	R320.61 (R261.69)	R217.41 (R201.19)
WTP this as "Fair Fee" for this Park[59]	R50.63 (24.54)	R71.03 (R96.62)	R36.43 (R18.14)	R 51.59 (R22.81)
WTP this "Fee Increment" at this Park	R50.48. (R89.01)	R27.37 (R42.96)	R43.75 (R70.02)	R50.86 (R84.91)
WTP this "Voluntary Donation" at this Park	R55.05 (R93.33)	R32.77 (R45.57)	R63.02 (R94.71)	R55.82 (R87.26)
Won't Visit this Park at this Fee or Higher	R116.94 (R90.14)	R169.61 (R220.40)	R85.33 (R37.97)	R106.83 (R72.75)
Accommodation costs incurred at this Park	R3 137.86 (3838.738)	R2 802.07 (R2 736.03)	R1209.29 (R1 197.17)	R 1 711.12 (R1 850.69)
Total Trip Costs	R7 565.51 (R6 263.59)	R7 521.90 (R10 037.30)	R4 635.20 (R3 779.10)	R 3 852.76 (R4 419.33)
Household Annual Income	R340 144.20 (R216 050.80)	R300 259.00 (R241 588.10)	R274 795.90 (R167 374.70)	R287 456.90 (R192 981.90)
Actual Number of Nights Spent at this Park	7.76 (9.63)	10.28 (11.12)	1.96 (1.28)	5.47 (3.79)
Number of Nights Desired at Zero Park Fee	8.39 (10.01)	11.06 (11.62)	2.94 (3.07)	6.51 (5.02)
Number of Nights at Increased Fee[60]	7.83 (9.85)	9.57 (10.85)	1.93 (1.27)	5.44 (4.09)
Age of Respondent (in years)	49.28 (12.45	49.70 (14.70)	50.53 (13.46)	44.48 (14.65)
Respondent is Male	62.50%	67.24%	59.18%	67.24%
Respondent is Black	0.97%	7.76%	0%	1.72%
Respondent is White	97.09%	92.24%	100%	98.28%
Respondent is Coloured	1.94%	0%	0%	0%
Respondent is Indian/Asian	0%	0%	0%	0%
No. of Obs.	104	116	49	116

Standard deviation in parentheses

[58] All visitors ordinarily pay conservation fees. However, some within the group visiting together had "wild cards" offering discounted fees and others paid old citizens' rates. As such, daily household fees will not necessarily be Conservation Fees x Household Size.

[59] None of the 3 WTP prices (fair price, raised prices and voluntary donation) are included in our model.

[60] The hypothetical increased fee is what we finally account for in our model. The number of nights corresponding to increased fee is generated from a question shown in table 4.1.

University of Cape Town

The data indicate that the majority of visitors to national parks do not make use of travel agency services. This is not surprising as the majority are domestic visitors who are more familiar with the local recreational services.

The average visitor who enjoys national parks around South Africa is approximately 50 years old, has at least a University degree and has an average household size of about 3.24. Given the average household size, the fact that an average of 2.94 of household members were on the trip during the time of the survey indicates that parks offer a great opportunity for a family vacation.

A median South African traveller spends between R3 852.76 to R7 565.51 on total trip costs at Pilanesberg and Kgalagadi respectively. Pilanesberg's lowest total trip costs is attributed to the fact that an overwhelming majority of respondents are from nearby cities, Johannesburg and Pretoria - which are an hour's drive away from the park. Augrabies's second lowest trip costs are due to the limited recreational activities at the park which contributes to visitors staying for short periods of time. The trip costs at the two parks are significantly less than at the much physically bigger Kgalagadi and Kruger parks, which are further away and also offer a wide variety of recreational activities. A significant portion of the total trip cost goes towards accommodation inside the parks. Domestic visitors are spending between R217.41 to R1 008.41 on conservation fees during their visits, which account for 5.6 percent and 13 percent of total trip costs at Pilanesberg and Kruger respectively.

Although the conservation fees are fixed for each park, the variability in household size enables us to estimate the actual total daily fees incurred by each visiting household. The total amount spent during the trip on conservation fees accounts for around 10.59 percent of the domestic visitors' total trip costs. The constant terms absorb the expenses held constant, such as like lodging and travel.

Domestic visitors at the Kgalagadi Park earn significantly more than visitors at other parks. This can be attributed partly to the fact that it's the most remote park in the country and is accessible only by 4x4 cars.

University of Cape Town

The willingness to pay additional money for entering the park is significantly higher in the presence of proposed benefit-sharing with local communities than what the park visitors deem to be a fair conservation fee level. It also seems that park visitors feel strongly about the institution that manages the revenues on behalf of local communities with visitors showing trust and willingness to contribute more when independent organisations administer the funds. A comparison of the means from the two ways of generating revenues for the local communities suggests that visitors prefer community-bound conservation revenues to be generated through voluntary donations.[61]

Although the variable representing race is not ordinarily expected to influence demand visitation, it is of great importance in South Africa which still has baggage from the apartheid era. The white market is considered to be mature in South Africa, hence other race groups are seen as crucial for achieving growth in the domestic market. The descriptive statistics indeed show that more needs to be done to grow these particular segments of the domestic market given that they account for approximately 91 percent of the South African population. The fact that SANParks has a consolidated marketing strategy targeting black, coloured and Indian races is testimony to this.

The data indicate that 96 percent of the respondents are white. The population income statistics indicate that 53 percent of white visitors earn more than R300 000 per annum. A look at the black, coloured or Indian races reveal that a mere 36 percent earn more than R300 000 per annum. Given the income distribution of park goers, and the income distribution of blacks, coloureds and Indians, we would expect an increase in the latter groups' visitation. According to SANParks (2010), there was a significant increase of 17.5 percent in black, coloured and Indian races compared to the previous period (2008/2009 financial year). This suggests that income alone does not account for the whiteness of the parks.

[61] We carried out two-tailed tests assuming unequal variances and a 5 percent significance level to formally assess whether magnitudes of the stated mean willingness to pay differ between the two payment vehicles. We conclude that the difference between "fee increment" and "voluntary donation" WTP is statistically significant only for visitors in Kruger and Augrabies.

University of Cape Town

4.4.4. Estimation Technique

This section discusses the appropriate estimation technique given the nature of the data collected. Many statistical analyses involving individual data have a censored dependent variable (Greene, 2008). In a case where the dependent variable is censored for a significant proportion of the observations, parameter estimates obtained through conventional regression techniques such as the Ordinary Least Squares (OLS) are biased. In that case, the technique proposed by Tobin (1958) yields consistent estimates. In the generalised censored regression model, the dependent variable can be either left-censored, right-censored, or both left-censored and right-censored, where the lower and/or upper limit of the former variable could take any value (Henningsen, 2010):

$$Q_h^* = x_h'\beta + \varepsilon_h \qquad ; \text{h=1,.., N} \tag{4.2}$$

$$Q_h = \begin{cases} a, \ if \ Q_h^* \leq a \\ Q_h^* \ if \ a < Q_h^* < b \\ b \ if \ Q_h^* \leq b \end{cases} \tag{4.3}$$

Where a indicates the lower limit and b the upper limit of the regressed variable, h refers to the observations, Q_h^* is an unobserved variable, x_h is a vector of independent variables, β is a vector of unknown parameters and ε_h is a disturbance term.[62]

Tobit models are commonly used in the context of cross sectional or panel data. Thus, autocorrelation in a Tobit model is less likely to be an issue in a case of panel data than in a univariate time series. With panel data, the model should ideally allow for individual observations that define a cross-sectional unit of data to differ systematically in the value of the dependent variable for reasons unobserved to the econometrician. In the case of the Tobit model, such individual specific observation, time-variant effects are modelled as a random effect (Wooldridge, 2002). A fixed effects model is not desirable due to problems in getting a good estimate of levels rather than changes (because you can't accurately estimate the fixed effects themselves), hence it's better to use random effects.

[62] In a case where $a = -\infty$ or $b = \infty$, the regressed variable is not left-censored or right-censored, respectively.

University of Cape Town

The random effects model using the full data set is preferred because it uses all the available information[63] (see Chase et al., 1998). According to Hsiao (1986) and Greene (1993), the random effects model makes it possible to draw inferences about the demand preferences of the population given the observed behaviour of the sample to be made. According to Chase et al. (1998), the random effects specification estimates the correlation between the multiple observations for an individual, and thereafter uses that output to generate more efficient coefficient estimates. An assumption made in this model is that the unobserved person-specific effect is uncorrelated with the included regressors.

The random effects Tobit model is therefore used to estimate visitation demand at the four parks. In a case where the sample data is clustered over a narrow price (and visitation demand) range, a log-linear demand may be better choice than a linear model (Thomas and Maurice, 2008). This is indeed the case with our survey data; hence the log-linear model is preferred. Thus, we specify the functional form for the CB data in a double log-functional form as follows:

$$\ln Q_i = \alpha + \beta \ln P_1 + \beta \ln P_2 + \beta \ln P_3 + \beta \ln P_4 + \beta \ln Y + \varepsilon \quad \textbf{(4.4)}$$

Where Q_i is the visitation demand at park i, P_i is the conservation fee at park i, and Y is the individual's disposable income, including other socio-economic characteristics. The model depicts the duration of stay during the year at each of the four parks as a function of the park's own-price, prices at other parks and income, including other socio-economic characteristics. When the visitation demand at national parks is log-linear, the coefficient terms are simply the elasticities. The above model is therefore subsequently used to estimate own-price and cross-price elasticities of visitation demand of the four parks which will form inputs into the computation of the optimal conservation fees that each park should charge to maximise revenue.

[63] Alternatively, a randomly selected observation per person could be used. While this alternative approach ensures independence of observations, it does not use all the available data. This implies that the random effects Tobit model is preferred over the standard Tobit model (see Chase et al., 1998).

University of Cape Town

4.5. Results

4.5.1. Random effects Tobit model for park visitation demand by South African residents

Table 4.3 presents the results of the random effects Tobit model analysing factors[64] determining visitation demand at four South African parks by residents, based on the experimental data generated from the CB approach. The random effects Tobit model proved to be the best fit for our data. Given that we are running a random effects Tobit with double log function, the coefficients in the random effects Tobit model are interpreted as marginal effects[65].

University of Cape Town

[64] Our analyses confirm that the attitudinal variables do not add significant explanatory power, hence these are excluded from the contingent behaviour model.

[65] Our attempts to find out if logs are driving the results using box-cox transformations did not work because the dependent variables are not strictly positive.

Table 4.3: Random effects Tobit model for park visitation demand by South African residents[66]

Variable:	**Kgalagadi Transfrontier Park**	**Kruger National Park**	**Augrabies National Park**	**Pilanesberg National Park**
Price – Kgalagadi (R/night)	-1.180 ***	-0.009	0.197 ***	0.164*
	(0.0824)	(0.082)	(0.072)	(0.086)
Price – Kruger (R/night)	0.0833	-1.032 ***	0.194 ***	0.138
	(0.082)	(0.082)	(0.072)	(0.086)
Price – Augrabies (R/night)	0.0711	-0.032	-0.366 ***	0.092
	(0.0608)	(0.060)	(0.053)	(0.064)
Price – Pilanesberg (R/night)	0.171 **	-0.021	0.142 **	-0.503 ***
	(0.076)	(0.075)	(0.067)	(0.080)
Income (R)	0.102 **	-0.022	0.098	0.091
	(0.049)	(0.044)	(0.060)	(0.068)
Age (years)	0.008	0.242	-0.401 **	-0.178
	(0.167)	(0.150)	(0.203)	(0.230)
No of H/H members on trip	0.064	0.020	0.081	0.396 ***
	(0.020)	(0.089)	(0.120)	(0.136)
Multi-trip	0.116	0.182	-0.309 **	-0.007
	(0.127)	(0.114)	(0.154)	(0.175)
Male dummy	0.060	0.083	-0.027	0.022
	(0.109)	(0.098)	(0.132)	(0.150)
Education (years)	-0.052	-0.006	-0.088*	-0.099*
	(0.040)	(0.036)	(0.048)	(0.055)
Constant	3.574 ***	5.209 ***	0.400	0.839
	(1.178)	(1.109)	(1.263)	(1.455)
Log-Likelihood	-2437.559	-2389.528	-2309.171	-2622.733
Wald chi2(10)	316.53	206.48	106.33	87.91
No. Of. Observations	1890	1890	1890	1890

Source: Field Survey, 2011

legend: * p<0.1; ** p<0.05; *** p<0.01; SE in parenthesis

The model yields expected signs at the four parks (KTP, Kruger, Augrabies and Pilanesberg). In particular, own-price coefficients are negative and significant at all the parks but generally

[66] Economic theory requires that the cross price elasticities be the same. Two of our results are not because one of them is insignificantly not different from 0 while the other one is statistically significant in the two cases. Bonfrer et al. (2006) investigate the theoretical possibility and empirical regularity of these troublesome anomalies (negatively signed cross-elasticities, and sign asymmetries in pairs of cross elasticities). They found that the presence of negative cross-elasticities is theoretically possible and can be explained by the relative magnitudes of the share-weighted income elasticity, the unobserved Hicksian compensated rate of substitution, and the category demand effects. This implies that it is possible for parks to be simultaneously a substitute and a complement to one another.

University of Cape Town

not elastic. However, this implies that an increase in conservation fees would result in a decline in visitation. In the visitation demand function for KTP, the cross-price elasticity is positive and significant with respect to Pilanesberg, indicating that it is a substitute, albeit weak, for KTP. Interestingly, conservation fees at Kgalagadi have no bearing on visitation at Pilanesberg. While some visitors to KTP might contemplate visiting Pilanesberg instead, most visitors to Pilanesberg find it unique enough not to be substitutable by KTP. This would be rational for visitors who package Pilanesberg with the adjacent Sun City tourist resort.

In the visitation demand function for Kruger, it is only own-price which is significant. The insensitivity of visitation demand to conservation fees at the other parks confirms its uniqueness. Indeed, Kruger is by far the most visited park in South Africa, if not in Africa. It receives more than 25 times more visitors per annum than any other park in the country.

In the visitation demand function for Augrabies, all the price coefficients are significant. The responsiveness of visitation demand at Augrabies to conservation fee changes at all the other three parks is expected given the limited size and attractions at the former. Augrabies is the only park in this set where the main attraction is a waterfall. Moreover, it does not have the "Big Five". Therefore, the positive and significant cross-price estimates imply that an increase in fees at the other three parks will result in increased visitation at Augrabies. However, changes in conservation fees at Augrabies will not affect visitation at the other three parks.

In the visitation demand function for Pilanesberg, although there appears to be insensitivity of visitation demand to conservation fee changes at the other parks, household size positively influences visitation demand at that park. Multi-trip arrangements and respondent's age negatively influence visitation demand at Augrabies. Income positively influences visitation demand at KTP, which is perhaps not surprising given that this is the least accessible park given its remote location and aridness.

4.5.2. Optimal conservation fees for domestic visitors at KTP

The main policy objective of this paper is to estimate the optimal conservation fees necessary to maximize park revenue at KTP. Given the low magnitudes of price and cross-price elasticities estimated in this study, we proposed that such fees be imposed on domestic

University of Cape Town

visitors to the park. It is plausible to apply such a park pricing regime to domestic visitors because South African residents make up the bulk of visitors to local national parks. Furthermore, South Africans constitute a significant portion of international visitors in neighbouring countries, where they are charged much higher fees than currently in place in the country. Given the unique profile of South African park visitors (including their high income levels), we argue that this warrants charging them "monopoly" prices at KTP as well as popular parks.

The Marshallian theory of price elasticity of demand can be used to determine the price-quantity points at which revenue is maximized. The standard result from economic theory is that the park agency can maximize revenue by setting the conservation fee at that point where the park visitation demand has unitary elasticity. Using the elasticities estimated in the random effects Tobit model, we solved for the revenue-maximizing daily conservation fees reported in Table 4.4 (see Owen (2012) for a fuller exposition of the computations).

Table 4.4: Various conservation fee options for domestic visitors (in 2011 South African Rand)

	Kgalagadi Transfrontier Park	**Kruger National Park**	**Augrabies National Park**	**Pilanesberg National Park**
Revenue-Maximising Fee (ZAR)	96.64	95.77	108.26	103.11
Revenue-Maximising Fee (USD)	(12.31)	(12.20)	(13.79)	(13.14)
Current Conservation Fee (ZAR)	45.00	45.00	25.00	45.00
Current Conservation Fee (USD)	(5.73)	(5.73)	(3.18)	(5.73)
Choke Conservation Fees (ZAR)	193.29	191.53	216.53	206.22
Choke Conservation Fees (USD)	(24.62)	(24.40)	(27.58)	(26.27)

Source: Field survey (2011) & own computation

The estimates shown in Table 4.4 indicate that the optimal fees could be increased at KTP as well as other parks. The conservation fees at KTP can increase by as much as 115 percent, thereby almost doubling current revenue after accounting for the drop in visitation which will be triggered by the increase. It should be noted that this fee increase will not drastically reduce visitation as it is not very high. For comparison with the ultimate tolerance level of visitors, see the choke conservation fees reported in Table 4.4. The results suggest that an

University of Cape Town

increase at, say, Pilanesberg, which has a low own and high cross elasticity, will result in an increase in revenues.

The computations reported in Table 4.4 suggest that there is a need to reform the current pricing strategy at KTP. This paper argues that two possibilities can be pursued to reform conservation tariffs to help communities extract more benefits for their participation in conservation. One way of doing this is for SANParks to revise the conservation fees to the revenue-maximising level and share the additional revenue with the communities. Of course, a critical concern has to do with what guarantee there is that the increased revenue following the fee increase will actually reach and benefit the adjacent communities. Alternatively, the required increase could be designed as a community-bound voluntary donation. Our results show that visitors would voluntarily give donations above the current conservation fee if they knew it would go to the local communities as compensation for their role in conservation.

Indeed, demonstrating that conservation fees can be designed to maximize revenue from domestic visitors without necessarily preventing lower income people from accessing the parks is important in political debates about land use. Implementation of voluntary donations is one way to over-come any potential adverse effect that optimal fees may have either on the poor or on park visitation demand.

The sharing of conservation revenue with local communities surrounding national parks is one way to demonstrate the link between ecotourism and local communities' economic development. Given that the Kgalagadi had approximately 21 985 domestic visits (which excludes 6 054 Wild Card Free Guests), our proposed scheme would raise R1 135 305.40 (R51.64 per visit). This is a substantial amount of money compared to the San total income. The San do not earn enough money from the tourist spend. Furthermore, the income received from their !Xaus lodge joint-venture is insufficient in comparison to the potential money that could be raised by our scheme. The current arrangement is that SANParks keeps all the revenue generated through conservation fees and yet they receive an equal share of revenues generated from the !Xaus lodge joint-ventures with the communities (Khomani San and Mier). For instance, from its opening in 2007 to March 2010, the !Xaus lodge with just 24 luxury beds generated a net revenue of R130 178 (SANParks, 2010).

University of Cape Town

Introduction of such schemes which directly benefit poor local communities in South Africa is the best way to help land restitution involving national parks to be viewed positively. Clearly distinguishing the part of visitors' payments going to local communities will help visitors connect with co-owners and co-providers of ecosystem services inside national parks. A gesture of this nature could act as an incentive for the local communities to participate in conservation even more than they already do. In fact, the need to share tourism revenue with local communities surrounding parks has recently been embraced by SANParks, as evidenced by their announcement that a 1 percent levy for these purposes will be added to accommodation and activity bookings, effective 1 June 2012 (Mlongo, 2011).

4.6. Conclusion

Now that some of the resource rights inside the Kgalagadi Transfrontier Park have been vested in the surrounding communities, the park should contribute toward improving the lives of these communities so that land restitution will not compromise conservation objectives. Given that the park has well-established infrastructure to help communities extract more benefits for their participation in conservation, this study argues that it is important to establish the possibility of generating more revenue from conservation fees for sharing with the new but poor co-owners of international parklands. If such opportunities exist, then the modes of making tourists pay more can vary from a mandatory conservation fee increment to a voluntary community-bound donation above the regular conservation fee.

In this spirit, the aim of this study was to estimate optimal conservation fees which should be charged at KTP to maximise revenue. This was done with the help of the contingent behaviour methodology. Our analysis, which focused on South African residents, shows that there is a wide variation in the elasticities of demand between the four national parks. The cross-price estimates indicate limited substitutability in visitation demand among the four parks.

Overall, our results suggest that there is sheer underselling of the recreational services offered by the South African park systems, which implies that there is room for improvement in the use of the conservation fee policy. Revenue could be maximized by increasing conservation fees for domestic tourists at Kgalagadi Transfrontier Park as well as the other parks without little effect on visitation. The ability to raise more revenue by the park agency opens up two

University of Cape Town

possibilities: revenue sharing with local communities and more sustainable park management. Our results are consistent with other empirical studies on nature-based ecotourism which estimate higher visitors' willingness to pay for the recreational services of parks. The policy implication is that the park agencies (SANParks & NWPTB) should consider instituting mechanisms for capturing more revenues.

Moreover, our results show that revising conservation fees to optimal levels could play a positive role in redistribution of ecotourism revenue to local communities surrounding national parks. The sharing of fee revenue could address South Africa's heavily skewed distribution of income. Clearly distinguishing the part of visitors' payments going to local communities will help visitors connect with co-owners and co-providers of ecosystem services inside national parks. A gesture of this nature could act as an incentive for the local communities to participate in conservation even more.

University of Cape Town

References

Alberini, A., Longo, A., 2006. Combining the travel cost and contingent behaviour methods to value cultural heritage sites: evidence from Armenia. *Journal of Cultural Economics 30 (4)*: 287-304.

Alpizar, F., 2006. The pricing of protected areas in nature-based tourism: A local perspective. *Ecological Economics 56*: 294-307.

Baldares, M. J., Laarman, J. G.., 1990. De-rechos de Entrada a las Areas Protegidas de Costa Rica. *Ciencias Economicas 10*: 63-76.

Baumol, W. J., Oates, W.E., 1975. The Theory of Environmental Policy: Externalities, Public Outlays and the Quality of Life. Prentice-Hall, Inc: New Jersey.

Bergstrom, T.C., Rubinfeld, D.L., Shapiro, P., 1982. Micro-based estimates of demand functions for local school expenditures. *Econometrica 50*: 1183–1205.

Bonfrer, A., Berndt, E.R.., Silk, A., 2006. Anomalies in estimates of cross-price elasticities for marketing mix models: theory and empirical test. Working paper 12756. Cambridge, Massachusetts: National Bureau of Economic Research.

Bosch, D., Hirschfeld, E. 2002. *The !Ae!Hai Heritage Park bundle - including the agreement whereby the land claims of the Khomani San community and the Mier community are finalized and associated documents*. Pretoria, Commission on the Restitution of Land Rights.

Bull, A., 1995. The economics of travel and tourism (2nd ed.), Longman, Melbourne.

Chase, C., Lee, D.R., Schulze, W.D., Anderson, D.J., 1998. Ecotourism Demand and Differential Pricing of National Park Access in Costa Rica. *Land Economics 74 (4)*: 466 - 482.

Cicchetti, R.T., Peck, N., 1989. Assessing natural resources damages: The case against contingent value survey methods. *Natural Resource and Environment 4*: 6.

Cullen, R., 1985. Rationing Recreation Use of Public Land. *Journal of Environmental Management 21*: 213-24.

Dikgang, J., Muchapondwa, E., 2012. The valuation of biodiversity conservation by the South African Khomani San "bushmen" community. *Ecological Economics 84: 7 – 14*.

Dikgang, J., Muchapondwa, E., *"The effect of land restitution on poverty reduction among the Khomani San "bushmen" in South Africa, ERSA working paper 352, June 2013, South Africa.*

Eagles, P.F.J., McCool, S.F., Haynes, C., 2002. Sustainable tourism in protected areas: guidelines for planning and management. Best Practice Protected Area Guidelines #8, UICN.

Fay, D., 2009. Property, Subjection and Protected areas: The 'Restitution' of Dwesa-Cwebe Nature Reserve, South Africa.

Fractor, D.T., 1982. Evaluating Alternative Methods for Rationing Wilderness Use. *Journal of Leisure Research 14*: 341-349.

Freeman III, A. M., 1993. The measurement of environmental and resource values: Theory and methods. Washington DC: Resources for the Future.

Greene, W., 2008. Econometric Analysis. 6 edition. Prentice Hall.

Grijalva, T.C., Berrens, R.P., Bohara, A.K., Shaw, W.D., 2002. Testing the validity of Contingent Behavior trip responses. *American Journal of Agricultural Economics 84*: 401 – 414.

Hanley, N., Shogren, J.F., White, B., 1997. Environmental economics in theory and practice, Macmillan, London.

University of Cape Town

Henningsen, A., 2010. Estimating Censored Regression Models in R using the censReg Package.

Hirshveld, E., 2009. Adjusted Map.

Hsiao, C., 1986. *Analysis of Panel Data.* Cambridge University Press, Cambridge, Mass.

IUCN (International Union for Conservation of Nature), 1994a. *Guidelines for protected area management categories*. CNPPA with the assistance of WCMC. IUCN. Gland, Switzerland and Cambridge, UK.

Jones, R.S., 1981. Laska native claims settlement act of 1971 (public law 92-203): history and analysis together with subsequent amendments. Report No. 81-127 Gov. American National Government, Alaska.

Khan, H., 2007. Willingness to pay and demand elasticities for two national parks: empirical evidence from two surveys in Pakistan. *Environment, Development and Sustainability:* 1-13.

Laarman, J.G., Gragersen, H.M., 1996. Pricing Policy in Nature-Based Tourism. *Tourism Management 17 (4)*: 247 – 254.

Lee, C., Han, S., 2002. Estimating the use and preservation values of national parks' tourism resources using a contingent valuation method. *Tourism Management 23*: 531–540.

Leibbrandt, M., Finn, A., Argent, J., Woolard, I. 2010. Changes in Income Poverty over the Post-Apartheid Period: An Analysis Based on Data from the 1993 Project for Statistics on Living Standards and Development and the 2008 Base Wave of the National Income Dynamics Study. *Journal of Studies in Economics & Econometrics* 34(3): 25 - 43.

Lindberg, K., 1991. Policies for Maximizing Nature Tourism's Ecological and Economic Benefits. Washington, DC: World Resources Institute.

MacEachern, A. 2001. *Natural Selections: National Parks in Atlantic Canada, 1935-1970.* Canada: McGill-Queen's University Press.

Mckinsey Pricing Policy., 2005. Revised Pricing Structure Announced on 2 April 2003. SANParks Policy Document.

McNamee, K., 2010. Filling in the gaps: establishing new National Parks. *The George Wright Forum 27 (2):* 142–150.

Mendes, I., 2003. Pricing Recreation Use of National Parks for More Efficient Nature Conservation: An Application to the Portuguese Case. *European Environment 13*: 288 – 302.

University of Cape Town

Mlongo, E., 2011. News Release: SANParks reaches out to communities with a dedicated levy. http://celtis.sanparks.org/about/news/default.php?id=1682. (11 July 2011).

Naidoo, R., Adamowicz, W.L., 2005. Economic benefits of biodiversity exceed costs of conservation at an African rainforest reserve. *Proceedings of the National Academy of Sciences 102*: 16712 – 16716.

Owen, G.W., 2012. Applying Point Elasticity of Demand Principles to Optimal Pricing in Management Accounting. *The International Journal of Applied Economics and Finance 6 (3)*: 89 - 99.

Peacock, L., 2009. South African safari guide. http://www.smarttravelasia.com/africa.htm. (20 June 2009).

Pienaar, U de V., "Neem uit die Verlede", Published by South African National Parks (then National Parks Board) in 1990. http://www.sanparks.org/parks/kruger/tourism/history.php. (30 June 2010).

Rosenthal D.H., Loomis, J.B., Peterson, G.L., 1984. Pricing for Efficiency and Revenue in Public Recreation Areas. *Journal of Leisure Research 16*: 195-207.

Sandwith, T., Shine, C., Hamilton, L., Sheppard, D., 2001. Transboundary Protected Areas for Peace and Co-operation. In World Commission on Protected Areas (WCPA), Best Practice Protected Area Guidelines Series No 7, Edited by A. Philips. Based on the Proceedings of workshops held in Bormio (1998) and Gland (2000).

SANParks., 2006. Developing a system for sustainable resource use by the Khomani San in Kgalagadi Transfrontier Park and environs: potential project themes. South African National Parks.

SANParks., 2010. South African National Parks Conservation fees. http://www.places.co.za/html/parks_conservation_fees.html. (5 May, 2010).

Scarpa, R., Chilton, S.M., Hutchinson, W.G., Buongiorno, J., 2000. Valuing the recreational benefits from the creation of nature reserves in Irish forests. *Ecological Economics 33*: 237 – 250.

Schultz, S., Pinazzo, J., Cifuentes, M., 1998. Opportunities and limitations of contingent valuation surveys to determine national park entrance fees: evidence from Costa Rica. *Environment and Development Economics 3*: 131 – 149.

Stevens, J., 2013. Personal communication with the General Manager, Strategic Tourism Services, South African National Parks, May 16.

University of Cape Town

Thomas, C.R., Maurice, S.C., 2008. Managerial Economics. 9th edition, McGraw-Hill Higher Education.

Tobin, J., 1958. Estimation of relationship for limited dependent variables. *Econometrica 26*: 24 - 36.

Wooldridge, J.M., 2002. Econometric Analysis of Panel Data. Cambridge, Massachusetts: The MIT Press.

University of Cape Town

Appendix 1: Questionnaire on the optimal pricing of South African National Parks

Name of Interviewer: _____

Date: ___/___/2011

Instruction

Introduce yourself to the respondent: "I am conducting a tourist survey on behalf of the Environmental-Economics Policy Research Unit, at the University of Cape Town. "The aim of our research is to estimate optimal gate fees at four South African national parks. Charging of optimal gate fees at recreational sites in particular could be a potential source that may be used to generate additional revenue by the park agency to offset the dwindling tax-based government funding. This implies that determination of optimal gate fees at parks could be the source of additional revenue that parks require so they can substantially contribute towards uplifting local communities' developmental state and demonstrate that conservation and ecotourism can indeed lead to tangible benefits accruing to local communities surrounding parks". Your opinion and the information provided by you is important as it may contribute towards developing effective pricing strategies in the context of South Africa's national park system. Your honest response would be appreciated for the success of this research project.

1. VISITOR'S RECREATIONAL BEHAVIOUR

1. HOW OFTEN DO YOU VISIT NATIONAL PARKS (NOT RESTRICTED TO SANPARKS MANAGED PARKS OR SOUTH AFRICAN PROVINCIAL PARKS)?

FREQUENCY		
ONCE A YEAR	1	
ONCE EVERY TWO YEARS	2	
ONCE EVERY FIVE YEARS	3	
ONCE EVERY TEN YEARS	4	
OTHER (SPECIFY)	5	
THREE MOST VISITED NATIONAL PARKS	**ENTRANCE FEE**	**STRUCTURE OF FEE (DAILY FEE, ONCE-OFF, ETC)**

2. IS THIS YOUR FIRST VISIT TO THE KGALAGADI TRANSFRONTIER PARK / KRUGER NATIONAL PARK / AUGRABIES FALL NATIONAL PARK / PILANESBERG GAME RESERVE

YES ☐ **NO** ☐

3. ARE YOU USING A TRAVEL AGENT DURING THIS VISIT

YES ☐ **NO** ☐

University of Cape Town

4. ARE YOU A DAY OR AN OVERNIGHT VISITOR ENTERING AT THE GATE?

TYPE OF VISITOR	**TICK APPROPRIATE CHOICE**
DAY VISITOR	
OVERNIGHT VISITOR	

5. HOW MANY MEMBERS OF YOUR HOUSEHOULD HAVE ACCOMPANIED YOU ON YOUR CURRENT TRIP TO THE CURRENT PARK?..... AND HOW MUCH DO YOU SPEND PER DAY ON ENTRY FEES AT THE CURRENT PARK: **R**_____

6. WHAT IS YOUR APPROXIMATE TOTAL COST OF ACCOMODATION AT THE CURRENT PARK (WHOLE PERIOD): **R**_____

7. HOW MUCH DO YOU SPEND IN TOTAL ON YOUR TRIP TO THE CURRENT PARK: **R**_____

8. WHAT IS YOUR MAIN REASON FOR VISITING THE KGALAGADI TRANSFRONTIER PARK / KRUGER NATIONAL PARK / AUGRABIES FALL NATIONAL PARK / PILANESBERG GAME RESERVE

.....

9. WHAT ACTIVITIES DO YOU PARTICIPATE IN WHILE AT THE KGALAGADI TRANSFRONTIER / KRUGER NATIONAL PARKS / AUGRABIES FALL NATIONAL PARKS / PILANESBERG GAME RESERVE

ACTIVITY	**TICK THE APPLICABLE OPTION**
NONE	
GAME DRIVEACTVITIES	
SELF GUIDED DRIVES	
BIRD WATCHING	
WILDLIFE VIEWING	
DAY WALK ACTIVITIES	
HIKING TRAILS	
WATER FALLS	
OTHER	

PLEASE SPECIFY OTHERS

.....

10. ARE YOU VISITING OTHER DESTINATIONS IN SOUTH AFRICA OR IN NEIGHBOURING COUNTRIES (INCLUDING OTHER SOUTH AFRICAN NATIONAL PARKS) DURING YOUR CURRENT HOLIDAY TRIP

YES ☐ **NO** ☐

11. IF YES, HOW LONG DO YOU PLAN TO SPEND ON AVERAGE IN OTHER PARKS?

NAME OF PARK	**TIME SPENT IN PARK**	**ENTRY FEES PER DAY**

2. VISITOR OPTIMAL CONSERVATION FEES

12. WE WOULD LIKE TO KNOW HOW YOUR VISITATION WOULD BE AFFECTED IF SANPARKS WERE TO DECIDE TO INCREASE ENTRANCE FEES[67]? PLEASE ASSUME THAT THE FEE CHANGES ONLY AT A SINGLE PARK– NOT AT OTHER PARKS. HOW MANY DAYS IN A YEAR ARE YOU PLANNING TO VISIT THIS YEAR OVER NUMBER OF VISITS AT THE DAILY ENTRY FEES SHOWN IN THE CHART BELOW?

[67] *PLEASE NOTE THAT THE ACCOMMODATION RATES, ETC ARE NOT CHANGING I.E. THE ONLY THING CHANGING IS ONE OF THE PARKS' ENTRANCE FEES*.

University of Cape Town

SOUTH AFRICAN RESIDENTS

Name of Park	Actual		Hypothetical Increases							
	Fee	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***
Kgalagadi Transfrontier Park	R45		R56.25		R45		R45		R45	
Kruger National Park	R45		R45		R56.25		R45		R45	
Augrabies Fall National Park	R25		R25		R25		R31.25		R25	
Pilanesberg[68] Game Reserve	R45		R45		R45		R45		R56.25	

SADC

Name of Park	Actual		Hypothetical Increases							
	Fee	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***
Kgalagadi Transfrontier Park	R90		R112.50		R90		R90		R90	
Kruger National Park	R90		R90		R112.50		R90		R90	
Augrabies Fall National Park	R50		R50		R50		R62.50		R50	
Pilanesberg[69] Game Reserve	R45		R45		R45		R45		R56.25	

INTERNATIONAL VISITORS (OUTSIDE SOUTHERN AFRICA)

Name of Park	Actual		Hypothetical Increases							
	Fee	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***	***Fee***	***Days***
Kgalagadi Transfrontier Park	R180		R225		R180		R180		R180	
Kruger National Park	R180		R180		R225		R180		R180	
Augrabies Fall National Park	R100		R100		R100		R125		R100	
Pilanesberg[70] Game Reserve	R45		R45		R45		R45		R56.25	

University of Cape Town

[68] *IN ADDITION TO THE GATE FEE SHOWN ABOVE, PILANESBERG CHARGES R20 FOR EACH CAR THAT GOES INSIDE THE RESERVE.*
[69] *IN ADDITION TO THE GATE FEE SHOWN ABOVE, PILANESBERG CHARGES R20 FOR EACH CAR THAT GOES INSIDE THE RESERVE.*
[70] *IN ADDITION TO THE GATE FEE SHOWN ABOVE, PILANESBERG CHARGES R20 FOR EACH CAR THAT GOES INSIDE THE RESERVE.*

13. THE CURRENT ENTRANCE FEE FOR KGALAGADI TRANSFRONTIER PARK / KRUGER / AUGRABIES FALL / PILANESBERG GAME RESERVE IS RXXXX. IF THE FEE WAS INCREASED, PLEASE INDICATE AT WHAT POINT (FEE) WOULD YOU DECIDE TO THEN RATHER VISIT ANOTHER PARKS INSTEAD? IN ADDITION, CAN YOU PLEASE STATE HOW YOUR VISITATION WOULD BE AFFECTED IF THE ENTRY FEE[71] CHANGED ONLY AT ONE PARK (ITS PART OF EXPERIMENT)

INDICATE THE FEE AT WHICH YOU WOULD VISIT OTHER PARKS INSTEAD								
R								
NAME OF TWO ALTERNATIVE PARKS	**ACTUAL (Rands)**	**HYPOTHETICAL INCREASES (FEES DOUBLE AT ONLY ONE PARK)**						
	Fee	**Days**	**Fee**	**Days**	**Fee**	**Days**	**Fee**	**Days**
			UNCHANGED		UNCHANGED		25%	
			UNCHANGED		25%		UNCHANGED	
KGALAGADI / KRUGER / AUGRABIES / PILANESBERG[72] GAME RESERVE	UNCHANGED		25%		UNCHANGED		UNCHANGED	

14. IN YOUR VIEW, WHAT ENTRANCE FEE LEVELS PER PERSON DO YOU CONSIDER TO BE "APPROPRIATE" FOR THE FOLLOWING PARKS?

Name of Park	**Appropriate Fee**
Kgalagadi Transfrontier Park	
Kruger National Park	
Augrabies Fall National Park	
Pilanesberg Game Reserve	

15. HOW MANY DAYS WOULD YOU VISIT THE PARK DURING A VISIT IF THERE WERE NO DAILY ENTRY FEES.

Name of Park	**No Fees**	**Days**
Kgalagadi Transfrontier Park	R0.00	
Kruger National Park	R0.00	
Augrabies Fall National Park	R0.00	
Pilanesberg Game Reserve	R0.00	

University of Cape Town

[71] *PLEASE NOTE THAT THE ACCOMMODATION RATES, ETC ARE NOT CHANGING I.E. THE ONLY THING CHANGING IS ONE OF THE PARKS' ENTRANCE FEES*.

[72] *IN ADDITION TO THE GATE FEE SHOWN ABOVE, PILANESBERG CHARGES R20 FOR EACH CAR THAT GOES INSIDE THE RESERVE.*

16. *FOLLOWING LAND RESTITUTION WITHIN PROTECTED AREAS, SANPARKS ARE CO-MANAGING SOME PARKS TOGETHER WITH LOCAL COMMUNITIES (EG. CO-MANAGEMENT OF THE KGALAGADI TRANSFRONTIER PARK WITH THE KHOMANI SAN AND MIER COMMUNITY).* ONE OF THE MAIN OBJECTIVES OF THESE CO-MANAGEMENT AGREEMENTS IS TO ENSURE TANGIBLE BENEFITS ARE ACCRUED BY THESE LOCAL COMMUNITIES IN ORDER TO CONTRIBUTE POSITIVELY TOWARDS THEIR *WELLBEING. THIS RESEARCH AIMS TO CONTRIBUTE TOWARDS THIS GOAL, THROUGH COLLECTING DATA ON WHAT TOURISTS WOULD BE WILLING TO PAY TOWARDS THIS OBJECTIVE.*

PLEASE INDICATE IF YOU WOULD BE WILLING TO PAY MORE THAN YOU ARE CURRENTLY PAYING AS AN ENTRANCE FEE[73], TOWARDS EITHER A HIGHER FEE OR A VOLUNTARY-COMMUNITY BOUND DONATION THAT WOULD CONTRIBUTE DIRECTLY TOWARDS DEVELOPMENT OF LOCAL COMMUNITIES SURROUNDING NATIONAL PARKS?

YES		NO	

IF YES, HOW MUCH ARE YOU WILLING-TO-PAY AS THE MAXIMUM ENTRANCE FEE IN THE FORM OF A REVISED ENTRY FEE BEARING IN MIND YOUR BUDGET CONSTRAINTS, VISIT EXPERIENCE AND ENTRY FEES AT OTHER PARKS (INCLUDING PRIVATE RESERVES AND PARKS IN NEIGHBOURING COUNTRIES)?

EXTRA AMOUNT WILLING TO PAY (RAND) PER PERSON OVER AND ABOVE THE EXISTING FEE		
0	0	
1 – 50	1	
51 - 100	2	
101 – 200	3	
201- 300	4	
301 – 400	5	
401 - 500	6	
501 + (SPECIFY)	7	SPECIFY

OR ALTERNATIVELY, HOW MUCH ARE YOU WILLING-TO-PAY IN ADDITION TO WHAT YOU ALREADY PAY IN ENTRANCE FEES TOWARDS THE PROPOSEDVOLUNTARY DONATION, BEARING IN MIND YOUR BUDGET CONSTRAINTS, VISIT EXPERIENCE AND ENTRY FEES AT OTHER PARKS (INCLUDING PRIVATE RESERVES AND PARKS IN NEIGHBOURING COUNTRIES)?

EXTRA AMOUNT WILLING TO PAY (RAND) PER PERSON OVER AND ABOVE THE EXISTING FEE		
0	0	
1 – 50	1	
51 - 100	2	
101 – 200	3	
201- 300	4	
301 – 400	5	
401 - 500	6	
501 + (SPECIFY)	7	SPECIFY

17. IF ANSWER TO ANY OF THE ABOVE IS ZERO OR YOU NOT WILLING-TO-PAY ADDITIONAL FEES ALTOGETHER, WHAT ARE YOUR REASONS (YOU MAY HAVE MORE THAN ONE)?
.....

[73] *PLEASE NOTE THAT THE ACCOMMODATION RATES, ETC ARE NOT CHANGING I.E. THE ONLY THING CHANGING IS ONE OF THE PARKS' ENTRANCE FEES*.

University of Cape Town

3*. GENERAL INFORMATION ABOUT THE VISITOR*

18. GENDER OF RESPONDENT

MALE	1
FEMALE	2

19. VISITOR OR RESIDENT

SOUTH AFRICAN/BOTSWANA RESIDENT	1
VISITOR	2

20. NATIONALITY.....

21. DATE OF BIRTH OR AGE.....

22. NUMBER OF MEMBERS IN THE HOUSEHOLD: _____ PEOPLE

23. WHAT IS YOUR EDUCATION LEVEL

EDUCATION LEVEL	**TICK THE APPROPRIATE**	**SPECIFY THE HIGHEST GRADE COMPLETED**
NEVER ATTENDED SCHOOL		
PRIMARY SCHOOL		
HIGH SCHOOL		
CERTIFICATE		
DIPLOMA		
DEGREE		
POSTGRADUATE		
ANY OTHER FORMAL TRAINING RECEIVED		

24. OCCUPATION

FORMAL EMPLOYMENT	1
SELF EMPLOYED (OWN BUSINESS)	2
UNEMPLOYED	3
STUDENT	4
RETIRED	5
OTHER	6

University of Cape Town

25. LAST YEARS HOUSEHOLD INCOME BEFORE TAXES

PLEASE TICK APPROPRIATE CURRENCY: RAND, PULA, US DOLLAR, EURO, BRITISH POUND OR OTHER.....

PRE TAX INCOME ( )	
0 – 10 000	1
10 001- 30 000	2
30 001 –50 000	3
50 001 – 100 000	4
100 001 – 150 000	5
150 001 – 200 000	6
200 001 – 250 000	7
250 001 – 350 000	8
350 001 – 500 000	9
500 001+	10

26. RACE OF RESPONDENT (**THIS QUESTION IS OPTIONAL**, YOU DO NOT HAVE TO ANSWER THIS QUESTION IF YOU FEEL UNCOMFORTABLE ABOUT IT)

RACE	
BLACK	1
WHITE	2
COLOURED	3
INDIAN	4

University of Cape Town

Appendix 2: Estimation of optimal conservation fees for international park visitors

A2.1 Data collection

University of Cape Town

Table A2.1: A selection of descriptive statistics of the 78 international overnight visitors interviewed

Variable	**Kgalagadi Park**	**Kruger Park**	**Augrabies Fall Park**	**Pilanesberg Park**
	International (n=19)	*International (n=32)*	*International (n=21)*	*International (n=6)*
Visit Frequency to Parks	1.79 (1.48)	1.69 (1.26)	1.86 (1.56)	1.33 (0.76)
First Visit	52.63% (50.20%)	37.50% (48.56%)	80.95% (39.46%)	66.67% (47.95)
Travel Agent	26.32% (44.27%)	21.88% (41.47%)	47.62% (50.18%)	0% (0)
Multi-trip	36.84% (48.49%)	43.75% (49.76%)	90.48% (29.50%)	33.33% (47.95%)
Household Size	2.47 (0.76)	3.34 (2.40)	3.24 (1.91)	2.67 (0.76)
Actual Fee Paid	R180.00 (0)	R180.00 (0)	R100.00 (0)	R45.00 (0)
Daily Fees (Excluding Wild Card)	R753.95 (R768.90)	R682.97 (R667.82)	R580.24 (R802.49)	R50.37 (R32.52)
Total Fee Expenses	R1 718.95 (R1011.59)	R2 331.25 (R1 865.34)	R804.05 (R937.44)	R 196.67 (R108.90)
Fair Fee	R171.58 (R80.84)	R170.63 (R75.60)	R93.81 (R26.76)	R 80.83 (R57.79)
WTP Over and Above Actual Fee Paid:				
Raised Fee	R88.16 (R112.51)	R81.25 (R147.57)	R45.24 (R44.28)	R60 (R97.63)
Voluntary Donation	R76.32 (R101.35)	R89.84 (R153.68)	R41.67 (R46.73)	R35 (R34.61)
No Visit Fee	R286.32 (R 121.61)	R322.42 (R153.44)	R274.29 (R159.12)	R158.33 (R77.11)
Accommodation costs	R1 726.05 (R1 790.26)	R4 835.78 (R4 242.48)	R2352.95 (R2 279.30)	R 2 774.33 (R3 009.46)
Total Trip Costs	R17 404.00 (R19 626.94)	R21 780.00 (R15 234.33)	R11 885.24 (R7 144.41)	R 10 056.67 (R9 738.09)
Household Annual Income	R281 578.90 (R217 132.30)	R325 312.50 (R240 985.10)	R197 142.90 (R197 170.90)	R282 500.00 (R139 850.60)
Actual Number of Nights	3.79 (1.80)	6.06 (6.07)	1.71 (1.04)	5.33 (2.67)
Number of Nights at no fee	4.79 (2.85)	6.88 (7.27)	1.95 (1.53)	6 (1.86)
Number of Nights at Increased Fee	3.94 (1.93)	5.23 (5.91)	1.6 (0.94)	5.13 (2.76)
Age (years)	49.42 (12.12)	48.03 (16.68)	52.62 (15.62)	54.33 (14.61)
Male-Respondents	68.42% (46.73%)	56.25% (49.76)	47.62% (50.18)	83.33% (37.90)

Standard deviation in parentheses

University of Cape Town

On average, respondents interviewed visit national parks about 1.67 times. Our data show that majority of international respondents (59.44 percent) are first-time tourists. The data indicate that majority of international visitors to national parks do not make use of travel agency services, with the exception of visitors at Pilanesberg national park. A slight majority, about 51.1 percent, of international visitors were visiting other recreational sites during their holiday trip.

International visitors earned an average annual income of around R271 633.58, with total trip costs accounting for 5.63 percent of their disposable income. This was expected for two reasons, firstly they incur high travel costs, and secondly in our case given their lower income levels relative to domestic visitors. Given their already higher conservation fees, it is not surprising that international visitor's total daily conservation fees are much higher at R515.54 (which includes 40 wildcard members). The total daily fee expenditure excluding wildcard holders is significantly lower at R325.29. International visitors' total expenditure on conservation fees accounted for 8.26 percent of their total trip costs. The constant terms absorb the things held the same like lodging and travel.

It seems that park visitors feel strongly about the institution that manage the revenues with international visitors of the view that the park agency is well placed to manage this scheme better with raised fee mechanism being their favoured mechanism, with the exception of visitors to Kruger Park. On average, domestic visitors stayed longer at the parks (6.37 nights) compared to 4.22 nights by international visitors. The average international visitor who enjoys national parks around South Africa is approximately 51 years old and has an average household size of about 2.93. About 63.91 percent of the respondents are male and 36.09 percent are female.

Furthermore, we carried out statistical two-tailed tests assuming unequal variances and a 5 percent significance level to assess the magnitudes of the stated mean WTP preferences between the two hypothetical scenarios. We conclude from these tests that the difference between "raised fee" and "voluntary donation" WTP is statistically significant only for local visitors in Kruger and Augrabies.

University of Cape Town

A2.2. Empirical results

The data gathered on park demand preferences resulted in a dataset consisting of five observations for each of the 78 respondents. The international visitor's estimates make use of random effects Tobit regression with a log-linear model. Table A4.2 presents the results of the random effects Tobit model estimation to analyse factors[74] that determine visitation demand by international tourists, based on the CB generated experimental data at the four parks. The regression output for all the parks is presented below:

University of Cape Town

[74] Our analyses confirm that the attitudinal variables do not add significant explanatory power, hence there are excluded from the contingent behaviour model.

Table A2.2: Random Effects Tobit model for demand for visits to the park by international visitors[75]

Variable:	*Estimates: Coefficient*			
	Kgalagadi Transfrontier Park	**Kruger National Park**	**Augrabies Falls National Park**	**Pilanesberg National Park**
Price – Kgalagadi (R/night)	-.568 *** (.186)	-.332 (.223)	-.113 (.141)	-.155 (.132)
Price – Kruger (R/night)	.711 *** (.127)	-.217 (.152)	-.636 *** (.097)	-.022 (.091)
Price – Augrabies (R/night)	.218 (.184)	-1.566 *** (.220)	-.043 (.140)	.029 (.130)
Price – Pilanesberg (R/night)	.235 (.166)	-.092 (.199)	-.123 (.126)	-.348 *** (.118)
Income (R)	-.076 (.089)	.111 (.096)	.024 (.095)	.163 (.162)
Age (years)	-.236 (.330)	-.023 (.354)	-.496 (.352)	-.670 (.598)
No of H/H members on trip	-.221 (.187)	-.111 (.200)	-.202 (.199)	.372 (.339)
Multi-trip	-.716 *** (.218)	-.181 (.234)	-.871 *** (.232)	-.183 (.395)
Male dummy	-.211 (.202)	-.435 ** (.217)	-.113 (.215)	.042 (.367)
Education (years)	.165 ** (.083)	-.064 (.089)	.135 (.088)	.219 (.150)
Asia	.335 (.261)	.175 (.280)	.171 (.278)	-.025 (.474)
American	-.182 (.323)	-.179 (.347)	-.271 (.345)	-.180 (.587)
Oceania	-.110 (.353)	-.612 (.379)	.1304 (.376)	-.261 (.639)
Constant	.204 (3.054)	12.110 *** (3.508)	6.35 ** (2.717)	1.819 (3.820)
Log-Likelihood	-506.555	-569.557	-424.955	-443.914
Wald chi2(10)	84.85	68.58	71.19	25.13
No. Of. Observations	390	390	390	390

Source: Field Survey, 2011

legend: * p<0.1; ** p<0.05; *** p<0.01; SE in parenthesis

Economic theory (law of demand) predicts that there is an inverse relationship between price and quantity demanded; this is indeed the case as the own-price estimates at all the four parks are negatively signed. However, the own-price estimate in Kruger and Augrabies are not statistically significant. The visitation demand at the Kgalagadi is sensitive to fee changes in

[75] It is not surprising that for international visitor's random effects tobit model that dummy variables of regions are not significant because of too few observations. Thus, we should be cautious in interpreting these results given the small sample sizes.

University of Cape Town

Kruger. The positive Kruger coefficient implies that it is a substitute. It is perhaps not surprising given that international visitors have already incurred high travel expenses that income levels do not influence visitation demand at any of the four parks.

A closer look at socio-economic characteristics shows that the multi-trip variable is both negative and significant at Kgalagadi and Augrabies. The fact the latter is the closest park to the former makes this result logical. The education coefficient is positive and significant only at the Kgalagadi. Gender (male dummy) is negative and significant only at the KNP. Neither of the regions that the tourists are from is of any importance in influencing visitation demand in any of the parks. This is perhaps not surprising given the popularity of South African national parks internationally.

Using the elasticities estimated in the random effects Tobit model, we solved for the revenue-maximizing daily conservation fees reported in Table A4.3 (see Owen (2012) for a fuller exposition of the computations).

University of Cape Town

Table A2.3: Various conservation fee options for international park visitors (in 2011 South African Rand)

	Kgalagadi Transfrontier Park	Kruger National Park	Augrabies Falls National Park	Pilanesberg National Park
Revenue-Maximising Fee (ZAR)				
Revenue-Maximising Fee (USD)	1131.94 (144.20)	575.67 (73.33)	722.95 (92.10)	634.11 (80.78)
Current Conservation Fee (ZAR)				
Current Conservation Fee (USD)	565.97 (72.10)	287.83 (36.67)	361.48 (46.05)	317.05 (40.39)
Choke Conservation Fees (ZAR)	1131.94 (144.20)	575.67 (73.33)	722.95 (92.10)	634.11 (80.78)
Choke Conservation Fees (USD)				

Source: Field survey (2011) & own computation

The results above indicate that the fees would have to be hiked[76] at the four parks. Our optimal fee estimates are significantly more than the current fees charged to international visitors at these four parks. Given that the Kgalagadi had 5 496 international visits (which excludes 1 514 Wild Card Free Guests), our proposed scheme would raise R5 231 862.24 (R951.94 per visit). This is significantly higher than the San total income.

A conversion of our estimates to US Dollar's as an international currency would appear to yield reasonable conservation fees which are comparable to those of similar recreational sites in Africa. For example, international visitors pay up to US$50 per night at some recreational sites in Botswana and Zimbabwe.

A2.3. Conclusion

Our analysis regarding international visitors shows that there is a wide variation in the elasticities of demand among the four national parks. Interestingly, our results suggest that revenue could be maximized by increasing conservation fees for domestic tourist's at all four parks. Furthermore, our findings imply that the conservation fees charged to international visitors are significantly lower than optimal. As expected, the optimal fees for international visitors are significantly higher than for local visitors. This indicates that both local and international park fees could be raised.

Given that international visitors are likely to be accustomed to contributing donations in their respective countries at recreational sites (such as museums), the introduction of voluntary donations has the potential to contribute significantly.

University of Cape Town

[76] A point to note is that Pilanesberg charges a weekly rate; hence our estimate reflects the optimal weekly fee. In the case of other parks, we estimate daily optimal conservation fees.

Chapter 5: The economic valuation of dryland ecosystem services in the South African Kgalagadi area and implications for PES involving the Khomani San

Abstract

The economic importance of the dryland ecosystem services in the Kgalagadi area is generally unknown, as is the distribution of benefits from use of the ecosystem services. This study seeks to value ecosystem services in the Kgalagadi area by applying the Choice Experiment technique and thereafter assess the potential for ecosystem services to contribute to the Khomani San livelihoods through a payment for ecosystem services (PES) scheme. The values placed on dryland ecosystem services by both tourists and indigenous communities are estimated using a Conditional Logit model, Random Parameter Logit model, a Random Parameter Logit model with interactions and a Latent Class Model to account for heterogeneity in tastes. The results show that local communities would prefer getting increased grazing, firewood collection, hunting opportunities and harvesting of medicinal plants. The park visitors prefer getting more pristine recreational opportunities, increased chances of seeing predators and show disapproval of granting more access inside the Kgalagadi Transfrontier Park to local communities. This scenario shows that there is a possibility to craft a PES scheme where park visitors could compensate the local communities to accept a restriction of resource use in the Kgalagadi area.

University of Cape Town

Keywords: choice experiment, conditional logit, ecosystem services, Khomani San, latent class model, random parameter logit

Note: *An extract of this chapter has been submitted to the EfD (Environment for Development) Discussion Paper Series*.

5.1. Introduction

Our study area is located in the Siyanda District Municipality (comprising six local municipalities) of the Northern Cape province of South Africa, bordering Botswana and Namibia. The district is approximately 120,000 square kilometres and includes large areas in the Kgalagadi desert. The Mier Local Municipality (one of the six local municipalities) is located next to the Kgalagadi Transfrontier Park.

The Kgalagadi area in South Africa is around 160 000 square kilometres with dried-up rivers, sparse scrubland and desert (Encounter South Africa, 2011). Despite this harsh dryland ecosystem environment, this area harbours unique biodiversity (animals and plants). Thus, like many other dryland areas, the Kgalagadi area produces ecosystem services which benefit the broader society.[77] In fact, the area provides a wide variety of ecosystem services ranging from medicinal plants, wild fruits, fuel wood, water, grazing (i.e. provisioning services); erosion control, climate regulation (i.e. regulating services); Camel thorn trees (i.e. supporting services); to eco-tourism, cultural and spiritual benefits (i.e. cultural services). While most visitors to the area mostly enjoy the recreational amenities, the Kgalagadi dryland ecosystem enables local communities, especially the Khomani San, to practice their culture and heritage.[78] Most important to note is that some of the ecosystem services from the area are produced on land owned by the Khomani San (i.e. their communal land and the portion of the Kgalagadi Transfrontier Park (KTP) which was allocated to them under land restitution).

The economic importance of the dryland ecosystem services in the Kgalagadi area is generally unknown, as is the distribution of benefits from use of the ecosystem services. This information can be obtained from an economic valuation of ecosystem services. Most of the ecosystem services are not sold on actual markets hence their economic valuation requires the use of non-market valuation techniques. Economic valuation of non-traded environmental resources is underpinned by the same principle as valuation of any marketed goods and services in that the main aim is to quantify the benefits that people obtain from their services.

[77] According to the MEA (2005) an ecosystem is a dynamic complex community of plants, animals, and smaller organisms and the non-living environment, interacting as a functional. An ecosystem service is a direct benefit that people obtain from ecosystems. Ecosystem services are classified into provisioning (e.g. production of food); regulating (climate regulating); supporting (e.g. Crop pollination); and cultural services (spiritual and recreational benefits).

[78] The Khomani San and Mier communities are located in the Mier Municipality. Livelihood strategies in this area traditionally combine pastoralism, hunting and gathering. The status of the dryland ecosystem affects the wellbeing of local communities.

University of Cape Town

Valuation of ecosystem services is not only of economic interest, but also has social and political implications, particularly in cases of land restitution in South Africa where policy makers ought to keep track of whether the intended outcomes have been achieved. This is particularly true in the case where public investment is needed to uplift rural communities and where additional sources of income for the local communities are urgently required. This suggests that the economic valuation of ecosystem services can demonstrate to decision-makers how maintaining public conservation investments can benefit beneficiaries of land restitution.

This study assesses the economic value of ecosystem services in the Kgalagadi area in an attempt to (i) establish the economic importance of conservation in the area, (ii) identify the beneficiaries of ecosystem services in this area, and (iii) assess the distribution of such benefits to the local communities especially the Khomani San. The economic value of ecosystem services computed for the local communities can complement the value of resource extraction calculated by other studies such as Thondhlana et al., (2011) to derive a full environmental income measure.

This study seeks to value ecosystem services in the Kgalagadi area by applying the Choice Experiment (CE) technique and thereafter assess the potential for ecosystem services to contribute to the Khomani San livelihoods through a payment for ecosystem services (PES) scheme. By assessing the dryland ecosystems in the study area, we acknowledge the importance of these systems; seek to understand the trade-off between non-consumptive use and conservation through use of market instruments in a manner that will incentivise the locals and visitors to utilize these assets sustainably. Given the levels of biodiversity degradation in the area and sustainability considerations, there is a need to harness greater roles for local communities in conservation in the Kgalagadi area. The value of particular attributes can be used as a starting point in the negotiations about price between demanders and suppliers of the service. Should these ecosystems services be proved to emanate from restituted land and that they benefit non-owners, then it can be argued that there be setting up of a PES scheme to generate rewards for local communities' role in conservation.

The reasons for rarely applying PES programmes in this field include the un-competitiveness of the market, equity concern in programme design and the lack of information on benefit

University of Cape Town

estimates. The PES concept is expanding both in academic and in policy circles. Dedication of *Ecological Economics* and *Environmental and Development Economics* to PES is evidence of this expansion. Furthermore, the United State Department of Agriculture recently created an Office of Ecosystem Services and Markets to create "new technical guidelines and science based methods to assess environmental service benefits which will in turn promote markets for ecosystem services, including carbon trading to mitigate climate change (Liu et al., 2010)".

The CE approach is an ideal method for valuing individual attributes of ecosystems, in addition to estimating the total value of the environmental asset as a whole. There are different categories of land and land tenure in the Kgalagadi area, and there are different categories of beneficiaries from the ecosystem services in that area. The CE approach is therefore preferred as it can help unravel the different values assigned to specific ecosystem services by their suppliers and demanders. According to Liu et al., (2010) valuation of this natural capital is an attempt to provoke stakeholders to acknowledge ecosystems contribution and significance.

Although there are several studies that have used CE for valuation, its application in dryland ecosystems with contractual parks involving local communities is limited, if not unavailable. This paper contributes to the scant literature on estimation of values of dryland ecosystem services by both tourists and indigenous communities using CE, and is the first application of its kind to be undertaken in South Africa.

University of Cape Town

5.2. Literature review

Most ecosystem services are neither rival nor excludable and are likely to be subjected to market failure. The implication of this failure is that markets cannot send the appropriate price signals to determine the suitable provision of ecosystem services. It is for this reason that a variety of methods have been developed to value ecosystem services, including non-monetary valuation methods, such as ecosystem benefit indicators, and environmental and natural resource methods (Liu et al., 2010).

Valuation of environmental and natural resources has come a long way since the first work carried out in the United States of America in the 1960s which primarily applied the CVM

and the TCM. Since then, valuation of non-market goods and/or services has been attempted in many fields, such as environmental and health studies, and transport and public infrastructure disciplines.

There has been long recognition of the need for valuation techniques that enable the estimation of values for specific attributes of ecosystems. The choice experiment (CE) method has emerged as the panacea as it allows for multi-attribute valuation. As a valuation technique, the CE is deemed as a more generalized version of the single attribute dichotomous choice CVM. Indeed both CE and CVM are considered as stated preference valuation methods (Adamowicz et al., 1998).

The CE technique was initially developed by Louviere and Hensher (1982) and Louviere and Woodworth (1983) as conjoint analysis in a multi-attribute preference elicitation format in marketing literature (Louviere et al., 2000). Despite similarity to conjoint analysis, choice experiments have a more direct link with economic theory. The approach has its roots in Lancaster's profile of value, as well as in random utility theory and experimental design (Adamowicz et al., 1998a; 1999).

Lancaster's theory of derived utility implies that a consumer's satisfaction is defined over a bundle of attributes of a purchased good or service (Gravelle and Rees, 1992). As a result of budget considerations, a change in price can lead to a discrete switch from one bundle of services to another that is consistent with cost-efficiency combination of attributes. The link between the Lancasterian theory of value and consumer demand models for discrete choices enhances the understanding of the underlying theory of choice experiments (Hanemann, 1984 and 1999).

The CE approach combines elements of experimental design, survey questionnaires, and discrete choice modelling to produce estimates of demand as a function of attributes of the services and/or goods and alternatives (Naidoo and Adamowicz, 2005). A study by Adamowicz et al., (1998) was the first study to use this technique (CE) to value non-market environmental services. Ever since, there have been a noteworthy and ever-increasing number of studies in the environmental economics literature (Alpizar, 2002).

University of Cape Town

An increase in the application of CE can be attributed to various reasons ranging from the technique's capability to minimize some potential bias of the CVM; more information is elicited from each respondent relative to CVM; and the prospect of testing for internal consistency (Alpizar, 2002). For example, several studies conducted in the past 15 years show that CE has many advantages over the CVM. A study by Boxall et al. (1996) about moose hunting found that CE's were more appropriate than CVM when substitution effects were important.

However, one possible disadvantage compared to a CVM may be that because CE surveys are detailed, they can be more challenging for respondents or they may make potential respondents less likely to participate (Raheem et al., 2009). Furthermore, a study by Adamowicz et al. (1998) showed that CE has the same problem of negative welfare measures as the CVM. The challenge of negative welfare measures was familiar from the CVM literature. The subsequent CE studies that followed have tried in different ways to address or minimize this problem. A study by Haffen et al., (2005) applied different hurdle models to differentiate serial nonparticipants from other respondents, while Carlsson and Kataria (2005) developed a spike model where demanders are distinguished from non-demanders. The use of these models can go some way to minimizing the problem posed by negative welfare measures.

CE design primarily involves four steps, firstly defining the service to be valued with regard to its attributes and the levels these attributes take; followed by experimental design; questionnaire design; and sample choice. According to Hearne and Salinas (2002) by soliciting people's preferences for distinct hypothetical packages involving different levels of each respective attribute, including price, welfare measures and values can be estimated.

According to Raheem et al., (2009) each attribute contributes to the overall utility that an individual derives from the good or service in question. The fundamental idea of a CE is to assess how people simultaneously make trade-offs given a multitude of attributes. The fact that people have different beliefs and preferences results in them choosing different options, which makes it possible to estimate and statistically distinguish WTP for each attribute.

University of Cape Town

In a CE study, given a hypothetical setting, a respondent is asked to select their most preferred alternative among a choice set (set of alternatives) and are asked to repeat this choice for several sets. The alternatives involve different combinations of attribute levels (Kataria, 2007). By assessing the choices made by individuals, it is possible to reveal the driving factors which influence their choice (Campbell et al, 2007). For a more detailed overview of CE's, refer to Louviere et al. (2000) and Alpizar et al. (2003).

Given the nature of choice data generated from surveys, the CE method usually uses probabilistic choice models such as the logit, probit and conditional logit to generate welfare measures (Kataria, 2007). CE-generated welfare estimates are consistent with utility maximisation and demand theory because the econometric analysis is based on a random utility model that exactly parallels the theory of rational, probabilistic choice (Bateman et al., 2003). The basis for random utility theory is the hypothesis that respondents will make choices based on the profile of the good or service along with some degree of randomness (Snowball et al., 2008). This randomness can be attributed to either a component of random preferences of the respondent or the incomplete information set that is made available to the respondent by the researcher.

The researcher can make use of a set of observed discrete choices to determine different marginal values for each attribute used in explaining the policy alternatives, instead of a single value for the whole policy scenario (Ferrini and Scarpa, 2007). The possibility of only getting the latter is considered as a constraint of the CVM, which unlike the CE's is not able to trace out the underlying WTP for each attribute. Nonetheless, the efficiency of the multi-attribute estimates relies on the choice of experimental designs i.e. how attributes and attribute levels are combined to create synthetic alternatives and eventually choice sets to provide as much information on the model parameters.

5.3. Methodology

In generating the choice sets for use in the survey, there are a number of design decisions which researchers need to make. These include whether to use main effects or interactive effects; generic or specific alternative titles; and the sample size. There are now several customized software designed to assist with CE design and analysis. The CE design in this

University of Cape Town

study was modelled using SPSS. The sub-sections below go through each of the design options and motivate the decisions which were adopted.

5.3.1. Main effects vs. interactive effects

The Kgalagadi area produces ecosystem services which benefit both local communities and visitors. Instead of finding the value of the whole ecosystem, this study seeks to value selected ecosystem services from the point of view of both local communities and visitors. In implementing the CE method, we specify seven attributes associated with the Kgalagadi ecosystem for local communities and visitors, namely Camel thorn trees (X_1), seeing predators (X_2), bush food/recreational restrictions (X_3), medicinal plants (X_4), traditional hunting (X_5), grazing opportunities (X_6) and the bid vehicle (X_7). The simple choice model would evaluate design *i* in terms of:

$$Z_i = \int (X_{1i}, X_{2i}, X_{3i}, X_{4i}, X_{5i}, X_{6i}, X_{7i}) \quad \textbf{(5.1)}$$

This is known as a main-effects design as it ignores interactive effects. Ignoring interactive effects is synonymous with settling on a first-order approximation of the true model (Louviere, 1988). Thus, by estimating the model with main-effects only we are making an implicit assumption that all the interaction effects are insignificant. The model with main-effects only has the benefit of significantly reducing the number of treatment combinations required. However, this benefit comes at a cost since each treatment combination represents a separate piece of information, and by using only a *fraction* of possible treatment combinations, we are in effect throwing away a significant amount of information (Hensher et al., 2005). All the same, main-effects designs tend to account for as much as 80% of the explained variance in choice models. Thus, it is generally believed that a simple main-effects design predicts choices fairly well (Reed et al., 2007) and is therefore adequate for the task at hand.

5.3.2. Generic versus specific alternative designs

A distinction is generally made between generic and alternative specific titles. A generic title (such as *Alternative 1, 2, 3*) does not convey any information to the decision maker (respondent) other than that its position as one of the alternatives. When the alternatives are given specific titles e.g. (national park, protected area), such experiments are known as

University of Cape Town

alternative specific experiments (Alpizar et al., 2001; Hensher et al., 2005). Generic experiments have the benefit of not requiring the identification and use of all alternatives within the universal set of alternatives (Hensher et al., 2005).

Since we are interested in the trade-offs made by respondents between attributes, we focus on a generic main-effects model (i.e. without interaction effects) and therefore the degrees of freedom (df) are calculated as $df = L - A$ where A denotes the number of attributes and L refers to the number of levels of attributes. Treatment combinations (i.e. the number of parameters which we would like to estimate) should be greater than or equal to df. Furthermore, one additional degree of freedom is needed to account for the random error component of the model (Hensher et al., 2005).

5.3.3. Determining the sample size

Given a desired list of attributes and attribute levels, we can apply the following rule of thumb to calculate the sample size needed for the CE survey:

$$N = 500\frac{NLEV}{NALT \times NREP} \quad \textbf{(5.2)}$$

where *N* is the sample size, *NLEV* is the largest number of levels in any attribute, *NALT* is the number of alternatives per choice set, and *NREP* is the number of choice sets/questions per respondent. Therefore, a suitable experimental design requires a number of initial judgments on the number of levels of attributes, the number of alternatives per choice set, and the number of choice sets per respondent. Generally, it has been found that the number of alternatives and the number of attribute levels do not have significant effects on eventual estimates (Johnson et al., 2006). Taking lessons from literature and the circumstances in the study area, the following decisions were made: the largest number of levels in any attribute is 4, the number of alternatives per choice set is 3, and each respondent is presented with 4 choice sets. Therefore, applying the formula to our CE design yields a sample size of 208 for the local communities and 104 for the visitors.

In making the decisions stated above we had to consider issues around level balance and orthogonality. Level balance provides an equal number of observations for each attribute

University of Cape Town

level. Our design is balanced in that each level occurs equally often within each attribute which therefore means that the intercept is orthogonal to each effect. This essentially ensures that we obtain the most information possible about each individual parameter. Introducing imbalance is undesirable as it would increase the information we obtain about one particular parameter at the expense of another (Johnson et al., 2006). When every pair occurs equally often across all pairs of factors, the design is orthogonal. Balanced orthogonal designs are desirable as they are 100% efficient and optimal.

5.3.4. Generating the choice sets

It should be note that the experimental design for both local communities and visitors requires seven attributes at 4 levels each. So the full factorial design is given as $L^A = 4^7 = 16384$. This is just for one of the alternatives. If we however estimate a fractional factorial main-effects design we need a minimum of 22 degrees of freedom which corresponds to 22 choice sets i.e. $df = L - A = (4 \times 7) - 7 = 21$ and adding 1 degree of freedom for the error term gives 22 degrees of freedom. However, if we wish to maintain orthogonality, the search for an orthogonal array reveals that we need 32 treatment combinations. These are far more manageable than 1,638,487 treatment combinations for a full factorial design. This is termed a *saturated* design - the smallest design that can be made. More importantly, a saturated design does not need to be the recommended design but provides some context for the recommended design size (Kuhfeld, 2010). A search for an orthogonal design yields one with 32 choice sets. Each of the designs is orthogonal - every pair of levels occur the same number of times across all of the pairs of factors in each design. For example the design for each of the 22 pairs appears once across the seven pairs of factors.

In order to create the choice sets from the levels combinations, we use the technique of cyclical design (i.e. shifting). We first produce the 32 combinations for the experimental design using SPSS. These combinations define the first profile (alternative) in each of the 32 choice sets. From this we create additional alternatives in each choice set by cyclically adding alternatives to the set. For example, the levels of these added attributes add one to the level of the previous alternative. When the highest level is attained, the level of the attribute is set to its lowest level. This works well for our case since we have a generic design.

University of Cape Town

Creating the choice sets this way ensures that there is no overlap in attributes (by construction).[79] When attributes do not vary in a choice set, the researcher does not obtain any information about respondent trade-off preferences from that observation. Clearly, this is not a good feature for choice set design, and we will generally want to minimize its occurrence (Johnson et al., 2006; Chrzan and Orme, 2000).

5.3.5. Optimal (or statistically efficient) designs

The designs that SPSS ordinarily produces are known as *orthogonal fractional factorial designs*. Recently, researchers have suggested that from a statistical perspective, experimental designs underlying stated preference tasks should impart the maximum amount of information about the parameters of the attributes relevant to each specific choice task, something that cannot be guaranteed with an orthogonal fractional factorial design. This has resulted in the introduction of a class of designs known as *optimal or statistically efficient designs (*Hensher and Rose, 2007).

By construction, orthogonal fractional factorial designs are such that the attributes of the design are *statistically independent* (i.e. uncorrelated). Orthogonality between the design attributes represents the foremost criterion in the generation process; the statistical efficiency of the design is rarely considered. Thus, while optimal designs optimize the amount of information obtained from a design, the construction process for orthogonal fractional factorial designs minimizes to zero the correlations evidenced within a design. Optimal designs will be statistically efficient but will likely have correlations; orthogonal fractional factorial designs will have no correlations but may not be the most statistically efficient design available. Hence, the type of design generated reflects the belief of analysts as to what is the most important property of the constructed design (Hensher et al., 2005).

In determining what constitutes the most statistically efficient design, the literature has tended towards designs which maximize the determinant of the variance-covariance matrix, otherwise known as the Fisher information matrix of the model to be estimated. Such designs are known as *D-optimal designs*. In determining the D-optimal design, it is usual to use the inversely related measure to calculate the level of D-efficiency – that is, minimize the determinant of the inverse of the variance-covariance matrix. The determinant of the inverse

[79] Overlap means that an attribute level is the same for both alternatives in the choice set (Reed et al., 2007).

University of Cape Town

of the variance-covariance matrix is known as *D-error* and will yield the same results maximizing the determinant of the variance–covariance matrix (Hensher et al., 2005).

Although D-optimal design is appropriate, we used the orthogonal fractional factorial designs as we believe that orthogonality (variation of the attributes should be uncorrelated) is of paramount importance. Thus, we are mainly interested in estimating the linear main effects, effect of each attribute on utility and not interaction between them. The final design used in the study was balanced and orthogonal.

5.4. Choice modelling framework for Kgalagadi dryland ecosystem services

For the purposes of data collection, two different questionnaires were formulated. The questionnaire used for visitors differs from the one administered to local communities. Nonetheless, both questionnaires[80] generally seek to gather information on general attitudes to ecosystem services, the choice modelling scenario and socio-economic characteristics. A total of eight versions of the questionnaires were finally produced. These were then divided to give eight blocks, allocation of respondents to a particular block were randomized. An equal amount of respondents were required to answer each version.

Visitors are defined as those who had come to the Kgalagadi area for purposes of tourism particularly entering the Kgalagadi Transfrontier Park. The attraction of this semi-arid area is based on an assortment of natural and cultural attributes, which collectively contribute to visitor experience.

In the choice modelling framework, the focus is on attributes of Kgalagadi ecosystem services that are deemed important. The attributes and attribute levels are developed based on reviews of the literature, personal observation spanning from 2009 to 2011, communications with stakeholders and other researchers working in the study area. The attribute descriptions

[80] Two major concerns with respect to the study's validity exist. First, whether the questions included in the questionnaire was tested for validity. Second, if an internal assessment was conducted to test content and construct validity. One of the shortfalls of this study is that the questionnaire did not ask respondents which attributes they put greatest weight on when choosing between alternatives. Therefore we cannot shed light on compensatory decision-making or the lack thereof. Nonetheless, the questionnaire used in the survey underwent numerous revisions following on from focus groups and a pilot study. Thus, we are confident that the study is credible.

University of Cape Town

and their levels[81] are shown in questionnaire shown in the appendix. However, Table 5.1 shows one of the typical choice sets presented to visitors:

Table 5.1: A typical choice set presented to visitors[82]

Attribute	**Status Quo**	**Alternative 1**	**Alternative 2**
Camel thorn trees	6.75 kg	6.75 kg	9 kg
Predator	448	700	1050
Recreational restriction	No Restrictions	No Restrictions	Wilderness Experience & Primitive
Medicinal plants	0.3 kg	1.2 kg	0.3 kg
Bushman cultural heritage	2 months	4 months	6 months
Grazing opportunities	719 large stock KTPs	958 large stock KTPs	1198 large stock KTPs
Levy	R 0	R 150	R 200
Your Choice (tick)			

Our choice set entails asking respondents to choose between two possible alternatives to enhancing ecosystem services preservation, and the status quo (SQ). The SQ is the base line for valuation. Alternative options to the status quo would entail a cost to the households. However, the subtle message is the status quo is that while no payment would be required for it, the ecosystem would naturally continue to be under severe pressure going forwards.

The inclusion of the status quo option may mean that respondents may always select the status quo option, which suggest that they apply a simple decision rule and have failed to make the necessary trade-offs. As a result, the information on trade-offs is lost if individuals prefer the status quo for all choices, but this is also more realistic in terms of generating policy-relevant results. Therefore, it is crucial that a test is performed to check for status quo bias, see table 5.2 below:

[81] As far as the data setup is concerned, it should be noted that there is no dummy coding of quantitative variables (i.e. camel thorn trees, predator, medicinal plants, bushmen cultural heritage and grazing opportunities). Instead, the actual values are used. It should be noted that a dummy coding of qualitative variables (i.e. recreational) is undesirable. Hensher et al. (2005) provide compelling reasons for the use of effects coding as opposed to dummy coding in CE studies (one being the issue of confounding), hence, effects coding is used for qualitative variables (i.e. recreational attribute). Only the analyses for park visitors are affected.

[82] One of the major content validity issues in CE is that of scenario design (i.e. whether the attributes and their levels described in an understandable and clear manner), hence we undertook a pilot study prior to finalizing the questionnaire. For example, in the case of the predator attribute, the levels were defined both as the chance of viewing predators and the absolute number of predator at a waterhole. Our observation from the fieldwork is that there was no confusion with regard to attribute definitions.

University of Cape Town

Table 5.2: Choice frequencies for local communities

Choice	Frequency	Percent
Alternative 1	353	42
Alternative 2	408	49
Status Quo	71	9
Total	832	

Table 5.2 shows the number of times each alternative was chosen (out of 208 x 4 choice sets = 2 496 choice sets across all respondents), and shows that the status quo was chosen 9% of the time. Nine percent of local communities chose the status quo, and so preferred to leave the ecosystem as it is which would naturally continue to be under severe pressure going forward. Although a bias towards the status quo appears, it is insignificant. This suggests an insignificant status quo bias. Therefore, the local communities have demonstrated that they have not applied a simple decision rule and conclude that there have made the necessary trade-offs.

Table 5.3: Choice frequencies for Kgalagadi Transfrontier Park visitors

Choice	Frequency	Percent
Alternative 1	238	57
Alternative 2	178	43
Status Quo	0	0
Total	416	

Table 5.3 shows the number of times each alternative was chosen (out of 104 x 4 choice sets = 1 248 choice sets across all respondents), and shows there was no status quo bias (was never chosen at all). This implies that the park visitors preferred enhancing ecosystem services preservation. Therefore, there is no status quo bias. We conclude that the park visitors have not applied a simple decision rule and have therefore made the necessary trade-offs.

University of Cape Town

5.5. The economic model

The main aim of our analysis is to estimate welfare measures. To be more specific, we intend to obtain the marginal rates of substitution (MRS) or marginal willingness to pay (MWTP). In order to evaluate the welfare effects of changes in the attributes, information regarding visitors' and locals' preferences for attributes of the Kgalagadi dryland ecosystem services is needed. According to Bennett (1999), the MRS between attributes can be estimated by modelling how respondents switch their preferred alternative in response to changes in the attribute levels. Note that we assume a linear utility function:

$$V_{ik} = \beta a_i + \mu \chi_1 \qquad \text{Where} \quad \chi_1 = M_k - P_1 \tag{5.3}$$

Our goal is to express the monetary value respondent *k* attaches to a change in attribute *i.* In the case of small changes, we can approximate changes in *v:*

$$\Delta V_{ik} = \frac{\partial V_{ik}}{\partial a_i} \Delta a_i + \frac{\partial V_{ik}}{\partial \chi_1} \Delta \chi_1 \tag{5.4}$$

By setting $\Delta V_{ik} = 0$ we can solve the equation for $\Delta \chi_1$.

$$\Delta \chi_i = - \left(\frac{\partial V_{ik}}{\partial a_i} \Big/ \frac{\partial V_{ik}}{\partial \chi_1} \right) \Delta a_i \tag{5.5}$$

[83]

The MRS or MWTP between an attribute and money is:

$$MRS/\ MWTP = \frac{\partial V_{ik}}{\partial a_{ik}} \Big/ \frac{\partial V_{ik}}{\partial \chi_1} = \frac{-\beta_i}{\mu} \tag{5.6}$$

Thus marginal values are estimated from the MRS between a coefficient β_i and the coefficient for the price parameter, μ (i.e. amount visitors would be willing to forego to conserve dryland ecosystems). By using the monetary attribute (cost to the respondent), we are able to estimate the average individual's MWTP. Note that, since this is a ratio, the scale parameters cancel each other out. Therefore, we can compare across models. A vital point to

[83] What change in real income would bring utility back to initial level (i.e. prior to change in a occurred).

University of Cape Town

note is that this welfare measure is not comparable to welfare estimates from CVM-generated estimates for the whole good as this is the MWTP for one attribute only (Carlsson, 2008).

There are two sources of variation (Haab and McConnell, 2002): variation across individuals and uncertainty from the randomness of parameters. There is no preference uncertainty since the error term does not enter the MRS expression. Variation across individuals can be obtained by including socio-economic factors which are interacted with the attributes. This makes it possible to obtain an average individual MRS for the various socio – economic groups. A point to note is that interaction with the alternative specific constant (ASC) does not affect MWTP. According to Krinsky and Robb (1986), for policy purposes it is of interest that we obtain the distribution of the welfare effects. Uncertainty from the randomness of parameters can be handled in various ways: using the Delta method, Bootstrapping, or the Krinsky-Robb method.

To illustrate the basic model behind the CE presented here, consider a Kgalagadi visitor or local resident's choice for a dryland ecosystem conservation initiative and assume that utility depends on choices made from a set *C*, i.e., a choice set, which includes all the possible conservation options. The representative visitor is assumed to have a utility function of the form:

$$U_{ij} = V(Z_{ij}) + \varepsilon\,(Z_{ij}) \qquad \textbf{(5.7)}$$

where for any respondent *i*, a given level of utility will be associated with any ecosystem conservation alternative *j*, *V* is a nonstochastic utility function and ε is a random component. Utility (U_{ij}) derived from any of the conservation alternatives is assumed to depend on the attributes (Z), such as probability of seeing predators and recreational restrictions. The attributes may be viewed differently by different individuals, whose socio-economic profiles will affect utility.

The Conditional Logit Model (CL) has been the work-horse model in CE. The main reason is simplicity to estimate. However, the last 10 years or so has seen a rapid development of other models as computer capacity and algorithms has made this model somewhat less important.

University of Cape Town

Given that the CL is restrictive (Alpizar et al., 2001), we also consider a number of extensions. These extensions "solve" different shortfalls encountered in the CL models.

The Mixed Logit Models (ML) and Latent Class Model (LCM) are such extensions which can approximate any random utility model (McFadden and Train, 2000). The former avoids the limitations of the CL as the alternatives are not assumed to be independent, i.e. the model does not exhibit IIA, there is an explicit account for *unobserved* heterogeneity in taste by modelling the distribution and it is possible to extend this to panel data. Thus, the stochastic component of the indirect utility function for alternative i and individual k is now decomposed into two parts: one deterministic and in principle observable, and one random and unobservable (Carlsson et al., 2003):

$$V_{ik} = ba_{ik} + \eta_k a_{ik} + \varepsilon_{ik} = \beta_k a_{ik} + \varepsilon_{ik} \quad \textbf{(5.8)}$$

Where β is the ASC which captures the effects on utility of any attributes not included in the choice specific ecosystem preservation initiative attributes. The coefficient vector can be expressed as $\beta_k = b + \eta_k$ where the first term expresses population mean and the second is the individual deviation that represents the visitors and local's taste relative to the average tastes in the respective population groups. Now we assume that the error term ε_{ik} is IID type I extreme value, in which case the model is now referred to as a ML (or random parameter logit - RPL) (Alpizar et al., 2001). The individual deviation term is a random term with mean zero. It can take on a number of distributional forms such as normal, lognormal, or triangular. This also determines the distribution of β. If $\beta \sim N\ (b, w)$ (the model) aims to estimate the density function with the two moment's b and w (note that the average individual deviation is estimated). We now assume that the individual coefficients (the preferences) vary in the population with a distribution with density:

$$f\,(\beta \mid \Theta) \quad \textbf{(5.9)}$$

First we can illustrate the choice probabilities for a given set of preferences (beta vector). This is called the conditional probability, which is estimated as:

University of Cape Town

$$L_k(i|\beta) = \frac{\exp(\beta a_i/\tau)}{\sum_{j\epsilon s_m} exp(\beta a_j/\tau)} \quad \textbf{(5.10)}$$

A point to note is that the researcher cannot condition on unknown preferences. The unconditional probability is the integral of the standard logit probabilities over all possible values of beta.

$$P_k(i|\Theta) = \int L_k\left(\frac{i}{\beta}\right) \int \left(\frac{\beta}{\theta}\right) d\beta = \int \frac{\exp(\beta a_i/\tau)}{\sum_{j\epsilon Sm} exp(\beta a_j/\tau)} \int \left(\frac{\beta}{\theta}\right) d\beta \quad \textbf{(5.11)}$$

The choice probability in mixed logit is a weighted average of the logit formula at different values of beta, with the weights given by the density *f* (beta). The estimation is more complex since the integrals cannot be evaluated analytically (i.e. open-form). Thus gradient-based optimization method (such as Newton-Raphson or BFGS) cannot be applied unless we can express the probabilities to choose the alternatives. As a result of this difficulty, we rely on some type of simulation method, called maximum simulated likelihood. These estimation techniques were developed in the past decade or so (see Hensher and Greene, 2003). Moreover, the computer capacity has of course improved dramatically. The simulated maximum likelihood technique simply replaces the $P\,(i|\theta)$ argument in the likelihood function, which lacks closed form solution, with its simulated counterpart SP_k. Our aim is to estimate the moments (b,W) of the distribution θ:

$$P_k(i|\Theta) = \int L_k\left(\frac{i}{\beta}\right) \int \left(\frac{\beta}{\theta}\right) d\beta \quad \textbf{(5.12)}$$

In a nutshell, from a given distribution θ, a draw of the individual specific values of β is taken. From each draw we approximate the choice probability using the standard logit. The mean of *Z* such draws is the approximate choice probability for individual k, denoted L_k.

$$SP_k = \left(\frac{1}{Z}\right) \sum_{r=1}^{Z} L_k\ (\beta_r) \quad \textbf{(5.13)}$$

This by construction is the unbiased estimator of $P_k(i|\theta)$. The simulated log likelihood is then where subscript *n* index sampled individuals. The maximum simulated likelihood estimator is the value θ that maximizes the simulated log-likelihood that is found by gradient

University of Cape Town

search given some starting values. In terms of determining the parameters which should have a random distribution, we opt to keep only the cost parameter fixed, as is common procedure in this kind of analysis. The implication of such an approach is that we know the distribution of the MRS and as a result avoid exploding MRS's.

Determining the distribution of each parameter is very tricky because economic theory has very little to offer to guide these decisions (see Hensher and Greene, 2003). A point to note in these RPL models is the assumption with regard to the distribution of each random parameter. Normal distribution and log-normal distribution are the two common formulations. The log-normal distribution stands out due to its restriction that all respondents have the same sign of the coefficients. However, we know that the log-normal distribution can have a huge impact i.e. mean WTP. Moreover, a log-normal distribution imposes a positive preference on everyone. Therefore if one expects a negative preference, one needs to estimate the model with the negative values of that attribute. Thus, caution should be exercised when using this distribution.

Recent applications of the RPL models seem to suggest that this technique is superior to the CL models of overall fit and welfare estimates (Breffle and Morey, 2000; and Carlsson et al., 2003). In this paper, the RPL model (see Greene and Hensher, 2010; Carlsson et al., 2010; Scarpa et al., 2011) and marginal effects are estimated using LIMDEP 9 NLOGIT 4 (see Greene 1993, 1998).

In LCM's, heterogeneity is cast as a discrete distribution, a specification based on the idea of endogenous taste segments (Bhat, 1997; Wedel and Kamakura, 2000). The sample consists of a finite number of groups of individuals (i.e. segments), each assumed to consist of homogeneous tastes. However, tastes and hence utility functions can vary among segments. The advantage of using this technique is its ability to explain the taste variation across individuals conditional on the probability of membership to a latent segment. The fundamental idea behind the LCM analysis is simple, that some of the parameters of a postulated statistical model differ across unobserved subgroups. These subgroups form the categories of a categorical latent variable (Vermunt and Magidson, 2002).

Given the membership of class *c*, the CL is used to estimate the probability.

University of Cape Town

$$L_k(i|c) = \frac{\exp(\beta_c a_j/\tau)}{\sum_{j\epsilon Sm} exp(\beta_c a_j/\tau)} \quad \textbf{(5.14)}$$

With C classes the basic choice probability is:

$$L_k(i|c) = \sum_{j\epsilon Sm} P(c) \frac{\exp(\beta_c a_j/\tau)}{\sum_{j\epsilon Sm} exp(\beta_c a_j/\tau)} \quad \textbf{(5.15)}$$

The class membership probabilities, P(c), and the class-specific betas to be estimated in the model. P(c) is normally estimated using multinomial logit specification with or without covariates.

The ratio of choice probabilities between two alternatives in a choice set is unaffected by what other alternatives that are available in the choice set and the levels of the attributes of the other alternatives. This requirement may or may not be satisfied, in many cases not. Violations of IIA imply error heterogeneity resulting from omitted variable bias (see McFadden, 1986), applying the CL model assumes that the CL model is the true model in the application of interest and that IIA is fulfilled (Carlsson, 2008). If there is a violation of this assumption, then the HEV or RPL models can also be estimated and reported. The Hausman-McFadden test for IIA violation should be performed (1984).

5.6. Data collection and descriptive statistics

A face-to-face survey was undertaken in May 2012 in the broader Kgalagadi area in an attempt to determine how preferences for particular dryland areas are formed. A survey instrument was prepared in both English and Afrikaans. English and Afrikaans speaking survey enumerators were recruited from among university students and residents in the study area. These enumerators were trained and supervised. The survey[84] attempted to measure

[84] As indicated earlier, the payment vehicle was tested beforehand to ensure its credibility. The fact that most respondents especially park visitors believes that the government should pay for conservation does not imply that the use of a special fund did not convince respondents to pay. These policies (resource use restrictions) cannot be implemented without proper funding. The San communities alone cannot fund these activities. Evidence from the literature suggests that the contingent valuations conducted in poor communities in developing countries have used labour contributions (i.e. willingness to contribute labour) as opposed to financial ones – which appear more credible, practical and realistic. In contrast, a study on valuation of biodiversity by the South African Khomani San (see Dikgang and Muchapondwa, 2012) shows that those who want to contribute labour also have a WTP>0. Therefore in-kind WTP responses were never used. It is on this basis that the problem of those people who would want to pay but in non-cash forms is not encountered in this

University of Cape Town

what people think about dryland ecosystem services conservation in the Kgalagadi area in South Africa.

For visitors, a survey was conducted with randomly picked park visitors (only park goers, and those who already paid to get to the park) at the Kgalagadi Transfrontier Park. Due to the vast size of the park, the surveys were mainly carried out at the gates, accommodation facilities and designated resting sites inside the park. Our sample composition is in line with the visitor profile at the park.

For local individuals, randomly selected households were surveyed in the Khomani San and Mier communal land respectively. Sample size determination took into consideration the elicitation format, as well as the budget constraints. Two hundred and eight randomly selected households were interviewed. Given that only 120 Khomani San out of 320 households were using the restituted land at the time of the survey, our sample size of 104 is representative of the San population. Thus, we restricted the San sample to those who could plausibly have taken up the offer to use Khomani San restituted land. In terms of the Mier, we made settlement maps, and identified each household. Then, we used a random function in Stata. Thereafter, we gave lists of household numbers and maps to enumerators including.

During the interviews, a map of the Kgalagadi dryland ecosystem location and colour photographs were shown to each respondent and enumerators described the Kgalagadi dryland ecosystem, its location, ecological importance and enumerated the ecosystem services.

The household heads were interviewed in each household. Where the respondents were household members other than the heads, their responses were interpreted as coming from the heads themselves. An introductory section explained to the respondents the context in which the choices were to be made and described each attribute and attribute levels, present status and hypothetical future status based on whether preservation action was taken or not. Moreover, respondents were told that there were no right or wrong answers, and that all answers were strictly confidential.

University of Cape Town

study. Thus money WTP is not biased downwards. This implies that it was not necessary to use in-kind WTP responses for the San indigenous people.

A total of 312 were completed, of which one third were visitors. Of the remaining 208 respondents, there were split equally between the Khomani San and Mier people. In addition to the CE questions, the survey gathered personal information of respondents to gain more insights about factors that affect the way people feel about dryland ecosystems. The information is used as explanatory variables to investigate heterogeneity in preferences. The descriptive statistics of the sub-samples are presented in Table 5.4:

Table 5.4: Summary statistics of the respondents

KGALAGADI LOCAL RESPONDENTS[85]			**KGALAGADI TRANSFRONTIER PARK VISITORS**[86]		
Variable	***Mean***	***Std.Dev.***	***Variable***	***Mean***	***Std.Dev.***
Harvest medicinal plants from communal land	0.581	0.493	Willingness-to-pay land owners (San) to ensure there is continued provision of dryland ecosystem services	0.394	0.489
Collect bush-food from communal land	0.533	0.499	Regular visitor	0.678	1.263
Collect firewood from communal land	0.856	0.351	Main attraction for visiting area – Birds	0.982	0.135
Make crafts	0.327	0.469	Main attraction for visiting area – Predators	.030	0.170
Involved in game farming	0.130	0.336	Main attraction for visiting area – Diversity of plains & Game	0.962	0.190
Involved in livestock farming	0.423	0.494	Main attraction for visiting area – Landscape	0 .971	0.167
Involved in traditional hunting	0.188	0.390	Main attraction for visiting area – Hiking Trails	0.096	0.295
Involved in tracking activities	0.163	0.369	Main attraction for visiting area – 4X4 Drivers (Trails)	0.115	0.320
Undertake other activities in communal land	0.048	0.214	Main attraction for visiting area – San Rock Engravings	0 .115	0.320

[85] It is vital that we analyse the Khomani San's preferences pertaining to activities that take place inside the park given that they have resource rights inside the park. This information will shed light on the local people's attitudes towards conservation in the area as a whole.

[86] It should be noted that the Khomani San people as co-owners of the park have resource rights inside the park. This implies that the San are entitled to collect medicinal plants, consider grazing opportunities inside the park and collect firewood. In fact, some of the San people are already collecting medicinal plants inside the park. Their actions will impact on visitor experience, hence it is vital that we assess their preferences. If the activities that locals want are in conflict with what tourists want, there will be a conflict. The conflict would be detrimental to conservation in the Kgalagadi area, hence it's vital the visitor's views about these potential scenarios are better understood.

University of Cape Town

Undertake activities in other areas	0.323	0.468	Main attraction for visiting area – Presence of San	0.135	0.341
Gender of respondent	0.361	0.480	Main attraction for visiting area – Other	0.202	0.468
Age of respondent	44.230	15.195	Actual number of nights spent at the Park	7.606	5.321
Responsible for paying household bills	0 .683	0.476	Involved in tracking with the San people	0 .077	0.267
Household size	5.683	3.246	Buy crafts from the San	0 .126	0.332
Involved in conservation in communal land	0.221	0.415	Involved in taking photos with the San	0.087	0.282
Education years of respondent	6.697	3.879	Take photos with San in exchange for cash	0 .029	0.167
Respondent employment status (1=fulltime employment; 2=part-time employment; 3=self-employment; 4=fulltime student; 5=part-time student; 6=retired; 7=other)	5.269	2.233	Visit the area again in 5 years	0 .726	0.446
Household Income (Rands)	27 019.20	30 249.60	Gender of respondent	0 .486	0.500
			Age of respondent	58.596	12.588
			Responsible for paying household bills	0 .808	0.394
			Household size	2.394	1.139
			What best describes where you currently live (1=city; 2=town; 3=suburb; 4=small town; 5=farm; 6=rural area)	2.423	1.574
			Education years of respondent	14.548	1.380
			Respondent employment status (1=fulltime employment; 2=part-time employment; 3=self-employment; 4=fulltime student; 5=part-time student; 6=retired; 7=other)	3.750	2.333
			Household Income (Rands)	277 692.00	246 280. 00

Given that the livelihoods of the majority of the Kgalagadi dryland communities are based on the natural environment, it is not surprising that most are involved in firewood collection, collection of medicinal plants and bush food collection in their communal land. The

University of Cape Town

percentage who reported participating in firewood collection is much higher than reported in previous studies (see Dikgang and Muchapondwa, 2012). One possible explanation is that the respondents collect more than usual during winter period, when the interviews were conducted. While the reason of having more respondents reporting to participate in firewood collection is because of the seasonality problem, that data were collected during the winter season could be correct, it should be noted that majority of the respondents are female (64%) whom by African traditions are the ones involved in firewood collection. Thus it is vital to control for this possibilities, or else the conclusion based on weather condition might be misleading.

Given that the Kgalagadi local people are traditionally involved in livestock farming the significant number of livestock farmers reported in this study is consistent. Of particular interest is the fact that 81 percent of the San people interviewed were not involved in traditional hunting. According to Crawhall (2001), out of a wide-range of reasons, the creation of the Kalahari Gemsbok National Park (now incorporated within the KTP) in 1931 was the most notable reason as to why the majority of the San people were forced to give up their hunting and gathering lifestyle to become farm workers. Only a few families remained in the park to work as labourers and trackers until they were also removed in the 1970s.

Very few San people who are still more traditional, hunters and gathers are unable to hunt as much as they would like due to budget constraint. The San community leaders set hunting quotas every year during the hunting time. Hunting time is normally in winter, the hunting fee varies from R300 for a springbok to R600 for a Gemsbok. The San community members also have to pay if they want to hunt. Their fees are lower than for non-community members, R150 for a springbok to R300 for a Gemsbok. Nonetheless, due to their relatively low income levels, very few can afford the hunting fees. It should be noted that most seem to be affected by the modern development and life style that they are pushing away their traditional life style.

Over half (64 percent) of the respondents were female. Most of the respondents indicated that there were persons in their households who paid the utility bills, with an average age of 44 years. The average number of household members is 5.7 persons. On average, most of the local respondents have not completed primary schooling (7 years). Most respondents

University of Cape Town

indicated that there were not aware of any public preservation project within their communal land. The local respondents experienced high unemployment levels, 47 percent on average.

Descriptive statistics for the park visitors reveal that most of the park visitors were not willing to pay the land owners (Khomani San) to ensure that there is continued provision of dryland ecosystem services in the broader area. One of the main reasons cited against such a scheme was that the money would be wasted, as well as that ecosystem preservation should be financed by the government. The abundance of animals, plants and the unique landscape was cited as the main reason for respondents visiting the study area, in particular the park. Approximately 68 percent of respondents were regular visitors to the park. Moreover, the majority indicated that they would visit the park again in the next 5 years.

On average, Kgalagadi park visitors visited the park for about 7.6 nights. Our data show that there is limited interaction between the park visitors and Khomani San people. The most cited interaction is taking of photos with the San, with a mere 3 percent having been involved in this activity. In contrast to local communities, park visitors are much older, have a significantly smaller household size, have completed secondary school (15 years) and have a significantly higher disposable household income. About 49 percent of the respondents are male and 51 percent are female. A picture that also emerges is that only a mere 4.81 percent of the park visitors were unemployed, with 35.58 and 17.30 employed and self-employed respectively. It should be noted that the fact that majority of the interviewed local communities are female (64%), this kind of results should be expected. In most cases in Africa rural women do not have income and also they tend to be younger than males.

University of Cape Town

5.7. Results and discussion

In most cases, we observe respondents making several choices. Stated preference literature often assumes that preferences are stable over the experiment. As a result, the utility coefficients are allowed to vary among respondents but they are constant among the choice sets for each individual. In a case where we have ASCs that are randomly distributed, we would have a random effects model.

We estimate RPL[87] models where we take into consideration that respondents are making repeated choices related to the panel nature of the data. Although the RPL model can account for unobserved heterogeneity, the model is unable to identify the sources of heterogeneity (Boxall and Adamowicz, 2002). The inclusion of interactions of respondent socio-economic characteristics with choice specific attributes and/or with ASC in the utility function is one way to detect the sources of heterogeneity while accounting for unobserved heterogeneity (Birol et al., 2006). Thus, we also estimate a RPL[88] model with interactions.

To make our results more robust, we employ the LCM as an alternative model for accounting for preference heterogeneity. The number of classes can be chosen by the researcher. To identify the optimal number of classes, statistical measures of fitness such as Akaike information criterion (AIC) or Bayesian information criterion (BIC) are commonly used. However, it is not clear whether the parameters of the classes are valid in a behavioural sense.

Thus we estimate a CL, two RPL models and a LCM. RPL model results are obtained using Halton sequences used for simulations, based on 500 draws. The RPL model was estimated with all attributes being randomly and normally distributed. The choice of distribution and which parameters should be random is a difficult choice. There is hardly any model specification which shows a clear dominance. Nonetheless, a specification test was undertaken. We keep everything else beside the cost parameter fixed. There are several reasons for choosing the normal distribution.

First, the normal distribution has been widely used and entails some convenience features. Second, in a situation where there are high parameter values, the probability that a value is on the `wrong' side is very low. Thus, the normal distribution can still be a good approximation

[87] Given that we want to use the RPL, we firstly run it and have all the attributes random (except the cost attribute). Then we check which of the standard deviations of the random attributes are significant. Thereafter, we run the RPL model again and have only those attributes with significant standard deviations random. Since if the standard deviations are not significant you do not have any unobserved heterogeneity in tastes of the respondents and there would be no need to have those attributes random.

[88] It should be noted that because of the use of different distributions in the RPL models it would be more prudent to estimate implicit prices in the 'willingness to pay space'. We have obliviously suggested an alternative approach. According to Carlsson (2008) a common practice is to keep the cost-coefficient fixed. Then we know the distribution of MRS and we avoid exploding MRS. An assumption about the distribution of the parameters implies a distribution of WTP. Given a fixed cost coefficient, the distribution of WTP is the same as for the attribute. Thus, we can talk about a population distribution of WTP, where the distribution is the distribution of preferences in the population. Again, this is NOT the distribution due to parameter uncertainty. There is still need to address that uncertainty too, with Krinsky-Robb, Delta method or bootstrapping.

University of Cape Town

(Meijer and Rouwendal, 2006; Sillano and de Dios Ortand, 2005). Third, given that at times the data is gathered in third world countries where illiterate respondents may make up a significant portion of the sample size, it is likely that due to limited understanding, the choices are made in an irrational way. Yet it is not possible to identify these `wrong' choices, it is likely that some respondents actually have positive parameters for cost. Hence, a wrong sign is a problem of data collection rather than of the statistical and behavioural assumptions (Sagebiel, 2011).

Fourth, as this paper aims to compare the CL, RPL with the LCM, theoretical assumptions on the sign of the parameter do not play a major role. The LCM is also not restricted to one sided parameters, so why should the RPL be? Fifth, after estimating several models with different parameter distributions, the model with all parameters being normally distributed gives the best results. Finally, using different distributions that force the parameter to have a positive sign only leads to further challenges with interpretation and estimation (Sillano and de Dios Ortand, 2005). The parameter estimates for the CL, RPL model and LCM for the local respondents[89] are reported in Table 5.5[90]. The attribute levels details are shown in Table 2.1 in appendix 2.

University of Cape Town

[89] Our data shows that the San people appear to be very poor and relatively uneducated. The choice experiment by its nature is a complex technique which places a cognitive burden on respondents. This is correct, particularly given that the San were each exposed to 4 choice sets with 3 alternatives each, and that each alternative comprised of 7 attributes – a very complex experiment. Based on the evidence from the fieldwork, the San understood the choice scenarios, and the trade-offs. In the presence of evidence from the choice frequencies, the San respondents did not choose status quo option all the time. Moreover, a study on valuation of biodiversity by the San (see Dikgang and Muchapondwa, 2012) shows that despite their low education, the San understand complex environmental issues.

[90] The problem of multicollinearity occurs when a strong linear relationship exists among the explanatory variables. A strong association between the explanatory variables makes it increasingly difficult to assess the impact of individual variables on the dependent variable. There are various techniques to check for the presence of multicollinearity. We checked for multicollinearity using the Variance Inflation Factors for each of the models, and it was not found to be a problem.

Table 5.5: RPL, RPL with interactions and LCM – local communities[91]

CL Model		**RPL Model**		**RPL Model with Interactions**		**LCM**	
|Variable|	***Coefficient (s.e)***	***|Variable|***	***Coefficient (s.e)***	***|Variable|***	***Coefficient (s.e)***	***|Variable|***	***Coefficient (s.e)***
Alfa	1.001 (0.368)	*Random Parameters in Utility Functions*		*Random Parameters in Utility Functions*		*Utility parameters in latent class -->> 1*	
Cost	-0.009 *** (0.002)						
Tree 1	-0.016 (0.014)	Tree 2	-0.096 (.070)	Grazing Opportunities 1	0.003 *** (.001)	Alfa	-0.169 (1.494)
Tree 2	-0.012 (0.012)	Predator 1	0.000 (.000)			Cost	-0.044 *** (.011)
Tree 3	0.003 (0.008)	Bush food 1	0.534 (.401)	*Nonrandom Parameters in Utility Functions*		Tree 1	0.112 (.073)
Predator 1	0.000 (0.000)	Medicinal plants 1	0.707 (.538)			Tree 2	0.169 *** (.059)
Predator 2	-0.000 (0.000)	Medicinal plants 3	0.795 (.506)	Alfa	1.156 *** (.403)	Tree 3	0.173 *** (.048)
Predator 3	0.000 (0.000)	Grazing Opportunities 1	.003 *** (.001)	Cost	-0.010 *** (.002)	Predator 1	-0.006 *** (.001)
Bush food 1	0.042 (0.195)			Tree 1	-0.019 (.016)	Predator 2	-0.001 (.001)
Bush food 2	0.148 (0.137)	*Nonrandom Parameters in Utility Functions*		Tree 2	-0.014 (.013)	Predator 3	0.001 *** (.001)
Bush food 3	0.066 (0.080)			Tree 3	0.004 (.009)	Bush food 1	-1.307 (1.004)
Medicinal plants 1	0.519 ** (0.247)	Alfa	0.610 (1.036)	Predator 1	0.000 (.000)	Bush food 2	0.780 (.451)
Medicinal plants 2	0.278 (0.218)	Cost	-0.020 *** (.005)	Predator 2	-0.000 (.000)	Bush food 3	0.365 (.277)
Medicinal plants 3	0.183 (0.132)	Tree 1	-0.014 (.031)	Predator 3	0.325 (.383)	Medicinal plants 1	0.204 (1.088)

[91] Essentially, if IIA is satisfied then the ratio of choice probabilities should not be affected by whether another alternative is in the choice set or not. One way of testing IIA is to remove one alternative and re-estimate the model and compare the choice probabilities. Although you can test for IIA, for generic experiment we often get problems with attributes with little variation when we drop an alternative (Carlsson, 2008)). With our data we actually have this problem.

University of Cape Town

Bushmeat traditionally hunted 1	-0.061 (0.063)	Tree 3	-0.006 (.016)	Medicinal plants 1	0.104 (.214)	Medicinal plants 2	0.458 (.714)
Bushmeat traditionally hunted 2	-0.002 (0.043)	Predator 2	-0.001 (.000)	Medicinal plants 2	0.226 (.234)	Medicinal plants 3	-0.376 (.617)
Bushmeat traditionally hunted 3	0.026 (0.031)	Predator 3	0.216 (.695)	Medicinal plants 3	0.202 (.144)	Bushmeat traditionally hunted 1	0.195 (.190)
Grazing Opportunities 1	0.001 *** (0.000)	Bush food 2	0.420 (.285)	Bushmeat traditionally hunted 1	-0.097 (.070)	Bushmeat traditionally hunted 2	0.440 *** (.150)
Grazing Opportunities 2	0.001 *** (0.000)	Bush food 3	-0.015 (.181)	Bushmeat traditionally hunted 2	-0.015 (.045)	Bushmeat traditionally hunted 3	0.287 *** (.122)
Grazing Opportunities 3	0.001 *** (0.000)	Medicinal plants 2	-0.476 (.555)	Bushmeat traditionally hunted 3	0.017 (.033)	Grazing Opportunities 1	0.002 (.001)
		Bushmeat traditionally hunted 1	0.036 (.171)	Grazing Opportunities 2	0.001 *** (.000)	Grazing Opportunities 2	0.003 (.001)
		Bushmeat traditionally hunted 2	0.094 (.111)	Grazing Opportunities 3	.001 *** (.000)	Grazing Opportunities 3	0.000 (.001)
		Bushmeat traditionally hunted 3	0.129 (.091)				
		Grazing Opportunities 2	0.002 *** (.001)	*Heterogeneity in mean, Parameter: Variable*		*Utility parameters in latent class -->> 2*	
		Grazing Opportunities 3	0.002 *** (.000)				
				Gender	0.000 (.000)	Alfa	5.381 (13.270)
		Derived Standard Deviations of Parameter Distributions		Age	-0.206 *** (.850)	Cost	0.049 (.109)
				Household Size	-0.000 *** (.409)	Tree 1	-0.654 (.738)
		Tree level 2	0.546 *** (.265)			Tree 2	-0.353 (.479)

University of Cape Town

		Predator 1	0.287 (.001)	*Derived Standard Deviations of Parameter Distributions*		Tree 3	-0.648 (.871)
		Bush food 1	0.554 (2.149)			Predator 1	0.021 (.018)
		Medicinal plants 1	3.166 *** (.950)	Grazing Opportunities 1	0.001 *** (.001)	Predator 2	0.002 (.003)
		Medicinal plants 3	3.166 *** (.950)			Predator 3	-0.002 (.003)
		Grazing Opportunities 1	0.002 *** (.001)			Bush food 1	2.539 (5.268)
						Bush food 2	-3.470 (4.498)
						Bush food 3	-4.859 (6.469)
						Medicinal plants 1	2.713 (9.683)
						Medicinal plants 2	-6.083 (9.157)
						Medicinal plants 3	3.073 (2.733)
						Bushmeat traditionally hunted 1	-1.731 (2.465)
						Bushmeat traditionally hunted 2	-0.675 (.478)
						Bushmeat traditionally hunted 3	-0.292 (1.262)
						Grazing Opportunities 1	0.003 (.011)
						Grazing Opportunities 2	-0.001 (.010)
						Grazing Opportunities 3	0.008 (.006)
						Class probabilities	
						PrbCls_1	0.578 *** (.015)
						PrbCls_2	0.422 *** (.024)

In the standard CL model, since the coefficients are confounded by scale parameter, we cannot interpret the magnitudes of the coefficients. But we can interpret the sign and

University of Cape Town

significance of the coefficients. From statistical point of view, a parameter is statistically significant if the probability of rejecting true null hypothesis is very low. In our case the null hypothesizes for each of the above estimated parameters are that the true parameter values of corresponding attributes is zero. This means that there is no relationship between the attributes and the outcome variable (probability of choosing an alternative containing that particular attribute). The sign of the parameter indicates the direction of the relationship between the attribute and likelihood of choosing the alternative, i.e., whether the probability of choosing an alternative increases or decreases when the level of the attribute increases or decreases.

As shown in the second column of table 5.5 above, the coefficient of cost is negative as expected and it is significant at 1% level of significance. This means that, all else equal, an alternative with high cost is less likely to be chosen. Coefficients of grazing opportunities 1, 2 and 3 are positive and significant at 1% level of significance. This implies that an alternative with these attributes is more likely to be chosen. This is consistent with the a priori positive expectation that people's tendency to like an improved grazing condition of the farmland area. Similarly we can see from the column that the coefficient of medicinal plant 1 is positive and significant at the 5% level of significant which also suggests that the respondents are more likely to choose an alternative with this attribute.

The output shown in column 4 is obtained by restricting the coefficients of Camel thorn trees 2 (1.5 bundles), predator 1 (700 lions), bush food 1 (1 container), medicinal plants 1 (1 container), medical plants 3 (2 containers) and grazing opportunities 1(958 large stock KTPs) attribute to be random and normally distributed. The randomness restriction suggests the presence of taste heterogeneity in the local sample for these 6 attributes. This limitation only holds if the estimated standard deviations are statistically significant. Our results show that there exists taste heterogeneity in the population for the tree 2, grazing opportunities 1, and medicinal plants 1 and 3 attributes. Our results indicate that the local people do not value the predator 1 and bush food 1 attributes differently.

As for the rest of the results, Alfa is the ASC common for the new alternatives, its significance indicates the effect on respondents' utility that is not captured by the attributes listed in the alternatives. In particular, when both positive and significant, it implies that it is

University of Cape Town

more likely that respondents choose one of the new alternatives instead of the status quo, *ceteris paribus*. Thus, our results show that the Kgalagadi local respondents are not supportive of the alternatives. As expected, the cost coefficient is negative, as well as significant. This implies that an alternative with high costs is unlikely to be chosen, *ceteris paribus*. Coefficients of grazing opportunities 2 and 3 are positive and significant. This implies that alternatives with these attributes are more likely to be chosen. Given that livestock farming is one of the main livelihood sources, it is not surprising that an alternative that includes maximization of grazing opportunities is preferred.

In the sixth column, when sex, age and household size are interacted with the grazing 1 attribute we assume that there is preference heterogeneity for this attribute across sex, age of respondents and household size. Indeed, our results show that the estimated mean interaction coefficients, GR Age and GR Household size, are statistically significant. All other estimated parameters can be interpreted in the same way as in column 1 (RPL model).

As shown in Column 8, the first set of estimation results belong to class 1 and the second set belong to class 2. In this particular model, we assume that there are two distinct classes of choice behaviour or preferences. Our results suggest that 58 percent of individuals with similar choice behaviour belong to class 1 and 42 percent in class 2. Thus the majority of the respondents belong to class 1. Individuals belonging to class 1 are more likely to favour an improved stock of firewood (tree 2 and 3), a moderate to large increase in the chances of seeing predators (pred 1 and 3) and an improved stock of bush meat (sting 2 and 3) while the preferences of individuals in class 2 for these attributes are insignificant.

CL, RPL and LCM models were used to obtain local respondents' MWTP for continued provision of Kgalagadi dryland ecosystem services. The MWTP estimates are presented in table 5.6 and 5.7 below.

University of Cape Town

Table 5.6: Marginal Willingness to Pay (MWTP) for dryland ecosystem attributes

Attributes	**CL Model (R)**	**95% Confidence Interval**	**Attributes**	**RPL Model (R)**	**95% Confidence Interval**	**Attributes**	**RPL Model with Interactions (R)**	**95% Confidence Interval**
Tree 1	-1.88	1.534 - 4.073	Tree 2	-4.89	3.266 – 10.07	Male	0 .15 ***	0.045 – 0.139
Tree 2	-1.40	1.322 – 4.076	Predator 1	.018	0.022 – 0.068	Female	0.11 ***	0.036 – 0.112
Tree 3	0.296	0.911 – 2.809	Bush food 1	27.32	19.044 – 58.72	Whole	0.12 ***	0.037 – 0.116
Predator 1	0.02	0.021 – 0.065	Medicinal plants 1	36.16	24.887 – 76.735			
Predator 2	-0.01	0.014 – 0.044	Medicinal plants 3	40.68	23.706 – 73.094			
Predator 3	0.00	0.004 – 0.012	Grazing Opportunities 1	0.15 ***	0.045 – 0.139			
Bush food 1	4.84	21.414 – 66.028	Tree 1	-0.72	1.515 – 4.671			
Bush food 2	17.01	14.943 – 46.075	Tree 3	-0.32	0.798 – 2.46			
Bush food 3	7.58	8.669 – 26.729	Predator 2	-0.032	0.018 – 0.056			
Medicinal plants 1	59.88 **	27.876 – 85.952	Predator 3	0.00	0.004 – 0.012			
Medicinal plants 2	32.09	24.164 – 74.503	Bush food 2	21.50	13.924 – 42.932			
Medicinal plants 3	21.14	15.654 – 48.266	Bush food 3	-0.79	8.902 – 27.448			
Bushmeat traditionally hunted 1	-7.04	7.22 – 22.262	Medicinal plants 2	-24.35	26.705 – 82.341			
Bushmeat traditionally hunted 2	-0.19	4.713 – 14.531	Bushmeat traditionally hunted 1	1.85	8.335 – 25.699			
Bushmeat traditionally hunted 3	3.05	3.382 – 10.428	Bushmeat traditionally hunted 2	4.83	5.39 – 16.62			
Grazing Opportunities 1	0.13 ***	0.04 – 0.124	Bushmeat traditionally hunted 3	6.59	4.385 – 13.517			
Grazing Opportunities 2	0.09 ***	0.032 – 0.098	Grazing Opportunities 2	0.09 ***	0.036 – 0.11			
Grazing Opportunities 3	0.09 ***	0.027 – 0.083	Grazing Opportunities 3	0.10 ***	0.031 – 0.095			

University of Cape Town

In the table above, a positive sign suggests the MWTP for that particular attribute, holding everything else constant. In contrast, a negative sign implies WTA compensation for a change that brings about that particular attribute, holding everything else constant. The CL model shows that respondents are willing to pay R59.88 (US$7.06) for an alternative with medicinal plant 1 all else equal, R0.13 (US$0.02) for grazing 1 and R0.09 (US$0.01) each for grazing 2 and 3.

The RPL model indicates that only the MWTP for grazing opportunities are positive and significant. For instance, local respondents are willing to pay R0.15 (US$0.02) to maintain the current carrying capacity of around 958 large stocks on Khomani San farmlands.

From column 8 we can see that males are willing to pay slightly higher than females. Males have a MWTP of R0.15 (US$0.02) for a programme that maintains the current grazing carrying capacity of their farmland. Females have a MWTP of R0.11 (US$0.01) to remain on the same indifference curve. The MWTP for the whole local sample is R0.12 (US$0.01). The MWTP estimates for the LCM are presented in 5.7 below.

Table 5.7: Marginal Willingness to Pay (MWTP) for dryland ecosystem attributes

Attributes	**LCM (R)**	**95% Confidence Interval**
Class 1	0.01	0.02 – 0.062
Class 2	-0.16	0.303 – 0.451
Whole	0.08	0.153 – 0.471

Comparison of the two classes in column 2 is difficult given that neither of the attributes was statistically significant. Given this complication, it is not surprising that none of the MWTP for any attribute is significant.

University of Cape Town

The results for the Park visitors are presented in table 5.8[92]. As shown below, the LCM model output is not reported. In this particular sample, our analysis suggests that there are no distinct classes of choice behaviour or preference.

Table 5.8: RPL and RPL with interactions – Kgalagadi Transfrontier Park visitors[93]

CL Model		**RPL Model**		**RPL Model with Interactions**	
|***Variable***| ***Coefficient (s.e)***	|***Variable***| ***Coefficient (s.e)***	|***Variable***| ***Coefficient (s.e)***
Alfa	*31.925 (0.000)*	*Random Parameters in Utility Functions*		*Random Parameters in Utility Functions*	
Cost	*-0.005 (0.001)* ***				
Predator 1	0.000 (0.000) *	Recreational Restrictions 1	0.784 (0.537)	Recreational Restrictions 1	2.818 (1.324) ***
Predator 2	0.000 (0.000)				
Predator 3	0.000 (0.000) *	*Nonrandom Parameters in Utility Functions*		*Nonrandom Parameters in Utility Functions*	
Tree 1	-0.029 (0.020)				
Tree 2	-0.021 (0.016)	*Alfa*	*33.869 (0.119)*	*Alfa*	*33.869 (0.113)*
Tree 3	-0.010 (0.010)	*Cost*	*-0.009 (0.003)* ***	*Cost*	*-0.009 (0.003)* ***
Recreational Restrictions 1	0.430 (0.181) **	*Predator 1*	*0.001 (0.001)*	*Predator 1*	*0.001 (0.001)*
Recreational Restrictions 2	0.844 (0.224) ***	*Predator 2*	*0.000 (0.000)*	*Predator 2*	*0.840 (0.000)*
Recreational Restrictions 3	0.670 (0.201) ***	*Predator 3*	*0.000 (0.000)*	*Predator 3*	*0.000 (0.000)*
Grazing Opportunities 1	0.000 (0.000)	*Tree 1*	*-0.050 (0.047)*	*Tree 1*	*-0.054 (0.045)*
Grazing Opportunities 2	-0.000 (0.000)	*Tree 2*	*-0.015 (0.041)*	*Tree 2*	*-0.016 (0.038)*
Grazing Opportunities 3	-0.000 (0.000)	*Tree 3*	*-0.022 (0.021)*	*Tree 3*	*-0.019 (0.020)*

[92] The problem of multicollinearity occurs when a strong linear relationship exists among the explanatory variables. A strong association between the explanatory variables makes it increasingly difficult to assess the impact of individual variables on the dependent variable. There are various techniques to check for the presence of multicollinearity. We checked for multicollinearity using the Variance Inflation Factors for each of the models, and it was not found to be a problem.

[93] Essentially, if IIA is satisfied then the ratio of choice probabilities should not be affected by whether another alternative is in the choice set or not. One way of testing IIA is to remove one alternative and re-estimate the model and compare the choice probabilities. Although you can test for IIA, for generic experiment we often get problems with attributes with little variation when we drop an alternative (Carlsson, 2008)). With our data we actually have this problem.

University of Cape Town

Experiencing Bushman Cultural Heritage 1	-0.000 (0.045)	*Recreational Restrictions 2*	*1.524 *** (0.371)*	*Recreational Restrictions 2*	*1.528 (0.369)*
Experiencing Bushman Cultural Heritage 2	-0.013 (0.036)	*Recreational Restrictions 3*	*0.900 *** (0.256)*	*Recreational Restrictions 3*	*0.913 (0.254)*
Experiencing Bushman Cultural Heritage 3	-0.011 (0.023)	*Grazing Opportunities 1*	*0.001 (0.001)*	*Grazing Opportunities 1*	*0.001 (0.000)*
Medicinal plants 1	-0.222 (0.293)	*Grazing Opportunities 2*	*-0.000 (0.000)*	*Grazing Opportunities 2*	*-0.000 *** (0.000)*
Medicinal plants 2	0.221 (0.494)	*Grazing Opportunities 3*	*-0.998 (0.000)*	*Grazing Opportunities 3*	*-0.271 *** (0.000)*
Medicinal plants 3	0.050 (0.150)	*Experiencing Bushman Cultural Heritage 1*	*-0.007 (0.107)*	*Experiencing Bushman Cultural Heritage 1*	*-.024 (0.102)*
		Experiencing Bushman Cultural Heritage 2	*-0.019 (0.093)*	*Experiencing Bushman Cultural Heritage 2*	*-0.034 (0.088)*
		Experiencing Bushman Cultural Heritage 3	*-0.007 (0.053)*	*Experiencing Bushman Cultural Heritage 3*	*-0.015 (0.050)*
		Medicinal plants 1	*-0.183 (0.614)*	*Medicinal plants 1*	*-0.208 (0.587)*
		Medicinal plants 2	*-0.739 (0.838)*	*Medicinal plants 2*	*-0.631 (0.810)*
		Medicinal plants 3	*0.189 (0.276)*	*Medicinal plants 3*	*0.173 (0.272)*
		Derived Standard Deviations of Parameter Distributions		*Heterogeneity in mean, Parameter: Variable*	
		Recreational Restrictions 1	5.617 *** (2.862)	Employment status	-0.519 (0.296)
				Derived Standard Deviations of Parameter Distributions	
				Recreational Restrictions 1	5.111 *** (2.525)

There are not many significant coefficients in this table. However, the few significant ones meet expectations and are plausible. The CL model shows that the intercept is positive implying that with everything constant the respondents would prefer one of the new alternatives to the current state. It is however insignificant. The cost attribute is significant and has a negative effect on the likelihood of the alternative to be chosen. The predator 1, predator 3, recreational 1, recreational 2 and recreational 3 attributes all have positive and significant effect on the likelihood of an alternative to be chosen.

University of Cape Town

The fact that the recreational 1 (wilderness experience & primitive) attribute is statistically significant proves that there are differences in preferences (see the standard deviation section on the output table - column 1). The intercept is insignificant. The cost coefficient is negative and significant which implies that an increase in costs reduced the likelihood that the alternative is chosen. Recreational 2 and 3 attributes are positive and significant which suggest that improved conditions for visitor experience increases the likelihood that an alternative to the status quo is chosen.

Column 6 results show that the employment status of the park visitor's interaction with the recreational 1 does not matter. Recreation 2 and 3 attributes are also positive and significant. Furthermore, the standard deviation results indicate that valuation of the recreational 1 attribute differs. Table 5.9 reports the implicit prices for each of the dryland ecosystem attributes.

University of Cape Town

Table 5.9: Marginal Willingness to Pay (MWTP) for dryland ecosystem attributes

Attributes	CL Model (R)	Confidence Interval	Attributes	RPL Model (R)	Confidence Interval	Attributes	RPL Model with Interactions (R)	Confidence Interval
Predator 1	0.09	0.05 – 0.154	Recreational Restrictions 1	87.93	62.273 – 192.009	Whole	94.77	176.725 – 266.891
Predator 2	0.06	0.04 – 0.122	*Predator 1*	0.09	0.084 – 0.26			
Predator 3	0.05	*0.026 – 0.08*	*Predator 2*	0.01	0.055 – 0.169			
Tree 1	-5.44	*3.71 – 11.44*	*Predator 3*	0.05	0.044 – 0.136			
Tree 2	-3.83	*2.878 – 8.874*	*Tree 1*	-5.64	5.162 – 15.918			
Tree 3	-1.87	*1.87 – 5.766*	*Tree 2*	-1.72	4.389 – 13.533			
Recreational Restrictions 1	79.40 **	*1.87 – 5.766*	*Tree 3*	-2.52	2.333 – 7.193			
Recreational Restrictions 2	155.88 ***	*35.574 – 109.686*	*Recreational Restrictions 2*	170.88 ***	58.658 – 180.862			
Recreational Restrictions 3	123.79 ***	*48.831 – 150.563*	*Recreational Restrictions 3*	100.89 ***	36.715 – 113.205			
Grazing Opportunities 1	0.04	*41.552 – 128.118*	*Grazing Opportunities 1*	0.07	0.049 – 0.151			
Grazing Opportunities 2	-0.01	*0.033 – 0.101*	*Grazing Opportunities 2*	-0.02	0.036 – 0.11			
Grazing Opportunities 3	-0.01	*0.022 – 0.101*	*Grazing Opportunities 3*	-0.011	0.034 – 0.104			
Experiencing Bushman Cultural Heritage 1	-0.48	*7.97 – 24.574*	*Experiencing Bushman Cultural Heritage 1*	-0.82	11.555 – 35.627			
Experiencing Bushman Cultural Heritage 2	-2.35	*6.39 – 19.702*	*Experiencing Bushman Cultural Heritage 2*	-2.08	9.992 – 30.808			
Experiencing Bushman Cultural Heritage 3	-2.08	*4.109 – 12.669*	*Experiencing Bushman Cultural Heritage 3*	-0.80	5.671 – 17.485			
Medicinal plants 1	-40.95	*52.04 – 160.456*	*Medicinal plants 1*	-20.55	66.305 – 204.441			
Medicinal plants 2	40.89	*86.606 – 267.036*	*Medicinal plants 2*	-82.93	97.426 – 300.396			

University of Cape Town

Medicinal plants 3: Collect 1.2 kg (2 Containers) - 100% more	9.19	*26.438 – 81.518*	*Medicinal plants 3*	21.15	28.405 – 87.583			

In column 2, keeping other things constant, the respondents are willing to pay R79.40 (US$9.36) to have the park consisting of wilderness experience and primitive (i.e. recreational 1), which is significant at 5% level. The marginal WTP for wilderness experience, primitive and comfortable (i.e. recreational 2) is R155.88 (US$18.38) and R123.79 (US$14.60) for wilderness experience, primitive, comfortable and developed, both effects are significant at all levels. The implication of this is that people have a higher preference for wilderness experience, primitive and comfortable than wilderness experience, primitive, comfortable and developed and wilderness experience and primitive.

In column 6, recreational 2 and 3 are the most important, with the only significant MWTP. Kgalagadi park visitors have a MWTP to have the park consisting of the wilderness, primitive and comfortable zones (i.e. recreational 2) of R170.88 (US$20.15), on average. The MWTP for those who want the zoning to include a developed section in addition to recreational 2 (i.e. recreational 3) is R100.89 (US$11.90), on average.

The results for visitors suggest that they want more recreational zones which entail preventing local from extensive use of environmental resources in the area. In particular, locals want more grazing opportunities, more trees for firewood, more predators connected with more hunting. The activities that locals want are in conflict with what tourists want. It therefore means that there is a conflict. This conflict is detrimental to conservation in the Kgalagadi area because the local who stay there permanently have an interest in activities which degrade it. There should therefore be ways to persuade the local to cut down on activities which are detrimental to the environment. From their results, it seems they derive very little value from the things they want to expand.

On the other hand visitors derive a much larger value from expansion of pristine tourism opportunities. Therefore, there seems to be able to compensate the locals and ask them to cut down on destructive activities on nature. Thus, there seems to be grounds to suggest that a PES scheme can potentially resolve the conflict and develop more sustainability in the

University of Cape Town

Kgalagadi ecosystem. Of course, the modalities of visitors pay and how local receive and what actions locals should desist from would require a more detailed analysis. But it seems there is a prima facie case for a PES scheme.

5.8. Conclusion

We contrasted three different models, namely the CL, RPL (with and without interaction) and the LCM. In general, our findings confirm our assumption during choice design that the Kgalagadi local residents (San and Mier) have different preferences to the KTP visitors.

In particular, our results show that a preservation initiative that is aimed at increasing grazing opportunities would be supported by the dryland communities. Although the San indigenous people are traditionally hunters and gatherers, over time a significant number have switched to livestock farming. Given that livestock farming is one of the main livelihood sources in the Kgalagadi dryland area, the ecosystem service that supports such a livelihood source is an important determinant of mode choice. Furthermore, there is considerable taste heterogeneity within the local communities.

The park visitors are more concerned about recreational restrictions within the park as a whole. Given the highly fragile Kgalagadi ecosystem, it is not surprising that park visitors are sensitive about the kind of activities undertaken inside the park.

Our estimates of MWTP suggest that there are significant benefits to be obtained from a programme aimed at imposing resource use restrictions inside the park and indeed outside. The MWTP results for the local sample gives considerably lower MWTP. If locals have less MWTP it means that they value the services less. If visitors have more MWTP it means they value the services more. So those who value the services more can pay those who value the services less so that those who don't value them more can stay away from them.

University of Cape Town

References

Adamowicz, W.L., Boxall, P., Williams, M., Louviere, J., 1998. Stated Preference Approaches to Measuring Passive Use Values: Choice Experiments and Contingent Valuation. *American Journal of Agricultural Economics 80*: 64 - 75.

Adamowicz, W.L, Louviere, J., Swait, J., 1998a. Introduction to attribute-based stated choice methods. Report to NOAA, Resource Valuation Brach, Damage Assessment Center. January 1998.

Adamowicz, W.L., Boxall, P., Louviere, J., Swait, J., Williams, M., 1999. Stated preference methods for valuing environmental amenities. In Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EC and Developing Countries (I. Bateman and K. Willis, eds) pp. 460±479. Oxford: Oxford University Press.

Adamowicz, W.L., Kupris, P.A., Veeman, M.M,. 1999. "Consumers Responses to the Potential Use of Bovine Somatotrophin in Canadian Dairy Production". *Canadian Journal of Agricultural Economics 47*: 151-163.

Alpizar, F., 2002. *Essays on Environmental Policy-Making in Developing Countries: Applications to Costa Rica. Doctoral Thesis, Department of Economics, Göteborg, Göteborg University.*

Alpizar, F., Carlsson, F., Martinsson, P., 2003. Using choice experiments for non-market valuation. *Economic Issues 8*: 83-110.

Alpizar, F., Carlsson, F., Martinsson, P., Using Choice Experiments for Non-Market Valuation. *Working Papers in Economics no. 52, Department of Economics, Göteborg University*, 2001.

Bateman, I.J., Carson, R.T., Day, B., Hanemann, W.M., Hanley, N., Hett, T., Jones-Lee, M., Loomes, G., Mourato, S., Ozdemiroglu, E., Pearce, D.W., Sugden, R., Swanson, S., 2003. "*Guidelines for the Use of Stated Preference Techniques for the Valuation of Preferences for Non-market Goods*", Edward Elgar, Cheltenham.

Bennett, J.W., 1999. "Some Fundamentals of Environmental Choice Modelling", Choice Modelling Research Report No. 11. The University of New South Wales, Canberra.

Bhat, C.R., 1997. An Endogenous Segmentation Mode Choice Model with an Application to Intercity Travel. *Transportation Science 31(1)*: 34-48.

Birol, E., Karousakis, K., Koundouri, P. 2006. Using economic methods to inform water resource management policies: A survey and critical appraisal of available methods and an application. Science of the Total Environment.

Breffle, W., Morey, E., 2000. 'Investigating Preference Heterogeneity in a Repeated Discrete-Choice Recreation Demand Model of Atlantic Salmon Fishing'. *Marine Resource Economics 15*: 1-20.

University of Cape Town

Boxall, P.C., Adamowicz, W.L., 2002. Understanding Heterogeneous Preferences in Random Utility Models: A Latent Class Approach. *Environmental and Resource Economics 23*: 421- 446.

Boxall, P.C., Adamowicz, W.L., Swait, J., Williams, M., Louviere, J., 1996. A comparison of stated preference methods for environmental valuation. *Ecological Economics 18*: 243 - 253.

Campbell, D.W., Hutchinson, G., Scarpa, R., 2007. Using choice experiments to explore the spatial distribution of willingness to pay for rural landscape improvements. Working Paper in Economics 6/07. Hamilton: Department of Economics, University of Waikato.

Carlsson, F., 2008. "Chapter 5 Analysis of Choice Experiment Responses". Unpublished Manuscript.

Carlsson, F., Frykblom, P., Liljenstolpe, C., 2003. 'Valuing wetland attributes: an application of choice experiments'. *Ecological Economics 47*: 95-103.

Carlsson, F., Kataria, M., 2005. Assessing management options for weed control with demanders and non-demanders in a choice experiment. Working papers in economics no. 208, S-WoPEc.

Carlsson, F., Kataria, M., Lampi, E., 2010. 'Dealing with Ignored Attributes in Choice Experiments on Valuation of Sweden's Environmental Quality Objectives'. *Environmental & Natural Resource Economics 47*: 65-89.

Chrzan, K., Orme, B. *An Overview and Comparison of Design Strategies for Choice-Based Conjoint Analysis.* Sawtooth Software Research Paper Series, 2000.

Crawhall, N., 2001. *Written in the Sand: Cultural Resources Auditing and Management with Displaced Indigenous People*. Cape Town, The South African San Institute (SASI) and UNESCO.

Dikgang, J., Muchapondwa, E. 2012. The valuation of biodiversity conservation by the South African Khomani San 'bushmen' community, *Ecological Economics 84: 7 – 14.*

Encounter South Africa. 2011. Kgalagadi Transfrontier Park ecosystem. http://www.encounter.co.za/article/154.html. (10 October 2011).

Ferrini, S., Scarpa, R., 2007. Designs with a priori information for nonmarket valuation with choice experiments: A Monte Carlo study. *Journal of Environmental Economics and Management 53(3)*: 342-363.

Gravelle, H., Rees, R., 1992. Microeconomics. London: Longmans.

Greene, W., 1993. Econometric Analysis. New York: Macmillan.

University of Cape Town

Greene, W., 1998. LIMDEP Version 7_0 User's Manuel, Revised Edition, Plainview. New York. Econometric Software Inc.

Greene, W., Hensher, D.A., 2010. Does Scale Heterogeneity across individuals matter? An empirical assessment of alternative logit models. *Transportation 37*: 413 – 428.

Haab, T.C., Kenneth, E., McConnell, E., 2002. Valuing Environmental and Natural Resources: The Econometrics of Non-market Valuation. Northampton, MA: Edward Elgar.

Haffen, R., Massey, D.M., Adamowicz, W.L., 2005. Serial nonparticipation in repeated discrete choice models. *American Journal of Agricultural Economics 87*:1061-1076.

Hanemann, M., 1984. 'Discrete/Continuous Models of Consumer Demand'. *Econometrica 52*: 541-561.

Hanemann, M., 1999. 'Welfare analysis with discrete choice models', in Herriges J and C Kling (eds.) *Valuing Recreation and the Environment*, Cheltenham: Edward Elgar.

Hausman, M.W. and McFadden, D. 1984. Specification tests for the multinomial logit model. *Econometrica 52 (5)*: 1219 – 40.

Hearne, R. R., Salinas, Z. M., 2002. The use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica. *Journal of Environmental Management 65*: 153 – 163.

Hensher, D.A., Greene, W.H., 2003. The Mixed Logit model: The state of practice. *Transportation 30*: 133–176.

Hensher, D.A., Rose, J.M., Greene, W.H. *Applied Choice Analysis: A Primer*. Cambridge University Press, 2005.

Hensher, D.A., Rose, J.M., 2007. Development of commuter and non-commuter mode choice models for the assessment of new public transport infrastructure projects: a case study. *Transportation Research A 41 (5)*: 428-433.

Johnson, F.R., Kanninen, B., Bingham, M., Özdemir, S. "Experimental Design for Stated Choice." In *Valuing Environmental Amenities Using Stated Choice Studies*, by Kanninen B.J. (ed.), 159–202. Springer, 2006.

Kataria, M., 2007. Environmental Valuation, Ecosystem Services and Aquatic Species. *Doctoral Thesis, Department of Economics, Swedish, University of Agricultural Sciences.*

Krinsky, I., Robb, R., 1986. 'On approximating the statistical properties of elasticities'. *Review of Economics and Statistics 68*: 715 - 719.

University of Cape Town

Kuhfeld, W.H. *Marketing Research Methods in SAS: Experimental Design, Choice,Conjoint, and Graphical Techniques.* SAS Institute Inc., 2010.

Liu, S., Costanza, R., Farber, S., Troy, A., 2010. Valuing ecosystem services: Theory, practice, and the need for a trans disciplinary synthesis. *Annals of the New York Academy of Sciences 1185*: 54 – 78.

Louviere, J.J., 1988. Analyzing decision making: Metric conjoint analysis. Newbury Park, CA: Sage.

Louviere, J. J., Hensher, D.A., 1982. On the Design and Analysis of Simulated Choice or Allocation Experiments in Travel Choice Modelling. *Transportation Research Record 890*: 11-17.

Louviere, J. J., Woodworth, G., 1983. Design and Analysis of Stimulated Consumer Choice Experiments or Allocation Experiments: An Approach Based on Aggregate Data. *Journal of Marketing Research 20*: 350 - 367.

Louviere, J., Henser, D., Swait, J., 2000. Stated Choice Methods. Cambridge: Cambridge University Press.

McFadden, D. 1986. The Choice Theory Approach to Market Research. *Marketing Science 5(4)*: 275 - 97.

McFadden, D., Train, K., 2000 'Mixed MNL models for discrete response'. *Journal of Applied Econometrics 15*: 447 - 470.

MEA (Millennium Ecosystem Assessment)., 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, D.C.

Meijer, E., Rouwendal, J. 2006. Measuring welfare effects in models with random coefficients. *Journal of Applied Economics 21(2)*: 227 - 244.

Naidoo, R., Adamowics, W.L., 2005. Biodiversity and nature-based tourism at forest reserves in Uganda. *Environment and Development Economics 10*: 159 – 178.

Raheem, N., Talberth, J., Colt, S,. Fleishman, E., Swedeen, P., Boyle, K. J., Rudd, M., Lopez, R. D., O'Higgins, T., Willer, C., Boumans, R.M., 2009. The Economic Value of Coastal Ecosystems in California. Unpublished manuscript.

Reed, J.F., Kanninen, B., Bingham, M., Özdemir, S., 2007. "Experimental Design for Stated Choice Studies." In *Valuing Environmental Amenities Using Stated Choice Studies*, ed. Barbara J. Kanninen Dordrecht: Springer.

Sagebiel, J. 2011. Comparing the Latent Class Model with the Random Parameters Logit - A Choice Experiment analysis of highly heterogeneous electricity consumers in

University of Cape Town

Hyderabad, India. Department for Agricultural Economics, Humboldt-Universitat zu Berlin.

Scarpa, R., Notaro, S., Louviere, J., Raffaelli, C., 2011. Exploring Scale Effects of Best / Worst Rank Ordered Choice Data to Estimate Benefits of Tourism in Alpine Grazing Commons. *American Journal of Agricultural Economics 93 (3)*: 813 – 828.

Sillano, M. and de Dios Ortand, J. 2005. Willingness-to-pay estimation with mixed logit models: some new evidence. *Environment and Planning A 37(3)*:525 - 550.

Snowball, J.D., Willis, K.G., Jeurissen, C., 2008. Willingness to pay for water service Improvements in middle-income urban Households in South Africa: a stated choice Analysis. *South African Journal of Economics 76*: 705 – 720.

Thondhlana, G., Shackleton, S., Muchapondwa, E., 2011. Kgalagadi Transfrontie Park and its land claimants: pre- and post-land claim conservation and development history. *Environmental Research Letters 6*: 1 – 12.

Vermunt, J., Magidson, J., 2002. Latent GOLD Choice 3.0 Users Guide, Belmont, MA: Statistical Innovations.

Wedel, M., Kamakura, W., 1997. Market Segmentation: Conceptual and Methodological Foundations, Boston, MA: Kluwer.

University of Cape Town

Appendix 1: Ecosystem service valuation questionnaire

Name of Interviewer:_____

Date: ___/___/2012

This survey attempts to measure what people think about dryland ecosystem services preservation in the South African Kgalagadi area. We are interested in how your feelings about possible Payment for Ecosystem Services depend on features like Camel thorn trees, biodiversity, and chances of seeing predators, recreational hunting and Khomani San cultural heritage. The survey has two sections.

INFORMATION BOX: KGALAGADI REGION

The total area of the Kgalagadi Transfrontier Park is 387 991 square kilometres, of which approximately 75 percent is on the Botswana side. The remaining part of the park is on the South African side, which also includes communal land within the protected area. The communal land in question refers to the contractual parks that were given as part of the land claim deal.

University of Cape Town

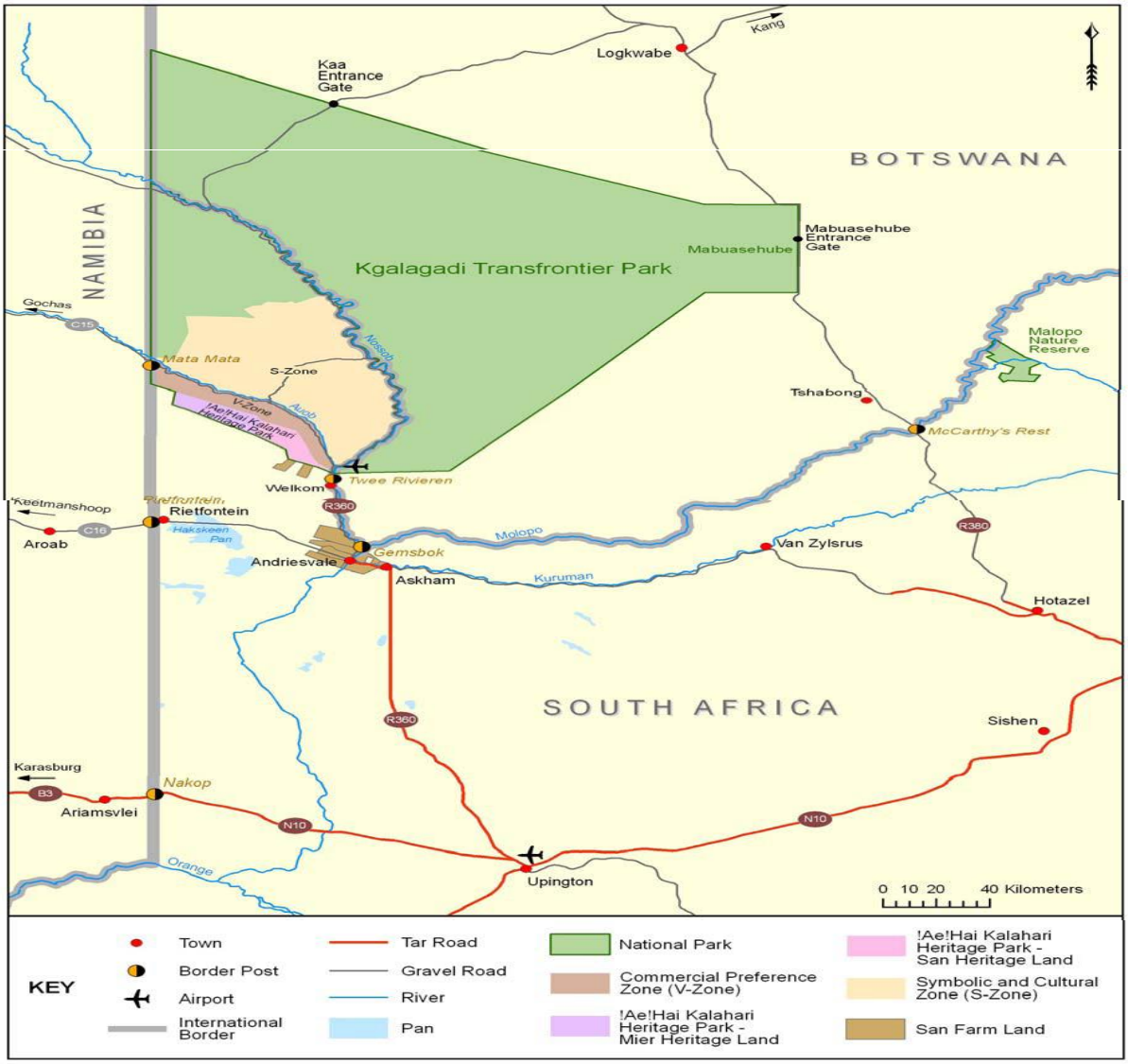


Figure: map of the broader Kgalagadi area

Source: Massyn & Humphrey, 2010

Survey Instructions

Univer

In section one of the survey, you will be asked 4 choice questions.

In each of those questions, we will ask you to choose between two possible ways to preserve ecosystems and the status quo.

The ecosystem service preservation under consideration is on the Khomani San restored land and requires local communities' efforts for the continued provision of ecosystem services in the area as a whole. In addition, failure to preserve ecosystems outside protected areas would lead to more pressure on the park especially given the Khomani San community has the right to harvest resources from the park.

The valuation of these dryland ecosystem services allows the services to be possibly considered as economically productive systems comparable with other alternative land uses. If we attach monetary values on nature and related activities, we can compare which ways of living give the most satisfaction. Neglecting features such as Camel thorn trees, biodiversity, predators, recreational hunting and San cultural heritage will lead to the gradual disappearance of these features and subsequently their unavailability for use by future generations.

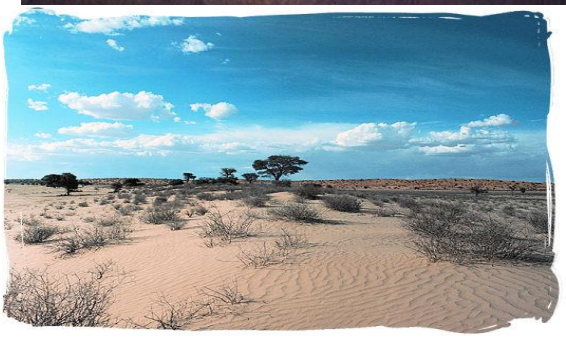
Section two of the survey gathers personal information of respondents to gain more insights about factors that affect the way people feel about dryland ecosystems.

There are no right or wrong answers, and all answers are strictly confidential.

Section One – Valuation Section

Habitat Preservation Information

The Khomani San people portions of the Park and their communal land provide ecosystem services. While the Kgalagadi desert has a physically harsh environment, the region is rich in biodiversity (animals, birds and plants) and concentration of animals in the dry Auob and Nossob Rivers. Currently the areas outside the Kgalagadi Park faces a threat of resource depletion due to over-harvesting of medicinal plants, fuel wood, overgrazing and excessive hunting. This is largely driven by the increased need of these resources for both domestic and commercial consumption. The unsustainable resource extraction is of dire consequence to the inter-linkages between the broader Kgalagadi area and to the community way of life. Some of these species are endangered, which means they are at risk of not existing in the area anymore.



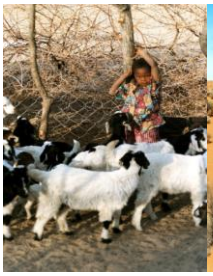
of Cape Town

Ecosystem Services Preservation Features

A point to note is that depending on how it is implemented, a dryland preservation initiative can have different features. The features described below are of interest in this survey. Please read this carefully in order to answer SECTION ONE questions of the survey.

Attributes	Description	Attribute Levels
Camel thorn trees (Communal land) 	It is the only big tree in the area. The shade of the tree provides a favourable microclimate for many animals. The shade also benefit human as they tend to camp where these trees are located, tend to undertake important traditional, cultural activities beneath the branches of Camel thorns and also provides firewood. **The San households harvest on average 9kg (1bundle) of firewood daily**.	**Level 1:** 9 kg - 6.75 kg (three quarters of a bundle) - 2**5% decline** **Level 2:** 9 kg (1 bundle) -**Current level** **Level 3:** 9 kg - 13.5 kg (1 and a half bundles) -**50% increase** **Level 4:** 9 kg - 18 kg (2 bundles) - **100% increase**
Chances of seeing Predators (Lion Population) 	The park is renowned for predator watching: Cheetah, Leopard, Brown and Spotted Hyena and Black-Manned Lion. All along the river bed are man-made waterholes fed with water from solar pumps. Along the 120km of the Auob river and the 300km of the Nossob there is a waterhole every 8-12km.The waterholes make for spectacular place for game viewing. The main attraction is lions; hence our focus is on lions.	**Level 1**: 448: 40 waterholes - **2005 estimate** **Level 2:** 700: 40 waterholes – **Current level** **Level 3:** 1050: 40 waterholes - **50% rise** **Level 4:** 1400 : 40 waterholes - **100% rise**
Bush Food (on San Communal Land) 	The San live off the land. They collect natural foods: bush food and wild fruits (i.e. water melon). **The Khomani San households collect approximately 0.84kg of the bush food on a weekly basis.**	**Level 1:**0.84 kg – 0.42 kg (Half Container) – **50% decline** **Level 2:** 0.84 kg (1Container) - **Current** **Level 3:** 0.84 kg – 1.26 kg (1.5 Containers) - **50% increase** **Level 4:** 0.84 kg – 1.68kg (2 Containers) - **100% increase**
Recreational Restrictions 	The area is characterized by a striking landscape of wide vistas, attractive red sand dunes, large Camel thorn trees and a desert bloom. One of the great advantages afforded by the Kgalagadi landscape is the ability to watch animals in an open, uncluttered landscape. SANParks (Park agency) are currently thinking of introducing a zoning programme. Current information on mapping sensitivity analysis and value of the biophysical, heritage and scenic resources of the park lead to SANParks having 4 zoning categories.	**Level 1:**No Restrictions **Level 2:** Wilderness Experience (no facilities and access by foot) & Primitive (controlled access by numbers, frequency and size of group) **Level 3:** Wilderness Experience; Primitive & Comfortable (access roads only open to visitors) **Level 4:** Wilderness Experience; Primitive; Comfortable Developed (access by sedan with larger self-catering camps and shops)

University of Cape Town

Medicinal Plants (Both inside and outside the Park) 	The San categorized thousands of plants and their uses, from nutritional to medicinal. **Medicinal plants** are **used** to treat many illnesses and play a role when performing traditions. The most used medicinal plants include Gamaghoe and Devil's Claw as well as the famous Bushman's appetite suppressant Hoodia (Xhoba).	**Level 1:** 0.3 kg (Half Container)- **50% decline** **Level 2:** 0.6 kg (Container) – **Current level** **Level 3:** 0.9 kg (1.5 Containers) - **50% more** **Level 4:**1.2 kg (2 Containers) - **100% more**
Bush meat Traditionally Hunted (on Khomani Farmlands) 	Hunting has been a way of life for the San for thousands of years although it is now a dying art as a result of loss of access to traditional hunting. Game meat is an essential part of their diet.	**Level 1:** 2 stingboks - **50% less** **Level 2:** 4 stingboks – **Current level** **Level 3:** 6 stingboks - **50% more** **Level 4:** 8 stingboks - **100% more**
Experiencing Bushman Cultural Heritage (in the Kgalagadi Transfrontier Park)  	The !ae!hai Heritage Park which was developed in 2009 gives Park visitors the opportunity to interact with the San. It can be entered through San Community gate and has overnight facilities at Imbewu or Sebobugas camp. San guides provide interpretive experience, evening walk with a knowledgeable guide and sunrise morning walk to see which animals came overnight.	**Level 1:** 2 months - **50% less** **Level 2:** 4 Months – **Current level** **Level 3:** 6 months - **50% more** **Level 4:** 8 months - **100% more**
Grazing Opportunities (on Khomani San Communal Land)  	Around 36 000 hectares of farmland outside the park, on Khomani San restored land is for grazing and game farming. The San farmlands are located in an arid savannah with some areas densely covered with grasses, trees and shrubs. The carrying capacity is around 958 large stock KTPs. The land has become overgrazed (two-thirds of the range) and was not productive (stocking rates should be kept to a minimum until vegetation had recovered).	**Level 1:** 719 large stock KTPs - **25% less** **Level 2:** 958 large stock KTPs – **Current level** **Level 3:** 1198 large stock KTPs - **25% less** **Level 4:**1437 large stock KTPs – **50% more**
Your One-Off Levy (Rands) 	The money from the levy would go into a special trust fund specifically for Maintaining Ecosystems.	**Level 1:** R50 **Level 2:** R100 **Level 3:** R150 **Level 4:** R200

University of Cape Town

Section One

Below you are presented with 4 choice sets.

In each set, suppose the three alternatives (Status Quo, Alternative 1 and 2) were the only options available for preservation of dryland ecosystems in the Kgalagadi. Please read **all** the features of each option and then **check the box that represents your choice**. If you do not like either Alternative 1 and 2, then please choose the box marked "Status Quo – No preservation". You can notice that, while the levels of attributes in the status quo always stay the same, the levels in the columns of the alternative options changes in each choice set. It is very important to consider each set because of its own outcomes irrespective of whether the preceding or the following choice sets provide better deals.

We would like to know which option you prefer the most in each choice set. Please bear in mind that we do not describe how each option is brought about, so you may find some options seem unrealistic.

CHOICE SET 1

Attribute	**Status Quo**	**Alternative 1**	**Alternative 2**
Camel thorn trees	6.75 kg	9 kg	13.5 kg
Predator	448	448	700
Recreational restriction	No Restrictions	Wilderness Experience; Primitive; Comfortable & Developed	No Restrictions
Medicinal plants	0.3 kg	0.6 kg	0.9 kg
Bushman cultural heritage	2 months	4 Months	6 months
Grazing opportunities	719 large stock units	1198 large stock units	1437 large stock units
Levy	R 0	R 50	R 75
Your Choice (tick)			

NEXT QUESTION

CHOICE SET 2

Attribute	**Status Quo**	**Alternative 1**	**Alternative 2**
Camel thorn trees	6.75 kg	9 kg	13.5 kg
Predator	448	1400	448
Recreational restriction	No Restrictions	Wilderness Experience; Primitive & Comfortable	Wilderness Experience; Primitive; Comfortable & Developed
Medicinal plants	0.3 kg	0.9 kg	1.2 kg
Bushman cultural heritage	2 months	4 Months	6 months
Grazing opportunities	719 large stock units	719 large stock units	958 large stock units
Levy	R 0	R 75	R 100
Your Choice (tick)			

University of Cape Town

NEXT QUESTION

CHOICE SET 3

Attribute	Status Quo	Alternative 1	Alternative 2
Camel thorn trees	6.75 kg	13.5 kg	18 kg
Predator	448	448	700
Recreational restriction	No Restrictions	Wilderness Experience & Primitive	Wilderness Experience; Primitive & Comfortable
Medicinal plants	0.3 kg	0.9 kg	1.2 kg
Bushman cultural heritage	2 months	6 months	8 months
Grazing opportunities	719 large stock units	1437 large stock units	719 large stock units
Levy	R 0	R 75	R 100
Your Choice (tick)			

NEXT QUESTION

CHOICE SET 4

Attribute	Status Quo	Alternative 1	Alternative 2
Camel thorn trees	6.75 kg	13.5 kg	18 kg
Predator	448	1050	1400
Recreational restriction	No Restrictions	No Restrictions	Wilderness Experience & Primitive
Medicinal plants	0.3 kg	0.9 kg	1.2 kg
Bushman cultural heritage	2 months	8 months	2 months
Grazing opportunities	719 large stock units	719 large stock units	958 large stock units
Levy	R 0	R 100	R 25
Your Choice (tick)			

Let's assume that setting-up of payment schemes for the ecosystem service was a feasible land use option that could enhance Kgalagadi dryland ecosystems.

a) Would you be willing to pay the land owners (Khomani San) to ensure that there is continued provision of these dryland ecosystem services?

YES ☐ **NO** ☐

University of Cape Town

b) If you are not willing to pay anything for ecosystem services, could you please explain why that is the case?

REASON	**TICK THE MOST SIGNIFICANT CHOICE**
I DO NOT CARE ABOUT DRYLAND ECOSYSTEM SERVICES	1
I CANNOT AFFORD TO INCUR ANY ADDITIONAL EXPENSES	2
IT COSTS TOO MUCH ALREADY TO VISIT THE KGALAGADI	3
THE MONEY WOULD BE WASTED	4
OTHER PEOPLE AND PRIVATE SECTOR SHOULD PAY	5
I DO NOT UNDERSTAND THE QUESTION	6
THERE ARE MANY OTHER SITES WHICH I COULD VISIT	7
THE ECOSYTEM PRESERVATION SHOULD BE FINANCED BY THE GOVERNMENT	8
OTHER	9

PLEASE SPECIFY OTHERS

.....

Section Two – Personal Information

The following information is important to help the researches check that all visitors in the Kgalagadi area have been fairly represented. All your responses are anonymous and strictly confidential.

1(a). DO YOU VISIT THE KGALAGADI AREA INCLUDING THE KGALAGADI TRANSFRONTIER PARK REGULARLY?

YES ☐ **NO** ☐

(b). IF YES, HOW OFTEN?

.....

2. WHAT ARE YOUR MAIN ATTRACTIONS FOR VISITING THE KGALAGADI AREA INCLUDING THE PARK ITSELF?

ATTRACTION	**TICK THE MOST SIGNIFICANT CHOICE**
BIRDS	1
PREDATORS	2
DIVERSITY OF PLAINS & GAME	3
LANDSCAPE	4
HIKING TRAILS	5
4×4 DRIVES (TRAILS)	6
SAN ROCK ENGRAVINGS	7
PRESENCE OF SAN	8
OTHER	9

PLEASE SPECIFY OTHERS

.....

3. HOW LONG IS YOUR WHOLE TRIP IN THE KGALAGADI AREA? .....NIGHTS

4. DO YOU OR HAVE YOU ENGAGED IN TRACKING WITH THE KHOMANI SAN?

YES ☐ **NO** ☐

University of Cape Town

5. DO YOU OR HAVE YOU BOUGHT THE KHOMANI SAN CRAFTS?

YES ☐ **NO** ☐

6. WHERE DO YOU MOSTLY PURCHASE THESE CRAFTS?

BUSHMAN CRAFT STALLS ☐ **SHOPS** ☐

7(a). DO YOU OR HAVE YOU ENGAGED IN TAKING PHOTOS WITH THE KHOMANI SAN?

YES ☐ **NO** ☐

(b). IF YES, WAS THIS IN EXCHANGE FOR MONEY?

YES ☐ **NO** ☐

8. DO YOU EXPECT TO VISIT THE KGALAGADI AREA AGAIN IN THE NEXT FIVE YEARS?

YES ☐ **NO** ☐ **DON'T KNOW** ☐

9. GENDER OF RESPONDENT

MALE	1
FEMALE	2

10. DATE OF BIRTH.....

11. ARE YOU THE PERSON IN YOUR HOUSEHOLD WHO PAYS THE UTILITY / MORTGAGE BILLS?

YES ☐ **NO** ☐

12. NUMBER OF MEMBERS IN THE HOUSEHOLD: _____ PEOPLE

13. WHAT BEST DESCRIBES WHERE YOU CURRENTLY LIVE? CHECK ONE.

CITY ☐ **TOWN** ☐ **SUBURB** ☐

SMALL TOWN ☐ **FARM** ☐ **RURAL AREA** ☐

14. WHAT IS YOUR EDUCATION LEVEL

EDUCATION LEVEL	**TICK THE APPROPRIATE**	**SPECIFY THE HIGHEST GRADE OR NUMBER OF YEARS COMPLETED**
NEVER ATTENDED SCHOOL		
PRIMARY SCHOOL		
HIGH SCHOOL		
CERTIFICATE		
DIPLOMA		
DEGREE		
POSTGRADUATE		
ANY OTHER FORMAL TRAINING RECEIVED		

University of Cape Town

15. WHICH OF THE FOLLOWING DESCRIBES YOUR CURRENT STATE OF EMPLOYMENT?

EMPLOYED FULL TIME	1
EMPLOYED PART TIME	2
SELF EMPLOYED	3
STUDENT FULL TIME	4
STUDENT PART TIME	5
RETIRED	6
OTHER	7 SPECIFY.....

16. WHAT CATEGORY COMES CLOSEST TO YOUR TOTAL HOUSEHOLD INCOME? **PLEASE TICK APPROPRIATE CURRENCY: RAND, PULA, OTHER.....**

PRE TAX INCOME	
0 – 10 000	1
10 001- 30 000	2
30 001 –50 000	3
50 001 – 100 000	4
100 001 – 150 000	5
150 001 – 200 000	6
200 001 – 250 000	7
250 001 – 350 000	8
350 001 – 500 000	9
500 001+	10

17. WHAT DID YOU THINK OF THIS QUESTIONNAIRE? CHECK ONE.

TOO LONG ☐ **REALISTIC** ☐ **DIFFICULT** ☐

INTERESTING ☐ **OTHER** ☐

.....

18. PLEASE USE THE SPACE BELOW FOR ANY ADDITIONAL COMMENTS OR ELEMENTS YOU FEEL WE MAY HAVE MISSED.

.....

.....

University of Cape Town

Appendix 2: Attributes levels in Choice Modelling

Table 2.1: Attributes and attribute levels in Choice Modelling

|Variables|
Tree level 1: harvest 9 kg (1 bundle) of firewood by San -Current level
Tree level 2: harvest 13.5 kg (1 and a half bundles) of firewood by San -50% increase
Tree level 3: harvest 18 kg (2 bundles) of firewood by San - 100% increase
Predator level 1: chances to see 700 lions – Current level
Predator level 2: chances to see 1050 lions – 50% rise
Predator level 3: chances to see 1400 lions – 100% rise
Bush food Level 1: San households collect 0.84 kg (1Container) - Current
Bush food Level 2: San households collect 1.26 kg (1.5 Containers) – 50% increase
Bush food Level 3: San households collect 1.68 kg (2 Containers) – 100% increase
Medicinal plants level 1: Collect 0.6 kg (Container) – Current level
Medicinal plants level 2: Collect 0.9 kg (1.5 Containers) – 50% more
Medicinal plants level 3: Collect 1.2 kg (2 Containers) - 100% more
Bushmeat traditionally hunted level 1: 4 stingboks – current levels
Bushmeat traditionally hunted level 2: 6 stingboks – 50% more
Bushmeat traditionally hunted level 3: 8 stingboks – 100% more
Grazing Opportunities level 1: 958 large stock – Current level
Grazing Opportunities level 2: 1198 large stock – 25% more
Grazing Opportunities level 3: 1437 large stock – 50% more
Recreational Restrictions level 1: Wilderness Experience (no facilities and access by foot) & Primitive (controlled access by numbers, frequency and size of group)
Recreational Restrictions level 2: Wilderness Experience; Primitive & Comfortable (access roads only open to visitors)
Recreational Restrictions level 3: Wilderness Experience; Primitive; Comfortable Developed (access by sedan with larger self-catering camps and shops)
Experiencing Bushman Cultural Heritage (in the Kgalagadi Transfrontier Park) level 1: 4 Months – Current level
Experiencing Bushman Cultural Heritage (in the Kgalagadi Transfrontier Park) level 2: 6 Months – 50 % more
Experiencing Bushman Cultural Heritage (in the Kgalagadi Transfrontier Park) level 3: 8 Months – 100% more

University of Cape Town

Chapter 6: Conclusion

6.1. Summary

This thesis assessed the relationship between use of land and well-being. The fact that land rights were awarded to the community rather than individuals is perhaps the reason the land effect on poverty is not significant, particularly where the institutional arrangements are weak as is the case in the Khomani San community. Land restitution was never meant to target individuals or certain sections of the community but the entire community that is eligible irrespective of their individual circumstances. Perhaps this limits the potential impact of land in terms of reducing poverty.

A positive link between greater access and poverty reduction should not be ignored because rural people especially indigenous people are heavily dependent on natural resources for their livelihoods. Greater access to nature that is attributed to the availability of land is important because natural resources such as wild fruits and hunting off-set the low income and consumption levels.

We then examined why the local communities tend to degrade the environment despite showing positive support for biodiversity conservation. The South Africa's Khomani San, whose attitudes toward modern conservation have not been evaluated until now, and the adjacent Mier community, generally attach a significant economic value to biodiversity in their area. The Mier generally have higher WTP than the Khomani San. For example, the Mier respondents have almost double the median WTP (R25) of the Khomani San (R15) in the category of those in favour of the proposed biodiversity conservation programme on communal land. However, when adjusted for annual median household income, there are no significant differences in the WTP between the two communities.

Thus, understanding the values of biodiversity is a critical step forward, as these values illustrate the economic benefits of conservation and therefore justify funding for biodiversity conservation programmes.

University of Cape Town

Now that some of resource rights inside the Kgalagadi Transfrontier Park have been vested in the surrounding communities, the park should contribute towards improving the lives of these communities for land restitution not to compromise conservation objectives. Given that the park has well-established infrastructure to help communities extract more benefit from their participation in conservation, this study argues that it is important to establish the possibility of generating more revenue from conservation fees for sharing with the new but poor co-owners of international parklands. If such opportunities exist then the modes of increasing income from tourists can vary from a mandatory conservation fee increment to a voluntary community-bound donation over and above the regular conservation fee.

Overall, our results suggest that there is underselling of the recreational services offered by the South African park systems, which implies that there is room for improvement in the use of the conservation fee policy. Revenue could be maximized by increasing conservation fees for local tourists at Kgalagadi Transfrontier Park as well as the other parks. The ability to raise more revenue by the park agency opens up two possibilities: revenue sharing with local communities and more sustainable park management. Our results are consistent with other empirical studies on nature-based ecotourism which indicate visitors' willingness to pay more for the recreational services of parks. The policy implication of our results is that the park agencies (SANParks & NWPTB) should consider instituting mechanisms for capturing more revenue as this will not necessarily jeopardize tourism by reducing the number of visitors.

Finally, the importance and value of ecosystem services in the study area is assessed in an attempt to establish their benefits. Some of these services might benefit people who are not members of the land claimant community. It is clear that the benefits of ecosystem services on the Khomani San people's land are currently not being transferred to the local communities due to the failure to identify and value their services.

Conservation schemes aiming to protect ecosystems, including PES in the Kgalagadi area, need to acknowledge that the Khomani San people have different needs and suffer some costs. For economic incentives to be effective, the local community needs to be compensated for what conservation role society imposes on them.

Park visitors are supportive of the introduction of some restrictions. This particular finding is

University of Cape Town

interesting because the indigenous San people have rights to harvest resources inside their contractual park. The current overharvesting of resources in their communal land is likely to lead them to harvest more inside the park, which would have a negative impact on visitors' experience.

The policy implication of our results is that there is a demand by visitors that the San activities inside the park be restricted. This scenario shows that there is a possibility of crafting some PES where park visitors and/or the park agency compensate the San for placing restrictions on San activities inside the contract park.

6.2. Policy recommendations

While our results suggest that restored land plays an important role in any anti-poverty strategy (in terms of greater access to nature), identification of socio-economic variables is important as it shows that factors other than land rights should be taken into consideration when developing anti-poverty measures. This implies that land restitution programmes should be part of a more comprehensive strategy to improve the potential of restored land to alleviate poverty.

The Khomani San care about modern biodiversity conservation as much as other indigenous communities in their area and can therefore be trusted to be good environmental stewards. However, in order for all members of the local community to support biodiversity conservation unconditionally, mechanisms for fair distribution of the associated costs and benefits should be put in place.

In sum, this thesis shows that it is feasible to raise conservation fees at national parks under investigation in South Africa. The findings in this study provide strong evidence that a carefully crafted and well-thought out pricing strategy such as the one proposed in this thesis has the potential to raise additional revenue that can be used to demonstrate that parks can indeed play a pivotal role in the local economics surrounding the recreational sites in question. Alternatively, these findings can be interpreted as proof that national parks have sufficient value to contribute significantly to local communities' welfare to justify continuation of public funding. As a conclusion, the park agency in South Africa should review the conservation fees levied on park visitors.

University of Cape Town

The policy implication of valuing environmental services is that when budget allocations are made, they can also be fairly considered by taking into consideration their costs and benefits. The findings in this study are crucial because they have a bearing on land use decisions, such as setting-up of payment schemes for the ecosystem services. Payment schemes can affect land use decisions, and land use can be affected by PES. It is on this basis that valuation of dryland ecosystem services makes it possible for them to be considered as economically productive systems comparable with other types of land use.

University of Cape Town