

CBNRM and AIDS in Bushbuckridge, Northern Province, South Africa

An exploratory geographic analysis

by

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CONTENTS

Summary	
Acronyms.	i
Acknowledgements.	ii
List of figures.	iii
List of tables.	iv
1 Introduction.	1
1.1 USAID support for HIV/AIDS relevant to CBNRM.	2
1.2 CBNRM in South Africa.	4
1.3 NRM and HIV/AIDS.	4
1.4 Geographic focus.	5
1.5 Selection of the study locality.	6
1.6 Study scope and caveats.	8
1.7 Geographic information systems(GIS) tools and data.	9
2 Description of the study area.	11
2.1 Physical environment.	11
2.1.1 Climate	
2.1.2 Vegetation	
2.2 History and pattern of settlement.	14
2.3 Population characteristics.	15
2.3.1 Man/land ratios	17
2.3.2 Health status	18
2.4 Economic activity.	20
2.4.1 Migrant labor	20
2.4.2 Pensions and other compensation	20
2.4.3 Farming and animal husbandry	21
2.4.4 Tourism	22
2.4.5 Small scale manufacturing	22
2.5 Uses of the communal woodlands.	23
2.6 Income from communal woodlands.	25
3 Community level natural resources initiatives in the study area.	26
3.1 Park-related CBNRM.	26
3.2 Land claims for park-related tourism	27
3.3 CBNRM not related to the parks or reserves.	29
3.3 Other NRM work in Bushbuckridge.	31
4 HIV/AIDS.	33
4.1 The Annual HIV Sero-Prevalence Survey.	33
4.2 HIV/AIDS in the study area.	35

5	Discussion.	36
5.1	Access to local data on HIV/AIDS.	36
5.2	Road building, road improvement and HIV/AIDS.	36
5.3	Women’s status	37
5.4	Sustainability of rural livelihoods	37
5.5	Urgent need for new ways to manage the grazing and cultivated commons. . .	38
5.6	Comparative advantages and disadvantages of Bushbuckridge Municipality. .	38
5.7	Contribution of GIS and spatial analysis	39
6	Recommendations.	42
	Bibliography and References cited.	45
	Annex.	48

Summary

A study of the intersection of HIV/AIDS and community-based natural resources management (CBNRM) was carried out in early 2002 in the Bushbuckridge area, South Africa, for USAID's Africa Bureau. The study, which involved a 2 ½ week visit to the area, explored the possibility of using geographic analysis and GIS tools to reveal spatial patterns of the two themes. It was expected that the results could assist in responding to the planning needs of CBNRM projects near the Kruger National Park being fostered by USAID's Transboundary Natural Resource Management Initiative.

Data on HIV sero-prevalence is obtained annually in South Africa at 418 antenatal clinics following international protocols established for this way of statistically measuring HIV prevalence. However, it was found that the survey results are not available at levels of aggregation below that of the province. No other local data on HIV or AIDS exists. Consequently the objective of a combined spatial display and analysis of the two phenomena at a resolution meaningful to CBNRM could not be achieved. The report's recommendations address the need to make local data on HIV/AIDS available for CBNRM planning and a parallel need to conduct research on households with members afflicted by HIV or AIDS, as regards the way they are coping with needs to grow food, tend livestock, gather fuelwood and other products from commons, and related livelihood tasks.

Mapping of features relevant to CBNRM in Bushbuckridge, unlike HIV/AIDS, is supported by digital base maps, thematic maps, and disaggregated census data as well as many location-specific reports about research or development initiatives. These various data are found in a diversity of locations, formats, and spatial resolutions. These data and other information were assembled and manipulated using GIS and other database programs to produce the various maps and charts which illustrate the report.

CBNRM has a very recent history in Bushbuckridge (and elsewhere in South Africa), but several initiatives described in the report are fostering greater community participation in park tourism, water resources development and watershed management. Little is being done to manage village commons, whose open woodlands supply a wide diversity of subsistence and income-generating products but which since 1994 are treated as an open access resource. Firewood cutting, in particular, is taking place at a rate that appears to be unsustainable. A recently completed 5-year project in community based forestry in Bushbuckridge supported by DANCED experienced many difficulties: inadequate water supplies, weak community governance and cohesion in this former homeland, and unrealistic expectations for income generation.

GIS data and spatial analysis were useful in at least two regards. Quantitative spatial analyses of population, resource availability and resource demands for the municipality were possible thanks to the existence of digital base maps and 1996 census data for the municipality. These analyses added value to existing research results on natural resource potentials and demands which had not been interpreted spatially. In particular a very large gap could be measured between fuelwood use and fuelwood availability. Population densities were mapped and man/available land ratios could be computed. Secondly, the visual integration of various research sites and development sites should prove useful as a tool for coordination of the efforts of the many governmental and NGO entities involved in natural resources, agriculture and other forms of development in the area.

June 28, 2002

Acronyms

AIDS	acquired immunodeficiency syndrome
AWARD	The Association for Water and Rural Development
AWF	Africa Wildlife Foundation
CBNRM	community-based natural resource management
CDC	Centers for Disease Control and Prevention
CITES	Convention on International Trade in Endangered Species
CPA	Community Property Association
DANCED	Danish Center for Environment and Development
DSS	Demographic Surveillance System
DWAF	Department of Water Affairs and Forestry
GIS	geographic information system
GPS	global positioning system
HIV	human immunodeficiency virus
MPB	Mpumalanga Parks Board
MRC	Medical Research Center (of South Africa)
NGO	non-governmental organization
NIH	National Institute of Health
NRM	natural resource management
STD	sexually transmitted disease
TBNRMI	Transboundary Natural Resource Management Initiative
TFNMRA	Transfrontier Natural Resource Management Area
USAID	United States Agency for International Development

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List of Figures

Fig. 1	Study areas and TBNRM area	1
Fig. 2	Bushbuckridge Municipality and environs	5
Fig.3	Bushbuckridge Municipality	7
Fig. 4	Blyde River canyon	11
Fig. 5	Elevations and yearly rainfall values in Bushbuckridge	13
Fig. 6	View east from the road on Bushbuckridge	14
Fig. 7	Panoramic view looking northwest near Bosbokrand on N40	15
Fig. 8	Population by age group and sex, Bushbuckridge Municipality	16
Fig. 9	Population distribution, Bushbuckridge Municipality, 1996	17
Fig.10	Location of the Agincourt study area and villages	19
Fig 11	(skipped)	
Fig.12	View east from road separating a nature reserve from communal area	24
Fig.13	Recent land claims lodged by communities	28
Fig.14	Portion of 1:50,000 topographic map.	29
Fig.15	Locations of site-specific initiatives of the 1996-2001 DANCED community forestry project, Bushbuckridge area	30
Fig.16	Lcoation of different research sites and sites where community based forestry was promoted	40
Fig.A-1	Portion of municipal base map digitized from 1:250,000 topo map.	49

List of Tables

Table 1	Temperatue regimes at Skukuza and Bosbokrand.	12
Table 2	Population of the Bushbuckridge Municipality	16
Table 3	Land areas and man/land ratio in Bushbuckridge Municipality . .	18
Table 4	Fuelwood supply and demand	25
Table 5	Value of secondary products from communal grazing areas	25

1 Introduction

This report presents the results of work undertaken by the author in South Africa and in the USA (Washington D.C. area) during January through April, 2002. A brief field study was carried out during Feb. 21 to March 13, 2002, to examine two themes in the Bushbuckridge study area: Community-based natural resources management(CBNRM) and HIV/AIDS. In particular the study sought to discover geographic patterns that would be helpful in CBNRM programs in Africa that wish to somehow address the implications of HIV/AIDS for their programs.

Mapping these themes together proved to be impossible, due to HIV/AIDS data restrictions, and this report will be useful mainly for the information and maps related to natural resources management and CBNRM. The disparity between local level NRM information and local level HIV/AIDS information handicaps programs in both areas. Findings and issues related to HIV/AIDS are presented in Section 5.0.

The area of the study was formerly a part of the Gazankulu and Lebowa homelands of the Shangaan and northern Sotho peoples, respectively(Figure 1). It borders several private game reserves, forest reserves, and the Kruger National Park. Recently designated a municipality of the same name, this 2,200 square kilometer area is home to approximately 550,000 black Africans living in numerous towns and villages..

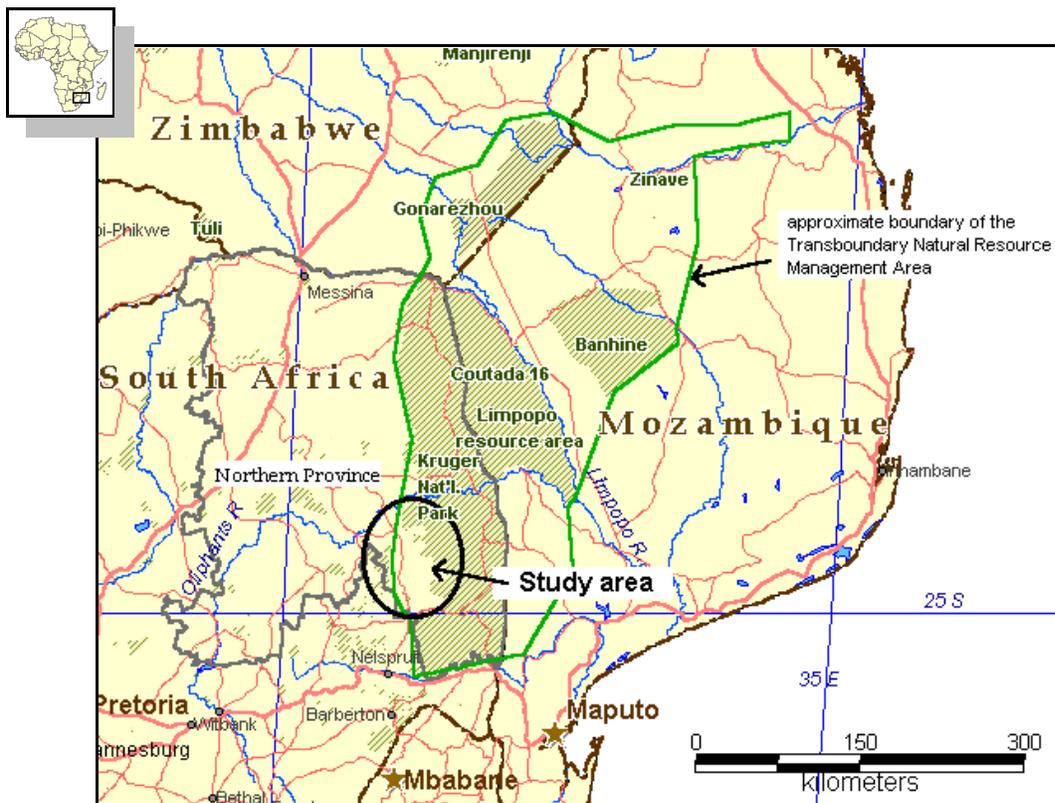


Fig. 1 Study area and TBNRM Area.

It was chosen for this study given its immediate relevance to the CBNRM component of the USAID-funded Gaza-Kruger-Gonarezhou Transboundary Natural Resources Management Initiative. The Initiative aims to increase inter-state cooperation in the management of shared resources. One means of accomplishing this is by improving natural resource management in the protected areas and community lands within the Transboundary area.

This report describes the study area's natural and human geography, reviews the state of CBNRM, its potentials, reviews HIV/AIDS in the area, and analyzes various issues that emerged in the course of the study. The findings are supplemented and informed by the various thematic and analytic maps that were rendered from GIS datasets prepared during the study.

1.1 USAID support for HIV/AIDS relevant to CBNRM

USAID policy on combating and preventing HIV/AIDS has undergone revision recently, and the most current policy is contained in the document "USAID's Expanded Response to the Global HIV/AIDS Pandemic, Tuberculosis and Malaria" (May, 2002). In addition to prevention, treatment and monitoring, USAID will help countries to adapt and utilize development interventions and increase the capacity of various development sectors (e.g., education, micro finance, etc) to reach and respond to communities impacted by HIV. This multi-sectoral approach figured in previous policies, and USAID commissioned a series of 'toolkits' to guide workers in areas other than health, including CBNRM (USAID/Bureau for Africa, 2001). Although the most recent position does not specify CBNRM, it does state that USAID will work to enhance food security for households affected by HIV. Most CBNRM activities aim to enhance household food security, directly or indirectly.

1.1.1 CBNRM support by the USAID Regional Center for Southern Africa(RCSA)

This Regional Center is supporting the 2 1/2-year TBNRM Initiative, through an institutional contract with DAI, as well as work by the African Wildlife Foundation (AWF) in the vicinity of the Kruger Park.

RCSA also supports community-based natural resource management (CBNRM) initiatives in Botswana, Namibia, Zambia and Zimbabwe, as well as regional networking and training initiatives through the SADC wildlife unit, based in Malawi. Several non-governmental organizations (NGOs), including the World Conservation Union and the World Wildlife Fund, and the African Wildlife Foundation(AWF) collaborate as implementing partners. AWF has established a center in White River, located between the study area and Nelspruit. The center is assisting several communities in the area to register their claims on land, as a precursor to developing community participation in wildlife-oriented tourism.

In addition, USAID's RCSA and SADC collaboration with the World Conservation Union has expanded the activities of its more than sixty governmental and NGO members in environmental

policy development, monitoring of trade in wildlife products, and development of new environmental education materials.

1.1.2 USAID/South Africa support for HIV/AIDS and Natural Resources.

USAID's South Africa mission is supporting numerous activities that address the HIV/AIDS epidemic, although none have focused on the study area, except indirectly through USAID support for annual surveys of HIV/AIDS and STDs channeled through the CDC and NIH.

USAID has conducted a study on the impact of HIV/AIDS on education, developed HIV/AIDS databases within housing programs, and incorporated micro enterprise expertise within a large grant to address orphans and vulnerable children. The mission's program also addresses the particular linkage between HIV/AIDS and the Foot and Mouth infectious disease outbreak. HIV/AIDS impact studies have been conducted, ranging from households to small/medium enterprises to low-cost housing.

Support for natural resources management is limited to a small program (Working for Water) which is removing exotic phreatophytic or water consumptive species from river valleys. USAID is supporting the decentralizing of water services to the Bushbuckridge populations and other local levels by offering technical assistance and training through June 2004. The support seeks to strengthen the roles and capabilities of Water Service Authorities and to help establish effective Water Service Providers.

1.1.3 DEVECOL work supported by USAID

The use of GIS for integrating site-specific and regional information in the DEVECOL information resource offers possibilities for a wide range of development themes which have geographic expression, and it was with this possibility in mind that work was undertaken to examine the geographic intersection of CBNRM and HIV/AIDS in the study area.

DEVECOL/Africa is an information resource designed for rural development field workers in Sub-Saharan Africa (www.devecol.org). The resource employs digital maps to help find and examine documentation on local development and research experiences. DEVECOL's use of digital base maps and thematic maps together with geo-referenced document sites linked to digital source documents provides a unique way for planners and managers to simultaneously access spatial and text information. This system makes it possible to find documents that otherwise are hard to locate geographically, and find documents in similar environments, as shown by various themes added to the base maps (i.e. soils, climate, crop suitability). This is technically possible thanks to the integrating capabilities of GIS systems.

1.2 CBNRM in South Africa

Community-based natural resource management is a relatively new theme in South Africa. In the past, moreover, natural resource management has focused upon parks and protected areas and this is reflected in the current narrow focus of CBNRM initiatives in the wildlife sector (Illustrative Project No. 1 Wilverdiend LEAP, 2001). However, there is increasing awareness within the South African government of the need to broaden the scope to include all natural resources and locales outside of protected areas. How this will be achieved is the subject of ongoing debate, complicated by the fact that seven government ministries and their accompanying policy and legislative arrangements are involved.

It is unclear as to where primary responsibility for CBNRM lies, although the Department of Environment and Tourism Affairs (DEAT) 1998 White Paper on 'Environmental Management for South Africa' provides a framework for it.

CBNRM principles are enunciated in the National Forestry Action Plan and the White Paper on Land, and the Local Government Act and the Constitution provide further vehicles for decentralization. The South African policy environment is generally supportive of CBNRM but it has yet to turn policy into practice in all but a few isolated cases. This is due in significant part to poor coordination and collaboration between and within departments and with NGOs and the private sector.

It is generally acknowledged that local government should play a central role but it is unclear how this may be achieved, despite the existence of various mechanisms. Further complications arise at the community level due to intra-community conflict, often involving the traditional authorities, and lack of capacity on behalf of the local authority. The severe dislocation resulting from apartheid has also resulted in the disruption of traditional institutions and knowledge to a degree not seen elsewhere and has led to a scarcity of communal and state-owned land upon which Community Property Associations can be established.

1.3 NRM and HIV/AIDS

Work that addresses the intersection, spatial or otherwise, of HIV/AIDS and NRM has only recently begun. For instance, "to date there appears to have been little or no effort made to understand the role of forestry in mitigating the impact of HIV/AIDS (Barany et al, 2001). A number of studies have examined the impact of AIDS on agriculture in several East African nations as regards the consequences of fatigue or inability to perform chores, as well as loss of special knowledge acquired about plants and practices, carried to the grave with the deceased before it could be passed on.

Concern about the spread of HIV/AIDS among professionals in conservation has focused on the toll it is taking on park managers and guards. Long separation from spouses and family during tours of duty in the parks militates against campaigns that seek to promote new sexual behaviors that prevent the risk of transmission. The economic implications of losing a well educated and trained park professional are very great, given the cost of education and special training for these professions.

1.4 Geographic focus

Initial planning discussions in Washington D.C. to locate a geographic focus for the study led to identification of CBNRM work in the Gaza-Kruger-Gonarezhou Transboundary Natural Resources Management Area (Fig. 1). A USAID project, the Transboundary NRM Initiative, is assisting ongoing efforts by a tri-country committee that oversees the establishment, development and management of the ecosystems in this 100,000-square kilometer area, formally created in November 2000 by the governments of Mozambique, South Africa and Zimbabwe.

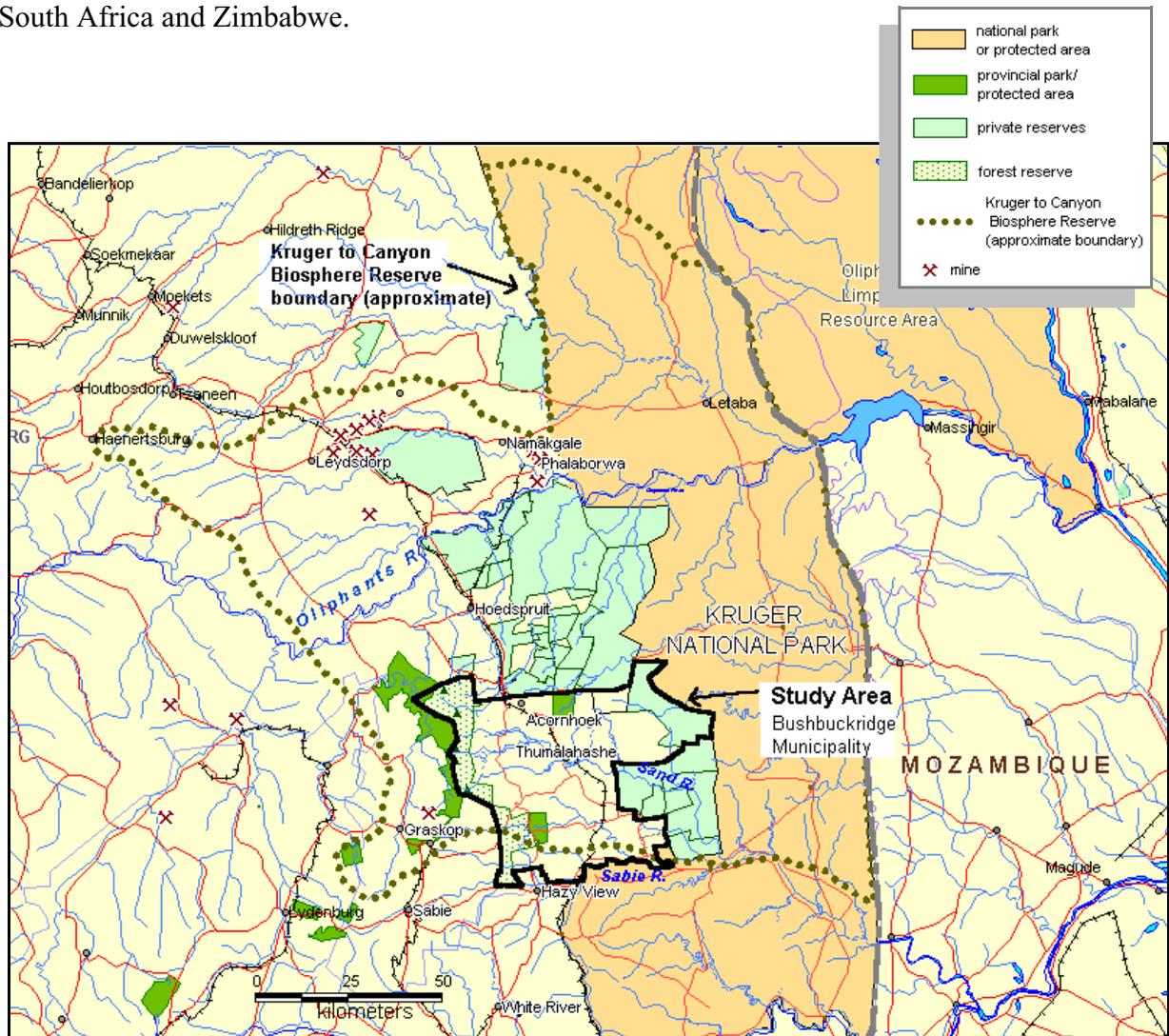


Figure 2. Bushbuckridge Municipality and environs.

1.5 Selection of the study locality

The Bushbuckridge Municipality¹ locale was selected by means of consultations with staff from USAID's Africa Bureau², Office of Sustainable Development, with a representative of Development Alternatives Inc. who is charged with that company's HIV/AIDS work³ for USAID in Africa, and by means of e-mail and telephone consultations with the TB NRMI Chief of Party⁴ and the research coordinator of the Wits Rural Facility⁵ in Acornhoek. Scientists from the Wits Rural Facility(WRF) are affiliated with the University of Witswatersrand in Johannesburg. WRF hosts several development and research programs in addition to its own research lines in ecology, demographics, and health.

The Bushbuckridge area is one of the most densely populated in the entire Transboundary Area – 255 persons/sq km (see Section 2.3.1). It is bounded on the east and north by private game ranches and the Kruger National Park, on the west by the provincial forest and parks, and on the south by commercial forest plantations and by similar, densely settled former homelands in the Nelspruit Municipality. It falls within the newly created UNESCO Biosphere Reserve named Kruger to Canyon, which extends westward into the Drakensburg Escarpment (Fig. 2).

¹Municipal demarcations are recent. The Bushbuckridge municipality is also referred to as the Bushbuckridge district within the Bohlabela District Municipality. The latter is one of several 'trans-boundary' districts shared by two provinces.

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³Laurie Liskin

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⁵Wayne Twine

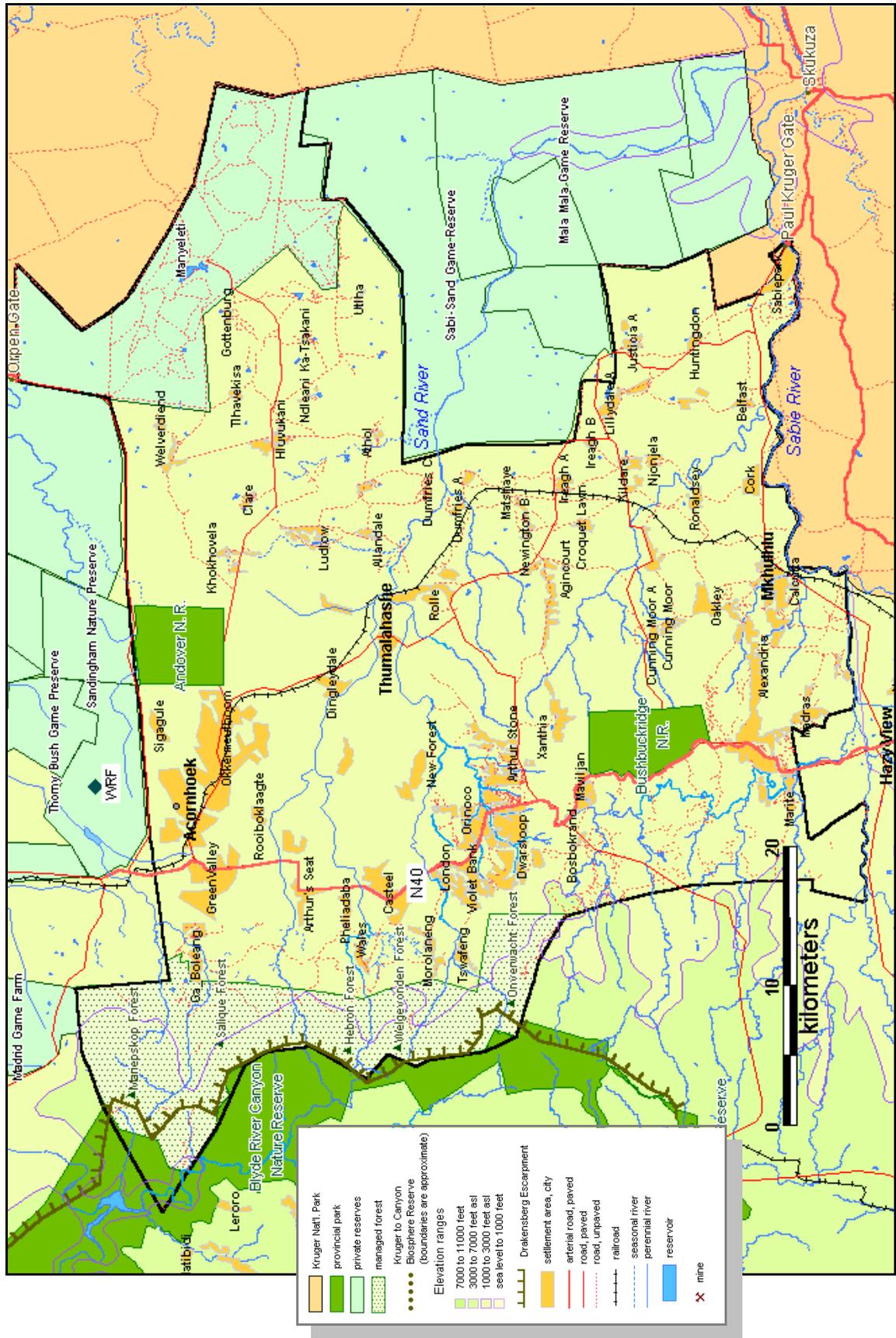


Fig. 3 Bushbuckridge Municipality

1.6 Study scope and caveats

The study aimed to test the usefulness of mapping tools, notably GIS applications, for integrating analysis and responses to HIV/AIDS and CBNRM. The working hypothesis was that both issues have geographic expressions that can increase understanding and guide planning of actions related to the issues. It was also assumed that GIS datasets of the two themes would be obtainable.

The Scope of Work for the study was drafted prior to the selection of the study area. The SOW stated as follows:

“The objectives of this task are two-fold: 1) examine the confluence in a place (community, village) of HIV/AIDS and efforts to manage the natural resource base, and 2) demonstrate the use of geospatial tools for revealing and understanding the spatial and systemic relationships of HIV/AIDS and NRM problems and management efforts.

Two GIS databases will be created for the study area(s): one concerning NRM problems and activities and one concerning HIV/AIDS. Using GPS and standard mapping procedures, natural resources problem areas and project areas will be geo-referenced and mapped using GIS applications. Similarly, areas(neighborhoods, villages) with high incidence of HIV/AIDS will be identified and mapped.

Host country PVO and government partners will be trained in the use of GPS and equipped with GPS units for use in establishing the location of areas or points for these two mapping layers.

A report will be prepared that describes the work done and the results, and examines the implications for actions which address these two phenomena when they may occur in the same place.”

The study was exploratory in several regards. While there has been considerable application of GIS systems to epidemiological work in South Africa⁶ and elsewhere⁷, it has been useful mainly for mapping intermediate vectors of disease and their habitats, such as mosquitos, black flies or snail vectors of malaria, river blindness and bilharzia.

Mapping the geographic patterns of HIV/AIDS in a population would essentially entail mapping the infected population. This turned out to not be possible in South Africa with existing data due to lack of data and due to restrictions. Data obtained in the surveillance of HIV/AIDS is

⁶See the South African Medical Research Council's GIS page (<http://www.mrc.ac.za/services/giscentre.htm>) for examples of mapping work.

⁷GIS for Health and the Environment edited by Don de Savigny and Pandu Wijeyaratne IDRC 1995,,172 pp. See also the online version at: http://www.idrc.ca/acb/showdetl.cfm?DS_ID=2&Product_ID=125&DID=6

designed to maintain the anonymity of individuals, owing to the associated stigma of being HIV-positive. These same restrictions probably exist in most other countries. However, as described later local data does exist; it just is not available.

1.7 Geographic Information Systems(GIS) tools and data

Mapping and analysis work done in this study used MapInfo software (MapInfo Professional 5.5). Geographic positioning of photographs and field observations was accomplished with a Garmin eTrex Legend Global Positioning System(GPS) unit. This is a handheld device that records the latitude, longitude, and elevation of specific places and routes traveled by means of signals from satellites.

1.7.1 Maps

Base maps and thematic maps were prepared using datasets from various sources. Portions were digitized from existing topographic maps. (See Annex)

The display and analysis of natural resources relevant to community level work using GIS requires medium to large scale base maps in digital format. In general South Africa's GIS capabilities are relatively advanced. It was assumed that GIS datasets, at least for base maps, would be found and indeed this was the case.

The field study area corresponds to the newly delineated Bushbuckridge Municipality, within the Northern Province, but formerly in the Mpumalanga Province. The Mpumalanga Parks Board had scanned and digitized 1:50,000 topographic maps of most of the study area. The images of the scanned maps and various files that were digitized from these maps were made available. Other useful GIS data made available by the Mpumalanga Parks Board included files for the Kruger National park, Mpumalanga provincial parks, the new municipality boundaries, and surface geology of South Africa.

Portions of the Northern Province that now fall in the Bushbuckridge municipality were not included in the MPB files. For these the author scanned 1:250,000 scale topographic maps and digitized certain features (populated areas, roads, railroads and streams) in order to make possible a single scale presentation of the entire municipality. Although not of comparable precision to the MPB files, the area in question is very small, and features such as roads and drainage patterns joined well with the more detailed datasets derived from the 1:50,000 topographic maps.

Population datasets were provided by the Medical Research Council of South Africa. The Council's GIS Centre supplied GIS layers and 1996 census information for the 919 individual enumerator areas in the Municipality.

Smaller scale (zoomed out) displays of the GKG area as well as location maps were designed using datasets contained in the DEVECOL/Africa information system. These in turn originated from Digital Chart of the World files, World Database II files, and South African sources for

parks.

All the maps developed for this report use the map datum and projections that have been adopted for use in South Africa, namely the World Geodetic System 1984 ellipsoid, commonly known as WGS84.

1.7.2 Geo-referencing with GPS

The study method anticipated using GPS units to establish the coordinates of field observations as well as household survey sites of a special census commissioned in early 2002 by the USAID TBNRM Initiative project. A 4% sample household survey was conducted to gather demographic, agricultural and socio-economic information about the communities living within the Transboundary Natural Resource Management Area. The use of GPS units was not part of the survey methodology, and the introduction of geographic positioning information to the survey of communities seemed to hold promise.

Upon arriving in South Africa the author contacted the survey team in order to explore this possibility for the household survey in the Bushbuckridge area. In that area, which was formerly a homelands (Gazankulu and Lebowa) rural inhabitants have been concentrated in villages or small towns. These are readily identified on 1:50,000 scale topographic maps. Fields cultivated by different households are located outside of the villages, however. As a consequence the geo-referencing of individual households surveyed within the villages would not have helped understand natural resource management potentials or limitations of individual households' fields. Consequently the households in the Bushbuckridge villages surveyed were not geo-referenced. The author nevertheless used a GPS unit to record elevations and to locate field observations and photographs.

As noted below, clinics in the area participating in the annual survey of HIV among pregnant women visiting the clinics have been located by the Department of Health using GPS units. At such time as clinic-specific data from the annual HIV sero-prevalence surveys becomes available, the clinic database will be useful to GIS-supported analyses.

2 Description of the study area

The region surrounding the study area is unique. There is no place in the world at similar latitudes in the subtropics that compares to its combination of landscapes, ecology, fauna and flora. This circumstance explains the long international interest in its value, which has recently culminated in the establishment of the Kruger to Canyon UNESCO Biosphere Reserve. The “canyon” refers to the Blyde River Canyon, one of the deepest in the world, that cuts through the Drakensburg Escarpment and channels the water of the Blyde river from the mile-high interior plateau, or High Veld, into the lowland savannah or Low Veld where it joins the Oliphants River and where private and public game parks are concentrated, visited by international as well as local tourists. Most of the Bushbuckridge Municipality falls within the Biosphere reserve (Fig. 2)



Fig. 4 Blyde River Canyon

2.1 Physical environment

Low foothills just east of the Drakensburg Escarpment bound the western side. The highest elevations in this area, approaching 900 meters, are to the southwest of the municipality on the north-south oriented granitic ridge that names it. The land descends into a piedmont with elevations steadily dropping to 400 meters or less at the eastern border (Fig. 8). Immediately south of Bushbuckridge can be seen isolated monadnocks or steep rounded hills of weathered granite rising dramatically from the piedmont. The area’s granite and tonalite (similar to granodiorite but lacking potassium-rich feldspar) has weathered into rather poor reddish sandy soils, except for an area in the northeast where a vein of gabbro found near Andover has given rise to more fertile black clays. Soil productivity is largely a function of its position on slopes, with nutrient poor soils on the summits of low hills or ridges and more nutrient rich soils accumulating at the foot slopes, where there may also be more moisture.

2.1.1 Climate

Located at the southern margins of the Subtropics, the municipality has distinct summer and winter seasons and a single rainy period from November to February. The climate is semi-arid and historical records show an 18-year oscillation of wet and dry periods, with nine years below and nine years above rainfall averages. The most recent dry period began in 1979 with droughts occurring in 1981/84 and 1991/92. 70% of the region’s cattle perished in the 1991/92 drought. This drier period had not abated by 1995 (Shackelton, S.E. et al, 1995), while a few years later very heavy rains leading to floods occurred (in 1998 and 2000).

Table 1. Temperature regimes at Skukuza and Bosbokrand(°C).

	Daily average ¹	Ave. daily max.	Extreme max.	Ave.daily min.	Extreme min.
Skukuza					
265 m					
January	26.5	32	39	20	16
July	15.7	26	32	16	10
Bosbokrand					
860 m					
January	n.a.	28	34	18	15
July	n.a.	22	29	9	4

Source: Rep. of S. Africa. Water Resources Planning of the Sabie River Catchment, Appendix 1 Catchment Study Report. March 1990.

Temperatures

Near to the southern boundary of the subtropics, the municipality enjoys a mean annual temperature of 22°C and frost is rare. Due to its latitude, however, the area experiences considerable temperature differences between hot rainy season and the cool dry 'Winter' months. Temperatures are markedly lower at higher elevations. Temperatures at Skukuza are typical of the Lowveld region, while those of Bosbokrand typify the higher elevations on the west. Daily maxima and minima are taken from records cited in footnote 7.

Rainfall and storms

Rain falls during the November to March summer. None falls in the mild 'Winter' season. Amounts range from 1200 mm in the west to 600 mm or less in the east. (Values in the figure above do not average in the 1990's period).

Rain occurs mostly as thunderstorms, some very intense. This is an important consideration in both erosion control and the design and maintenance of reservoirs and irrigation systems. The rains of February 2000 resulted in one dam being breached. The whole of the region is also prone to longer-lasting tropical cyclonic storms moving into Southern Africa from the Indian Ocean. Rainfall is highly variable, however, statistical calculations of variance were not found.

¹Source for 1961-1990 records: <http://www.worldclimate.com/>

High evapotranspiration in the warmer eastern Lowveld of approximately 1600 mm² is about 3 times greater than rainfall, whereas cooler temperatures at the higher elevations in the eastern portion lower evaporation to approximately 1400 mm, only slightly more than average rainfall.

Poor harvests or failures of rainfed crops are frequent. Winter season agriculture is not possible without irrigation. However, irrigation has been little developed in the municipality, 'though to the north and south large irrigated, commercial farms supply South Africa with its winter season fruits and vegetables.

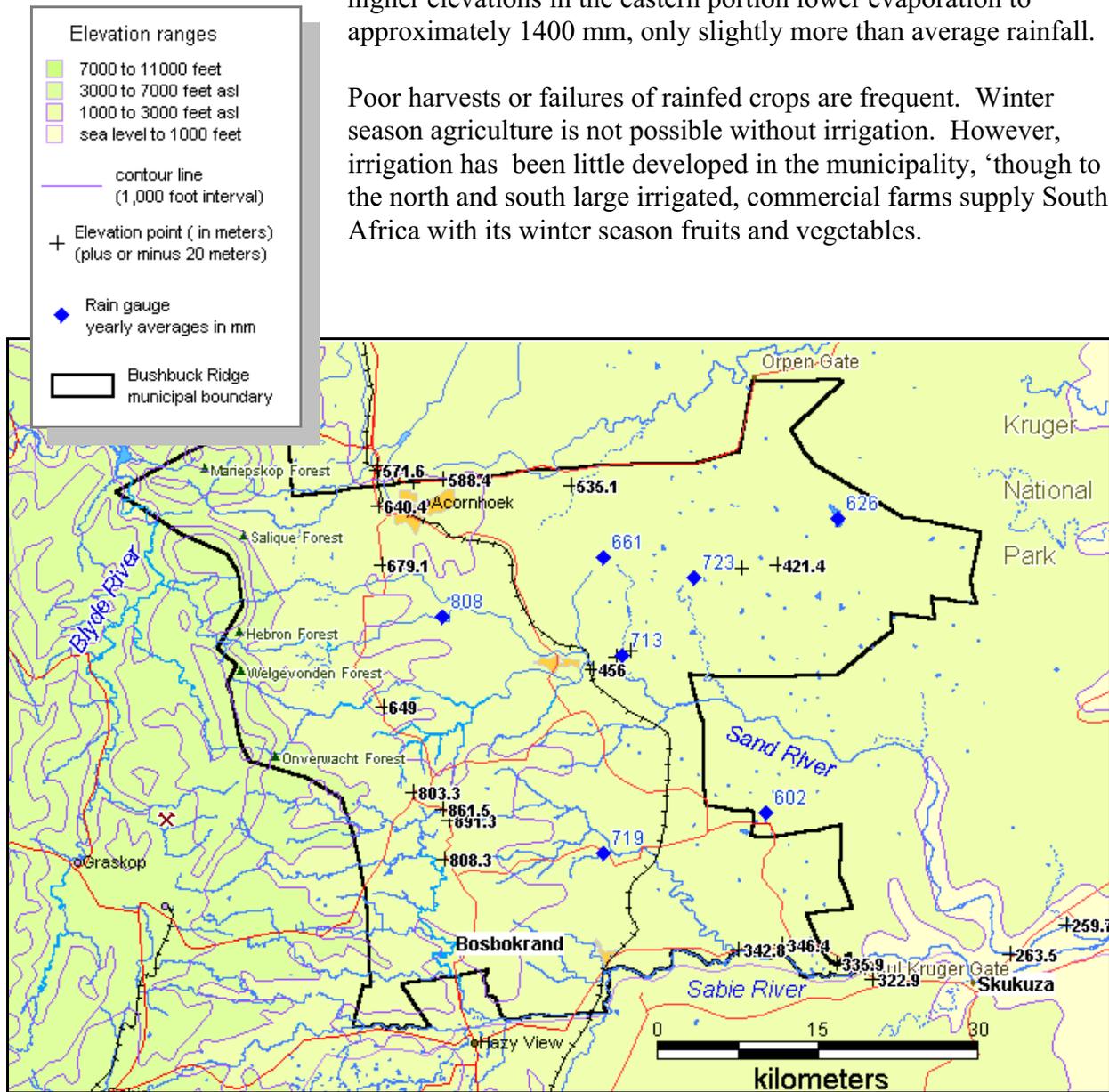


Fig. 5. Elevations and yearly rainfall values in Bushbuckridge. Spot elevations are from GPS readings. Rainfall values are from: Rep. of S. Africa. 1990. Rainfall averages do not reflect below normal rainfall in the early 1990's.

²Rep. of S. Africa. Water Resources Planning of the Sabie River Catchment, Appendix 1 Catchment Study Report. March 1990.

2.1.2 Vegetation

The natural vegetation of the area is a savanna woodland, or bushveld (or Lowveld) dominated by Combretaceae and various acacias of the Mimosaceae family. This low woodland is densely vegetated if undisturbed, as in protected nature reserves, while in the communal grazing woodland areas of Bushbuckridge it is more open and in places reduced to scattered trees, e.g. in the area of Green Valley west of Acornhoek.

The more arid eastern portion is classed as Arid Lowveld. It's natural forest has a canopy 5-6 m in height and is dominated by Acacias along with *Combretum apiculatum* and *Sclerocarya birrea* (Marula). To the west as the land rises the vegetation type become Semi-arid Lowveld, with a canopy height of 6-7 meters, and with the Combretaceae species dominant, but with Marula continuing to be common.



Fig 6 View to the east from road on Bushbuckridge into the semi-arid Lowveld and beyond to Kruger National Park. 24°51'S 31°06'E. Elevation 890 meters. 2/25/2002

Extensive eucalyptus and pine plantations have replaced the natural vegetation in areas bordering the municipality to the south and west, at elevations above 900 meters.

2.2 History and pattern of settlement

During the Apartheid period homelands were created by “Crown” land and the farms of white settlers who were bought out. The land was surveyed and divided into blocks of 1000 hectares or more, and black Africans were moved to them. In the 1960's a policy of “betterment and villagization” was instituted which clustered households into villages of 1000 to 2000 so as to allow control over agriculture and other land use and facilitate access to schools and clinics.

Bushbuckridge is made up of districts that were once part of the apartheid 'homelands' of Lebowa and Gazankulu. The former Mhala district (to the east of the N40) was part of Gazankulu; Mapulaneng (west of the R40) was in Lebowa. These district names still appear on

the currently available topographic maps.



Fig. 7 Panoramic view looking northwest near Bosbokrand, on N40. The Drakensburg Escarpment rises to 1800 meters in the distance. House construction and settlement pattern are typical. 24°51'S 31°06'E. Elevation 861 meters. 2/25/2002.

Densely settled rural villages with cash-based economies based on remittances from migrant laborers became the pattern. (Village areas are displayed with an orange color on the various large scale maps in this report). In some settlements arable land was withdrawn from cultivation and people lost their subsistence basis of livelihood. Men turned to jobs outside the settlements for their livelihoods. Males 25-59 years old are largely absent from the permanent population, at work in mines in Phalaborwa, in cities, or in large commercial farms or forest plantations. Women can also be seen working in the forest plantations. Many single parent households are headed by women.

Since 1994, people in rural villages, previously restricted in their movements, have begun to move to larger towns such as Mkhulhu and Acornhoek. Thumulahashe, the recently named municipal seat, is also destined to attract rural migrants.

2.3 Population characteristics

The principal ethnic groups are Shangaan/Tsonga and Sotho. The Shangaan people living in the area are closely related to the Tsonga who live in Mozambique. Many Shangaan speakers are refugees from the civil war in Mozambique during the 1980's. Mozambican refugees have taken up residence in many of the villages, and constitute up to almost a third of some villages, e.g. those that are part of the Agincourt DSS. Their houses are generally of more rustic materials - adobe mud and thatch, compared to the better off South African blacks who use cinder block or bricks and tin roofs. Many of the villages have electricity. Potable water is provided either from reservoirs, hand dug wells in river bed areas, or - less frequently - boreholes.

Table 2. Population of the Bushbuckridge Municipality, 1996

male	247,049
female	296,650
total	543,699

Source: 1996 Census Enumerator Area files for Bushbuckridge Municipality, Medical Research Council, GIS Centre.

Note: New municipal boundaries and names were established in South Africa in 2001. 1996 population data for what is now the Bushbuckridge Municipality has been prepared by the Medical Research Council and was provided in a GIS dataset with accompanying tables of census results.

The municipality has a youthful population, although, as the Agincourt surveys have discovered fertility rates have declined steeply in the 1990's.

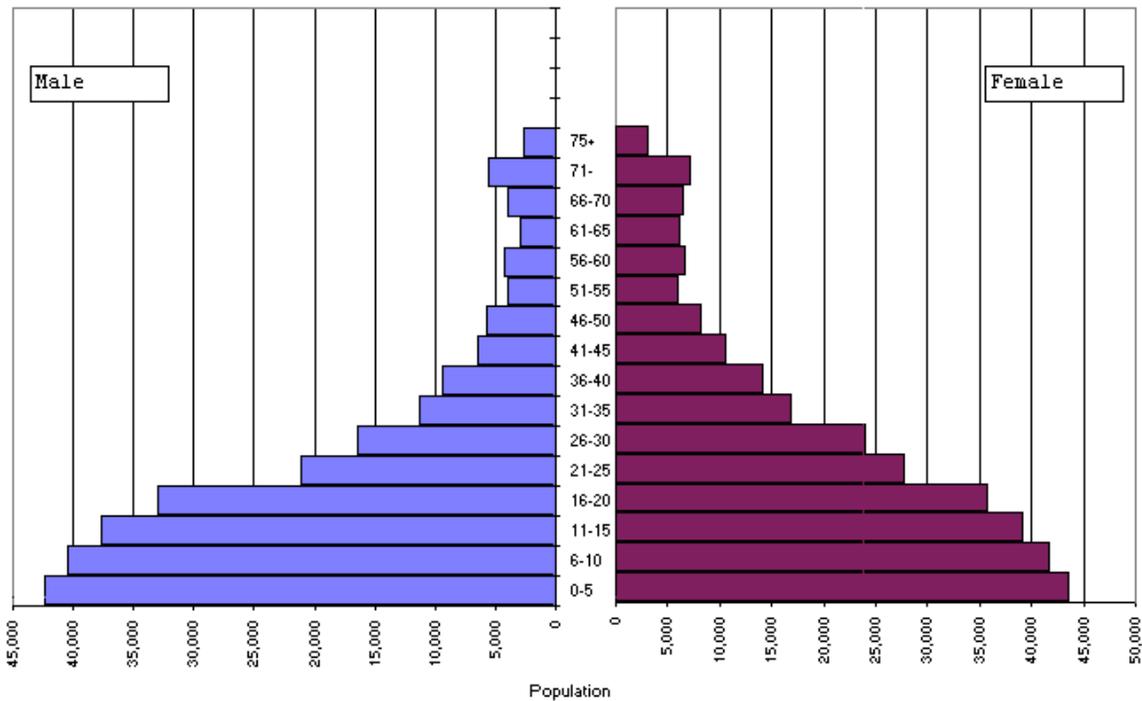


Fig. 8. Population by age group and sex, Bushbuckridge Municipality, N. Province, 1996. The 75+ total includes 2,613 males and 2,988 females of unspecified ages. Source of data: Medical Research Council of S. Africa, GIS Centre.

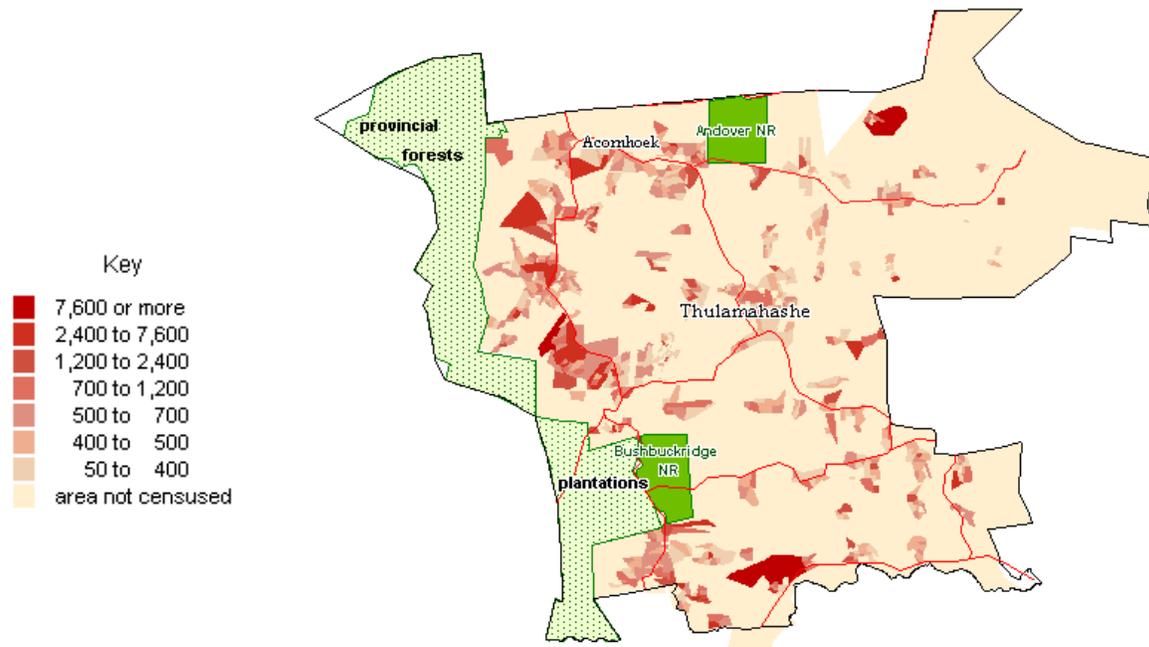


Fig. 9 Population distribution, Bushbuckridge Municipality, 1996 census enumerator blocks. Source of data: Medical Research Council of South Africa.

The “not censused” category corresponds to the cultivated areas and wooded savanna grazing commons outside of the villages, with few or no inhabitants and recorded as having “0” inhabitants.

2.3.1 Man/land ratios

The population is concentrated in numerous villages and larger towns throughout the municipality shown on topographic maps as “built up” areas. These are dense settlements with small home gardens and corrals for animals. Many of the settlements include sections where refugees from Mozambique have established themselves. Larger towns along N-40, the paved highway that connects Hazy View with Acornhoek and Hoedspruit, are becoming development nodes and taking on the characteristics of urban areas. Agriculture, grazing, and the gathering of secondary products take place in the lands designated as communal areas.

The ratio of inhabitants to available land is 255 persons per square kilometer, a density greater than most published estimates and one that was calculated with 1996 population data for the municipality, as now demarcated. Available land does not include the forest and plantation areas, totaling 370 sq,km and two reserves – the Andover Nature Reserve (a tourist oriented facility) and the Bushbuckridge Nature Reserve, since these are unavailable for agricultural or

grazing uses. Thus only 2,156 sq km of the 2,596 sq. km total for the municipality is available, and of this available land 356 sq km is settlements.

Table 3 Land areas(in sq.km.)¹ and man/land ratios² in Bushbuckridge Municipality

Bushbuckridge municipality	2596
Forest reserves and plantations	-370
Andover and Bushbuckridge nature reserves	-70
Available land	2156
Inhabitant/sq km of available land	255
Settlement areas(towns, villages)	-356
Wooded commons	1800
Inhabitant/sq km of wooded commons	300

¹ Area measurements are taken from GIS files. ²A total population of 550,000 was used.

2.3.2 Health status

An in depth portrait of a portion of Bushbuckridge’s rural inhabitants has been developed by the Agincourt Demographic Surveillance System project. Beginning in 1992, six censuses have gathered demographic and health information for 10,500 households in 21 villages in the south of the municipality(Fig. 11). Among other data, these censuses have included verbal autopsies, i.e. interviews as to the causes of deaths not recorded by or reported to public health authorities. These verbal autopsies are analyzed to reveal a population’s most serious health problems.

Table 4 Principal health problems in the Agincourt Study Area, Bushbuckridge Municipality.

< 5 years	diarrhea, kwashiorkor and AIDS
15-49 years	accidents, violence and AIDS
≥ 50 years	chronic degenerative diseases

Since 1994 there has been an increase in mortality among children 0-4 years, young adults(20-49. years) and adult women(50-64 years). There has been a steep decline in the total fertility rate - from 6 births to 2.72 births per woman between 1974 and 1999.

Results of annual HIV sero-prevalence surveys are not available for individual cooperating clinics, which includes the Tinstwalo hospital in Acornhoek. Other municipal level health status information was not obtained.

Additional discussion of HIV/AIDS is presented in Section 4.

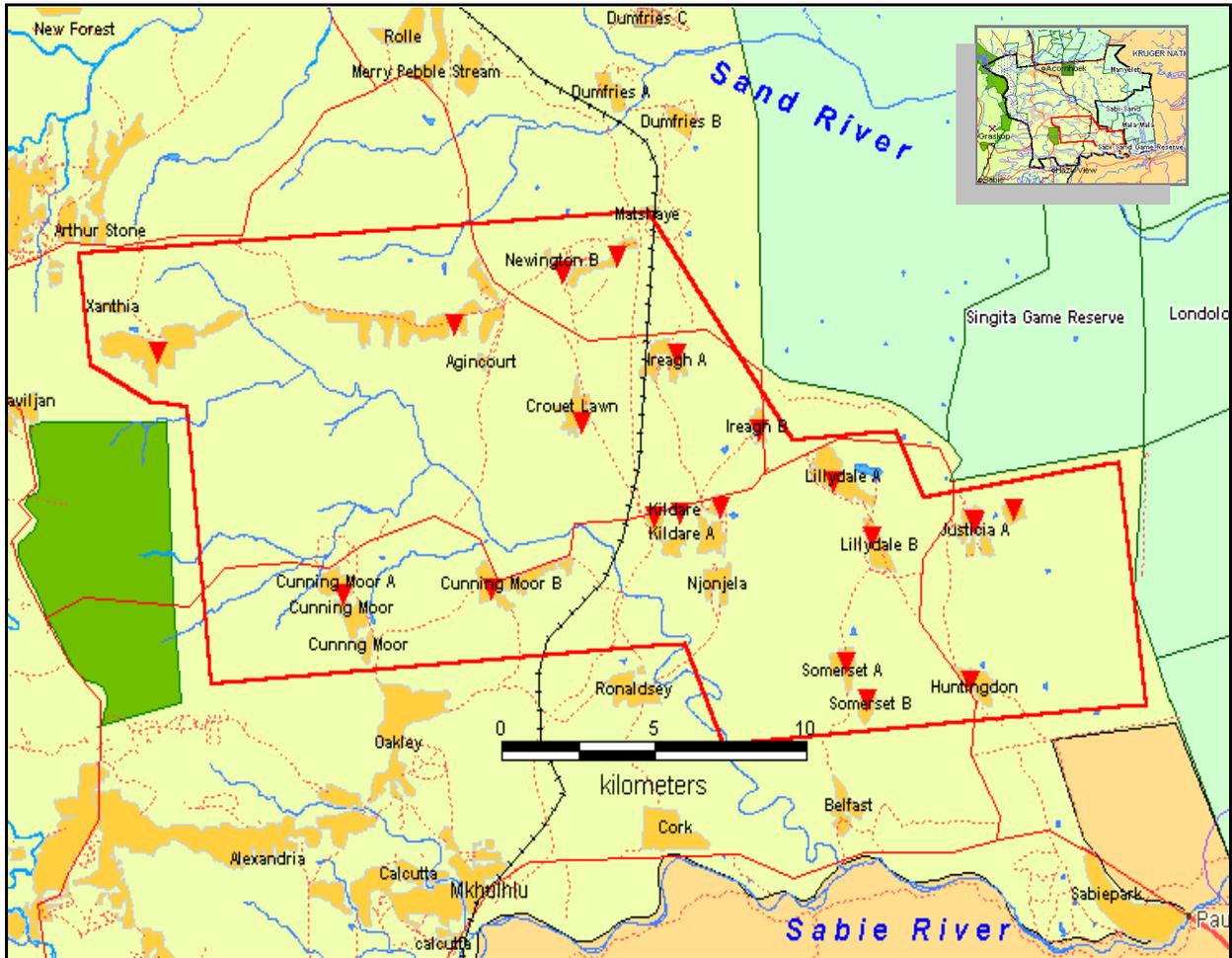


Fig.10 Location of the Agincourt Study Area and villages.



2.4 Economic activity and sources of income

Bushbuckridge is one of the poorest areas in the Northern Province, in contrast to the prosperity of the many private farms and game ranches that surround it and the natural resource wealth in adjacent forest plantations and protected reserves.

Unemployment estimates for the area vary between 40% and 80% of the economically active population (people between the ages of 15 and 64 years). Taking informal economic activities into account, unemployment is probably in the 50-60% range, with most of this being residents in the 25-34 age group. The major internal sources of employment are public service (mainly teaching), tourism, forestry and commerce.

Monthly household income in the area ranges from R180 to R1130 (Twine, et al, 2002). Most estimates suggest an average household income of R630 per month, which gives a per person figure of around R100 per month.. Mozambican refugee villages have much lower household incomes. More than half of BBR household incomes go to food. Transport, schooling and agricultural production costs account for much of the remainder. The level of 'disposable' income is extremely low(Baumann, 2000). Nevertheless, living conditions are made easier by its rural setting. Households do not face the sort of overcrowded and unhygienic conditions often found in urban informal settlements.

2.4.1 Migrant labor

The principal sources of income are remittances from migrants working outside of the municipality in mines, forest plantations or cities. Local sources are public services such as teaching, agriculture, and for a few villages, employment in Kruger National Park or in Private Game Reserves.

Almost 70% of working-age males and 40% of females work outside the area for more than half the year, while half the males and 14% of females between the ages of 25 and 59 are long-term migrant workers. This is the main form of income for many households, and is the major source of cash. However the contribution of migrancy to average household income is beginning to fall, as some households migrate permanently to urban areas, and outside work opportunities (particularly in mining) are in decline. The Phalaborwa mining complex is expected to close in five years and recently 600 mine workers were laid off. Jobs were lost in the Kruger National Park (recently as well) (M4857)

In 1996 there were 9, 631 men aged 66 to 71 (the oldest age group censused) and 19,818 women between the ages of 61 and 71. Counting only the men and assuming they are each living in a different household and that the numbers have not changed significantly since 1996, there would be 9,613 households receiving pensions out of an estimated 88,710 households (550,000/6.2), or representing 11 % of the total households.

Compensation for disabling accidents or for accidental death (an important cause of death in Agincourt) may be a further source of income for workers such as miners and forest plantation laborers. In the case of death, the widow/er is entitled to 40% of what an employee would have received for 100% disablement and the compensation extends to children who receive 20% of what an employee would receive if permanently disabled(until age 18). The compensation for permanent disablement is 75% of an employee's earnings but not less than R1081 per month³.

Unemployment compensation may become a source of income as well for out-of-work miners or other industrial workers, however, the local Labor Department Office dealing with unemployment compensation did not exist in the district until very recently and the current office is operating in Thumalahashe without telephones, computers or other basic office supplies. People who were receiving unemployment benefits numbered 235, and in February 2002 there were 78 new claims. Fourteen death benefits had been claimed in that month⁴.

2.4.3 Farming and animal husbandry

Most households farm for household consumption. Most households have gardens and keep small herds of cattle or goats. The proportion of goats is increasing. Some farming for export does occur, but on a very small scale. More important is the production of vegetables for sale in local markets.

Crop lands in the communal areas outside the villages are assigned to households by village headmen, though many households also cultivate small "hidden" fields. Rainfed crops are mainly traditional maize(5 months) and hybrid maize(3 months), sweet potatoes, tomatoes, beans, pumpkins, and peanuts - the last two often intercropped with maize. Winter season crops grown with irrigation are: tomatoes, onions, pumpkins, beans, spinach and potatoes. Sorghum is not grown because, although seen as drought resistant, bird damage is too great. (The author observed a nesting flock of *Quelea quelea* (Red-billed Quelea) near Gottenburg on the western side of the municipality). Home gardens in the settlements typically have a variety of fruit trees (papaya, citrus, guava, mango, mulberry) and the native Marula is a common shade tree in settlements. Maize is sold or traded for maize meal at mills where a 130 kg bag of maize is exchanged for an 80 kg bag of meal.

³Compensation for Occupational Injuries and Diseases Act, 1993.

⁴ Interview with Edward Nxumalo, Dept of Labor, Thumalahashe, March 4, 2002.

Cattle are grazed in the commons, not stall fed, even those kept for milking. Goats are increasingly replacing cattle. Cattle near the game reserves are often killed and eaten by lions, and park ungulates transmit foot and mouth disease. Cattle suffer this disease and are dipped weekly. On the other hand, cattle have transmitted bovine tuberculosis to park buffalo in the past⁵.

Various schemes in and near the municipality have promoted commercialization of agricultural products. The Mhala Development Center, near Thumulahashe has recently set up a Marula conserve operation and has created a local market for this native fruit. Oil from the Marula kernel is also expressed for use in the cosmetic industry; it is valued for its trait of not becoming rancid. A tomato canning plant at Hoedspruit, north of the municipality, closed and with it a market for local tomatoes ended. Several large sisal plantations established in the past are in a state of abandonment and unused. The nation's only silkworm farm was established in the municipality but was shut down. There are several irrigated orange groves; one near Casteel is sheltered by a Casuarina windbreak.

2.4.4 Tourism

The tourism industry, and particularly the nearby Kruger National Park and private game reserves, is a source of employment for people in villages near the park boundaries. For instance workers from villages near Skukuza Camp are transported daily by bus to their jobs. No estimates were found of the actual numbers employed by the industry, however, and in 2001 Kruger Park downsized from 4,000 to 1,857 employees.

2.4.5 Small scale manufacturing

The area is home to many small-scale manufacturing enterprises which sell their products locally. Chief among these are sewing, woodworking, steel fabrication, and food processing. The DANCED sponsored Community Forestry Project fostered a number of chain link fence manufacturing operations (next section). For future economic development initiatives, this is critically important, for several reasons (Baumann, 2001). It indicates a culture of manufacturing often absent in the cities. It suggests a local approach that encourages household production rather than only wage employment or trading. It alerts policymakers to the possible impact of broader development initiatives (for example, improving transport) on production-based economic activity.

2.5 Uses of the communal woodlands

Numerous studies of the ecology, the potentials, and the uses of the area's woodlands have been conducted by researchers working out of the Wits Rural Facility, notably Charlie M. Shackleton and Wayne Twine (see bibliography). All these studies establish the critical value of the

⁵personal communication with Wayne Twine

woodlands for the livelihood of the municipality’s rural populace. The woodland communal areas provide a diversity of needs and constitute an important buffer for crop failures or income loss. In addition to browse, fuelwood and construction wood, the woodlands provide a wide variety of fruits, particularly the Marula whose tangy, plum-sized fruit is eaten or processed into conserves or beer, wood for carving (*Pterocarpus* sp.), many medicinal products, edible herbs, insects which are eaten, grass for thatching and reeds for weaving. Harvesting of these products is year around according to the seasons. The equivalent cash value of the wild fruits is greater than that of the firewood.

Almost all households burn wood for cooking and heating, even when electricity is available since it is too costly for these purposes. Several studies summarized below have examined fuelwood supply and fuelwood demand.

In the region’s Low Veld the average standing crop of fuelwood varies according to the land use.

nature conservation	20.4 t/ha
commercial cattle farming	17.5 t/ha
communal lands	4.8 t/ha

Measurements were made in the mid-1990's of the standing crop of fuelwood at a number of places in Bushbuckridge communal lands of Athol (7.2 t/ha), Cottondale (2.0 t/ha), Okkerneutboon (5.5 t/ha and 2.3 t/ha), and Rolle (3.5 t/ha). In the area of the Wits Rural Facility in contrast, 18.9 t/ha were measured (Shackleton, C.M. 1994). The WRF is located within a nature preserve.

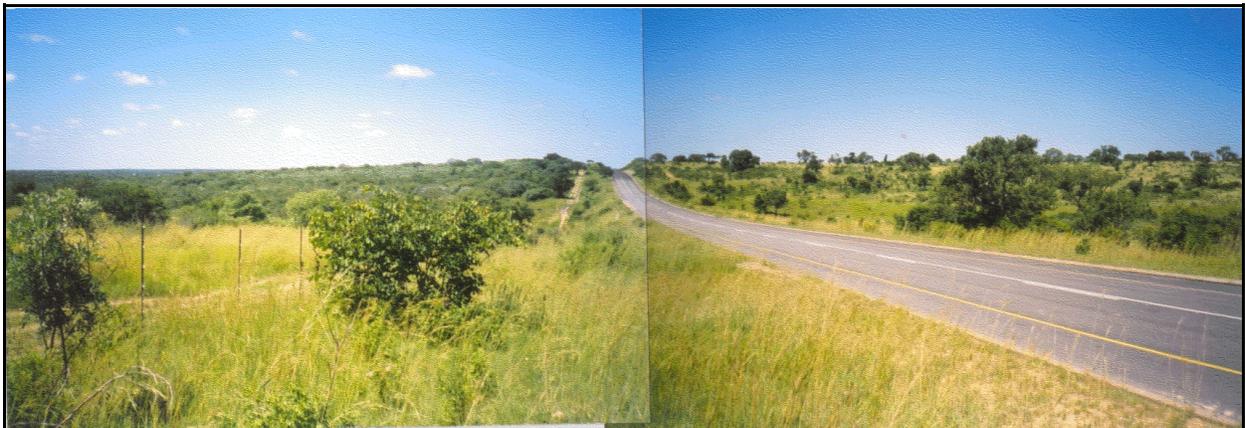


Fig. 12 View east from road separating a nature reserve(left) from communal grazing area(right). Near Wits Rural Facility gate.

Yearly fuelwood consumption in Bushbuckridge has been measured at 485 kg per person (Shackleton and Shackleton, 2000), which equates to almost 3 t per household of 6. The average

household size is 6.2.

Shackleton determined that the wooded savannas in the area produce 17 kg of harvestable dead fuelwood per year per ton of standing biomass (Shackleton, C.M. 1998). Using his estimate of an average of 4.8 t/ha of standing trees in the woodlands commons, the municipality's 173,100 ha of communal grazing lands⁶ holds a standing tree biomass that could yield approximately 14,125 tons of harvestable dead fuelwood. On the demand side, there are approximately 88,710 households in Bushbuckridge ($550,000 \div 6.2$). If only 80 % of the households depended upon fuelwood, the yearly demand would be 212,904 tons. This tremendous gap between supply and demand has translated into uncontrolled cutting of live trees as fuelwood becomes more scarce and more dear. A pick up load of fuelwood (approximately 2 tons) cost 150 rand in December 2001, twice as much as in 1999 (Twine, 2002).

Present rates of fuelwood cutting and deforestation have not been studied nor are they monitored, however, live branches are being cut and severe pruning can be seen in the misshapen and diminished crowns of trees. The woodlands are predictably thinner near to villages (Shackleton, 2000), where the remaining trees are mainly the well-liked Marula. Few native trees remain in the Green Valley area west of Acornhoek.

Cutting of live trees or branches is permissible only with permits from traditional chiefs or headmen, yet this restriction, once respected, is now honored mainly in the breach as the power of tribal authorities has faded.

Fuelwood supply

	amount	total for wooded communal area (173,100 ha)
Standing woody biomass	4.8 t per ha	830,880 t
Yearly available dead wood (17 kg/ha/ton standing crop)	81.6 kg per ha	14,125 t

Fuelwood demand

Fuelwood use per household per year	3 t
Number of households using fuelwood (80% of the total)	70,968

⁶ The areas occupied by of densely settled villages, tree plantations, managed forests, and the Bushbuckridge and Andover reserves have been deducted from the total municipal area to determine the extent of communal grazing area.

Total potential fuelwood consumption per year	212,904 t
Potential dead wood fuelwood deficit	198,779 t
Deficit as percent of the estimated standing woody biomass	24%

2.6 Income from communal woodlands

The communal woodlands are especially important during droughts, as a source of products consumed and ones that can be sold. Shackleton computed both household and hectare values of these products (see table 5 below), which included fuelwood, fruits, edible herbs, insects, medicinal plants, thatch grass, weaving reeds, and more (Shackleton and Shackleton, 2000).

Table 5. Value of secondary products from communal grazing commons.

Resource	Value per hectare	Annual value per household	
		value used at home	value traded
Edible herbs	256	736	2625
Fuelwood	182	465	unknown
Medicinal plants	150	383	unknown
Other	222	612	1786 ^a
Total	810	2196	4411
US\$ equivalent (1998)	141	386	767

^a

Includes weaving reeds valued at R1140 per household

3 Community level natural resources initiatives in the study area

Many initiatives, large and small, are underway or have been carried out recently in the study area. None of the descriptions mentioned or treated the subject of HIV/AIDS. Except for the DANCED project of village-based forestry, described below, CBNRM has focused on park-related activity.

3.1 Park-related CBNRM

In the general region the African Wildlife Foundation has begun to assist communities in the process of gaining legal title to their lands, especially in regards to laws passed since 1994. Establishing ownership is strategically important for communities who wish to negotiate with private sources of development money interested in a community. This is the case for several communities bordering private game reserves.

Two key, related laws establish the legal context for community ownership and control of land resources: the Restitution of Land Rights Act of 1994 and the Communal Property Associations Act of 1996. An understanding of common property management and community-based natural resources management today among communities in the former homelands surrounding Kruger National Park is largely framed by these two laws and subsequent actions.

The Restitution of Land Rights Act of 1994 was established:

“To provide for the restitution of rights in land in respect of which persons or communities were dispossessed under or for the purpose of furthering the objects of any racially based discriminatory law; to establish a Commission on Restitution of Land Rights and a Land Claims Court; and to provide for matters connected therewith.”

Under the act, tribes (of Black South Africans) can lodge a claim for restitution of tribal lands taken from them during apartheid. Claimants are identified as communities. The act defines community as:

“any group of persons whose rights in land are derived from shared rules determining access to land held in common by such group, and includes part of any such group”

The Communal Property Associations Act applies to a community:

“(a) which by order of the Land Claims Court is entitled to restitution under the Restitution of Land Rights Act, 1994 (Act No. 22 of 1994), where that Court has ordered restitution on condition that an association be formed in accordance with the provisions of this Act;

“(b) entitled to or receiving property or other assistance from the State in terms of an agreement or in terms of any law, on condition that an association be formed in accordance with the provisions of this Act.”

Communal Property Associations can receive loans, advice and technical assistance, for instance in how to effect a transition from a solely owned irrigated citrus farm to one owned by several thousand CPA members.

Extant communities in the former homelands can also claim land ownership and communal rights on lands that they presently occupy. The process entails lodging a claim in the Land Claims Court that, inter alia, identifies the “parent farm” that pre-existed the settlement of the community. The boundaries of these pre-existing parent farms appear to be plotted on the 1:50,000 topographic map series, and they constitute a commonly understood but incomplete reference rather than a legally binding property delineation. Until this step is accomplished it appears that their authority to control access to their lands, especially the treed savannah grazing commons is weak. The power of tribal authorities, who exercised this control during apartheid, is weakening and varies from one community to another, according to personalities and community idiosyncrasies.

3.2 Land claims for park-related CBNRM

Numerous villages or tribes immediately adjacent to the park and the privately operated game reserves are taking steps to become stakeholders in ecotourism or safari hunting tourism, with the help of NGOs as well as the South African National Parks.

Several claims have been lodged, one successfully, to gain access to portions of the Kruger National Park (Figure 13). In 1998 the Makuleke Tribe succeeded in reclaiming a portion of the northern tip of the park, as shown on the map below, from which it was evicted in 1969. The complex history leading to this event is succinctly described by Carruthers (Carruthers, 1995) on pages 97-99 of her social and political history of the the Kruger National Park. The tribe has formed a Communal Property Association and negotiated an arrangement to keep management of the Makuleke Contractual Park under the Kruger National Park Authority and in accordance with the CITES treaty. They are now dealing with a commercial operator, Matswani Safaris, to develop a luxury 24-bed lodge, along with a tent-camp and even a museum. Instead of resettling on the land, they have decided to use it as an economic base for their villages on the park’s frontier. In addition to lodging, the Makuleke have also decided to offer some trophy hunting, arranged by a private safari company. In 2000, two elephants and two buffaloes were hunted, which brought about \$57,000 for local development projects (and meat which was distributed among Makuleke villages). The tribe was reported to have earned the equivalent of \$57,000 in fees. (“Tales of white elephants” Eddie Koch, director of the Mafisa Research and Planning Agency in: http://www.unesco.org/courier/2001_07/uk/planet2.htm)

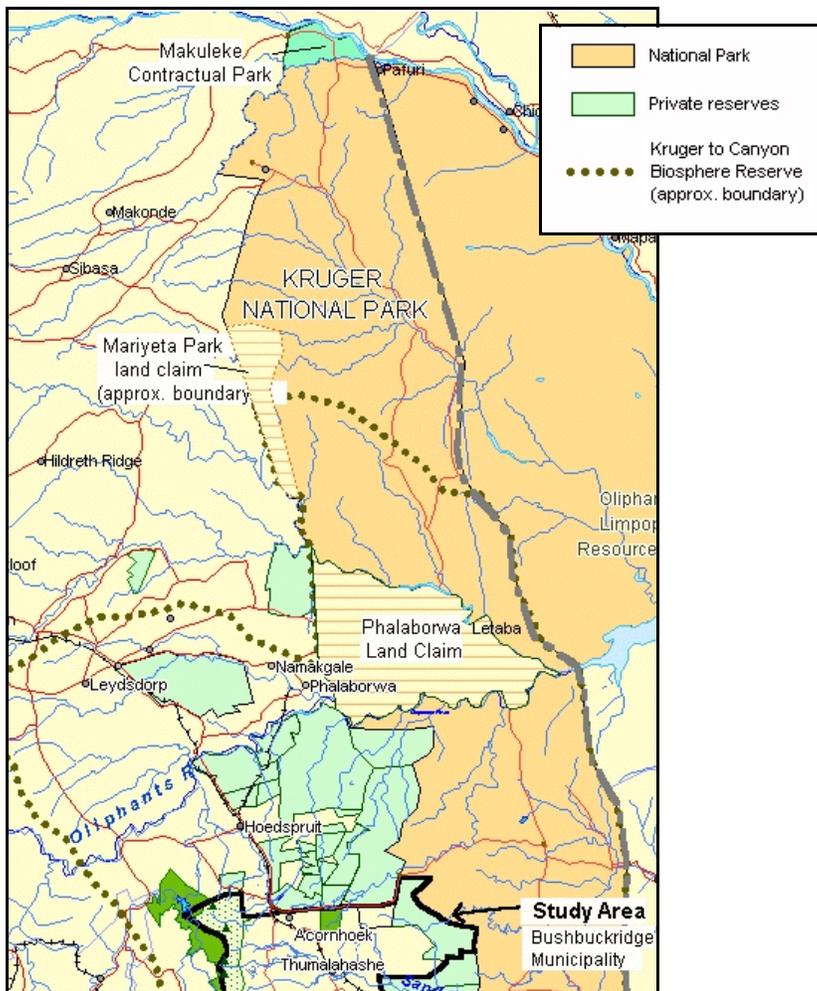


Fig. 13. Recent land claims lodged by communities to gain access to lands in the Kruger National Park.

The Kruger National Park’s Social Ecology Programme has entered into planning dialogs with communities within 15 km of the park boundaries. Six multi-village fora have been organized and since June 2001 have met fortnightly to discuss issues of concern to the communities such as lion attacks on livestock, hoof and mouth disease, land claims, and ways to bring about development in the communities. The latter are of the greatest interest to the communities, several of whom have begun the process of land titling and formation of Community Property Associations, looking to the day when they can negotiate with the Kruger National Park and with safari operators for lands within the park they are claiming.

A very large land claim extending into the park has been made by the Ba-Phalaborwa Tribe. It is

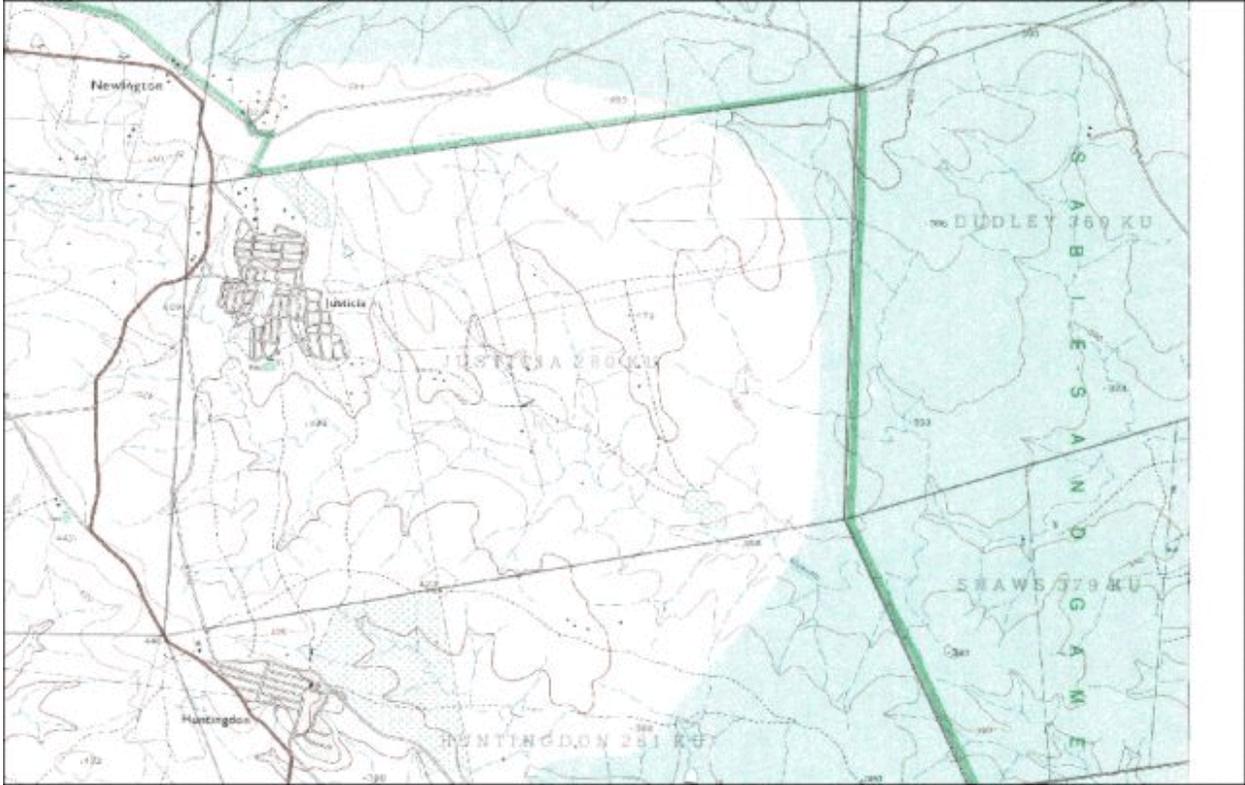


Fig. 14 Portion of a 1:50,000 topographic map showing survey lines that are probably the original boundaries of farms in the area later purchased from white owners when the homelands were created. Heavy green line is reserve boundary.

complicated by the fact that the tribe is represented by four groups, and part of the land is privately owned (the Croc Ranch). Eight communities near Mariyeta have formed an association to claim that portion of Kruger (Figure 13).

With the assistance of the African Wildlife Foundation’s White River Center, a number of communities adjacent to the Sabie-Sand complex (Justicia A, Justicia B and others) have begun the process of claiming title to their lands(see Figure 14). They plan to negotiate with private tour operators who wish to gain access to their land mainly to shorten travel time.

3.3 CBNRM not related to the parks or reserves

A five-year village based forestry project in the municipality, financed by Danish Center for Environment and Development(DANCED) recently closed out. This 10.8 million Kroner project was carried out with the Department of Water Affairs and Forestry (DWAF) during 1996-2001.

An end-of-project report chronicled a series of village-based initiatives that had varying degrees of success (Yeatman, L, M du Toit, and L. Andreasen, 2001), and the lessons learned will be

familiar to those who have participated in community-based forestry and agroforestry initiatives elsewhere in sub-Saharan Africa since the 1980's. The report should be read carefully as a prelude to any future efforts to foster CBNRM in the municipality.

DWAF community forestry officers were trained in Participatory Rural Appraisal methods and a series of PRAs and community meetings were conducted in six start up communities. These did not go well, and a lack of community cohesion and inability to find a consensus prevented decision-making and progress. Subsequently the project focused on a 'user -group approach' in which the participation was on the basis of a common interest and motivation, usually shared by a relatively small number of people.

Figure 15 displays the locations and themes of the initiatives. This map is derived from a database created from the end-of-project report. For each initiative site, a record in the database characterizes the initiative, its organizational basis, and the outcome.

The most successful initiatives were a Eucalyptus woodlot with 6000 seedlings started in Clare

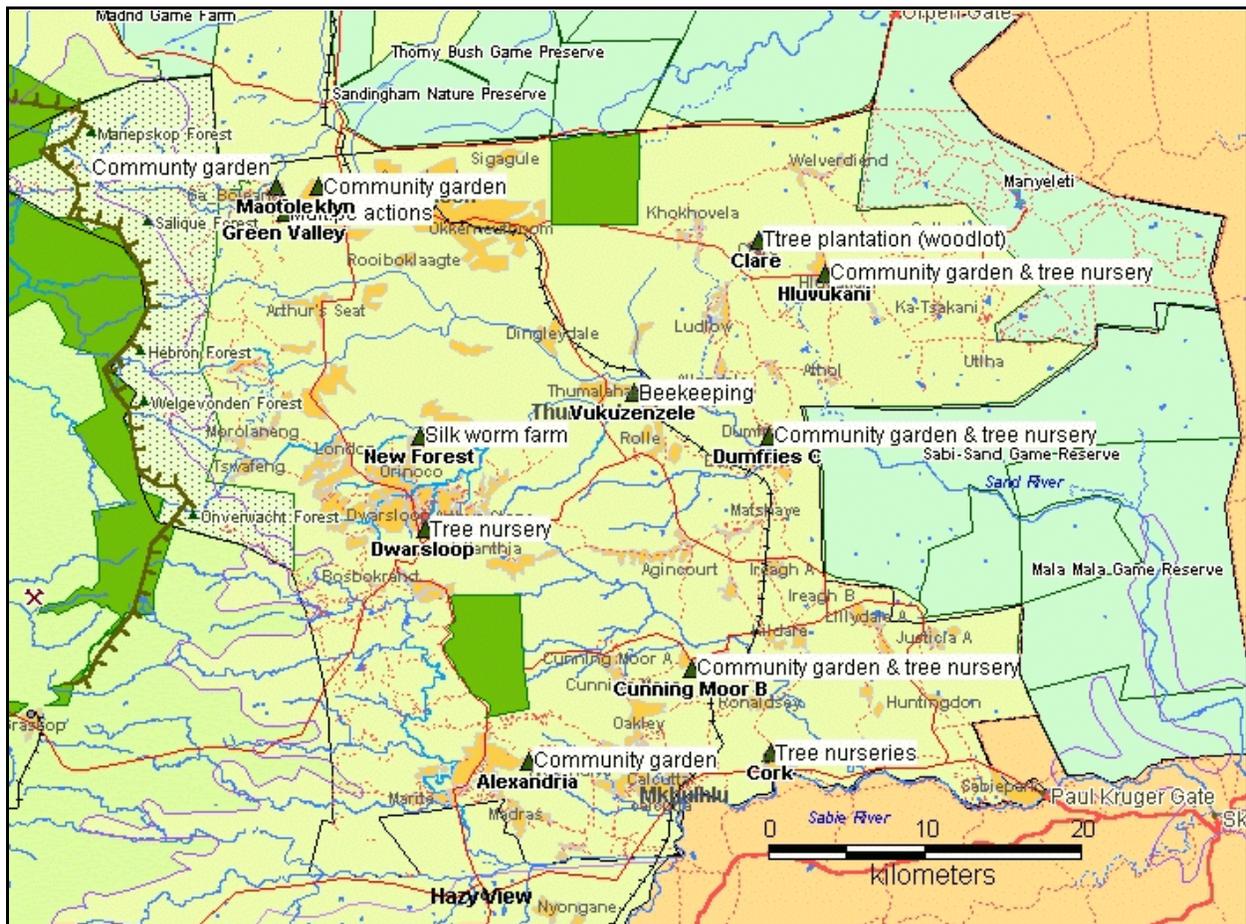


Fig. 15 . Locations of site-specific initiatives of the 1996-2001 DANCED community forestry project, Bushbuckridge area

by a single household, and two small community gardens in the western portion of the municipality where a key to success was a good water supply for Winter vegetables, in one case provided with gravity irrigation. Silk worm farming started well and capitalized on experience from an earlier silk worm farm, but was discontinued when the managers clashed. Many garden-cum-tree nursery projects were premised on the sale of tree stock as a source of revenue, but in more remote rural areas there was insufficient demand and people lost interest. Problems in accessing water for the nurseries in the drier portion of the area and for outplanting also were a hindrance. Animals damaged or ate trees planted around schools.

The planting and eventual sale of eucalyptus poles for construction - a lucrative business in many village-based forestry initiatives in Sub-Saharan Africa - seems unfeasible here given a virtually endless supply of such poles in nearby commercial plantations at higher elevations where growth is much faster. Bee-keeping, a project to re-forest with tree species for wood carving, and medicinal plants were other initiatives that were defined on the basis of few individuals' interest but were not supported well by the community at large. In all the tree nurseries tarpaulins used for shade were stolen and had to be replaced with local materials that did not tempt thieves. Bee hives were stoned or stolen. Fencing was stolen.

The Wits Rural Facility promoted the formation of a woodcarvers' association in the area, with one purpose being that of better management of trees preferred by wood carvers. The potentials for expanding this craft are not great and at present the supply of carvings is "saturated" Personal communications with Wayne Twine, head of SUNRAE program, WRF.

The DANCED sponsored project attempted to promote the plantation of preferred wood carving species and had some success, at least in terms of elevating awareness of their dwindling numbers in the landscape. Obviously such an endeavor would be very long term.

3.4 Other NRM work in Bushbuckridge

A number of regional programs, both governmental and non-governmental are at work in the municipality: the Association for Water and Rural Development (AWARD), Save the Sand - an NGO, and the Working for Water Program.

AWARD promotes and underwrites "sustainable community water supplies and sanitation" in the Sabie-Sand River catchment. WRF hosts the AWARD staff and collaborators. The program builds community water supply infrastructure and is also promoting awareness of rain water harvesting and has set up several demonstrations. An environmental component of AWARD is promoting community access to forestry areas in the upper catchment for collecting firewood, fruits, and medicinal products as well as for recreation.

The Save the Sand Project is coordinated by AWARD. It promotes ecosystem management, public awareness, development activities and rehabilitation of the catchment through an alliance of institutions, individuals and communities. It is also promoting a larger river basin management initiative - that of the Inkomati Catchment Management Agency. The Sabie and Crocodile rivers empty into the Inkomati river in Mozambique.

DWAF's Working for Water program has been active in the Sand's upper headwaters, that arise in the forest reserves on the western margin of the municipality. This program employs local labor to clear exotic trees from the catchment in order to increase run-off. By the end of 2001 4260 hectares had been cleared in DWAF plantations in the Mariespskop forest and an additional 4,000 plus hectares were being cleared in communal areas, the Bushbuckridge Nature Reserve and other DWAF areas. (The ultimate fate of the cut trees, which include eucalypts, was not found out, however, the DANCED community forestry program had arranged for a truckload of trunks to be delivered to local wood carvers.)

DWAF manages the forest reserves to the west as well as plantations in the western portion of the municipality. These will eventually become part of a national park that would include the Blyde Canyon park now managed by Mpumalanga Parks Board.

4 HIV/AIDS

The epidemic's arrival in South Africa was delayed by restrictions in road travel and commerce with the countries to the north until 1994. But by 2000, 40% of the adult deaths aged 15-49 years occurring in 2000 were due to HIV/AIDS. The mortality rate of young, adult women (25-29 years) has increased rapidly and in 1999/2000 was 3.5 times greater than in 1985. For the 30-39 year age group of men the increase was two times. If it continues unchecked the epidemic will kill an estimated total of 5 to 7 million South Africans by 2010 (Medical Research Council, 2001).

The pathways of transmission can be characterized geographically: (1) truck routes between Durban and Johannesburg and between Maputo and Johannesburg¹ and (2) brothels and similar locations, including at major truck stops, where sex workers and their clients meet. However HIV/AIDS has now reached the general population, and knowing focal points or routes of transmission is not as strategically important as it might have been at earlier stages of the epidemic

A particularly perverse outcome of the epidemic is the widespread belief among black South Africans that a man can be cured of AIDS if he has sex with a virgin. This has led to a parallel epidemic of rapes of young women, girls and even girl babies.

Prevention of the transfer of HIV from a pregnant mother to her foetus has been hindered until very recently (April 19, 2002) by President Mbeeki's refusal to accept the causal link between HIV and AIDS. This position, which has now been dropped, hampered the ability of public hospitals to treat HIV-positive pregnant women with Nevirapine, although some had openly defied the proscription and were administering the drug.

4.1 The Annual HIV Sero-Prevalence Survey

An examination of how the HIV/AIDS epidemic could influence support for CBNRM in the GKG TNRM Initiative requires an examination of data about this epidemic at the local level. The annual HIV sero-prevalence survey collects data at locations throughout South Africa, including at Tintswalo Hospital, but the data at this level are not available.

The data are collected nationwide once a year at 418 participating clinics in the course of the national survey of HIV and syphilis infections among pregnant women. These surveys at antenatal clinics began in 1990 in South Africa and have continued every year since. As in other

¹This was mentioned to the author in interviews with a number of health workers and other professionals

countries tracking the epidemic, they are the principal means of detecting HIV in the population, and the sampling and analysis methods are consistent with well established international norms.

Only public health facilities are sampled. In South Africa 80% of all pregnant women, of whom 82.5% are African, attend public sector antenatal clinics². The HIV sero-prevalence survey takes blood samples of the first 40 women to visit a clinic in the month of October. Women are interviewed to request their permission and to allow them to choose whether or not to know the results of the test. Whether or not participating women wish to know their status, the results remain anonymous and no personal identifiers are used on the blood sample and results that enter the database.

In 1999, all of the 418 participating clinics in South Africa were geo-referenced using GPS units.

The most local level at which the survey data exists, then, is that of the participating clinic or hospital, and in principle this data could reflect the status of a population in the administrative district for which the participating hospital offers services. Requests were made to the Medical Research Council's GIS Centre and to the AIDS & STD Directorate, Department of Health, for survey results at this level for participating clinics in the study area. The GIS Centre responded that "no one in South Africa" (outside the Health Department) has access to the data from individual clinics. Only provincial level data is made available. (The Department of Health did not respond to the same request for clinic-specific information.)

A second possible source of information about HIV/AIDS at the level of the community is offered by the results of a wide-ranging household survey of communities in the environs of the Kruger National Park, notably in the Bushbuckridge area. This 3% sample survey was commissioned by the GKG TNRMA Initiative, and was carried out in late February, 2002, in 14 villages in the Bushbuckridge Municipality in a total of 340 households.

The questionnaire sought information related to the health of people in the surveyed household as well as the extent of awareness of HIV/AIDS. It did not ask if someone in the household was HIV positive or had AIDS. However, the interviews posed surrogate questions, e.g. whether a household member had symptoms corresponding to tuberculosis or whether debilitation and extreme fatigue, independent of the cause, was experienced and whether it prevented a household member from routine tasks. According to the enumerators only one respondent household of the total surveyed offered the information that a family member had AIDS.

Results of this survey were not yet available as of the date of this report.

²SADHS, 1998 cited in: South Africa Department of Health. 2000. National HIV and Syphilis Sero-prevalence Survey of Women Attending Public Antenatal Clinics in South Africa.

4.2 HIV/AIDS in the study area

No statistical data on HIV/AIDS specific to the municipality is available. HIV sero-prevalence is estimated to be around 18% in the municipality, and the epidemic has spread to the general population³. A rate of 18% HIV positive is low compared to other areas in South Africa, but very high compared to the rest of the world.

In the absence of statistical data on HIV/AIDS in the study area, no geographic analysis was possible. Information was sought through interviews. Except for the results of the Agincourt village census, it is necessarily anecdotal. In Agincourt villages, which are distinctly rural in character with no paved roads, AIDS is the third cause of death contributing to an increase in mortality rates since 1994 after a period of decline (see section 2.3.2).

Acornhoek is reported to be a focus of HIV/AIDS because it is a major truck stop on N40. At truck stops, truck drivers seek out female companions, and nine out of ten truck drivers are reported to be HIV-positive. Women put themselves at risk as well by having multiple partners, so as 'to pay the bills' as one interviewee put it. One medical researcher in the area foresees that AIDS will kill most people between the ages of 15 and 35 in the area. Several interviewees noted that the frequency of funerals is so great that it complicates the conduct of business. Numerous establishments selling coffins are seen along the N40 roadway between Hazy View and Acornhoek.

³ Personal communications with Dr. Paul Pronyk and Dr. Mark Collinson.

5 Discussion

5.1 Access to local data on HIV/AIDS

Programs outside of those run by the Department of Health that seek to assist rural communities with vulnerable or at risk groups, e.g. CBNRM initiatives, would benefit from more localized information on HIV prevalence and incidence (rate of increase/decrease). Although geographic descriptors such as municipality or village of residence of sampled individuals are not included in the data that accompanies blood samples, having access to the data for the area served by a clinic would be a great improvement over the presently available provincial level data. AIDS researchers recognize that provinces are experiencing very different epidemics, that the spread within a province is not uniform, and that models are needed to allow for geographic heterogeneity in the population (Dorrington, et al, 2001).

CBNRM programs and numerous other programs are location-specific. Were it known that some localities showed higher prevalence or incidence than others, a corresponding level of prevention and treatment could be planned. Prevention could be built into locality-specific initiatives, e.g. NRM initiatives, education, democracy and governance, or community-based enterprise. Also, now that the Nevirapine drug is an accepted intervention for HIV-positive pregnant women, every occasion should be seized to inform pregnant women of this possibility and of the need to be tested for HIV if they have not already done so.

5.2 Road building, road improvement and HIV/AIDS

One of the known impacts of road construction into hitherto inaccessible or poorly serviced areas is the health impact resulting from contact by road construction workers with residents of areas adjacent to the road, usually poor or unsophisticated folk who may not be aware of health risks. Environmental impact studies of road infrastructure projects routinely examine this potential. Inhabitants are exposed to diseases carried by the workers and STDs are a foremost concern. The N40 road linking Nelspruit to Hoedspruit has been identified as a major sub-corridor of the Maputo Corridor Spatial Development Initiative, although at present it is reported to be unpaved north of Hoedspruit. New roads are reported to be planned in TBNRM Areas in Zimbabwe and Mozambique. Improving existing paved roads and bridges entails the same risks during construction, as well as post construction transmission risks related to increased truck traffic. Environmental impact studies and mitigation measures for road building should explicitly address the risk of transmission of HIV as well as other STDs, and mount appropriate programs to eliminate this risk during construction and after.

5.3 Women's status

The inferior social status of women vis a vis men in the region, reflects cultural values that complicate HIV/AIDS prevention and community projects alike. In the numerous groups fostered by the DANCED Community Forestry Project in the area, women were the majority participants with only one or two men joining, usually to be appointed as leaders or managers. Only wood carvers and herbal healers groups were purely male in membership. In all the groups women deferred to a few men who were named leaders or who assumed management roles. The exception to this was the silkworm breeding project. The women co-managers clashed, to the detriment of the initiative. One woman manager left the group and started her own operation that in the end became a competitor of the community' project, which folded.

The health consequences of women's inferior social status are far more disastrous than the complications for CBNRM projects related to their status. However CBNRM projects (or micro-enterprise projects) could become a means to enhance women's status and render them less vulnerable to HIV/AIDS. First, the economic benefits they receive through their work and participation in CBNRM projects could enhance their economic status in the household, and this could encourage a shift in their social status. Secondly, where women have been widowed as a consequence of AIDS, CBNRM projects could offer an important avenue for them to derive some of their needs from a community's natural resources and to ensure that these resources remain productive.

5.4 Sustainability of rural livelihoods

The Bushbuckridge area presents an unusual economic picture in which households are geared to a cash economy after years of cash remittances from migrant laborers (although unemployment is now very high) and guaranteed pensions (in principle, at least 1/10 of the households). Income is derived locally from the sale in local markets of animals or agricultural products, and is supplemented by food from home gardens, outfields, and household livestock, and secondary products of the wooded grazing commons. The secondary woodland products provide for many basic livelihood needs, especially fuelwood, and provide an important buffer in times of drought or economic hardship when these products may be sold or traded for necessities.

Livelihood sustainability is being weakened, however, by a combination of high unemployment and increased pressures on the village commons, which are exacerbated by the erratic nature of rainfall and frequent crop failures. The wooded commons, which have helped sustain households in times of drought appear to be fulfilling this function in all years, regardless of rainfall, as other sources of sustenance are lost.

The decline and perhaps disappearance of woody species, except unpalatable ones such as the invasive exotic *Lantana camara*, in the communal woodlands is foreseeable, and it will greatly affect the ability of households to weather droughts, economic misfortunes, and poverty. Women will be especially affected as they do much of the fuelwood and fruit collection.

An outcome similar to that observed among the Mbeere people in the semi-arid to arid Embu District in Kenya can be envisioned (Brokenshaw and Riley, 1986). There the natural woodland vegetation, whose diverse species supplied a wide spectrum of products as in Bushbuckridge, dwindled over a 15-year period to be supplanted by a few fruit, fodder, and shade species planted near settlements, where they can be protected from animals (Brokenshaw, and Riley, 1986). Many medicinal, ceremonial and household uses of the naturally occurring species ceased, and knowledge of these uses faded

5.5 Urgent need for new ways to manage the grazing and cultivated commons.

The present lack of community management of communal areas is very worrisome given the increasing pressures and foreseeable decline of their woodlands. The management role and power of the tribal authorities, chiefs and headmen, who allocated grazing land, issued licenses for cutting trees, and prevented exploitation by outsiders of a village's commons is fading. However, municipal and more local level governance is yet to be fully developed. In the evolving work towards democratic forms of local governance the issues and needs of common property resource management must be given high priority.

5.6 Comparative advantages and disadvantages of Bushbuckridge Municipality

Bushbuckridge enjoys a locational advantage of being situated between world renowned parks and reserves and being almost entirely within the Kruger to Canyon Biosphere Reserve. Whether and how this can become the basis for community-based initiatives beyond those related to community ownership of park areas or equivalent reserves is yet to be seen. However experience to date in the Makuleke and Mariyeta reserves has revealed several constraints.

In a broader sense most of the municipality has neither a locational advantage nor an ecological advantage for intensifying exploitation of its natural resource base on a commercial basis. Except for its cooler and moister western margins the municipality has neither the climate or soils for commercial tree plantations. Further, the forest reserves in the western region are to become a national park.

Ecological conditions are not favorable for rainfed crops while water resources for irrigation are limited, hence agricultural intensification with irrigation is constrained. The flow of the Sand River, whose tributaries drain much of the municipality, is of crucial importance to aquatic wildlife where it flows through the Kruger National Park, and a certain amount of its flow must be maintained to support the aquatic habitats of the Park. This demand limits the amount of water that can be extracted for agriculture or tree crops, and a proposition to establish plantations of eucalypts in better watered sites or alluvial/colluvial sites with groundwater would run counter to watershed management goals of enhancing stream flow by eliminating such exotic species.

The municipality is at a locational and ecological disadvantage vis a vis private farms nearby. Trees and commercial orchards of mangos and citrus are grown without irrigation in more

favorable ecological conditions at higher elevations (over 900 meters) immediately to the west and south of the municipality. CBNRM projects in Bushbuckridge that seek to generate income (e.g. sale of poles, sale of tree seedlings, specialty crops) must thus compete with nearby sources of these same products grown in more favorable environments. Only fuelwood, carving wood (especially *Pterocarpus* sp.) and plant-based medicinal products seem to have no competition from nearby commercial operations. The standing crop of native trees in communal grazing areas does have commercial value as firewood, but it is slowly renewable owing to the semi-arid and arid conditions that prevail and its exploitation for commercial gain would benefit fewer people than its use for everyday fuel by the many households that depend on the wooded areas.

Thus, to view the municipality's natural resource base as the foundation for economic growth or as the basis for income-generating CBNRM under intensified use does not square with reality. Rather, the natural resource base of the municipality should be viewed as an important but rather limited source of livelihood needs that, if purchased, would be unaffordable to most households. CBNRM initiatives must be carefully chosen for their ecological, social and financial sustainability. In particular the short term income-generating potentials exploited elsewhere in Africa (e.g. village or private nurseries, polewood plantations) must take account of the various constraints that exist.

5.7 Contribution of GIS and spatial analysis

Mapping of features relevant to CBNRM in Bushbuckridge is supported by digital base maps, thematic maps, and disaggregated census data as well as location-specific reports about research or development initiatives. The various data are found in a diversity of locations and at different spatial resolutions, however GIS programs make possible the spatial integration of these disparate data.

GIS data and spatial analysis were useful in this study in two regards. Quantitative spatial analyses of population, resource availability and resource demands in the municipality were possible. These analyses added value to existing research results on natural resource potentials and demands which had not been interpreted spatially. A very large gap was computed to exist between fuelwood use and fuelwood availability. Second, the visual integration of various research sites and development sites is a useful means of assisting the called for coordination of the various government entities involved in natural resources, agriculture and other forms of development in the area (Fig. 16 below).

On the other hand, spatial analysis of HIV and AIDS at scales meaningful to natural resources management and local activity planning is not possible at present. Consequently geographic tools cannot be used to analyze and discover spatial relationships of these two phenomena or to better understand how the disease may impact on the natural resources use.

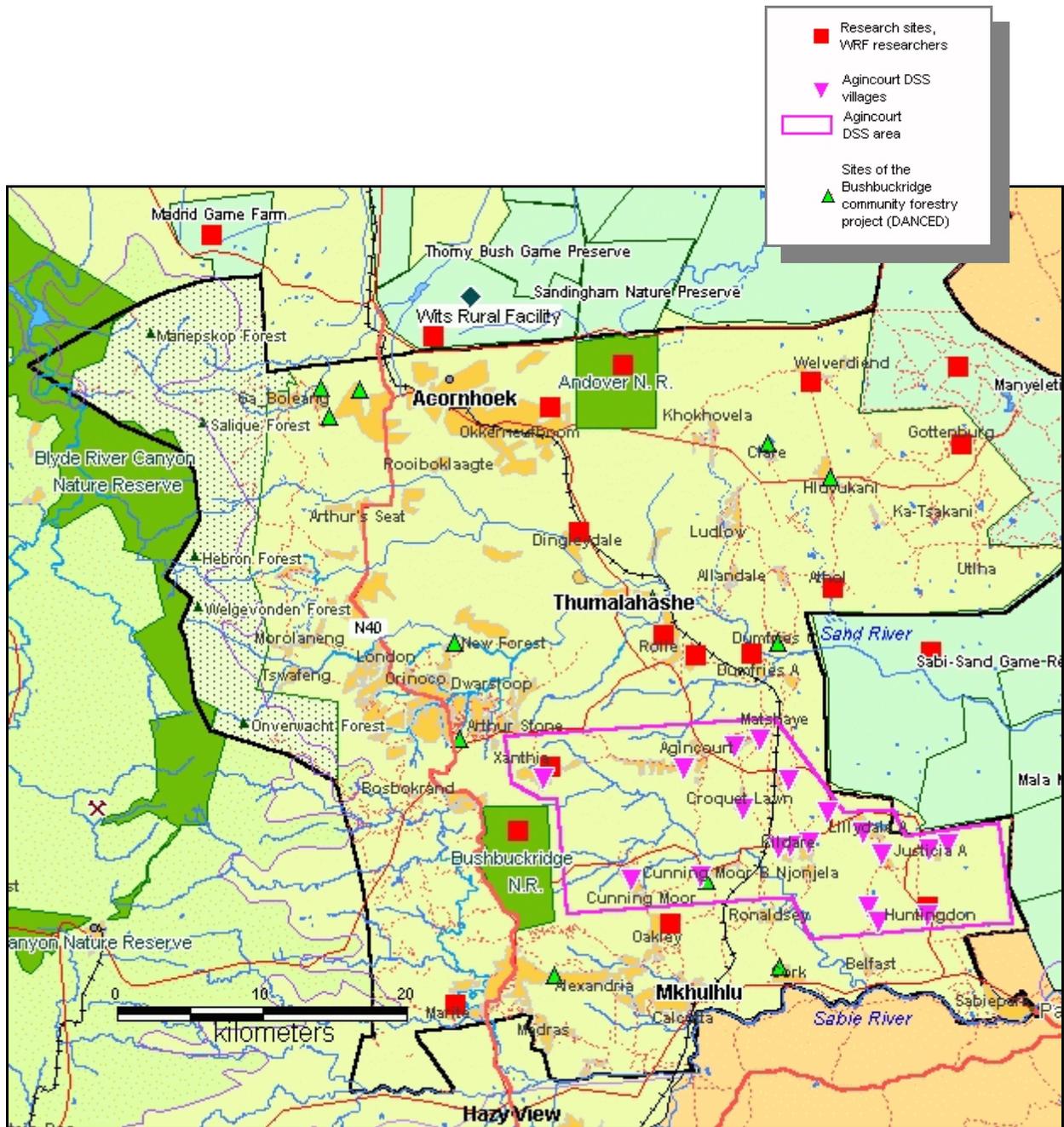


Fig. 16. Location of different research sites and sites where community-based forestry was promoted during 1996-2001.

It is worth noting, at the same time, that neither natural resources management programs nor CBNRM have explicitly dealt with the relationship of epidemics and natural resources use/management. Rather the focus of attention has been on the eradication or control of endemic diseases that have limited human occupation and use of certain areas, such as sleeping sickness, malaria, and river blindness. The HIV/AIDS epidemic presents a very different problem in that it affects all realms of human activity in all spaces. Until this disease is vanquished, its predictable morbidity and mortality must be factored into any long term activity that engages the populace of rural areas in South Africa. The site- and area-specific nature of natural resources and agriculture would benefit from a health survey and treatment approach that is equally location-specific, especially among populations who are to be involved in development efforts. This will require access to localized demographic and HIV prevalence data, a thorough understanding of how this disease affects agrarian livelihoods in different cultural and ecological settings, and an appropriate measure of cooperation between health services and development projects.

6 Recommendations

6.1 Community organizations and procedures, supported by municipal government, must be devised to ensure effective management of resources in the wooded communal areas.

This is perhaps the most urgent need that faces the new municipal government and the rural villages of the municipality. It is one that might be considered for support through USAID/Pretoria's Democracy and Governance actions (i.e. Democratic Consolidation Advanced, 674-001) as well as through the ongoing Save the Sand project. Without a strengthening of local governance of the commons, their over-exploitation and degradation is predictable, and a critical source of livelihood sustenance will dwindle and disappear.

6.2 Improved wood-burning stoves adapted to local materials and uses should be vigorously promoted.

The disparity between the calculated fuelwood supply and demand (section 2.5) indicates a pressing need for a reduction in demand. Improved stoves reduce the demand for fuelwood by up to 50% with corresponding cost savings and lessening of cutting pressures on remaining woodlands. Many models have been developed elsewhere in Africa and in the world. A model suited to local manufacturing capacity, available materials, and customary uses of fuelwood should be found or adapted, promoted, manufactured, and diffused among the population.

Models that burn wood charcoal should be considered in addition to those that burn wood. The manufacture of wood charcoal for local consumption, using raw materials from the Working for Water program or from commercial plantations should be explored.

6.3 Clinic level data obtained from annual HIV sero-prevalence surveys at Tinstwalo Hospital should be made available to inform local programs in the area.

Without this local information, local level (e.g. municipal, village) programs cannot be designed to take account of the local impact of HIV/AIDS, foresee the consequences, and take steps to mitigate them. In the case of CBNRM the long time frame of most NRM programs (at least 5 years before results can be expected, especially in semi-arid environments) is paralleled by the long time frame of HIV/AIDS. CBNRM programs could be designed to mitigate over the long run the impact of poor health and mortality according to the expected severity as indicated by local level data. Also, HIV/AIDS interventions, including prevention and treatment, could be facilitated via appropriate actions in CBNRM programs, tailored to the health profile of the affected population.

6.4 The impact of HIV/AIDS on households that rely on natural resources should be researched in order to interpret disaggregated HIV sero-prevalence survey data for NRM planning and management

Assuming eventual access to survey data on HIV and AIDS at the level of the clinic, how could the data be used to shape programs that seek to mitigate the impact of this disease among the population served by a clinic? What guidelines or even working hypotheses could be developed relevant to the implications for natural resources management and CBNRM in a population from which the survey is drawn, i.e. where antenatal health services are offered by a clinic or hospital? How could the impact of this health problem be disentangled from other influences that affect the use and management of natural resources, so as to permit identification of appropriate actions and the development of corresponding monitoring and evaluation instruments?

These questions can best be answered by conducting research on households that have already been affected by HIV/AIDS and whose livelihood depends upon the range products that are drawn from local natural resources in communal areas. To some extent the impact on agriculture has been researched in Africa, i.e. in Rwanda and other countries of SSA. Generic courses of action have been delineated in “AIDS brief: Community-based Natural Resource Management”(USAID. 2001)¹. But work on this theme in South Africa is not known to exist, nor was work found reporting on the NRM dimension of this disease’s impacts in rural areas. How does this debilitating disease affects a household’s use of the secondary products of the commons? How does a household cope if one or two members can no longer gather firewood or wild fruits? Will harvesting of secondary products for income to treat the affected family member (or pay for a funeral) increase? Might affected households needing income ignore restrictions on harvesting and gathering in the commons - which are presently open access?

Understanding the implications in Bushbuckridge for NRM (and other activities) must ultimately entail detailed qualitative and quantitative profiles of individual rural households already affected by HIV/AIDS that rely on natural resources. Households that have been affected by HIV/AIDS in varying degrees of gravity and according to the range of consequences for the household must be identified and engaged in long term, detailed surveys. These surveys should discover coping strategies and the way households have adjusted practices, food and fuelwood consumption patterns, uses of household resources, and movements within and outside the homestead to outfields as well as grazing and fuelwood collection areas throughout the year. Armed with this information for representative impacted households, the implications of an increase or decrease in affected households in a given area could be analyzed. With the results in hand, hypothetical questions could be more accurately formulated preparatory to analyzing HIV/AIDS prevalence data obtained in local clinics.

¹ Six courses of action are proposed: monitor impacts, reduce risk, mitigate impact,empower surviving family members, preserve future NRM options, and provide HIV/AIDSservices through community-based organizations

The profiles could be designed to inform a wide variety of hypotheses related to all areas of a household's livelihood, not just NRM, and could thereby serve planning work in several sectors, with education likely to be a primary beneficiary after health services.

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Annex

1. Map projections and datum

The original co-ordinate reference system, used in South Africa as the foundation for all surveying, engineering and geo-referenced projects and programmes, is the Cape Datum. This Datum is based on the Clarke 1880 ellipsoid and has its origin point at Buffelsfontein near Port Elizabeth.

As of 1st January 1999, the official co-ordinate system for South Africa has been based on the World Geodetic System 1984 ellipsoid, commonly known as WGS84.

All the maps prepared for this report are shown in the WGS84 projection.

2. Municipality base map

Roads and streams of different categories, reservoirs, and built up areas were derived from a GIS dataset prepared by the Mpumalanga Parks Board(MPB) from scanned 1:50,000 topographic maps. These layers were used to create the larger scale displays of the municipality, e.g. figure 2.

One section corresponding to an entire 1:50,000 topographic map (No.2431A) was omitted and to complete the municipal base the author scanned an available 1:250,000 topographic map (see figure A-1) and digitized the principal features. The 1:250,000 topographic map shows larger areas as built up(light yellow) relative to the built up layer created by the MPB when digitizing the 1:50,000 topographic maps. However, in general roads, rail line and river courses match well with the more detailed files that abut the section.

(See Fig. A-1, next page.)

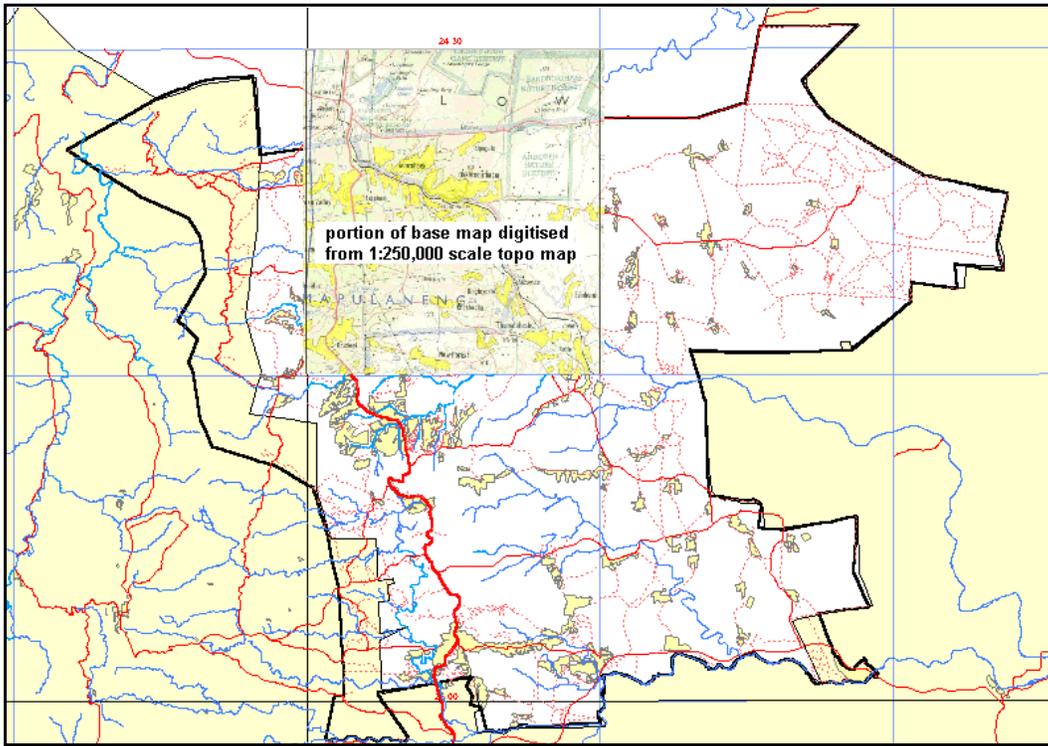


Fig. A-1 Portion of municipal base map digitized from 1:250,000 topographic map (scan shown). Roads and rivers shown elsewhere are from the dataset derived from 1:50,000 topographic maps.