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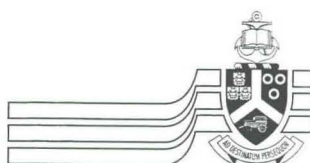


REGIONAL WORKSHOP
ON
SPATIAL APPROACHES
FOR
LAND USE AND LOCAL GOVERNANCE

24-26 NOVEMBER 1999

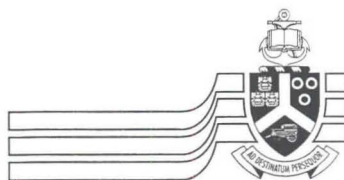
PRETORIA

SOUTH AFRICA



University of Pretoria

Post-Graduate School of
Agriculture and Rural Development



University of Pretoria

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Foreword

The Southern Africa Centre for Co-operation in Agricultural Research and Training (SACCAR) and the Post Graduate School of Agriculture and Rural Development at the University of Pretoria has organised a Regional Workshop on Spatial Approaches for Land Use and Local Governance, with financial support by the French Ministry of Foreign Affairs. This workshop was held from 24 to 26 November 1999 at the University of Pretoria, Pretoria, South Africa.

BACKGROUND

Decentralisation of decision making and empowerment of local communities have a significant effect on a large number of countries in the SADC region. The State is reducing its direct resource allocation and involvement and is transferring the responsibility for development planning and support to the local governments. It is desirable since it provides the opportunity for involving new stakeholders in decision making, therefore empowering previously disadvantaged communities. It further provides the opportunity for institutional responses adapted to specific local conditions. However, the success is directly related to the local management capability and their ability and experience to mobilise and manage resources.

These rapid changes, as well as the impact of liberalisation, calls for a new approach in agricultural research, technology and information development and transfer. In addition, there is a need for designing and testing methods to stimulate the participation and the dialogue between local stakeholders in the rural development process.

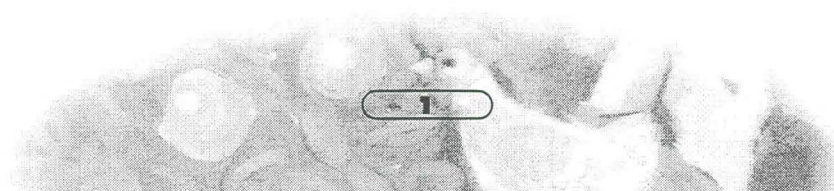
Available information is generally sectorial (i.e. pedology, climatology, demography, production practises and volumes, health, etc). This information is often not up to date and does not account for the transformation processes of the rural world. While censuses might exist, they often address descriptions of objects in relation to administrative boundaries, which are not always relevant to explain the evolution and prospects of agriculturally-based rural development initiatives.

Professionals in the SADC region recently started to undertake research and development activities focussed on spatial approaches for land use and local governance with the aim of supporting agriculture and rural development planning at community and local government levels. However, experiences to date remain isolated, therefore an urgent need was identified to provide an opportunity for professionals working in this field to gather and to exchange ideas and experiences.

OBJECTIVES OF THE WORKSHOP

The workshop has offered an opportunity for professionals to present their own activities (case studies) relating to spatial approaches for land use and local governance and to learn from experiences of other country teams. The specific objectives of the workshop were:

- to provide the opportunity for the exchange of information, methodologies and experiences;
- to initiate comparative analyses of approaches implemented in different and specific contexts;
- to valorise the scientific production derived from such experience, through their formalisation and publication; and
- to develop a conceptual framework for improved collaboration and interaction.



EDITORS' NOTE

SPATIAL APPROACHES FOR LAND USE AND LOCAL GOVERNANCE: INTRODUCTORY NOTE

by
Patrick Caron
*Frans Swanepoel*¹
*Aldo Stroebel*²

1. INTRODUCTION: NEW PARADIGMS AND CHALLENGES FOR RESEARCH IN AGRICULTURE

Developing new technologies is a necessary, but not the only required condition for increasing agricultural production in a sustainable way and improving rural livelihoods. Since the 1980's, serious questions have been raised relating to the economic, social and ecological constraints associated to Green Revolution technologies (Swanepoel and Stroebel, 1999). They refer to unsatisfactory conditions of technology transfer and to the undesirable social and environmental impact of some of these technologies. To address the challenges of rural development, a shift is therefore required to adapt research practices.

As a result, new concepts and approaches for conducting research have emerged. Among them are the systems approach in the 1970's and eco-regionality in the 1980's. However, these have essentially been applied to technology development and transfer at farm level. They aimed at improving the adoption by farmers of new technologies validated at experimental stations, by taking into account socio-economic constraints and the environmental impact of these technologies. But the role of technology development and transfer as one of the various factors that impact on the development of the agricultural sector has rarely been questioned by researchers. Eco-regionality has for example been a useful concept for researchers to deal with the diversity of natural resources, by offering a basis for stratification that could prevent taking into consideration many diverse situation. Nevertheless, it has not been used to analyse the mechanisms of evolution of agricultural production by considering not only the natural resources base but also the socio-economic complexities.

Yet, many decisions of fundamental importance to agricultural production are not taken at farm level. For agricultural research, recognition of this has led to the identification of three main activity areas:

- (i) technology development and transfer at farm level, taking cognisance of socio-economic constraints at both farm level and the environment;
- (ii) appropriate policies at national level;
- (iii) supportive institutional arrangements to ensure successful and sustainable delivery of research products, especially focussing on emerging, resource-poor producers. However, these three areas have remained separated. There is in fact a continuum, if one for example considers the management of local common resources, local government policies, market organisation from local to international levels, etc. It presents a scientific challenge in integrating these three areas when addressing research and development issues and for taking into account other stakeholders' needs and practices than the only farmers' and policy makers' ones.

Among other issues that raise questions to be dealt with by researchers, is the theme of the workshop, i.e. Land Use and Local Governance. In a general context of decentralisation, Local Governments are increasingly accepting the responsibility in terms of policy planning and resource allocation. Yet, in many cases they are inexperienced in this regard. Moreover, between top-down planning at national level and participatory approaches at local level, there is an opportunity to design and apply intermediate methods at this particular level.

After presenting the context for this type of research, this introductory note will highlight the challenge for designing and validating methods that could facilitate the planning of agricultural and rural development at Local Government level. Special attention will be paid to the need for reliable and relevant information systems and to support stakeholders' co-ordination process (part 3). The role of research in this context will finally be discussed (part 4).

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2. GLOBALISATION AND DECENTRALISATION: CHALLENGES FOR LOCAL STAKEHOLDERS

The agricultural sector in the SADC region is rapidly evolving. Globalisation is one of the main factors impacting on changing the region. Democratisation and political stability obtained during the past years in most of the countries have increased the importance of this process. It also relates to global agreements and conventions, e.g. trade, biodiversity, desertification. However, globalisation extends beyond these formal mechanisms and is generally characterised as a process of intensification of the flow of capital, products, people and information.

Changes in international and cross-border trade patterns are increasingly debated, but there are in fact other diversified in-depth re-organisations resulting from on-going globalisation. New stakeholders are playing an important role, including farmers' organisations and Non Governmental Organisations (NGOs). Relationships are developing between stakeholders, previously not used to exchange information and products. New informal stakeholders' networks are developing on the basis of common interest and initiative.

As a result, an increasing complexity of relationships related to agricultural production and marketing in different localities evolves, involving a multiplicity of stakeholders acting at different levels and pursuing different objectives. These relationships rely on new organisational patterns developed between local stakeholders, but also on the development of networks involving far distant institutions and individuals. This implies new rules, practices and flows and results in the multiplicity and tangle of hierarchised organisation patterns. The "production of new spaces and territories" is therefore regarded as a social process and the spatial patterns and characteristics produced as a consequence, reflect the complex interactions between stakeholders (Brunet, 1990). This assumption makes spatial approaches particularly relevant to understand rural transformation.

Because of their influence in this transformation process, urban centres turn to be organisation knots. They serve as a concentration of capital and political power. Urban cities attract rural people as a result of services, employment opportunities and living conditions offered, and also impact on rural areas as a result of their demand for agricultural products.

The way in which rural areas are connected to urban centres through the establishment of networks for exporting and importing information, labour, products and financial resources is fundamentally important. Together with the characteristics of the natural resources, the patterns and relative success of this connection is one of the factors that make each rural area unique.

The penetration of urban products and life style in rural areas and the problems associated with competition with other producing areas, raise concerns related to the loss of local identities in a global and uniform environment. For some people, the solution to maintain satisfactory living conditions for rural populations is based on a withdrawn attitude to reduce dependency and survive in an ever changing and uncertain environment. For others, this process offers new opportunities for development. Economic integration is regarded as a way to promote comparative advantages and local identity of agricultural products. It is argued that new developments in participatory approaches and information and communication technologies offer opportunities to address these concerns.

Between these two options, there is in fact numerous other development models available. Their implementation strongly depends on the development of new local stakeholders' networks and territorialities and on the local answers and activities that might be developed to address the problems and opportunities related to globalisation.

This challenge is amplified due to increased National Government withdrawal of responsibilities and resources to rural development initiatives, which is in fact indirectly related to the globalisation trend. This withdrawal results in the decrease in public funding, less support of programmes, subsidies, incentives and services, as well as the usually low effective transfer of national responsibilities and resources to Local Governments. The role of the private sector and NGOs is therefore becoming increasingly important, promoted as a strategy to reduce the negative impact of such an evolution.

The requirements for rural development are also becoming more complex, specifically relating to the multifunctional character of agriculture and land (Swanepoel and Stroebel, 1999). The increase in food production and food security through the improvement of productivity in both large and small-scale sectors is no longer the only issue that agricultural research and training should address. The competitiveness and quality of agricultural products, labour employment and income generation, equity and gender awareness, environmental concerns and management of natural resources also need to be taken into consideration (SACCAR, 1999).

As a consequence of the above, the public action of national and local Governments should be reviewed and adapted in light with the changing environment. Increasingly, local planning is regarded as a challenge. However, Governments represent only particular stakeholders that interact in the whole system. The social networks that induce technical, spatial and economic changes are usually not matched to the administrative limits and boundaries (Caron, 1998 a). There is therefore a need for an improved identification and understanding of spatial and social organisations that underlie agricultural and rural changes. With increasingly limited resources, the challenge for Government bodies shift from the execution of programmes to the facilitation and promotion of collective action for local development. The latter relies on organisations whose spatial, social and economic principles differ from those of Government.

This paper further discusses issues related to the contribution of agricultural research to this challenge through the production of information and methods.

3. LOCAL PLANNING: THE NEED FOR OPERATIONAL INFORMATION AND CO-ORDINATING MECHANISMS

3.1. Operational information specially organised for local planning

Local planning implies the availability of information organised in such a way that it can inform decision-makers to develop scenarios and design and implement new projects. In the case of Local Governments, this means the creation of an information system that reflects evolutions in progress and transformation dynamics with particular, but not exclusive, attention to the area defined by administrative boundaries.

The information in support of rural development is usually scattered, sometimes irrelevant, and there is in most cases a need for organising the available information.

The latter is usually sectorial (pedology, climatology, demography, production volumes, health, etc) and rarely up to date. It is static and does not account for the transformation processes of the rural environment. Even when recent censuses are available, they deal with the description of subjects according to administrative boundaries and are thus not always relevant to understand the evolutions and prospects of agricultural production (Caron, 1998 b).

The knowledge of what rural stakeholders are producing and reasons for their priorities and activities, are of fundamental importance. To conduct an analysis of farming systems' sustainability, Hubert (1998) suggests the need to focus on four issues: (i) their diversity; (ii) their complexity; (iii) their spatial and time dynamics; and (iv) their interactivity with other local systems. The same principles apply also to rural areas, considered as agrarian systems and highlight the need to identify the stakeholders, factors and processes that are meaningful to rural changes, in other words, the stakeholders' networks, their principles of organisation and their evolution. Such an analysis is a prerequisite to the design of a relevant and operational information system by providing an evolution model useful as a conceptual framework to define the type of information to be collected.

This is of particular importance when situations are complex, such as places where farmers do not only depend on agricultural activities to make their livelihoods, where increases in production and productivity strongly depend on socio-economic complexities and ecological sustainability is threatened.

Spatial approaches are particularly useful in implementing the suggested information system. They provide a representation of the whole study area through the integration of different types of information. Based on an analysis of changes along the time, they also facilitate the identification of meaningful networks and their interactivity. Finally, recent development in Geographic Information System (GIS) provide tools to integrate heterogeneous data.

3.2. From information to planning: the need for co-ordination mechanisms

Information, as an input for local planning, should be timely delivered and in a format useful for its appropriation by different types of stakeholders. The objective is to contribute through information to the formalisation of individual and collective projects, by creating new representations and models, and arousing discussion and debates for decision-makers. The challenge is to support stakeholders' decision-making, although information always remains incomplete and uncertain (Simon, 1969; Le Moigne, 1990).

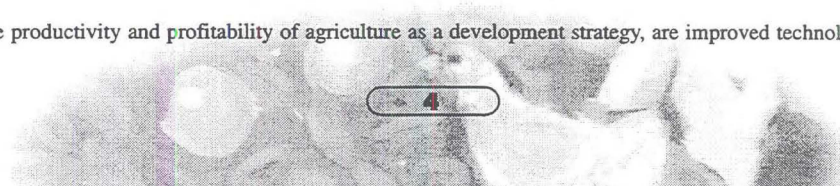
Yet, information is not neutral. It is strongly dependent on agents and mechanisms responsible for developing and transferring the information. There is an asymmetry between stakeholders in the capacity to access and use information. It relates to their position within power networks, to their education and skills, to the resources they can mobilise to implement projects, etc. The democratisation of information is not a sufficient condition to address the needs of less advantaged social groups and integrate them into decision-making processes. According to Bertomé and Mercoiret (1992), "it is a dangerous myth to think that dominated and alienated peasants in survival conditions will transform themselves through verbal stimulation into entrepreneurs able to negotiate their projects with other stakeholders".

To address this concern, the stimulation and support to a learning process is a necessity. It also calls for specific mechanisms of dialogue and mediation. The information, as (im)perfect as it can be, can not solve the participation problems of the farmers or professional organisations. It can, nevertheless, promote participation by offering a basis for reflection for the definition of priority projects regarding regional development, financial and technical support to individual and collective initiatives, legislation, price policies, etc. Institutional innovation and methods for supporting a collective decision-making process and the mobilisation of adequate resources are required (Caron et al., 1997).

4. THE ROLE OF RESEARCH

Agricultural strategies are perhaps the most important component of overall development strategies in a continent where agriculture still accounts for 70 percent of employment, 40 percent of exports and 30 percent of Gross Domestic Product (GDP) (Delgado, 1997).

Central to improving the productivity and profitability of agriculture as a development strategy, are improved technologies, appropriate policies



and supportive institutions. At the core of technological improvement is agricultural research. A prominent feature of new strategies in agricultural research and development in southern Africa and elsewhere in the world is the consideration, from the start of a project, of the needs and aspirations and of the socio-economic circumstances of the potential beneficiaries.

In addition to technology development and transfer, there is a need to produce knowledge and information regarding agrarian situations, production process and mechanisms for social, economic and technical transformation, conditions and pathways for technological changes and support. This confers to development oriented research three inter-related functions:

- An **analysis function**, through diagnosis of agrarian situations and of technical, economic, social and spatial factors which give rise to changes;
- An **experimentation function**, through testing of technical (off and on-farm), economic and organisational innovations, with the objective of producing knowledge regarding possible changes of the production process. Results should be related to experimental protocols and to the specific conditions of experimentation to deliver references that can be used by extensionists and farmers after adapting them to their needs.
- A **planning function** to support stakeholders' decision making in order to help them to design, implement and follow-up technical and economic individual and collective "projects". This function includes: (i) the production and delivery of information regarding the current situation and possible changes (diagnosis, mobilisation of available technical and economic information); (ii) the facilitating of stakeholders dialogue and creativity in order to design collective and public action to take place, thus promoting contractual relationship between private and public stakeholders; (iii) the monitoring of the activities and their impact through the production of references, in order to adapt/readapt the activities on a permanent basis.

Inter-disciplinarity (multi-disciplinary, collaborative, problem-focussed approach) is a necessary mode of organisation of development oriented research. Research has to consider, through system approach, different levels of social and spatial organisation and the interactions between them, from macro- to micro scale, namely:

- the regional and national scale (SADC, country, Province, large watershed, etc), at the level of which it is possible to analyse or promote policies and planning, infrastructures implementation, market organisation, demographic and migration patterns, and to organise public and private support services;
- the local scale (village, small watershed, etc), which is relevant to understand the production, consumption and marketing patterns, the mechanisms of common resources management (land allocation, grazing areas, water and wood resources, etc) and to plan and test possible interventions;
- the household level, at which the main economic and technical decisions are taken as far as agricultural production is concerned; it is relevant for understanding the rationale of economic and technical choices by considering the whole farming system, and for testing innovations; the plot (or the herd) level (by extension the plant or the animal), at which it is possible to analyse and modify the technical and biological mechanisms of production.

From one level to the other, there are strong linkages: what is observed or promoted at one level is not independent of what is happening at the other. As a consequence, a specific issue can be dealt with at various levels. For example, to analyse and improve cattle feeding, one might have to consider, not as constraint but as research and development issues, the organisation of extension and input delivery systems at regional and local level, the management of grazing areas (fences, access, stocking rate, etc) at the village level, the practices of the farmers according to the available resources at the household level, the feeding practices and their nutritional consequences at the herd and at the animal level.

Spatial approaches provide thus an adequate framework to integrate processes occurring at different levels and contribute to the production of operational knowledge. GIS offers opportunities for addressing these issues and increasing the effectiveness of the contribution of research to local planning. They are related to the production and delivery of relevant information and to the design of methods and software.

Nevertheless, the use of such tools does not prevent previous identification of relevant levels and information to be considered. As we have seen previously, it is impossible to define *a priori* the levels of organisation that are consistent and meaningful to explain and understand stakeholders' behaviours and practices and to design new activities. The analysis of the stakeholders' networks, their principles of organisation and their evolution is a first step to the identification of the relevant levels to consider, which might be undertaken by the study of changes along the time.

At each of the relevant levels, diversity and complexity are key elements. To design and test relevant innovations, it is necessary to understand how stakeholders take decisions to manage resources in order to achieve their objectives (Landaïs and Deffontaines, 1990).

5. CONCLUSION

Researchers have recently tested new approaches to understand changes in agricultural production processes, integrating different spatial levels of analysis. These approaches aim to identify possible actions and combinations to address development issues, including technology development and transfer. These are based on the analysis of stakeholders' practices and of individual and collective decision making processes, taking into

account indigenous knowledge and representation. They focus on the identification of stakeholders' networks that are responsible for inducing change and on co-ordination parameters.

Nevertheless, these experiences are rooted in local situations and remain isolated from an institutional point of view, even more so because of the diversity of research institutions involved (national research institutes, Universities, NGOs).

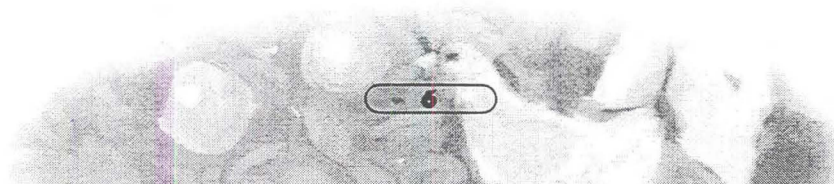
There is consequently a challenge for promoting collaborative activities in order to validate and transfer local experiences and methodologies to other areas. In addition, such a transfer raises new questions to be addressed by research, such as the adaptation to local conditions or the promotion of actions to take place at macro-scale in order to ensure the success of local initiatives.

These local experiences offer a basis to set a new agenda for research in agriculture, cutting across national boundaries. Although local responses for planning might be different in each case, methods to be tested and implemented should benefit from such an exchange.

To achieve such an objective, there is a need to experiment and validate methodologies, to compare results obtained in different contexts, but also to identify the limitations, areas of validity and the fields of application of the methods. The organisation, objectives and challenges of this Regional Workshop on "Spatial Approaches for Land Use and Local Governance" address these concerns.

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WHICH NEGOTIATION FOR WHICH PARTICIPATION?

**A CASE STUDY IN PARTICIPATORY LAND
USE PLANNING IN THE MID-ZAMBEZI VALLEY,
ZIMBABWE.**

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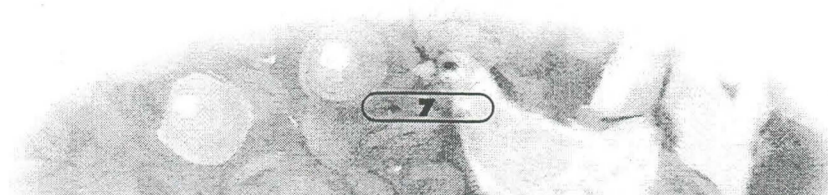
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INTRODUCTION

The *Biodiversity Conservation Project in the Mid-Zambezi after eradication of the Tsetse fly* was launched in 1996, as a result of a bilateral agreement signed between the Government of Zimbabwe (through the Ministry of Mines, Environment and Tourism) and the French Government (French Fund for World Environment). The project document identified Land Use Planning as one of the core activities that the Project should undertake.

The purpose of this paper is to make a critical analysis of the Project's achievements as far as Land Use Planning is concerned, after three years of implementation (1996-1999). The three authors have been involved, at one stage or another, in the Biodiversity Project, and wish to draw lessons from their experience. One of the main questions that the project raises, is to know which methods are efficient for negotiation and implementation of Land Use Plan objectives, at the level of a Rural District Council (local authority). Although there exist difficulties of a political nature, in terms of definition of objectives, means and time-table of the Land Use Planning exercise, methodological questions are also important: how, at what level and when should the Project advocate and organise negotiations amongst stakeholders? To what extent should the Project be involved in the negotiations as a stakeholder in its own right?

This paper will make an attempt to address these issues, by describing the historical background of the Project, and the context in which the Project operated. It will then indicate clearly the original objectives and assumptions of the various partners initially involved (or not involved) in defining a programme of activities. The paper will briefly expose the methodology utilised in order to draw up the Land Use Plan proposal, before clarifying the current situation of the project. We will critically discuss the methodology, objectives and assumptions of the project, mainly around two topics: the participatory approach and the rationale of planning. Is it possible to dissociate consultations and negotiations, in the course of a participatory planning exercise? How can *planning* incorporate local concerns about utilisation of natural resources?



1. PRESENTATION OF THE PROJECT: CONTEXT, HISTORY, INITIAL OBJECTIVES, METHODOLOGY AND RESULTS

1.1. General Context and History

1.1.1 Geographical situation, agro-ecological data

The Mid-Zambezi Valley is part of the vast Zambezi basin, which covers some 1 300 000 km² from the source of the river in the north-west Zambia to the Indian Ocean into which it flows. The Valley is bounded by the Victoria Falls and the artificial lake of Cabora Bassa in Mozambique. It extends, 40 km wide and at an average altitude of 400 m, between longitudes 30° and 31° and latitudes 15°30' and 16°20' South. It is dominated to the south by an escarpment which culminates at 1400 m and reaches the Zambezi river on its most northern section.

The District of Guruve, which harbours the Biodiversity Conservation Project where the Land Use Planning consultations were undertaken, covers 7516 km². The Project site includes three wards¹ of Dande Communal Land. The total project area amounts to 1885 km² distributed between 781 km² for Ward 2 (Chisunga), 356 km² for Ward 3 (Neshange) and 718 km² for Ward 4 (Chiriwo) (see Figure 1: Geographical situation of the Biodiversity Project).

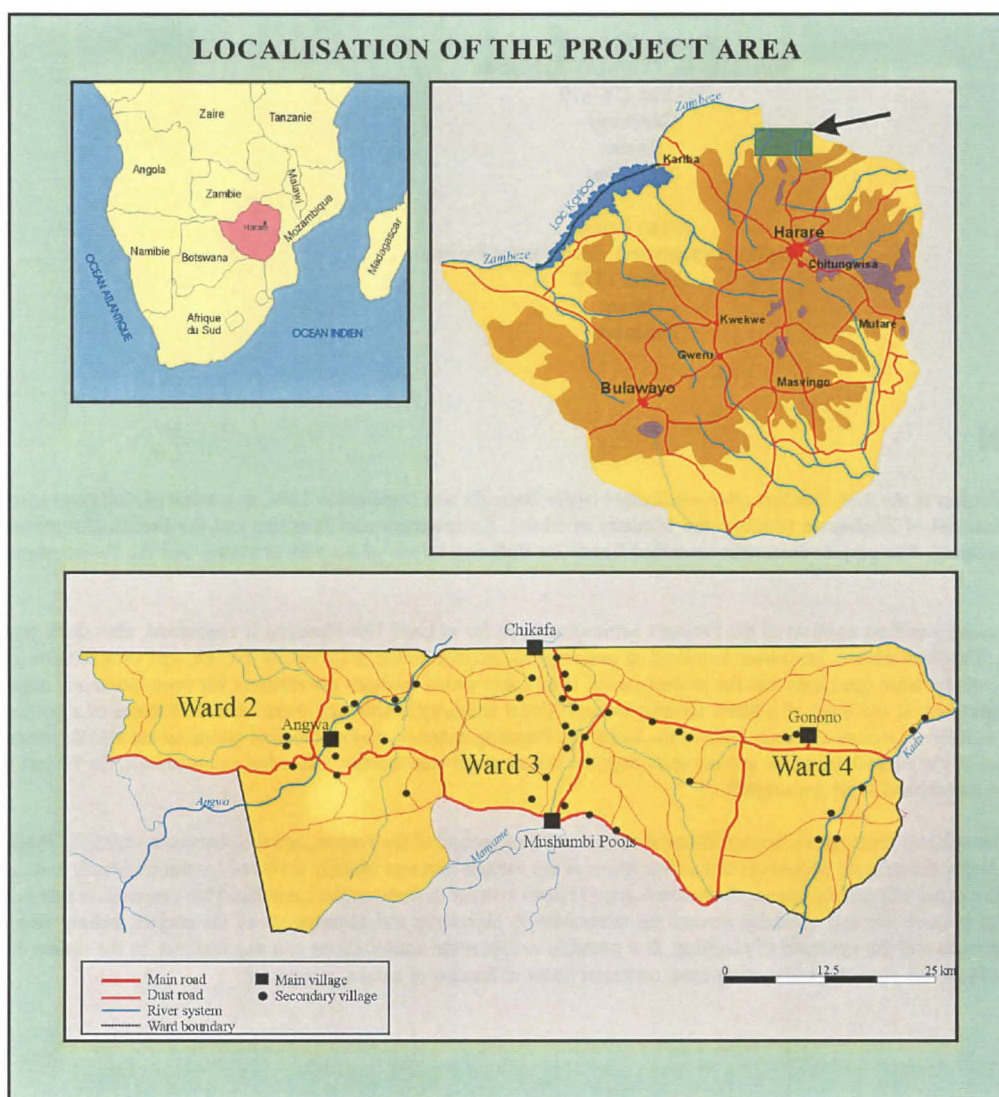


Figure 1: Geographical situation of the Biodiversity Project.

The Mid-Zambezi Valley is classified in Zimbabwe as part of agro-ecological region IV, that is a semi-arid area, characterised by "unreliable, low and erratic rainfall (450-800 mm)"² and poor soils, prone to erosion and fertility depletion³ (see Figure 2: agro-ecological data on the Project's area).

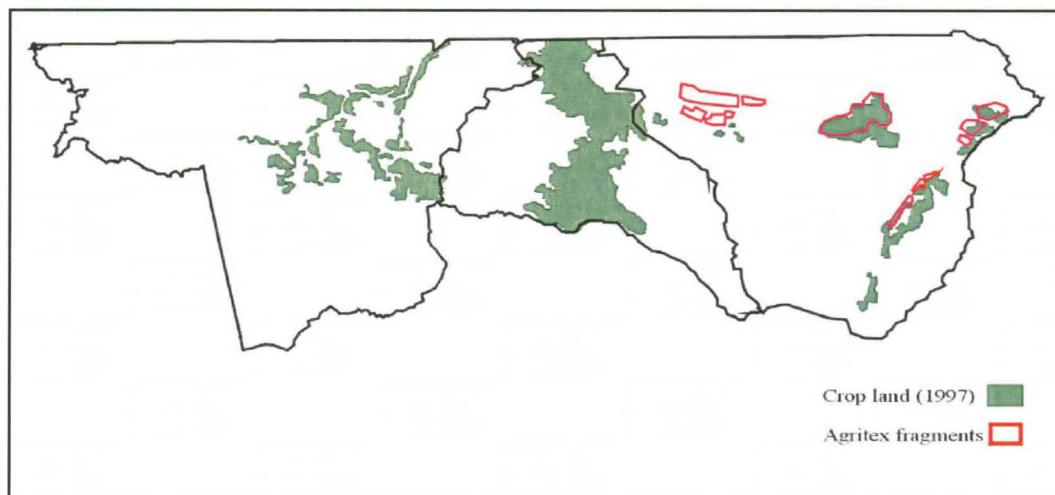
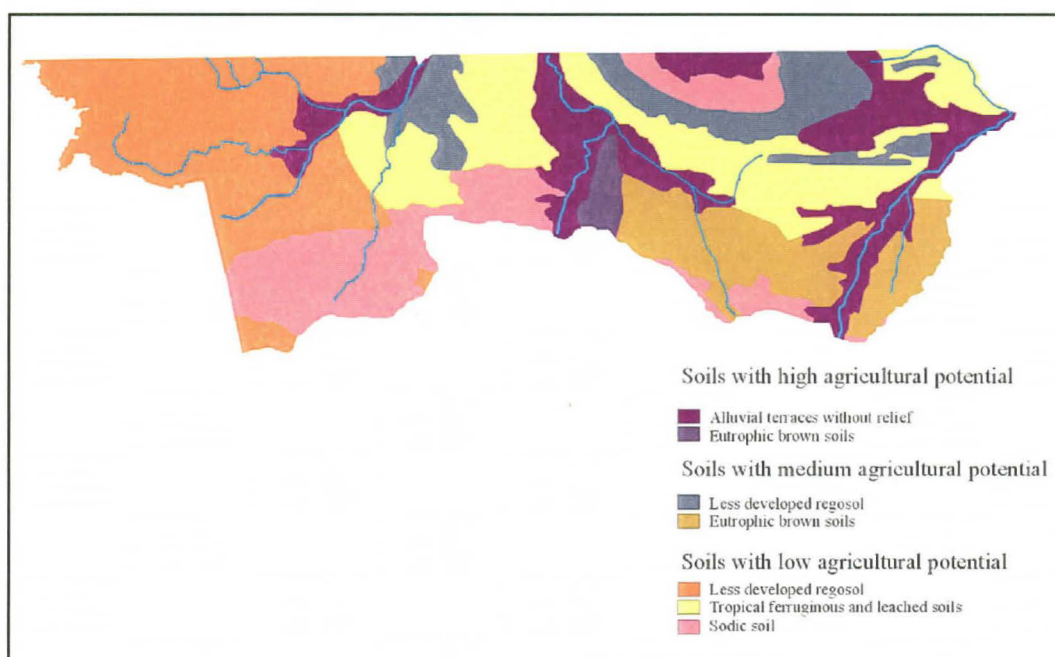


Figure 2: Agro-ecological data on the project's area
2.a: Cropland and agritex pegged areas 1997



2b: Soils agricultural potential, according to agricultural patterns which currently prevail in the valley (cotton extensive cropping, subsistence agriculture).

² P. H. Mugrabe, H. Hamudikuwanda, "Land Use Planning for livestock production in communal areas". Paper presented at Workshop on Socio-Economics of Land Use Planning, Hwange, 14-15 April 1997.

³ For a description of soils in the Dande Communal Land, see H.M. Cumming and T.J.P. Lynam, Landuse Changes, wildlife Conservation and Utilisation and the sustainability of Agro-systems in the Zambezi Valley. Final technical Report - Volume 1, WWF-CSS, Harare, August 1997. Dande Communal Land has a great density of rocky and sandy soils, not very suitable for arable agriculture.

Nevertheless, the Mid Zambezi Valley harbours a considerable biodiversity, in both animal and plant species. The studies which were undertaken during the first year of the project have shown that there are more than 800 plant species in the area, and a great number of fauna species (amongst these, most of the largest species of African mammals, such as elephants, buffalos and hippopotamus). The situation of Dande Communal Land is remarkable, since it borders safari areas and national parks on its western and southern sides, and an area with very sparse human population on its northern side, along and beyond the border line with Mozambique (see Figure 3: Safari area around project area). Therefore, movements of animal populations are common in the area, and may create problems when they interfere with human activities (see Figure 4: Interventions in the Project area in the framework of Problem Animal Control -PAC- operations).

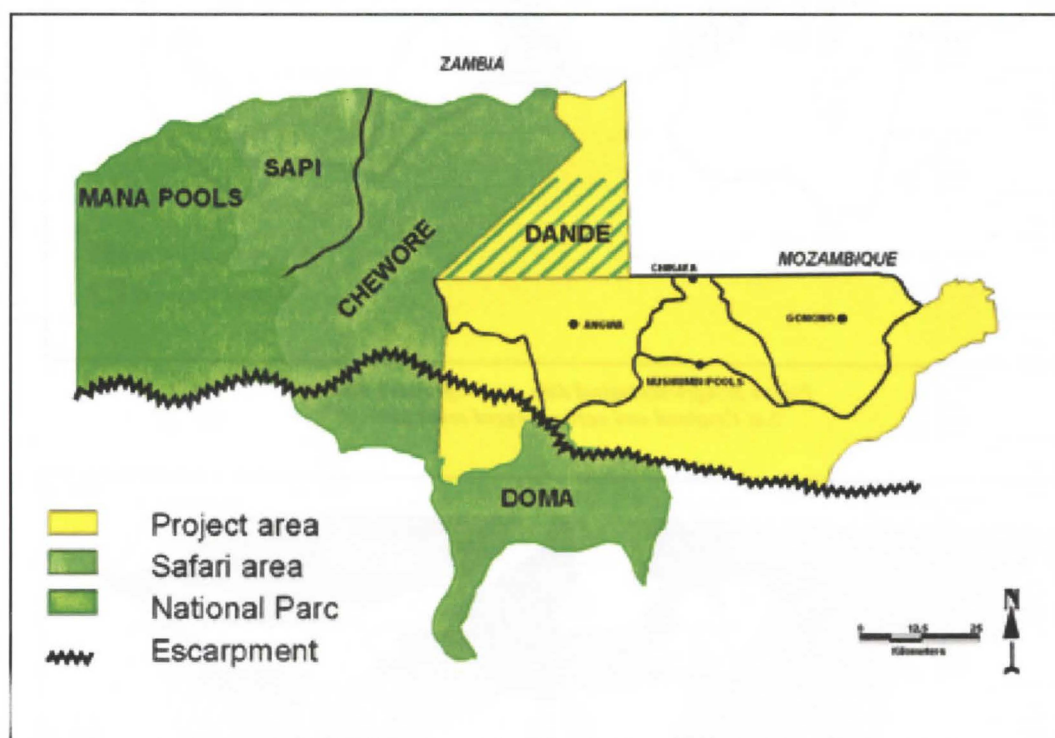


Figure 3: Safari area around project area.

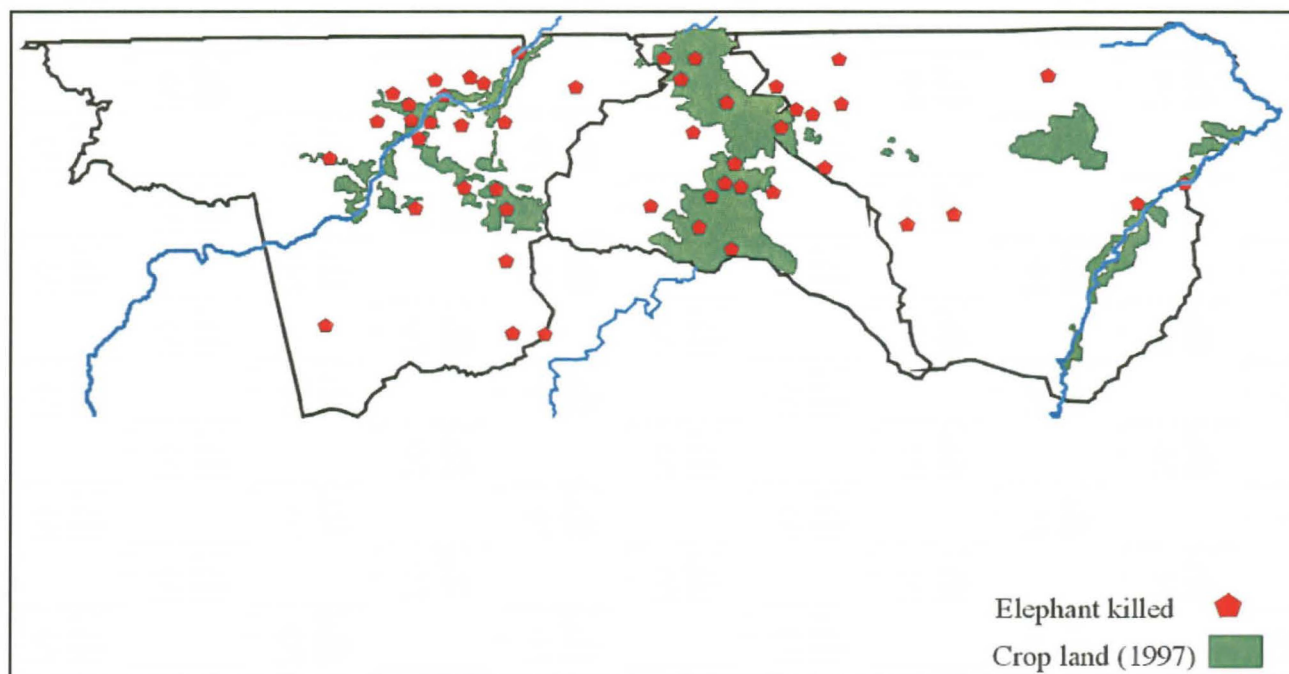


Figure 4: Interventions in the project area in the framework of problem animal control -pac- operations).

1.1.2 Institutional context

As we shall see below, Zimbabwe has taken steps towards administrative decentralisation, since 1975. The country is currently divided into Provinces, and, further down, Districts. Only District Councils are elected assemblies, which implement their own policies (by-laws) and pass their budgets. The area in which the Project is operating falls under Guruve Rural District Council. This Council is commonly perceived as comprising two geographically and socially different areas, Lower Guruve from the one hand (which comprises the eleven wards located on the Valley floor) and Upper Guruve, which comprises the wards on the plateau. In recent years there has been increasing tension between inhabitants of the Valley and those of the Plateau. This tension reflects an old situation of political minority of the inhabitants of the Valley, vis-a-vis. the inhabitants of the plateau⁴. In the past ten years, the bitterness of the population has been fuelled by the implementation of the CAMPFIRE programme, which transfers the benefits of wildlife commercial utilisation to local Communities (Ward Wildlife Committees) through Councils. The Valley inhabitants feel that their resources are utilised in order to promote development of the upper wards which have the majority in the Council (16 wards). This context of political instability has given birth to a project to separate lower and upper Guruve areas, which is currently being examined by the Minister of Local Government and the President.

In addition to this political tension at District level, unity does not prevail amongst wards of the Lower Guruve area, which are very diversified in terms of natural and human resources. This situation of political uncertainty has affected the Project's implementation, since, as we shall see, the Project was from the very beginning, under Guruve Rural District Council, i.e. under the control of elected councillors of the 31 wards which compose the District (16 Wards in Upper Guruve, 11 in Lower Guruve, and 4 in the escarpment), although it only operated in three wards of the Lower Guruve area.

Another characteristic of the institutional landscape lies in the originality of the decentralisation system which currently exists in Zimbabwe. Although District Councils have been delegated a lot of powers (see 1.2 and 3.1.2), central government retains a great number of privileges. This can be seen through two examples: the role of Chief Executive Officers within District Councils structures, and the approval of minutes of Council committees.

All resolutions and recommendations of District Councils (resolutions made in Full Council Meetings, and recommendations made in Council Committee Meetings according to the delegated powers that these committees have received) are executed through the authority of a Chief Executive Officer (CEO), appointed by the Full Council assembly, and "approved by the Minister [of local government]"⁵. Besides, the Minister of Local Government can name a Chief Executive Officer when the post is vacant: he only has to consult the Council⁶. Council will just play an advisory role. Chief Executive Officers are in charge of controlling the legality of operations made by the Council. They have control upon all expenditure

⁴ "from Dande the world appears as made up of two spheres: panapa and mugomo, this place and on the mountain. [...] The people of Dande live out most of their lives on the Valley floor but the plateau and the people who live up there are never long out of their minds". David Land, *Guns and Rains, Spirit Mediums and Guerilla War in Zimbabwe*, Zimbabwe Publishing House, 1985.

⁵ Zimbabwe, *Rural District Councils Act*, IX. 66.1, p. 463.

⁶ Zimbabwe, *ibid.* IX. 66.2, p. 463.

resolved by the Council, since any expenditure can only be effected with their consent and approval. The Chief Executive Officer is a compulsory signatory on Council's accounts, the others being the Chairman of the Full Council, and/or the Chairman of the Finance Committee. Thus one can understand the important role that Chief Executive Officers play in the running of Council activities. Generally speaking, there is some evidence that "appointed officials exercise more authority than elected people's representatives at the district and provincial levels of Local Government structure"⁷. In the framework of the Biodiversity Project, this importance has been increased by the fact that the Project's account is opened under the name of the District Council but operated by both the CEO and the Project Coordinator (double signature)⁸. This indeed contravenes the District Councils Act.

Besides, District Councils are dependent on central government decisions, via the Provincial Administrator, since all minutes of Council Meetings have to be forwarded to the Provincial Administrator in order to be approved. The Provincial Administrator can amend the recommendations of District Council Committees and resolutions of Full Council: "Councillors make decisions but the District Council has no power. For example, DC minutes are sent to the Provincial Administrator. If the decisions are perceived to be in conflict with the central government's position or policies, the Provincial Administrator can amend them in consultation with central government. Consequently, the District Councils end up receiving directives from central government"⁹.

Therefore, it appears that local government is not as decentralised as one might have believed in the first place. Actually, studies have shown that Central Government utilises local government structures in order to make its own policies more acceptable in the eyes of the local inhabitants. Decentralisation tends to be used by Central Government "to soften resistance to the profound social changes which development entails"¹⁰. "Central government plans, policies and programmes for change and development are channelled through decentralised institutions which are, in many cases, expected to adopt them as their own initiatives"¹¹.

One should keep in mind all these observations, since the Biodiversity Project, and the Land Use Plan consultation process, largely operated through and on behalf of Gurube Rural District Council.

Besides and beneath the Council, there exist other levels of decentralisation, which we will mention briefly. The Ward Development Committees (WADCO) and Village Development Committees (VIDCO) were created through the Prime Minister's directive of 1984¹². These committees only have an advisory role. They submit proposals to District Council, which are deliberated in Full Council Meetings, and then transmitted to the Provincial Administrator for approval.

1.1.3 General Context

The eradication of Tsetse flies in the Mid Zambezi Valley, undertaken throughout the XXth century but especially during the post-independence period (Regional Trypanosomiasis and Tsetse fly Control Programme) facilitated the settlement of farmers and cattle owners in the area (but the migration of settlers to the Valley started long before the eradication of the fly, for various reasons, one of them being the lack of available arable land on the high-veld: this demonstrates that the fly has never really been a real impediment to settlement in the area¹³).

The rapid change of settlement patterns in the Valley, with expansion of large cultivated areas along river beds and in the hinterlands, the incorporation of the Valley's economy into broader national and international networks (particularly with the cotton crop, which is one of the main sources of cash revenue in the Valley), threatened the fragile ecosystem of the Valley.

Besides these spontaneous migratory movements, which are still ongoing at the present time, official resettlement programmes took place after independence. The fact that resettlement programmes took place in the Valley after independence was merely coincidental. During the period of the liberation war, the Valley (specially the Dande and Muzarabani Tribal Trust Lands) played an important role supporting ZANLA guerrillas. Thus, when the newly elected ZANU-PF government intended to fulfil the promises of the liberation movement (mainly land redistribution and the development of the former Tribal Trust Lands, marginalized and under-developed during the apartheid rule)¹⁴, it chose Dande as a resettlement area, as a reward for its support during the liberation ward period, and in order to avoid a violent political backlash. Several programmes were launched in the 80's.

- 7 John Makumbe, Zimbabwe: decentralisation, development and democracy. African Studies Centre, Michigan University, 1993, p. 64.
- 8 Cf. Minutes of the First National Steering Committee of the Project.
- 9 John Makumbe, *ibid.*, p. 67. He quotes an administrative officer in the District Administrator's office, Gwanda.
- 10 See Smith, B.C., *Decentralisation: the Territorial Dimension of the State*, George Allen and Unwin, London, 1985: 187. Cited by Makumbe, *ibid.*, p. 68.
- 11 John Makumbe, *ibid.*, p. 68.
- 12 Zimbabwe, Provincial Councils and Administration in Zimbabwe: a statement of policy and a Directive by the Prime Minister; Ministry of Local Government, Rural and Urban Development, Harare, 1984a and Structure of Village Development Committees / Ward Development Committees and Extension Services; Ministry of Local Government, Rural and Urban Development, 1984b.
- 13 Bill Derman explains this thoroughly: "The most important reason that migrants come to the Valley appears straightforward: to gain access to land. For multiple reasons, the Valley was one of the few places in Zimbabwe where there was open land and migrants were welcomed by long-term residents. [...] The Zambezi Valley is the site of the current EEC effort to eradicate tsetse flies. I had initially hypothesised that migrants had heard about the programme and begun to enter the Valley with their cattle in anticipation of its success. However, in the surveys that have been done by CASS, Spierenburg and myself, I have not found a single migrant stating that they came in the Valley for such reasons." In *The unsettling of the Zambezi Valley: An examination of the Mid-Zambezi Rural Development Project*, CASS Occasional Papers, 1990, pp. 13, 14. In another paper, Derman explains the reasons why various development agencies (particularly the designers of the MZRD project) thought that the Valley was under-populated because of tsetse flies constraints: "Past settlement patterns were partially disrupted by the war for Independence. One reason why the project designers miscalculated the number of Valley residents was due to the war itself. From the Kariba Dam east, the Zambezi Valley was a centre for the anti-colonial struggle and there was frequent military activity throughout the Valley. When the war ended, Land [...] was free in the Valley." In *Recreating Common Property Management: Government Projects and Land Use Policy in the Mid-Zambezi Valley, Zimbabwe*, CASS paper, 1991, p. 9.

The most important of these programmes was the Mid-Zambezi Rural Development Project, launched in 1987, which aimed at pegging 7600 plots, in order to resettle 3000 families from the plateau¹⁵. The original objectives of the programme remained unchanged, though. Up to the end of the nineties, the MZRDP operated in the Valley and resettled both foreigners and indigenous people, who had to move from their original dwelling areas and occupy "residential stands" and "arable land plots", pegged by engineers and agricultural extension workers from the AGRITEX (Agricultural Extension Services) department. The MZRDP led to major changes in term of Land Use. The programme involved, besides pegging of plots, the construction of boreholes, clinics, and schools. It was inspired by "Villagization" programmes, as undertaken in the 70's in Tanzania, for instance: the residential areas were pegged around boreholes, far away from the fields. Arable Land areas were determined through analysis of pedology, geology, according to their agricultural potential. As we can see, the MZRDP was characterised by merely technocratic objectives. The programme aimed at facilitating modern development, at a time where the Zimbabwe government was coping with the programme of the Liberation Struggle guerrillas. The limitations of the MZRDP have been thoroughly analysed¹⁶. The project has often been given as an example of top-down approaches, where local leaders are only consulted in order to give advice, and to approve decisions made by others.

The Communal Areas Management Programme For Indigenous Resources (CAMPFIRE) had very important consequences on the Valley's socio-economics as well. This programme aims to devolve management of natural resources, especially wildlife, to local populations, through Wildlife Committees, created at ward level as sub-committees of Ward Development Committees (WADCO, cf. Prime Minister's Directive of 1984)¹⁷. These Ward Wildlife Committees manage the funds which are raised through taxation of safari companies running sport hunting operations in Communal Lands. The philosophy of the CAMPFIRE programme is that of "community participation" and co-management of natural resources. It intends to foster bottom-up planning and management systems: Ward Wildlife Committees make recommendations to WADCO's and to Councils in terms of natural resource use (especially hunting quotas) and in terms of utilisation of CAMPFIRE funds. These are utilised to improve the well-being of local people (through implementation of "community projects" -schools, clinics, for instance-, or distribution of dividends to the people living in the ward). It is assumed that the devolution of benefits that can be obtained from natural resources, and of management powers, to local people, will give a strong incentive towards sustainable management of natural resources, and conservation of the ecosystem.

CAMPFIRE has been subject to a great many studies and critical analysis¹⁸. As far as Dande Communal Land is concerned, it has been shown that the programme failed to actually devolve management and benefits of commercial use of natural resources to local inhabitants, because funds are retained by the Council, and because Ward Wildlife Committees only have advisory power. This means that decision making powers, and control on utilisation of resources are held by the Council and by other agencies and state departments, such as AGRITEX, the Natural Resources Department and National Parks, for instance. The local inhabitants have little to say as far as utilisation of "their" resources is concerned. On the other hand, CAMPFIRE has only focused on wildlife utilisation, since it is the most profitable resource (in terms of cash generation) in the Valley. Indeed, this is a weakness of the CAMPFIRE programme, since inhabitants of the Communal Lands are concerned about utilising a very wide spectrum of resources, which can be geological, plant or animal. Issues of management and benefit sharing of these resources definitely have to be addressed as well.

Last but not least, CAMPFIRE designers failed to actually identify the complex bunch of vested interests which can be observed at the very local level. The "community" notion hides, rather than explains, the political reality at local level.

1.1.4 History

The project of a Land Use Plan for the Mid-Zambezi Valley originated as a result of an identified need to address changes in Land Use Utilisation in the Mid Zambezi Valley, following the eradication of Tsetse flies. The Scientific Environmental Monitoring Group (SEMG), a scientific group of the European Union, designed the first project document in 1994, insisting on both research (evaluate evolving patterns regarding Land Use issues) and intervention aspects (defining alternative Land Use options). The project was then supported by the French World Environment Facility (FFEM) which was created after the Rio Conference of 1992 with a mandate to evaluate environmental impacts of major development programmes. FFEM was able to fund a project which took over from the RTTCP programme.

The negotiation process prior to the signature of a funding agreement between the French and the Zimbabwean governments, took place from 1994 up to 1996. It mainly involved French partners, even though contacts were made with local NGOs, Guruve Rural District Council, perceived as the potential delegated contracting institution, and the Ministry of Mines, Environment and Tourism, (potential contracting institution) in January 1995; and between August 1995 and July 1996. These contacts did not prevent the general guidelines and budget of the Biodiversity Project being modified on several occasions, without the knowledge of the Zimbabwean partners.

Therefore, it appears that the request for the Project did not really emanate from the Zimbabwe Government, or from the local inhabitants of the Valley. The objectives of the Project (mainly the Land Use Planning component), the institutional set-up (roles of the Ministry and of the Council), were identified and formalised, at most, by French cooperation institutions which had an interest in the Project's implementation (CIRAD, FFEM, Ministry of Foreign Affairs) and some NGOs (like WWF). In the final

14 Terence Ranger has described the dynamics of peasant consciousness in the Communal Lands of Zimbabwe, and the way they participated into the definition of political programmes with the guerrillas, during the liberation war. Cf. *Peasant Consciousness and the Guerilla War in Zimbabwe*, Zimbabwe Publishing House, 1985.

15 Derman, 1990: 7: the MZRDP programme assumed that 4600 families were leaving in the area. In fact, the first census carried out in the 80's showed that there were much more families leaving on the Valley floor that anticipated: it would therefore be impossible to bring 3000 families from the plateau.

16 Cf. Murombedzi, J.C. The dynamics of conflict in Environmental Policy in the context of the CAMPFIRE programme. Unpublished Dphil Thesis, CASS, UZ, Harare, 1994, and Rural Land Tenure Systems, Renewable Resources and Development: The Zimbabwean Case, CASS, Occasional Paper, 1996. Cf. as well: Sibanda, B: "Impacts of agricultural microprojects on rural development: lessons from two projects in the Zambezi Valley", Land Use Policy, pp. 311-329.

17 Cf. Murombedzi 1996.

18 Cf. Derman, 1990, 1991.

project document, which was eventually disseminated in November 1995 (Christophe Crepin report, "*Maintien de la biodiversité avec un développement durable dans la vallée du Zambèze après éradication de la tsé tsé*"), the research component (scientific evaluation of ecological dynamics related to land use changes in the Zambezi Valley) was left out, and the document concentrates on the implementation of a Land Use Plan, which would be drawn up through consultations with stakeholders.

As we shall see (3.2.1), these historical developments were to have an impact on the relationship that the Project had with various institutional partners involved, at some stage, in the coordination and implementation of the Land Use Planning activity.

1.2 Objectives

The main objective of the Biodiversity Project is to facilitate the definition of a Land Use Plan by making a Land Use Plan Proposal which could reflect the views of Local inhabitants as well as technocrats, and to present it to the Council, so that it can be used as a starting point for further negotiations. The Project makes the assumption that it is possible to undertake participatory consultations without the active involvement of the Council, and to utilise the results of these consultations as a catalyst of a certain political, social and economic situation, likely to trigger off a fruitful political debate at Council level.

Besides, the Biodiversity Project evaluation document identifies training of the Council in environment monitoring and sustainable use of natural resources as a major activity to be undertaken, one of the main assumptions of the Project being that the Council is the appropriate decentralised level for management of natural resources and land use planning. This assumption was formulated at the very early stages of the Project's identification, before any contact with the Council, any discussion on the project objectives and means, had been made¹⁹. It derives from the fact that Zimbabwean legislation, through the *National Parks and Wildlife Act* of 1975, confers "privileges on owners or occupiers of alienated land as custodians of wildlife"²⁰. The Act "contains a provision enabling the Minister to designate district councils in communal lands as "appropriate authorities" for the management of wildlife on lands under their jurisdiction, analogous to the "custodianship" of wildlife conferred on owners or occupiers of alienated land"²¹. This Act was the first step in Zimbabwe towards decentralisation of natural resource management. The District Council of Guruve obtained the Appropriate Authority qualification from the Minister of Mines, Environment and Tourism (at that time Minister of Natural Resources and Tourism) in 1989. Besides, the District Councils Act of 1988 gives powers to Councils in terms of land allocation²², and in terms of conservation of natural resources. Councils have powers "to take measures for the conservation or improvement of natural resources"²³ and to control "the preservation and conservation of natural resources"²⁴. Council approves the Project's budgets and controls Project activities, since it is responsible for the execution of the budgets (approval of expenditure). The Biodiversity Project has made some efforts to train and sensitise the Council on natural resource management issues (through workshops and meetings), so that it acquires the institutional capacity to later run and implement biodiversity-related policies, one of them being permanent control over the implementation of the Land Use Plan.

Generally speaking, the Biodiversity Project intends to challenge and overcome the experiences of the Mid-Zambezi Rural Development Project and CAMPFIRE. It addresses current challenges in the field of natural resource utilisation and Land Use Planning. It raises several questions: what are the various current patterns, and available alternative options, in terms of sustainable utilisation of resources (such as stream banks, forest areas, wildlife, etc.)? How can vested interests regarding resources utilisation be identified? What are these vested interests? How can the project be a platform to articulate people's demands and technocrats' views with regard to Land Use? The project intends to bring together different levels of perception. It advocates a participatory, bottom-up planning approach. It intends to address all issues related to natural resource utilisation dynamics, since it is based on the methodological hypothesis that these issues are all related. Therefore, the Project incorporates all types of resources and uses while attempting to draw up Land Use Plan proposals, instead of focusing on the most commercially profitable resources, as CAMPFIRE does²⁵.

1.2 Methodology and Results

1.3.1 Methodology

1.3.1.1 Workshops

The work started with briefing meetings with various leaders from district to community level. These leaders include council officials, councillors, local Members of Parliament, non-governmental organisations working in the area, traditional leaders, spirit mediums, political leaders and village development committee members. The meetings were aimed at discussing the objectives and formulating approaches to be adopted. The roles of each participant were clearly defined. Briefings were followed by community workshops. The community land use plan was to be formulated first, and the other stakeholders would bring their plans to be included to form the WARD plan.

Two workshop days were spent in each village (13 villages in total). The two days were separated by two

19 The first draft of the Project identifies the Council as the potential delegated contracting authority of the Project. Cf. *Biodiversité animale et développement durable après l'éradication des tsé tsé des aires protégées du bassin du Zambèze*. RITCP - French Embassy in Zimbabwe, Harare, November 1994.

20 Zimbabwe, Parks and Wildlife Act, 1975: 5. Quoted in Marshall Murphree: *Decentralising the proprietorship of Wildlife Resources in Zimbabwe's Communal Lands*, CASS, occasional paper, 1990: 2.

21 Zimbabwe, Parks and Wildlife Act, 1975: 12, 66-67. Quoted by Marshall Murphree, *Ibidem*.

22 Zimbabwe, District Councils Act, revised edition 1996, Schedule, 1, clause 9, p. 439.

23 *Ibid.*, schedule 1, clause 6, p. 494.

24 *Ibid.*, schedule 2, clause 11, p. 500.

25 Cf. Christophe Crépin, *Projet de Conservation de la Biodiversité après éradication de la mouche tsé-tsé*. Document de Projet, FFEM, Octobre 1995. This approach was formerly clarified and outlined to the local populations, in the early stages of the project's implementation, cf. Etienne Ballan, « Notes de terrain sur la période de mise en place du projet Biodiversité. 01.07-20.11.1996 », in *Mise en route du Projet MAE-FFEM : « Maintien de la Biodiversité dans la Moyenne Vallée du Zambèze après éradication de la mouche tsé-tsé »*, Cirad-Biodiversity Project, Harare, 1996 (Annexe 21).

days of transect walks and interviews. During the first workshop, the objectives and work schedule were thoroughly discussed. People were then put into various groups. In these groups, people analysed the natural resources and existing developments. The analysis looked at issues such as ownership, uses, regulators, management and problems. The natural resources were ranked according to their usefulness using pair wise technique. While still in-groups, they sketched the location and extent of their natural resources and existing infrastructure. At the end of the day, the maps most compatible with topographical maps which were held by the Project team (Surveyor General maps as well as ortho-photographs) was chosen by the whole workshop and missing information was added. These maps were used during the transect walks for ground truthing. During the initial phase, the sketches were done on transparent sheets of paper (see Figure 5A and 5B). These were difficult to handle in the field or transfer onto topographical maps²⁶. Photocopies of ortho-photographs at a scale of 1: 25 000 were then used to overcome the problem. Most people could easily identify their areas, on the photographs, after a few minutes of training and orientation.

During the second workshop, the whole village assembled at the usual meeting place. The people were again divided into various groups where they listed all the problems faced in the area. These problems were then ranked according to the most pressing ones. The causes, effects and possible solutions were then analysed. A problem calendar was also drawn (see table 1). Each group then formulated its land use and resource management plan to address the listed problems. Again the most complete presentation²⁷ was chosen and more information, agreed by the workshop, was added. The maps from the workshop were then taken to CIRAD head office for drafting.

1.3.1.2 Transect Walks

At the end of the first workshop, the community would select a team of people, who knew their area well, for the transect. The teams normally comprised young and old men²⁸. During the walks, extensive discussions were held based on indigenous technical knowledge. The discussions centred on topography, soil type, classification and evaluation, vegetation types and uses, present use, problems and potential of the area. Time series diagrams were drawn depicting the depletion or usage of natural resources, such as firewood. Some diagrams indicated the predicted scenario in the future if the current trends continue.

1.3.1.3 Interviews

Informal interviews were held in the afternoon after the transect walks. The interviews were held with key informants, individuals and special interest groups. The interviews were held to solicit independent information on key issues deliberated on the workshop, and weaknesses and strengths of local leadership, management structures and institutions working in the area.

1.3.1.4 Ward Land Use Plan Draft

The work from various villages was combined into a Ward land use plan (two Wards completed). A project report was also produced. The proposed land use plan combined the communities' proposals and plans from other stakeholders which could be found in the existing literature. The Biodiversity Project was one of the stakeholders: it combined its own views with those of others. The reports were sent to various stakeholders such as the Council, Safari operators, various government departments, CAMPFIRE association and non governmental organisations. This was done to have inputs from stakeholders.

1.3.1.5 Land Use and Resource Management Plan Negotiations

A land use planning workshop was held at the District Council offices. Most stakeholders (mainly technocrats from Local and Central Government) attended. The work was presented and the stakeholders were asked to analyse the community work and highlight areas interfering with their sphere of influence/interest. The negotiations are still at this stage.

1.3.2 Problems

The whole exercise was not an easy one. Community meetings for planning purposes are very difficult. Controlling the large gathering and coming up with a plan proposal which everybody (from the community) agrees on is very time-consuming. A number of assistants from the community had to be trained by the facilitators to lead some of the workshop groups. Some members of the community did not turn up, thus affecting the acceptability of the land use plan at community level.

Timing of the participatory work is very crucial. The community will not attend meetings once the rainy season has started.

The coordination of all the stakeholders was very difficult, as far as organising and implementing consultation activities (transects, workshops, meetings, etc) was concerned. This was mainly because there was no coordination forum through which all the stakeholders could channel their inputs. An outsider, the Project sponsors, took centre stage and the local stakeholders lost interest or adopted a wait-and-see attitude.

The community is a bit hesitant to participate when there are no immediate tangible results. Land use planning is a long-term benefit and some officials who initiated the project employed the political tactic of promising some game fencing. These unfulfilled promises affected the smooth implementation of the participatory work.

26 Obviously, this is not really a surprise. Agreeing with Patrick Caron (personal communication), we ask ourselves whether it was really necessary to make compatible representations which are not; as different objectives, different principles, different tools hold their own value and might enrich each other.

27 This presentation would draw a synthesis amongst various individual attitudes. From a methodological point of view, one can fear that a lot of information will be lost in the process of compiling these various strategies, and perspectives held by different individuals.

28 The fact that women have in most cases been left over is definitely a methodological limitation.

A hand-drawn map of the Minda Yakapegnia area in Mozambique. The map features several rivers: KAREMBUE (top left), POLO (top left), MATSUTSUI (top left), SANGO (top center and right), and SALUGA (bottom left). A road, indicated by a red line, runs diagonally from the top left towards the bottom right. Key locations and features include:

- MINDA YAKAPEGNIA**: A large rectangular area in the center, outlined in green, containing a circle and the text 'MINDA YAKAPEGNIA'.
- MINDA**: A small rectangular area at the bottom center, outlined in green, containing the text 'MINDA'.
- CHAMUTARARA**: A label above a river section in the upper right.
- CHAMUKOPOHO**: A label below a river section in the lower right.
- Other labels**: KAMUTAWHIKE, KALONA, BH, and various symbols like 'X', 'A', and 'B' are scattered across the map.
- Vegetation**: Green grass-like symbols are drawn throughout the map, particularly along the rivers and in the central area.
- Topography**: Blue wavy lines represent hills or mountains at the top and right edges.

Figure 5a: Community mapping, ward 4, sabhuku mhande, group of men

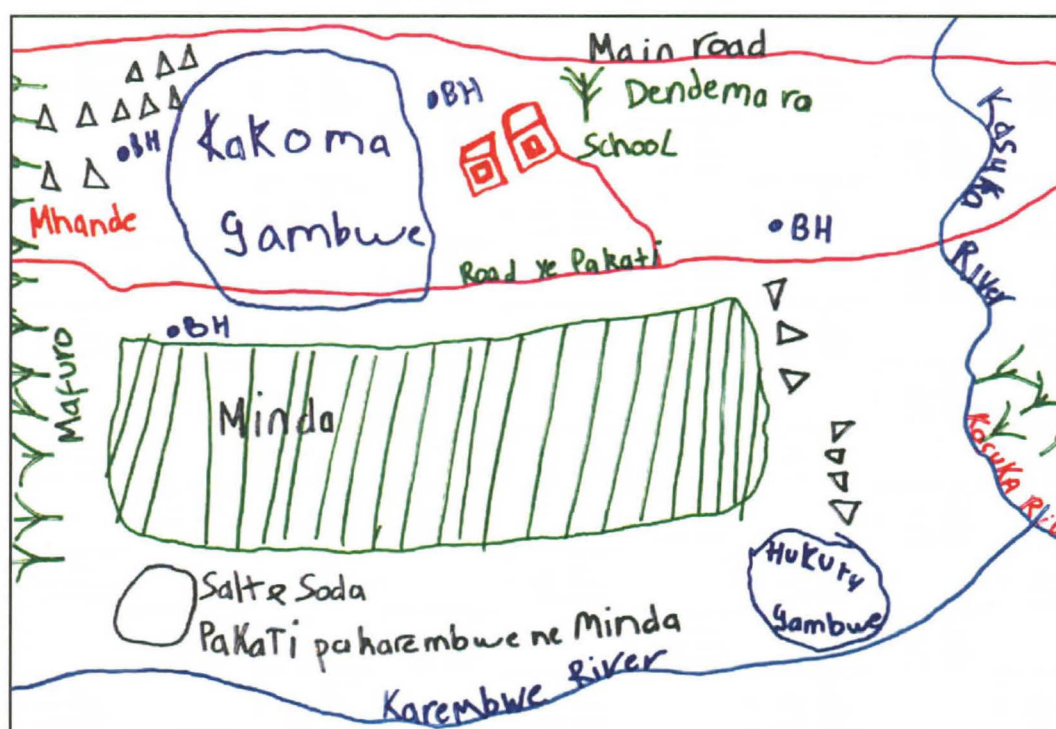


Figure 5b: Community mapping, ward 4, sabhuku mhande, group of women
 Table 1: Vegetation type and soils: associations as indicators of soil classification

SOIL TYPE	VEGETATION SPECIES
Poor Soils	Mukono, Mumbambara, Kagoro, Muchesi, Mutuwa, mubikanyemba, stunted mopani and muchenje. Grass species ; ruhusu, kasiyesiye, Katete, nykapanda, kaverera.
Good Soils	Grass species ; katsekera, mbuvi, tsangadzi, bande, tsine, Tree species ; big mopane, musomo, mutukutu, muchenarota, munhanga.
Exhausted Soils	Grass species ; nyakapanda, katete, gaso, bepe. Bukwe, kajajiwa.
Recovered Soils	Grass species ; tsagadzi, Trees ; muzunga
Wetness Indicators	Grasses ; tsekera, sedges Trees ; mushuma, musiga, mupandapanda, muchekesa, muchenarota, mukuyu, mubvewe

Table 2: Soil types, characteristics, present use and their suitability

Soil Type/ local name	Characteristics	Present Use	Suitability
Sand soils <i>Kafukazingizi/Gonono</i>	Reddish sand soil. Low fertility, low water retention capacity, excessive drainage, easy to work.	Variety of crops like maize, cotton, millet, sorghum, groundnuts, water melons, cow peas.	Suitable for sorghum, millet, groundnuts, water melons, cow peas.
Sand loam <i>Matabvu</i>	Black soils. High water retention capacity, high fertility, sticky, slippery, surface cracks when dry, poor drainage, difficult to work when wet. Easy to prepare when dry even by hand.	Variety of crops like cotton, maize, millet, sorghum, groundnuts, pumpkins, water melons, cow peas.	Suitable for most of the crops - cotton, maize, millet, sorghum, groundnuts, water melons, pumpkins, cucumbers, cow peas, sunflower.
Sand loam <i>Daga retsangadzi</i>	Brownish sand loam soils. High fertility and better water holding capacity than matabvu. No surface cracks. Needs a lot of water before preparation. Needs draught power or tractors for preparation.	Millet, sorghum, groundnuts, maize, cotton, cow peas, round nuts.	Cotton, maize, millet, sorghum, groundnuts, cow peas, water melon, cucumbers.
Sand loam <i>Daga rebande</i>	Dark brownish, sticky soil. Moderate water retention capacity. Difficult to work when wet or very dry. Gives big clods when ploughed dry. Relatively resistant to erosion. Requires draught power or tractors for preparation.	Cotton, Sorghum, Millet, Maize, Pumpkins.	Cotton, sorghum, millet, groundnuts, maize, pumpkins, cow peas.
Loamy sands <i>Shapa</i>	Pale loamy sands. Low water retention capacity, low fertility status. Easy to prepare even by hand.	Maize, cotton, millet, sorghum, groundnuts, cow peas, cucumbers, pumpkins.	Millet, sorghum, groundnuts, cow peas.
Alluvial soil <i>Tseti</i>	Found on the river bed of Kadzi river. Mixture of sand, sand loam, sand clay loam. Fertility varies with mixture and material deposited. High moisture regimes. Easy to prepare.	Maize and vegetables like okra, tomatoes, cucumbers, rape, cabbages, beans, sweet potatoes.	Maize, cow peas, vegetables like cabbages, rape, beans, sweet potatoes, pumpkins, okra.
Shallow stony <i>Chipfukumbi</i>	Very stone and shallow. Some areas have surface stones.	Grazing, collection of fuel wood, poles, thatch grass, fibre.	Forestry reserve, grazing, wildlife area, collection of fuel wood, poles, thatch grass, fibre.

Table 3: Bonga vidco transect discription

Area	Bonga forest	Fields	Gumbo - Mufanechiya	Madeduka forest
Topography	Flat with a perennial pool along Bonga river.	Flat.	Generally flat. Kadzi river is seasonal. There is a perennial sacred pool, Chisangu.	Generally flat, gently sloping towards Kada river.
Soil type	Various soil types. Shallow and stony soils towards Binya road, black sand loams (Matabvu) on low lying areas, dark brown sand loams (Bande) along depressions and water ways and brownish sand loam on the greater part of the area.	Loamy sands and sand loam. (Shapa and, Matabvu and Daga reTsangadzi).	Various soil types - Matabvu, Daga reTsangadzi and Bande.	Matabvu soils towards Kada river. Stony and shallow soils in the central portion. Shapa soils towards Kadzi river.
Vegetation	Open woodland. Trees are <i>C. mopane</i> , <i>C. apiculatum</i> , <i>A. nigrescens</i> , <i>S. birrea</i> , baobab, <i>K. acuminata</i> , <i>X. americana</i> , <i>L. capassa</i> , <i>Mungodza</i> . Grasses are <i>Mbuvi</i> , <i>Tsine</i> , <i>Bande</i> , <i>Tsangadzi</i> .	Fer <i>C. mopane</i> , <i>A. tortitis</i> and <i>Z. mauritiana</i> .	Along rivers and pools - <i>K. anthotheca</i> , <i>C. mopane</i> , <i>B. madagascariensis</i> , <i>T. sericea</i> , <i>C. imberbe</i> , <i>S. birrea</i> , <i>Muvee</i> . On the uplands are <i>C. mopane</i> , <i>C. imberbe</i> , <i>L. capassa</i> , <i>T. sericea</i> . Grass type are <i>Tsine</i> , <i>Tsangadzi</i> , <i>Bande</i> , <i>H. petersiana</i> .	Predominantly <i>C. mopane</i> , <i>L. capassa</i> , <i>T. indica</i> , <i>C. imberbe</i> , <i>S. birrea</i> , <i>B. petersiana</i> , <i>A. nigrescens</i> , <i>C. apiculatum</i> , <i>Muzurumbi</i> . Towards Kada river the dominant trees are <i>D. kirkii</i> , <i>S. birrea</i> , <i>A. ? nigrescens</i> , <i>B. petersiana</i> , <i>L. capassa</i> ,
Present use	Wildlife and livestock grazing. Collection of poles, firewood, fruits, timber. Watering gardens, livestock and wildlife from the perennial pool.	Demarcated for agriculture. Crops grown are cotton, maize, groundnuts, cow peas, sorghum, millet, cucumber and water melons.	Pool water is used for watering gardens, livestock and wildlife, and , washing, bathing, diluting pesticides. Fishing and collection of soda. Water from Kadzi river is used for domestic purposes and watering animals. Uplands are used for cropping - cotton, maize, millet, sorghum, groundnuts.	Grazing area for wildlife and livestock. Collection of fruits, honey, poles, fuel wood, thatch grass.
Problems	Sanctuary for elephants. Poaching of wood and animals. Special purpose trees now far away from people.	All demarcated plot have been fully allocated.. Opening of land illegally on the increase. Some fields pegged within water pools, crops are always waterlogged.	Pool - harbours mosquito, gully erosion occurring, reeds now extinct. Fields pegged along Kadzi river are frequently washed away by floods. In 1996/97 season portions of 23 fields were washed away.	Greater part of forest is far from settlements. Poaching of wood, grass and animals. Destruction of trees by elephants. Lack of water for animals.
Potential	Opening up of agricultural land. Game ranching.	Introduction of soil conservation measures and good agricultural practices..	Fish farming on the pool. Mechanised agriculture.	Opening of arable land. Wildlife reserve.

Table 4: Resource analysis: - bonga vidco

Resource	Owner	Use	User	Regulator	Management	Problems
1. Land	Local people, Agritex, R/O, Chief, Gvt, Local Spirit, Wildlife.	Crop prodn, brick moulding and pots, burying the dead, home to people and animals.	Local people, farmers, trees & grasses, government council, wild & domestic animals.	VIDCO chairmen, Sabhuku, R/O, Local Spirits.	Selective cutting of trees to retain soil stability ploughing across the slopes.	<ul style="list-style-type: none"> • Some soils are poor and sandy, • low fertility, and low water retention • land needs tractor ploughing every year • Lands are now exhausted.
2. Water	Local people, local spirits, animals.	Drinking, watering livestock wildlife, gardens, diluting pesticides.	Local people, wild & domestic animals, frogs, fish, local spirit, birds, bees.	Local people, local spirit, DDF, Gvt, VCW.	Protecting water sources, keeping the borehole yard clean, observing rules applying on some sacred water points, not ploughing on natural pools.	<ul style="list-style-type: none"> • Very few boreholes • drinking dirty water from rivers, • some boreholes have saline water • sharing water with wildlife.
3. Trees	Local people, wild & domestic animals, local spirit, snakes.	Poles for construction, fruits, tree bark, food, graze for wild and domestic animals, shade, medicine, burning bricks, oxygen, craft, fuel wood.	People, local spirit, birds bees, snakes, wild and domestic animals.	APUs, Local spirit, Sabhuku, R/O,- Lands.	Declare some trees sacred, selective cutting, using dead wood for fuel wood, using designated lands for cropping.	<ul style="list-style-type: none"> • Competing with wildlife for fruits, • wood poaching by people with lorries, • veldt fires.

Table 5: Problem analysis: - bonga vidco

Problem	Cause	Effect	Possible Solution
1. Water	<ul style="list-style-type: none"> • Very few boreholes in comparison with people, • some boreholes do not yield water and some yield saline water, • some boreholes cited on water ways, poor consultation with the community and its leaders, • poor representation by the local Councillor 	<ul style="list-style-type: none"> • Continued use of dirty water shared with animals, • walking long distances looking for water, • increases in water borne diseases 	<ul style="list-style-type: none"> • Additional of boreholes, • improved communication and involvement of the community as well as the Spirit Medium before citing of boreholes, • construction of dams for water for gardens, • livestock as well as wildlife , • re citing of boreholes that are on the waterways, • citing of windmills close to some natural pools for wildlife water.
2. Land/ Soil	<ul style="list-style-type: none"> • Most pegged plots have been taken, • demarcated plots on poor soils, • poor communication with the community and its leaders, • fields pegged on water ways, • some people are not using their demarcated plots, • 12 acre plots are too small, poor agricultural practices, • some fields pegged on Kadzi River 	<ul style="list-style-type: none"> • Sub dividing 12 acre pots with children, • low crop yield, • hunger, • shortage of cash, opening of land illegally 	<ul style="list-style-type: none"> • R/O should come and peg more plots, • plots should be pegged on fertile soils, • fields should be increased, • Area should have its own extension officer for technical advise
3. Hunger	<ul style="list-style-type: none"> • Crop destruction by wildlife, poor soils, • low rainfall lack of agricultural inputs, small fields, • lack of technical advice, • laziness, intensification of cash cropping 	<ul style="list-style-type: none"> • Starvation, relocating to some parts of the district, • low development, theft, • poaching, break up of families, • low production, selling of live-stock, • dependency on wild food that is sometimes poisonous 	<ul style="list-style-type: none"> • Driving away all animals from the area, • construction of dams, Gvt to give people loans payable after ten years, • fields should be increased to 24 acres, • fields should be pegged on fertile soils, • area should have its own extension officer, • AFC should give people loans to buy tractors and inputs

Table 6: Problem ranking and analysis at ward level

Problem	Cause	Effect	Possible Solution
1. Water	<ul style="list-style-type: none"> • Very few boreholes in comparison with people, • some boreholes do not yield water and some yield saline water, • some boreholes cited on water ways, poor consultation with the community and its leaders, • poor representation by the local Councillor 	<ul style="list-style-type: none"> • Continued use of dirty water shared with animals, • walking long distances looking for water, • increases in water borne diseases 	<ul style="list-style-type: none"> • Additional of boreholes, • improved communication and involvement of the community as well as the Spirit Medium before citing of boreholes, • construction of dams for water for gardens, livestock as well as wildlife, • re citing of boreholes that are on the waterways, • citing of windmills close to some natural pools for wildlife water.
2. Land/ Soil	<ul style="list-style-type: none"> • Most pegged plots have been taken, • demarcated plots on poor soils, • poor communication with the community and its leaders, • fields pegged on water ways, • some people are not using their demarcated plots, • 12 acre plots are too small, poor agricultural practices, • some fields pegged on Kadzi River 	<ul style="list-style-type: none"> • Sub dividing 12 acre pots with children, • low crop yield, hunger, • shortage of cash, • opening of land illegally 	<ul style="list-style-type: none"> • R/O should come and peg more plots, • plots should be pegged on fertile soils, • fields should be increased, • area should have its own extension officer for technical advise
3. Hunger	<ul style="list-style-type: none"> • Crop destruction by wildlife, • poor soils, low rainfall lack of agricultural inputs, small fields, • lack of technical advice, • laziness, • intensification of cash cropping 	<ul style="list-style-type: none"> • Starvation, relocating to some parts of the district, • low development, • theft, • poaching, break up of families, • low production, selling of live-stock, • dependency on wild food that is sometimes poisonous 	<ul style="list-style-type: none"> • Driving away all animals from the area, • construction of dams, Gvt to give people loans payable after ten years, • fields should be increased to 24 acres, fields should be pegged on fertile soils, • area should have its own extension officer, • AFC should give people loans to buy tractors and inputs

2. CURRENT SITUATION IN THE LAND USE PLAN NEGOTIATION AND METHODOLOGY DISCUSSION.

2.1 Current situation

2.1.1 The Land Use Plan Proposal

After completion of field work, the maps were drawn in Harare making use of GIS software (MAPINFO). The whole exercise basically consisted of drawing with the software what had already been drawn by hand during the workshops and meetings. No use was made of GIS as a tool to understand Land Use, nor as a tool to dialogue with the farmers. There is a reason for this: the Project was advocating a participatory approach, as far as possible, whereby the local people would be allowed to give their own views on planning. The Project team intended to remain as much as possible in the background, whereas the local people were asked to carry out their own analysis of current trends in use of natural resources. Thus, the Project team made the assumption that Traditional Knowledge Systems were of such a nature that they could allow people to embark on a planning exercise, which could challenge the plans previously drawn by technocrats.

Nevertheless, since local inhabitants are not the only stakeholders involved in the planning process, the Biodiversity Project had to consider other views on Land Use as well. This is the reason why the final proposal combines the maps² drawn by Agricultural Extension Services (AGRITEX) and the Mid-Zambezi Rural Development Project (MZRPD), while incorporating the plots which they officially demarcated within the areas eventually set aside for agricultural purposes.

Last but not least, the Biodiversity Project team put forward its own views in terms of conservation and sustainable use of natural resources, while making an attempt to reconcile the various interests of stakeholders into a global picture: hence the vast cropping areas that one might notice on the map, which are **aggregations** of both the drawings of the local communities and the views of the AGRITEX technocrats. Some other areas, such as corridors and areas for conservation or sustainable use of natural resources (eco-tourism, traditional hunting, sustainable forestry management, etc.), only reflect the views of the Biodiversity Project Team. (see Figure 6.). The fact that the Biodiversity Project aimed to produce a synthesis of stakeholders' views while being a very important stakeholder itself (and therefore partial) can seem quite contradictory.

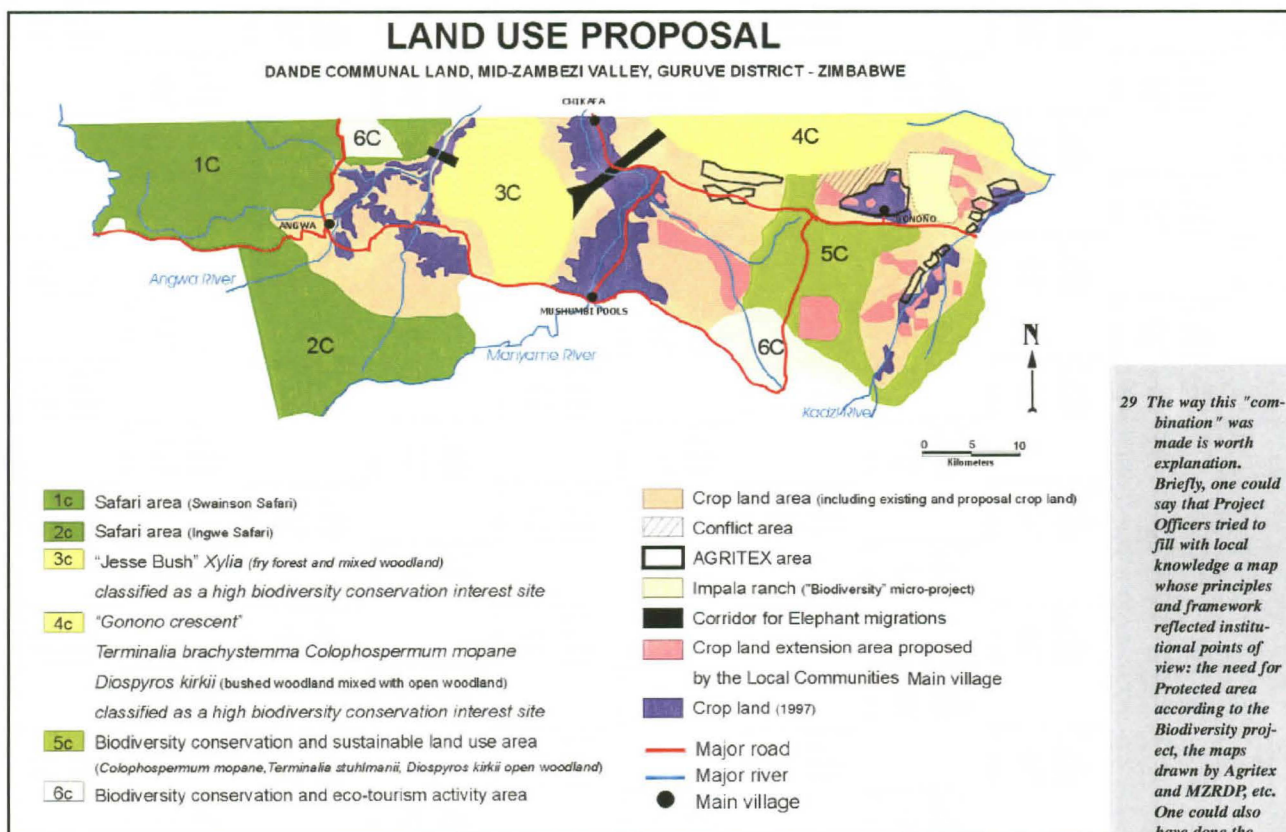


Figure 6: Biodiversity project land use proposal

Briefly, apart from the Safari Areas (1C and 2C - see map), the proposed Master Plan envisages essentially three types of area:

- priority biodiversity conservation areas (3C, 4C, 6C).
- mixed areas- conservation of the biodiversity using sustainable exploitation of resources, by gathering and safari hunting especially (5C)
- crop areas.

In order to reduce conflict between the rural people and large wild animals (destruction of crops by elephants in particular), one option is to organise migration corridors, which appear as white and black hatching on the map. The conflict area shown in orange and green hatch north of Gonono village is the consequence of the proximity between the fields and Gonono Crescent (4C) which harbours vast populations of elephants. It is shown on the map for reference purposes.

Besides, it should be noted that the proposal which is shown does not reflect any compromise between stakeholders, as far as the Ward 3 is concerned. In this Ward, the "squating" situation created by both the MZRDP and the influx of illegal settlers to the Valley made it very difficult to reach agreement with the Appropriate Authority on the appropriateness of carrying out a participatory and negotiated planning exercise, since the District Council felt that this would somehow lead to recognising the legitimacy of squatters' claims³⁰. Therefore, the drawing for Ward 3 only reflects the views of the Biodiversity Conservation Project. One can thus foresee a lot of problems that might arise during the consolidation and open negotiation process.

It appears clearly that the Land Use Plan proposal is not founded upon any compromise, resulting from a negotiation process amongst stakeholders. The map-makers have only worked out the final map, by combining the views of various stakeholders. The way various stakeholders perceive space cannot be seen on the map. Stakeholders' views and claims on land were collected in different instances (place, time), each of them separately. There was no dialogue amongst the stakeholders, though it could have brought new ideas, and possibly a completely new picture would have emerged from this dialectic process of negotiation. As can be seen, the idea of a compromise amongst stakeholders is a pure fantasy, built up theoretically in the mind of the Biodiversity Project Officers, the assumption being that the stakeholders' views, shown here as they have been expressed when individually consulted, would remain unchanged once thrown into the midst of a large political forum.

One can, however, advocate this approach by saying that the Project's document does not intend to be a final proposal, but a tool for discussion. In other words, it is aimed to create and foster the conditions for a dialogue which would otherwise be impossible. **But then, the question is to know at what level and how this aim can be attained and how the map that has already been elaborated might impact on individual and collective strategies and modify the negotiation process.**

2.1.2 An overview of the various stakeholders.

It is now the duty of the Biodiversity Project Team to facilitate and participate in the negotiations for the implementation of a Land Use Plan in the three wards concerned by the Project. These negotiations have to be done at various levels (from the very local to the national), bearing in mind that it is the Council only which has been granted Appropriate Authority upon the land. A Land Use Plan can thus be given legal force by becoming a by-law of the Council.

Each level of negotiation has its own logic and rationale, reflects a particular level of interests.

If one considers Ward level, for instance; it appears that the resources which the inhabitants primarily value still look very abundant and inexhaustible: "land is plentiful", is a statement that is commonly heard amongst inhabitants of the Valley floor. But which resources are we talking about? At this stage, it seems crucial to acknowledge the fact that the way people consider a resource is determined by the type of use and benefit that they get from it. In this case, one of the main benefits that the inhabitants of the Valley get from land is its agricultural value, as has been shown in various studies (cf. Aubin). Generally, at Ward level, there is a high demand for agricultural use of land, and this attitude is not very conservation-oriented. Thus, if the wards had to take measures to control and restrict their own use of natural resources, the danger is that there would always be the suspicion that this policy is irrelevant and that the neighbouring wards could take advantage of the situation by violating it.

At District level, however, the natural resources available in the District, especially wildlife, appear limited. The Council intends to promote the conservation of Biodiversity, with emphasis on big wild mammals, because it is one of the main beneficiaries of the CAMPFIRE programme. The District Council, because of its awareness of the limited nature of alternative resources that can be found on its land, might be much more favourable to implementation of Land Use Plan policies.

It is therefore the duty of the Biodiversity Project to make an attempt to articulate and coordinate different levels of negotiation, in short to facilitate dialogue amongst different actors, at different levels. In this process, the fact that the Council is the main policy-maker, with a particular political agenda, should not be underestimated: the District Council is not an individual person but an administrative body, with a mandate to conserve and promote sustainable use of natural resources (National Parks and Wildlife Act, Natural Resources Act, District Council Act, etc.).

Besides, the District Council is in a better position to undertake certain actions for management of natural resources, such as migrations of wild animals (buffaloes, elephants), than the Wards. Although certain

30 The official plots pegged by AGRITEX fail to take into account the reality of traditional settlements along the river banks - the villagers on the banks of the Manyame, who have suddenly become "squatters", refuse to acknowledge the legitimacy of the resettlement programme.

types of environmental degradation problems should be managed at the very local level, others require to be addressed at a much wider level (including national, regional or international level, in some cases). Although District Councils are administrative bodies, whose areas of jurisdiction are not necessarily consistent with natural and social phenomena, they have an important role to play in the management of natural resources.

It is thus the opinion of the Biodiversity Project that the District Council should be (one of ?) the main forum for discussion on the proposal. As a "custodian of the land", the District Council is in a position to call for workshops and meetings which would involve all the stakeholders.

At this stage, it seems quite important to understand that the District Council, though being an Appropriate Authority, is not the only institution legally empowered to take decisions on land utilisation and natural resource management. A great number of government departments need to be considered in this respect as well. These are the Natural Resources Department, which has a mandate to make the local authority adhere to the terms of the Natural Resources Act; the Department of National Parks and Wildlife Management, which retains the final powers in terms of utilisation of Wildlife, the Department of Veterinary Services, the Forestry Commission, AGRITEX, etc.

All these departments should be associated in the debate on the Biodiversity Project proposal. The difficulty that might arise is that these organisations follow their own agenda. The Department of Veterinary Services, for instance, is about to erect a foot-and-mouth fence between the Angwa river and the border between Ward 2 and Ward 3, irrespective of the Land Use Plan proposal and of general management concerns for the whole of Lower Gurove District. The Natural Resources Department is mainly concerned about making the local people adhere to the terms of the Natural Resources Act. The Department of National Parks does not have a management plan for the communal lands of the Zambezi Valley.

In these circumstances, it seems very difficult to bring these various people (not to speak of the local community, where one might find a lot of vested interests as well) together so that they can thoroughly debate the relevance of a Land Use Plan for the Lower Gurove District, especially on the Project's proposal.

2.1.3 The political constraint

On the other hand, there is another major constraint which makes it even more difficult to come up with a broad forum for debate, whatever this forum may be. This is the political constraint. Pressure for land is considerable in Zimbabwe, and the government has not fully carried out the agrarian reform promised so vehemently during the liberation war period. The landless rural people are all investing in land reputed to be virgin and potentially favourable for agriculture. Dande, even according to the Government, is to become a pioneer front. This policy, which is both deliberate (demarcation of official plots by DDF) and lax (illegal appropriation is tolerated), gives rise to tension between the indigenous people and new arrivals.

Therefore, the land issue is a very sensitive one, especially in an area like Dande. It is politically dangerous to embark on policy making and Land Use Planning, for it will necessarily shed light upon tensions which already exist on the ground and step on someone's interests. Therefore, it might seem politically wise, in the eyes of the policy-makers whom the Project is dealing with, to favour the status quo.

It appears that Land Use Planning, which is the first priority for the Biodiversity Project, is very controversial. One might say that the Project failed, so far, to bring consensus on the necessity of carrying out such an activity. It may be considered that the Biodiversity Project did not understand how important it was to build such a consensus prior to any kind of field work. By proceeding as it did, the Project took the risk of getting marginalized. But at the same time, one can without doubt consider that the Project was, from the start, of a very controversial and political nature. Conserving natural resources in the communal lands of Zimbabwe, and doing so in its current political and economic situation, is a task which is difficult enough to achieve. By supporting a certain approach, the Biodiversity Project was to become a political actor, which obviously negated its neutrality in calling for political fora of discussion. One can thus conclude that the political difficulties that the Project is facing ensued from its own particular political nature: the Project advocates environment conservation, control and limitation of immigration, sustainable utilisation of natural resources.

2.1.4 Towards implementation?

Even if the Land Use Plan proposal becomes part of the by-laws of the District Council, political problems are likely to interfere again, especially when it comes to implementation mechanisms. As Precious Moyo and Costain Nyamuno have shown in their work³¹, there are two different procedures for land allocation in Dande, one of them being unofficial (see Figure 7A and 7B). This shows that there are mechanisms which allow land allocation to illegal settlers: those mechanisms, although illegal, are in some way socially accepted. How then can a Land Use Plan best be implemented? In this particular context of land scarcity, one sometimes gets the feeling that whatever rules and procedures are adopted officially, there will always be a socially relevant mechanism to counteract these procedures: "nulla legs sine moribus". Without social acceptance, legislation will remain ineffective and impossible to implement. One could add to this that society should be involved in the process of definition of rules, for these to be more easily accepted.

31 Precious Moyo, Costain Nyamuno; Participatory Land Use Plan, Gurove District, Ward 2. Village consultation report, July-August 1997. Biodiversity Project, 1997. Precious Moyo, Costain Nyamuno; Participatory Land Use Plan, Gurove District, Ward 4. Village consultation report, September - November 1997. Biodiversity Project, 1997.

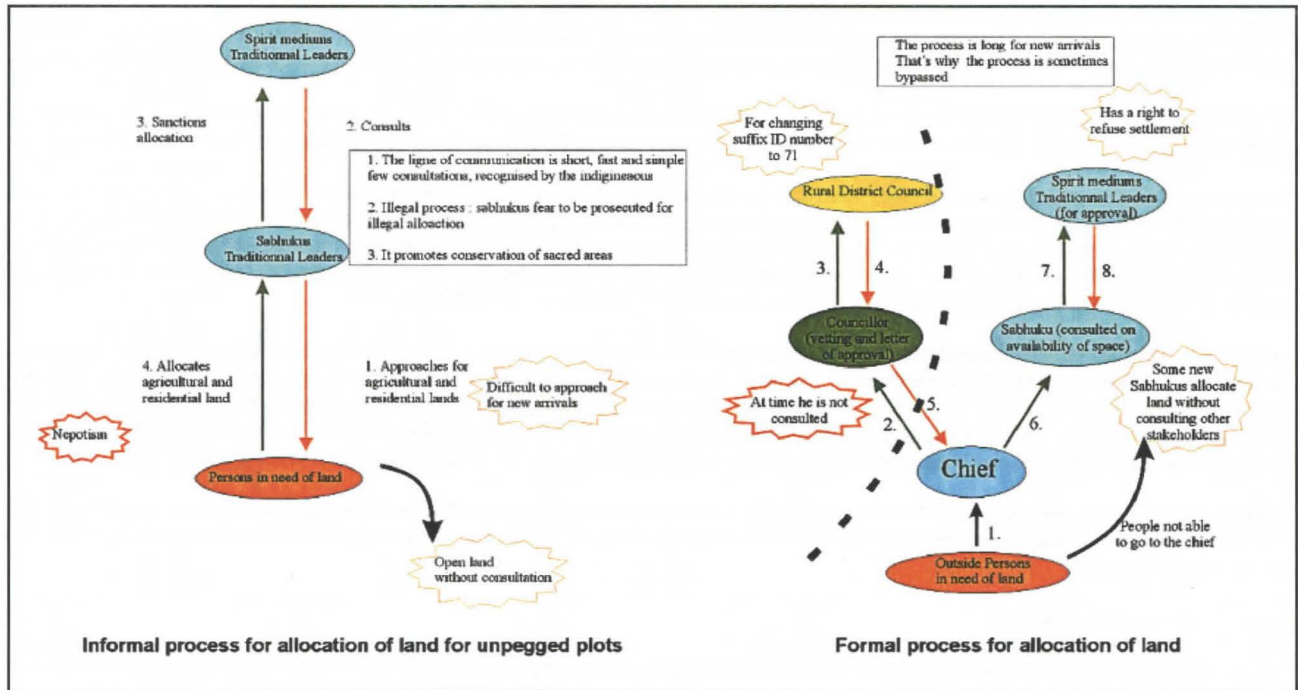


Figure 7: Informal and formal process for allocation of land in ward 2 and 4
Figure7a: Informal and formal process for allocation of land in ward 2

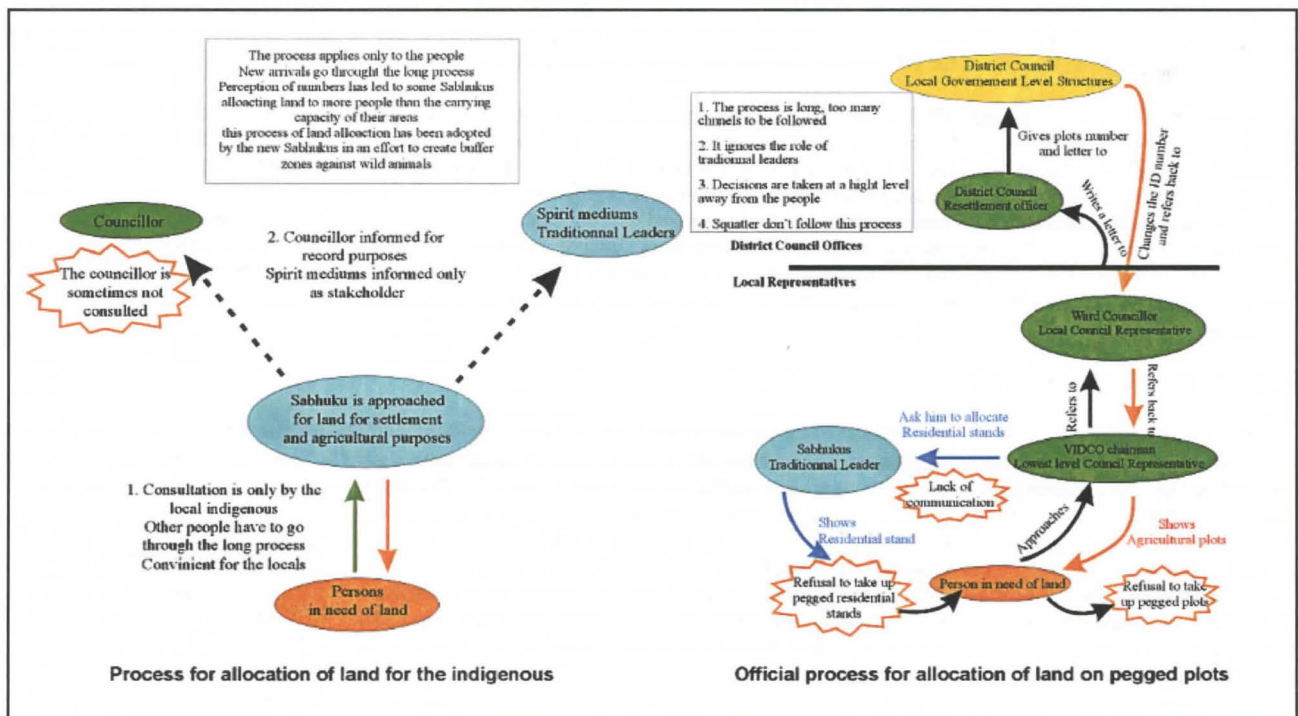


Figure7b: Informal and formal process for allocation of land in ward 4

2.2 The participatory approach: a methodological discussion

From the start, the Biodiversity Project intended to promote a participatory approach to Land Use Planning, drawing lessons from the experience of the Mid Zambezi Project and other top-down attempts towards rural planning. Instead, the Project wanted to facilitate a planning negotiation where the main actors would be the local people. As far as participatory methods were concerned, there were two assumptions which later proved to be mistaken: 1° that the Project could be a neutral facilitator. 2° that the local people could be seen as an homogeneous entity, or, at least, that it would be possible to reach consensus on the long-term interests of the "community". These are the two assumptions that we want to discuss here. We will then discuss the existence of alternative fora for conflict resolution amongst the "community".

2.2.1 Is the Project a neutral facilitator?

To start with, one can easily question the assumption that the Project could be a neutral observer or facilitator.

On the one hand, the objective of carrying out a Land Use Plan for the Zambezi Valley was part of the Project's agenda. It was defined long before the Project's bilateral agreement was signed, and before any negotiations on the Biodiversity Project's implementation with Gurube Rural District Council had started. Although it is true that the Land Use Plan programme was agreed on by the Zimbabwe government (at least in principle, but one wonders if there has ever been any consensus, or any negotiated compromise, on the planning objectives, as we pointed out above), there was no final consensus whatsoever with Gurube Rural District Council, nor with the local people³². As a matter of fact, although it happened that the local communities showed enthusiasm in undertaking the Land Use Plan "participatory" exercise³³, it is not certain that this was one of their top priorities, and whether they would have otherwise asked for it in the first place. In these circumstances, the negotiation of a Land Use Plan could hardly be participatory. The way things happened, in fact, looks pretty much like a process of convincing partners, *a posteriori*, to carry out certain actions. Once again, we feel that the Project is advocating a certain approach, a certain programme of activities, whereas local actors could be looking at the way forward in a completely different manner.

Again, this does not mean that afterwards the Project could not build partnership and trust around the activities that were to be carried out anyway. In fact, the local people understood that this was an opportunity to voice and articulate their claims on land, their discontent against the situation they found themselves in, the Council and Government policy. The Land Use Plan negotiation became a forum for discontent articulation. The fact that the Land Use Planning methodology included interviews on how local people looked at their political leadership and institutions undoubtedly helped this. According to the Moyo and Nyamuno report for Ward 2, the Land Use Plan activity was considered as "one such study that aims at extracting information from the community", but at the same time, people "were happy that they were consulted as to how they will want their villages planned [...They...] however look up to the Biodiversity Project to help them in this exercise as well as representing them at Council". Instead of being an institution attempting to get information on the community's perception of their environment and trends in terms of use of natural resources, the Biodiversity Project became, in the eyes of the local people, an institution which would voice their political demands and stand next to them in the political arena: was the Biodiversity Project able to do this? One can legitimately have one's doubts.

Thus, one can see that the Land Use Plan exercise eventually aimed at reconciling the interests of stakeholders, with the Biodiversity Project playing the role of the most interested party. That is the reason why it has been referred to from the beginning as the Land Use Plan *negotiation*.

In this negotiation process, the Biodiversity Project could not give its blessings to all suggestions and claims emanating from the ground. Although the Biodiversity Project decided not to consider whether these suggestions were legal or not (since it appears that almost every kind of land use commonly found in the Valley -such as river bank cultivation, land allocation, subsistence hunting, etc.- is illegal), leaving it to the policy makers to decide if it would be expedient or not to change the legislation (and advocating such a change at the same time), a lot of these suggestions were not necessarily in line with natural resource conservation objectives, as formulated by the Biodiversity Project. The Project participated in the debates to help the local people come up with proposals consistent with its own views.

32 The archives of the project show that the need for dialogue and coordination amongst the various stakeholders involved in Land Use Planning operations has been constantly highlighted, whether by the Project Co-ordinator or by the technical institutions working in the area. This can be seen from the Activities Report for Phase 1 (pp. 4 and 21) where the coordinator insists on the coordination aspects, and from the minutes of the first meetings (Preparatory Executive Meeting, 23-05-96, where one can read that a "meeting [that had been planned] with technical organisations, [in order to] see what has been done in the area before starting all over again") was cancelled on suggestion of the permanent secretary of the Ministry". 2nd National Steering Committee, 10-10-96, where need for coordination with AGRITEX and negotiation on the basis of existing maps and plans ["the project should combine the different plans that have been designed for this area and then discuss them with the local communities"] is highlighted, 4th National Steering Committee, where the lack of coordination with technicians and government departments clearly appears). Indeed, several meetings with Non Governmental Organisations working in the area were organised in 1996, prior to the launching of the project (cf. Appendices for Activities Report, Phase 1). In all cases, the idea of constant coordination was approved.

It is thus very surprising to see that in the course of the project, collaboration with other stakeholders, and mainly with policy-makers, was set aside. The general approach, timetable, and protocols for the Land Use Plan exercise were defined by the Biodiversity Project team, without much negotiation with the policy-makers and government departments which would later be involved in the implementation of the Land Use Plan.

It is the Biodiversity Project Team which decided to postpone the negotiation stage: "Two decisive stages were identified: consultation at the base on the present and future utilisation of land and resources, with maps produced from what the actors said, and recommendations, and negotiation using these documents with the District Council for their consideration in future plans" (Activities Report, Phase 2, p. 13).

There was no workshop organised on Land Use Planning at the National Steering Committee level, and the only meeting at Council Level was attended by very few council members (cf. Activities Report Phase 2, p. 13). Therefore, while the Biodiversity Project team was making the assumption that Council had an interest into embarking in a participatory Land Use Planning exercise (cf. "Gurube Rural District Council is in the process of reviewing its Land Use and Conservation By-laws, in a more integrative and participatory way", Working Paper, General approach for Land Use Planning, Appendix 9 to Activities Report Phase 2), the reality indicates that Council was not showing much interest in the Land Use Plan Project.

2.2.2 Is it possible to reach consensus, or else compromises, at the local level?

At the local level, societies are far from being homogeneous in Dande. Many studies have shown how complex the situation is, and have made attempts to build up typologies of different types of stakeholder³⁴. In each village, one might find different types of household strategies, with different impacts on natural resources, and different interests. Besides, these social differentiation patterns diverge according to the area. As can be seen from Figure 8, there are 3 different socio-economical situations, according to the type of constraint which affect the management of resources by the inhabitants. In Ward 2, west of the Angwa river, the MZRDP programme does not operate, and there is no Tsetse control. Therefore, people cannot keep cattle, but they are free to settle almost anywhere (pending authorisation from the Councillor). In Ward 2, east of the river, there is Tsetse control but still no intervention by MZRDP. Although this is a buffer zone in terms of the Tsetse programme, people keep cattle and clear large fields. This is an area where a lot of migrants from the high veld have settled, and they compensate poor soil conditions by extensive farming with a lot of cattle and mechanisation. These migrants have views which differ from those of indigenous farmers living along river banks. Lastly, people living in Wards 3 and 4 face a completely different situation: the MZRDP and the Tsetse programme operate at the same time: these areas host a lot of migrants, but are, at most, concerned by problems of illegal settlement. Stephanie Aubin has thoroughly analysed the kind of inextricable situation which has arisen in these areas, especially along the banks of the Manyame (see Figure 9). You might find people who have just refused to move to the residential plots pegged by AGRITEX (red hut), still living in the middle of their former fields, that is to say in the middle of what is now someone else's field (dark green hut), still growing cotton on the river bank, and newcomers who share their official plots with the former. One can easily imagine that these inhabitants all have vested interests as far as the use of land is concerned. Indeed, they have different attitudes towards the CAMPFIRE programme and natural resource management in general.

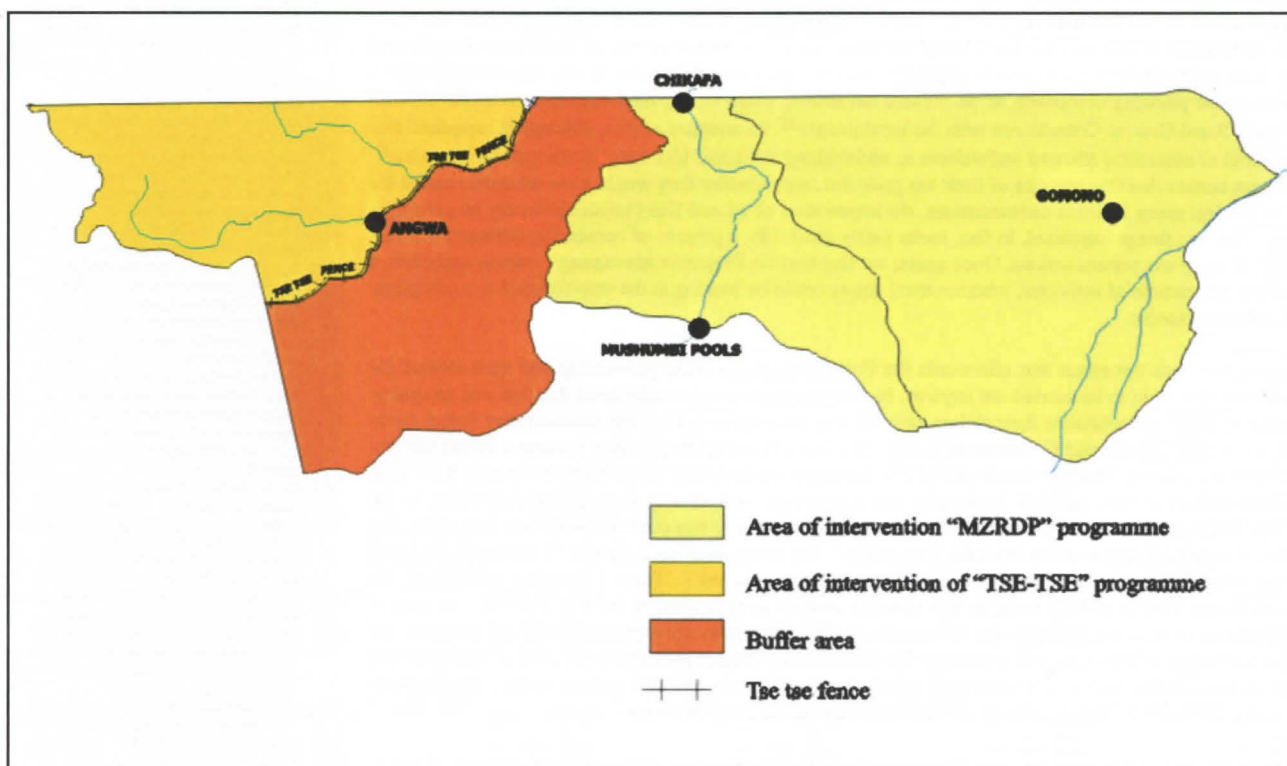


Figure 8: Major constraints (institutional frameworks?) affecting land utilisation patterns

33 Cf. reports of Precious Moyo and Costain Nyamuno, op.cit.

34 Stéphanie Aubin; De la terre, des Animaux et des Hommes. Diagnostic d'un système agraire dans la Moyenne Vallée du Zambèze, CNEARC-Biodiversity Project, Harare, 1997. V. Dzingirai, A typology of Households According to Social and Economic Strategies, Biodiversity Project, CASS, UZ, Harare, 1997.

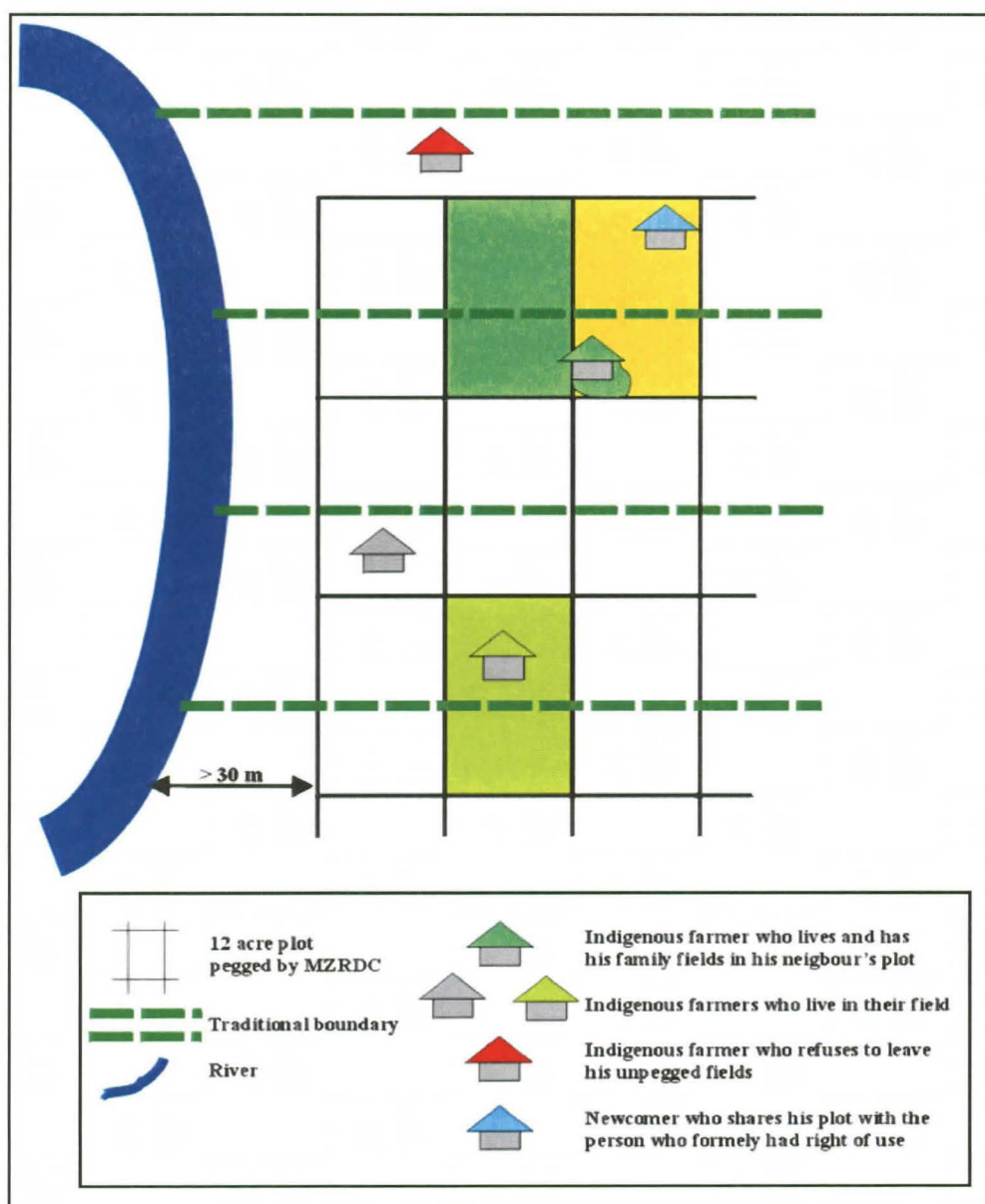


Figure 9: Diagram of present land tenure system in Nyambahwe

The fact that the Biodiversity Project did not manage to negotiate compromises amongst the various stakeholders in Ward 3 clearly illustrates the fact that various powerful vested interests can compete at local level.

In other words, the local "community" does not exist. We can say, quoting Hasler, that «local situations are often not homogeneous, static, bounded and integrated "communities"»³⁵. It can even be pointed out that these vested interests do not necessarily converge in the long run. In the first place, one should not take the long-term approach for granted: short-term interests can easily overcome long-term considerations. On the other hand, there is no unanimous understanding of what is most desirable in the long term. For each and every type of household strategy, there might be a different perception of what the future should be like. For instance, some very enterprising farmers may favour intensive and extensive agricultural use of land, whereas small-scale traditional farmers may value a broader spectrum of resources and,

³⁵ Cf. Hasler, Richard, *The cultural and political dynamics of Zimbabwean wildlife: resource use in the Zambezi Valley: a case study of Chapoto Ward*. Unpublished Dphil Thesis, University of Michigan, 1993, p. 81.

³⁶ For instance, Precious Moyo and Costain Nyamuno's report on the Participatory Land Use Plan exercise in Ward 2 does not show political struggles amongst spirit mediums for the control of certain areas, or amongst various families for the control of the chieftaincy, which later proved to be existing.

in areas where wildlife and biodiversity are abundant, strongly support long-term conservation of natural resources. While facing this kind of split amongst the community, the Project Manager cannot do other than question the limitations of the participatory approach. This is especially true if one considers that the internal struggles of the "community" do not necessarily appear during Participatory Rural Appraisal (PRA) meetings or Key Informants interviews³⁶. These are issues which normally remain below the surface, and are rather addressed in other fora.

2.2.3 *Alternative existing fora for settling internal conflicts*

It would be surprising if the PRA meetings and Land Use Plan exercise were a peaceful forum where "communities" voice violent conflicts otherwise unexpressed, or expressed in political arenas, where political solutions can be identified and positive action can be taken. Land issues are very sensitive, and someone might be reluctant to express tensions unless that person feels there will be some political benefit in so doing.

It is common knowledge, in fact, that the District Council and its local representatives are the first ones aware of this kind of struggle over land. Besides, there is another forum which has traditionally been granted powers over land: this is the Spirit Mediums institution.

The *Mhondoro* cult is still very common in Dande, and plays a role in land allocation and natural resource management. In this context, it challenges, or complements, the official authority, as Marja Spierenburg has shown in her paper *The role of the Mhondoro cult in the struggle for control over land in Dande*³⁷. The nature of the *Mhondoro* cult is to remain inaccessible to stakeholders unless the spirit (and his medium) give their consent. They retain a lot of power, up to the moment they decide to bring the tensions hidden up to then into the open.

Therefore, there exist alternative fora for negotiation and conflict resolution. These fora cannot necessarily be taken over by outsiders (such as Project staff, or even local enumerators and facilitators) but they exist and need to be incorporated in the framework of Land Use Plan negotiations.

2.2.4 *The Biodiversity Project as a political partner*

As we can see, the Biodiversity Project appears, throughout the Land Use Plan negotiation process, as a political partner. It might be interesting, therefore, to situate it in the political spectrum. Without doubt, the Biodiversity Project as a whole intended to promote development through conservation. It was not a mere conservation project, although it looked at conservation as a means to development. But, as far as the Land Use Plan was concerned, the position of the Biodiversity Project could look very much like that of the District Commissioners and Natural Resource Officers in the 30's, pleading in favour of contour ridging and destocking in the overcrowded Tribal Trust Lands. Like them, the Project does not question the way the Environment degradation problem in the Communal Lands has been created historically, through land policies (Land Apportionment Act of 1930, Lancaster House Agreement, etc.). The Project could seem, in the eyes of the local people, very conservative-minded, whereas people have to face strong economic constraints, in the context of the unsolved problem of land shortage in Communal Lands of Zimbabwe. If this is true, one can understand that local people were cautious, and, to a certain extent suspicious, in their approach towards PRA meetings and interviews.

2.3 The rationale for rural planning

Not only is it necessary, in the context of this paper, to question the assumptions and mechanisms of the participatory approach as a tool for rural development. We also have to ask ourselves about the rationale of rural planning: is "planning" a mere technique, which might be used in whatever context and by whatever type of society (which we should, so to speak, take for granted) or is it a particular rational attitude?

To plan is to take a decision for the future. As far as a whole society is concerned, planning involves policy and decision-making mechanisms. Let us look at planning from a decision-making and institutional point-of-view, at ground level (we shall leave to others, whoever they might be, the task of analysing individual rational attitudes and choices).

Drawing up a Land Use Plan is important both symbolically and practically. In the context of the Biodiversity Project, some options concerning the way a Land Use Planning exercise should be carried out have been chosen. These can be articulated at two different levels:

- delimiting a space by making simultaneous use of participatory methods and modern mapping tools (GIS maps, aerial photos);
- promoting global and sustainable technical management.

Space here becomes a positive object which can be understood as a whole. The Land Use Plan is, therefore, an ideal illustration of the management approach which the Biodiversity Project is trying to encourage.

As a result, in the case of the Project, establishing plans for land use involves both a particular type of **representation of space** (drawing maps in the Euclidean plane, for instance), and an intention to come up with **management plans**. In addition, we should remember that the act of planning means that one has the possibility to **make a choice amongst several options** which are equally possible. It is our duty here to confront these three prerequisites to land use planning with the real situation, as observed in Dande.

37 The role of the Mhondoro cult in the struggle for control over land in Dande (northern Zimbabwe) : Social Commentaries and the Influence of Adherents (CASS paper, April 1995, Harare, Zimbabwe).

2.3.1 *The representation of space: the mapping tool*

Maps can be a useful tool for planning, though not an absolutely compulsory tool, since one can imagine situations where plans are defined through a system of rules and mental representations of space. The Biodiversity Project chose to make use of maps, believing that they would facilitate the research phase (maps can show the contradictions amongst stakeholders as far as representations and utilisations of space are concerned), as well as the negotiation and implementation phases.

Therefore, in the context of the Biodiversity Project, drawing up a land use plan means first drawing maps. It is a process whereby space becomes delimited, determined, qualified, using rules which are scientifically accurate and known by any future policy maker, so that the plan can be implemented and used quickly and efficiently. A map is a codified system of representation. Undoubtedly, anyone who does not know the code might find it difficult to understand what is shown on the map. The same applies to the mapping exercise itself: one has to know the procedure to be followed if one ever wishes to produce an acceptable and recognisable map.

A lot of experience of community mapping shows that local people quickly grasp the whole idea of drawing maps, and are even able to utilise aerial photographs, ortho-photographs, and mercator maps. In other words, they can understand without major difficulties mapping protocols and representation codes. But still, that does not necessarily mean that they perceive space in this way. If one looks at the two maps which were drawn by the inhabitants of Gonono area (see Figure 5), one can see that there is a great difference between such a representation of space and the final maps produced on the basis of ortho-photographs (the inhabitants were just asked to redraw their proposed crop lands on the photograph). In these two drawings, which were made by two groups (one group of women -above-, the other of men) but which aim to show the same area (the bush land between the Kasuka and the Karembwe rivers), one might notice a lot of surprising data. In terms of Euclidean representation of space, these surprising data are inaccuracies. And yet, they are very interesting since they give information on the way some social groups perceive the environment they live in. Why is the Kasuka river perpendicular to the Karembwe in one case, parallel in the other? Why is it that a salt-collecting site appears in one case, and does not appear in the other, etc? These questions are of primary interest for whoever wishes to understand cultural and social dynamics of land use. They are interesting for social scientists, especially ethnologists. They are interesting for land use planners, in that land use planning comprises a vast research component. In that sense, the Biodiversity Project should in the future look at these drawings as a challenge to understand the community's appraisal of space and resources, and try to venture into analysis of these drawings much more than it actually did. For instance, one might venture the hypothesis (and in some cases verities) that the way local people perceive their living environment is related to the use they make of it, that is to a certain experience of their livelihood, rather than to a very abstract and artificial exercise of their minds³⁸. But even if the Biodiversity Project had done further research on the way local people appreciate space and their environment, we must keep in mind that when it comes to planning, it becomes compulsory to produce standard maps. There will always be a gap between the initial drawings of the local people and the final maps, impossible to fill, and a big loss of information. Besides, the gap between the initial drawings of the local people and the final maps shows the path towards and the need for a negotiation process to take place.

2.3.2 *Managing an environment*

What are these maps produced for? They are to become tools for dialogue amongst decision-makers. They are to be consolidated as a Land Use Plan which is binding, and will be implemented by the Appropriate Authority, i.e. the District Council. They will be the main guideline for land allocation and management of resources.

Maps will be a basic management tool, for biodiversity conservation and long-term sustainable use of resources. By so saying, we mean that the Land Use Plan exercise certainly heralds a policy promoting natural resource conservation, i.e. a global management approach, determined by a scientific diagnosis of the ecosystem, an assessment of zones which offer different types of potentials for use, and a deliberate choice to prioritise biodiversity and ecosystems conservation concerns in land utilisation. It should be pointed out that these fundamental choices, although very important in the context of a negotiated planning exercise, were not clarified and agreed on at the early stages of the Project's implementation.

What could be the position of local people regarding the Biodiversity Project objectives? As we said earlier, we do not want to embark on a discussion of individual attitudes towards land and resource use. We merely wish to state that we completely acknowledge the fact that inhabitants of the Valley have vast knowledge (what others call: Indigenous Knowledge Systems) about their resources, and that they take decisions accordingly. This kind of knowledge is part of the day-to-day experience of farmers and inhabitants of the Valley. It is empirical knowledge arrived at through many years of hypothesis testing, analysis of results, etc. Certainly, individuals in the Valley make plans and try to anticipate, as much as possible, changes in their environment.

But since the Land Use Plan is to be implemented, it may be interesting to consider the norms and collective representations determining use of land, to look at the way collective decisions are taken in matters of land utilisation.

At first sight, we shall say that there exist a plurality of norms on this matter: one just has to remember the land allocation procedures, where traditional authorities and modern administrators play the one against the other. One can say, agreeing with the analysis of Ballan, that while describing the community, "the anthropologists [...] note a plurality of interests, a plurality of norms, and lastly a plurality of legitimate policies"³⁹.

38 Cf Georges Dupré (ed.), *Savoirs Paysans*, Karthala, Paris 1995.
39 Etienne Ballan, *From participation to Conflict: participatory decision making put to the test in the Zambezi Valley*, *Proceedings of the Workshop on Social Dynamics and the Environment*, Bordeaux, 1997.

What are these policies? While agents of the modern administration (DNPWM, Department of Natural Resources, District Council) claim control over the land and their ability to manage it in an ecologically sustainable manner, there is no doubt that there exists some kind of traditional control over use of natural resources at the local level, in other words that some traditional authorities have control, to a certain extent, upon this usage. And yet, can we call this control a Natural Resource Management system? Certainly not, since traditional leaders, especially Spirit Mediums, articulate different levels of perception of nature. Spirit Mediums, and other traditional leaders, take decisions on use of natural resources according to a great number of constraints and representations of nature and human society, which they share with all members of their community. Therefore, in order to understand the thinking behind the final choices expressed by Traditional Leaders, it is necessary to investigate this system of representations, and compare it with the management approach advocated by the Project.

In this regard, one could be right in thinking that the natural resource management approach is definitely a novelty for people influenced by traditional culture, where utilisation of space is partly conditioned by ritual prohibitions. These prohibitions, transmitted through myths, reflect at times a perception of society much more than a concern for sustainable utilisation of natural resources. They are based on the concept of a nature which partially removes itself from direct control by man. Only the spirits of royal ancestors (*Mhondoro*) are fully able to intervene in what happens to natural objects. This inter-penetration between the spheres of culture and nature permits the production of norms whose real purpose, beyond the apparent objective of controlling the natural sphere, can be the organisation of society. Thus, although it is true that these norms have occasionally restricted degradation of the environment (some forests have been preserved owing to their sacred nature, for example), they are not always inspired by an ecological objective, and may even be against it. For instance, on the one hand, the annual collection of mopane worms is strictly regulated, since it is integrated within a framework of traditional rules which meet sustainable management and conservation purposes (the worms have to be harvested when they are fully mature); but on the other hand, the restrictions upon the use of *Kirkia acuminata* do not have any obvious ecological purpose (at least for the modern ecologist), since this is not the most endangered tree in the Valley. Finally, the ritual prohibitions affecting the hunting of *Manis temminckii* (vulg. Pangolin) do not aim at conserving the species: it is handed down from old Shona traditions, where consumption of this animal was restricted to the Chief (nowadays, *Mhondoro* and Spirit Mediums retain this privilege); on the contrary, hunting an elephant is a fulfilling achievement, which gives prestige to the hunter⁴⁰.

The first effect of the technical approach - whether it is included in proposals for biodiversity conservation or not - is to discredit mythical creations: hence, the fear that, in some cases, there might no longer be any firebreak against over-exploitation of nature.

What has to be borne in mind, in any case, is that traditional leadership (like any other political authority, one might say) is not only concerned about biodiversity conservation. Its task is to find a compromise between various interests and levels of perception of reality, unlike the Project which tends to prioritise biodiversity conservation concerns⁴¹. Therefore, one should be very cautious and opened-minded when incorporating traditional institutions and traditional knowledge systems into negotiations for implementation of management plans.

2.3.3 Choosing amongst various possible options?

As we were saying above, planning requires that one make a choice amongst various equally possible options. As in liberal micro-economy theory, individuals make rational choices to maximise their marginal profit. But which span of choices do they have?

There exist a number of constraints which restrict the number of possible choices. Stéphanie Aubin has shown, for instance, that the land insecurity created by the implementation of the MZRDP (where traditional settlers are threatened with eviction), leads farmers to overexploitation of resources, in an attempt to make the best living out of their land before they are moved to less fertile soils. Even in the long run, Aubin demonstrates that the extensive agricultural patterns, commonly found in the Valley, are rational choices in the context of a given number of constraints (lack of cattle and mechanisation, lack of fertilisers)⁴². In the same vein, Aubin states that, according to the situation of the Valley in terms of infrastructure, people can only get their basic daily food supply through cultivation of gardens on river banks. Both examples show that, since there are no alternative choices, river bank cultivation and overexploitation of soils are rational decisions.

Thus, one might find here another limitation of the Biodiversity Project's approach to Land Use Planning, namely that the consultations were done on the ground before any alternatives to current trends in Land Use were made available. The facilitators collected suggestions from the local people as to the areas that they wanted to set aside for future use, but the final drawings were done in Harare and incorporated the Project views as well. The overall document mentions areas for conservation of biodiversity, areas for sustainable use, etc. The whole map is supposed to be a once-and-for-all document, which will guarantee the future conservation of biodiversity. And yet, the alternative management patterns which are supposed to enforce the plan and turn it into a realistic document (sustainable use of forests and renewable energy, sustainable river cultivation, sustainable use of biodiversity and wildlife) are still either nonexistent or questioned. The Biodiversity Project is far from having achieved its Action IV (Sustainable utilisation of Biodiversity and promotion of methods of exploitation compatible with its maintenance - man-

⁴⁰ These inaccuracies show the limits of the functionalist approach in anthropology: set of rules should not only be looked at from the point of their apparent objectives, effects and results. This is true not only because contradictory rules can exist in one unique society, with contradictory results (and that different rules can lead to similar results), but also because rules are not necessarily enacted in order to meet specific functional objectives. Rules need to be looked at as systems of representations in their own right.

⁴¹ As Hasler stated concerning Local Wildlife Management: "In this regard, it is important to remember that wildlife 'management' at the local level is not simply a question of committeeing and the artificial administration and decision-making concerning revenue from safari operations. For most people, it is to do with protecting fields, building wildlife oriented granaries, huts, a dara, fences and chicken coups. It is to do with gathering herbs, foraging for tubers and wild fruits, setting snares, praying to the ancestors, witchcraft accusations, and of course, obtaining meat; all done largely for the benefit, maintenance and reproduction of oneself and one's immediate family" (op.cit., p. 284.)

⁴² Ranger has thoroughly analysed the process which led, throughout the XXth century, to extensive farming in the Tribal Trust Lands (today's communal lands); Peasant Consciousness and the Guerrilla War in Zimbabwe, Zimbabwe Publishing House, Harare, 1985.

agement methods-). Moreover, the current legislation of Zimbabwe still restricts the possibility of determining alternative uses for Natural Resources (stream bank cultivation is illegal, subsistence hunting as well -except with Bows and Arrows-, and collecting natural resources in the wild still constitutes an offence).

As a result, we can ask ourselves: is the Land Use Plan proposal ever likely to be implemented? It will require a lot of effort from the Biodiversity Project to convince local inhabitants to embark on alternative uses of natural resources (since we acknowledge the fact that inhabitants might consider that they are taking a risk, without any direct benefit) and to lobby at the highest level to bring about a change in the current legislation. Some feed-back workshops at local level are scheduled: their aim is to make the local people aware of the final Biodiversity Project proposal. Should we not say that issues of alternative use of resources should be addressed at first?

CONCLUSION

As we have seen throughout the discussion, the limitations that the Biodiversity Project has encountered while carrying out the Land Use Plan consultations are both methodological and political. It is our feeling, though, that political problems are prominent, and that methodological problems are to be addressed once a political consensus about Land Use Planning Exercise's objectives and the general means of attaining them is reached, at least at the level of policy-makers. **Generally speaking, the first task should be to trigger the political debate amongst stakeholders, around common objectives.** This is the main lesson that one can draw from the Biodiversity Project experience.

This leads to an interesting question, though. How far is an NGO or a co-operation institution supposed to go in the political arena, when supporting and advocating a certain technical solution or a certain approach and negotiation process (in this case, both) to decision-makers, that is to say, when itself acting as a political actor? This is more a question for political scientists than for agricultural technicians. Let us say it is a question for rural planners and development agents in general. The experience of the Biodiversity Project shows that, when a programme is launched without any clear political consensus, the technical institution in charge of implementing the programme becomes a political actor in its own right, and gets involved in a political struggle. In the event that it fails to organise an appropriate forum where contradictory views could be expressed, the technical institution needs to lobby for its own interests. Since it cannot achieve this task alone, it needs to build up trust and political alliance with other political forces in the country.

But then one might wonder: what kind of a political legitimacy does an NGO or a technical institution have to act in such a manner, to become a political actor? Whose interests does it represent? Political activism comes up against the problem of legitimacy. One can argue that it is both politically dangerous and unethical for a technical institution to get involved in policy-making and political struggle, particularly when this institution operates abroad.

In these circumstances, the Biodiversity Project has no other alternative than to keep all ways to negotiation open. Without expecting to bring about consensus, the Project should become a political arena itself, since it raises and articulates broad questions of common concern to all stakeholders.

THE USE OF GEOGRAPHICAL INFORMATION SYSTEMS IN AGRICULTURAL RESEARCH: A CASE STUDY

by

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The Eastern Province consists of the former Eastern Cape region, part of the old Karoo region and the former Transkei and Ciskei. Latitudes and longitudes range from 30 10' S to 34 20' S and 30 30' E to 23 50' E. Agriculturally, it is served by i.a. the Dept. of Agriculture and Land Affairs. This consists of a number of Directorates, including Research. I am in charge of the crop section of the Research Directorate.

The Province is endowed with both favourable and unfavourable characteristics. A favourable factor is our range of ecological conditions unequalled in the rest of S.A. These include:

- the high - rainfall, humid, sub - tropical Northern coastal zone.
- the cooler Southern coastal area.
- a hinterland with a high rainfall and moderate temperatures.
- somewhat drier hinterland areas, with greater temperature variations.
- the arid Karoo, with its extreme temperature variations.
- the Southern Drakensberg.

This variability, combined with some breathtaking scenery, creates a potential tourism paradise. However, there is a flip side. The Province is reportedly the poorest or second - poorest of S.A.'s provinces (depending on the moment's political expediency). The cause of this poverty is easy to find. Population pressure in what could be S.A.'s agriculturally most productive area has placed unbearable demands on natural resources. Link this to a low level of education and a highly skewed demographic distribution, and a serious social problem arises. This urgently needs to be addressed.

The Province lacks a strong industrial base. Except for tourism (which would demand massive infrastructural upgrading), prospects are poor. Social upliftment must therefore be sought elsewhere. Only agriculture can meet this need.

It is estimated that, taking linkages and non - commercial production (eg. vegetable food - plots) into account, agriculture contributes well in excess of 30% of the Province's GDP. Although the figure is almost impossible to verify, it serves to underline agriculture's significance. Only crop production can deliver a short - term social betterment. Fellow - disciplines (stock and rangeland management) are important, but will deliver tangible results only years down the line.

Politicians and technologists alike are urgently seeking a "wonder crop" to meet this social demand. A prerequisite is that it must introduce a cash economy into a previously cashless society. In the past, such wonder crops have arisen, amidst a fanfare of publicity, only to disappoint and disappear. There has always been one or other constraint attached to them.

Enter hemp (*Cannabis sativa*). This close relative of marijuana (lacking only the narcotic ingredient) is a crop of old standing in the N. Hemisphere, where it was grown mainly N of the 32nd parallel. It is a bast fibre crop and was cultivated mainly for rope, cordage and newsprint production. Social concerns, together with competition from synthetics, caused its demise. By the mid - 1960's it had all but disappeared from the USA and Canada. Currently, commercial production is focussed largely on Yugoslavia, China and India. Russia holds the world's largest hemp gene - bank at its Vavilov Institute.

Modern technology has developed a multiplicity of end - uses for hemp - some 27000 at last count. These include clothing and building materials derived from the fibre and biological insecticides extracted from the leaves. Essential oils derived from the seed make high - quality cosmetics. It can also be used as a food - crop. With all of these end - uses, hemp is potentially a profitable crop for the grower. It could also stimulate the local economy through extensive job - creation. It may, therefore, be a latter - day "wonder crop".

Previous wonder crops have largely come adrift because essential agronomic issues have not been addressed. It is heartening to see that, this time, the Research horse is correctly placed relative to the hemp industry cart. Research must generate the data which, using GIS, are used and manipulated to facilitate decision - making for a sound industry.

What do we know about hemp? As all of its development has taken place in the N. Hemisphere - and far up, at that - it is fair to assume that we will face challenges of adaptation here.

- (a) Day - length. Hemp is sensitive to day - length. For most cultivars, exposure to day - lengths below 14.5 hrs. stimulates flowering, hence reduces stalk and fibre yield. Because S.A.'s latitudes are not far S enough, our day - lengths tend to be short. The E.Province, being one of the most S of the Provinces, may prove to be adapted to some of the cultivars developed in the S parts of Europe.
- (b) Hemp requires deep, well - drained soils. The Province possesses such soils. A further requirement, for high fertility and organic matter, cannot so easily be met.
- (c) Hemp's fairly high moisture demand during its growing season is fairly simple to meet - either in the form of rainfall or irrigation.
- (d) The need for high temperatures during its growing season can be met.

If these factors are combined, we see that hemp is not ideally suited to our growing conditions. Day - length, in particular, is a constraint. This, then, poses a research challenge: to identify, or to breed from scratch, cultivars adapted to the prevailing environmental conditions. GIS will be able to identify where specific cultivars, with quantified day - length requirements, can be grown. Ultimately, it would be desirable to develop mathematical growth models to predict yields in such zones. This would be of great use to industrialists using hemp fibre as a raw material. However, such models are extremely difficult to construct and are not always accurate. An alternative approach is to collect historical zonal yield data sets and subject them to a few production factors which can be manipulated and whose effect is quantifiable. An example of this would be the effect of applied nitrogen on fibre yield and quality.

An evaluation of the data sets available to us shows that they are incomplete. In particular, there is a large chunk of Transkei where soil data sets are missing. Although a soil map of Transkei exists, it is not equipped with a legend - or if it is, the legend is missing. Even if the legend is found, there can be no guarantee that it is in accordance with standard soil classes as used in S.A. Geo - referenced verification work is required there.

Research and GIS: quo vadis? An emerging hemp industry opens the way for a collaborative research / GIS approach. Research must provide data to be converted into information within GIS. Remote sensing, to evaluate the status of a season's hemp crop and to assist in the tracking of illegal "dagga" planting, must surely play a role.

In conclusion, hemp, as a completely new crop in South Africa, presents challenges and opportunities to the GIS practitioner.

AMATOLA ZONING PROJECT

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LOCAL CONTEXT

The Amatola zoning project was conducted in 2 phases (April 1998 and July to November 1998) in the Amatola District of the Eastern Cape province in South Africa. The Amatola District is the area (approximately 30000 km²) of jurisdiction of the Amatola District Councils. It is made up of 19 Magisterial Districts.

The Amatola District could somewhat be in itself a showcase of the development challenges of the new South African democracy as it includes two very different former independent bantustans (Ciskei and Transkei) and a mainly white area, the former Border Corridor.

The main challenges facing the area are as follows:

- address the development backlog of the 2 former bantustans,
- reintegrate those two bantustans within the regional and national economy,
- implement rural development programmes addressing the poverty issue in those former bantustan areas where most of the households income is generated through welfare payments (pensions, grants) and migrant labour (remittances),
- set up some sort of wealth redistribution mechanisms between formerly white areas and the bantustans and between urban and rural areas.

In terms of planning management, the main problems facing planners in the region are the following :

- the region is undergoing rapid changes since 1994 and such dynamics have to be identified and monitored,
- there is a very strong lack of information (even basic statistics) for the former bantustans since the 1970's, there is a strong objective of participatory planning involving all stakeholders in order to break away from the top down planning approaches of the previous regime (*the Development Facilitation Act (1995) aim is to involve the local level at all stages of the development process. The latest discussion document from the National Department of Agriculture on Agricultural Policy in South Africa (1998) also stresses the need to accommodate the diversity of production in policy making*).

EVOLUTION OF THE EXPERIENCE

The initial zoning project took place in April 1998 with a focus on a limited area (only 6 Magisterial Districts). The idea of conducting such a project was brought forward after conducting various socio-economic studies in the local area of Kambashe (Bonnal P., Caron P., Laurent C., 1998). The zoning must enable a better interpretation of the results obtained in Kambashe area, by situating Kambashe in its environment, by identifying the main basis of organisation of the regional layout and the flows of money, population and products. Furthermore, highlighting the diversity of the situations allows one to envisage the validation or the adaptation to a wider area of the knowledge acquired in Kambashe, in particular the elaboration of a regional typology of households. It was first decided to test out a methodology elaborated in Brazil on six magisterial districts (Peddie, Middledrift, King William's Town/Zwelitsha, East London, Komga, Keiskammahoek). The initial survey and analysis phase involved all the people taking part in the Kambashe project (ECDALA, ARDRI, ARC, UP, INRA, CIRAD and IFAS)

As the results proved worthwhile, it was then decided to extend the study area (phase 2) to the whole of the Amatola District and to design a planning tool from the results. It was also deemed that a study of the Amatola would provide us with results that might be applicable to the Eastern Cape as a whole as this District Council, due to its central geographical position within the Province, encompasses the three main elements:

- Commercial farming areas
- The Southern and Central part of former bantustan of Ciskei
- The Western part of the former bantustan of Transkei

Training played a key role in the whole project. The use of the methodology had to be mastered by a number of people in order for such an exercise to be replicated in other areas when necessary. Therefore, two junior economists from ECDALA were included in the project team and a geography student from Fort Hare also took part in the enterprise. A junior staff from ARC's Development Impact Analysis Group also

1 ECDALA: Eastern Cape Department of Agriculture and Land Affairs, ARDRI: Agriculture and Rural Development Institute, ARC: Agricultural Research Council, INRA: Institut National de la Recherche Agronomique, UP: University of Pretoria, CIRAD: Centre International en Recherche Agronomique pour le Développement, IFAS: Institut Français d'Afrique du Sud.

joined the team for a couple of weeks. A training manual explaining the methodology used and using concrete examples from the South African case study has been made available (Lhopitalier & al., 1999).

METHODOLOGY

Background and principles

Zoning is a geographical delineation (mapping) of spatial units presenting an acceptable degree of homogeneity, according to some relevant criteria and to the scale of the analysis (Caron, 1998). The key notions are therefore:

- the identification of the diversity through homogeneous spatial units (HSU) : an area where available resources, their use and the constraints related to productive activities form an homogeneous problematic at the chosen scale,
- the use of relevant criteria to identify the diversity: synthetic variables chosen for they best reflects the diversity one wants to highlight in a given area.

It implies the existence of spatial information (statistics, local knowledge, and mental representations^{1/4}) that can be collected through a survey for instance. But zoning goes beyond data collection and representation, it also leads to data management and modelling. It relies on the principle that it is possible to commit all spatial phenomena, their states, their dynamics and their functioning, to a smaller number of elementary models. These models have an explanatory potential that goes beyond the simple graphic representation.

Thus, zoning techniques differ from mapping techniques, since they entail the combination of several variables and initial hypothesis, and they overpass a simple demarcation process. Although some mapping techniques rely on hypothesis and variable selection, zoning goes a step further in its attempt to classify and order information and in the wealth of collected information that is not available on the map itself.

Objectives and principles of a zoning based on verbal representations

The information is generally fragmented (soil, climate, demography, production volumes, health, transport networks^{1/4}) and rarely up to date. Furthermore, where censuses exist, they often deal with the description of an object in relation to administrative boundaries, which are not always relevant to understand the diversity, evolution and prospects of the rural population and agriculture.

Therefore, the choice is here to take advantage of the knowledge of local stakeholders who live and work in the area. The produced knowledge is structured from the verbal representations of stakeholders who have already unconsciously completed the essential part of the analysis of the complex situation.

The objective is to organise all available knowledge in order to produce and map all operational elements needed for rural development planning. It relies on the understanding of the social processes that determine the organisation and management of rural areas. Zoning also attempts to stimulate the participation of all rural stakeholders to the planning process by creating a dialogue around development prospects and issues.

Experience has confirmed the interest of the verbal representations of local participants, whose expert capacities prove to be very productive. It is the comparative analysis of their representations, the search for consistencies and inconsistencies between them that will enable one to generate new representations.

- The first option relies on the choice of variables that account for the diversity and the dynamics of the situation. They are not determined *a priori*, but become the object of the study. Conversely to most of the agro-ecological surveys and GIS, the variables that are not chosen *ex ante*, according to the abilities and skills of the expert in charge of the analysis.
- The second option consists in using cartographic support as the basis for dialogue and the portrayal of knowledge. It allows the persons interviewed to express themselves while referring to specific locations, material objects, geographic boundaries, etc.
- The third option is to focus on dynamics. Diversity is the focus one can easily start with. One has then to further explain diversity by taking into account forms of territorial and social organisation. Such a process is the basis for modelling rural space evolutions. Space is looked upon in its entirety and the exercise integrates the influence of different stakeholders and of exogenous phenomena and events.

It is then a matter of defining the links that exist between different HSUs : financial and demographic flows, products and labour force flows, complementarity and synergy, competition and even conflicts around the appropriation of production means, resources or markets.

Methodological steps

The zoning operation can be subdivided in various phases. Yet, in order to get the necessary consistency in the research, one must understand that zoning is an iterative process.

Phases can be defined in the following manner:

- Preparation phase,
- Interview phase,
- Analysis phase,
- Feedback phase,
- Synthesis phase.

The preparation phase

An essential aspect of the preparation, as with most research undertakings, is to prepare questions and hypothesis, that will hopefully be at least partially answered by the zoning. Once the key question to be answered and the objectives are properly defined one has to choose a target area and define it properly. There are numerous ways of choosing a target area but one should be able to properly define its boundaries, whether physical or political.

One should then also select a proper base document, generally a map, which will be the main support of interviews, analysis and synthesis. Basically the choice will be based around the following issues:

- scale of the map: the scale will depend on size of the target area. The scale should probably remain within the 1:50000 to 1:250000 range in order to provide sufficient details to conduct the interviews and to remain of a manageable size during the interviews ;
- features depicted on the map: it is preferable to have a map with a relatively important number of features such as: main and side roads, villages and their names, rivers, forest. The more features there are, the easier it will be to locate oneself during the interviews (although an excessive amount of information on the map could create a bias in the interviews) ;
- age of the map: obviously, one has to look for the most recent map available on the area. One must however be careful of name changes for administrative or political reasons that are shown on the map but have not gone into the minds of local people.

In the Amatola zoning project, the base document chosen was an assembly of the most recent 1:250000 topo-cadastral maps from the Chief Directorate of Survey. These maps depicted a number of very useful features: Magisterial District boundaries, contour lines, rivers, roads, and villages.¹⁴ However, we came to realise that a lot of villages identified on the map did not appear under their proper names.

One must then prepare the questionnaire framework or matrix that will be used during the interviews. The preparation of the questionnaire is basically choosing a set of variables that are relevant for the area and the questions one should answer. One must also define the key variables that represent best the diversity one wants to represent. The remaining variables will be there to provide additional information and to help in cross-checking the answers. One must therefore look for inter-dependant variables.

Here are the main variables that were used for the Amatola zoning project: productive activities, sources and level of income, types of farming, land tenure, land use, natural resources, demographic patterns, main employers (local and non-local), rural-urban linkages, local services, infrastructure, marketing system, political system, external interventions, main problems, perspectives, projects. The main variables (i.e. : the variables we deemed relevant to highlight the diversity) were productive activities and sources of income.

The whole preparation relies on a preliminary knowledge and understanding of the area that has to be tackled. That knowledge does not have to be extensive, however one must have some idea of what is happening in the area. The collection of secondary data is crucial and could prove very useful at a later stage. Flicking to available reports and informal discussions with people conducting research or living and working in the area can be of valuable help.

The interview phase

Zoning based on verbal representations is supposed to be a «lightweight» operation. One has therefore to carefully plan interviews in order not to waste time and energy in conducting the interviews. These considerations obviously depend on the size of the area one has to cover and the type of questions that have to be answered.

Ideally, one should try to work through some form of organisation when setting up the interviews. The choice must be made according to the objectives of the research. A degree of legitimacy should also be sought. Such organisation could be:

- local authority,
- farmers association,
- community organisation.

Such organisation will be able to motivate the community around the research and to centralise everything, especially in areas where means of communications are poor or non-existent.

One must then concentrate on the sampling of interviewees. Key aspects are as follow:

- a wide socio-economic diversity,

- a wide gender and age diversity,
 - a selection of key people (i.e. people that have a good knowledge of the area one is covering through their activities).
- The size of the sample obviously depends on the means in terms of manpower one has. However, one should not go below five interviews per area for the sake of diversity and to enable the subsequent comparative analysis.

During the Amatola zoning project, it was decided to organise the interviews through the Transitional Representative Councils (local government structures at the Magisterial district level). They would mobilise the communities and organise people to come for a meeting with us for interviews. Depending on the number of people present, we would either conduct individual interviews or group interviews.

Practically, the interviewee will be placed in front of the base map, a sheet of tracing paper will then be placed over that base map in order to draw with a lead pencil the spatial units identified by the interviewee.

An essential aspect of the interview is the initial step of getting people acquainted with the support map. One has to make sure that the interviewee has understood the map and is able to locate his environment and other features on the map before carrying on. A good way of doing so is showing:

- the main roads,
- the rivers,
- the towns and villages,
- main relief features

and then asking the interviewee to locate his village on the map. It is also important to define with him his «area of knowledge» (i.e.: the area, he is confident with and not necessarily the whole study area).

The following step is the interview itself. One must rely on the key variable to get the interviewee to draw on the tracing paper the different spatial units within the chosen area. One must then gather from the interviewee the main elements that differentiate one unit from the other.

One must then gather information from each defined unit and place it in the matrix. It is a tedious operation and, with a bit of skill and experience, one can conduct the drawing of the map and the filling of the matrix in a simultaneous manner. An interview should not last more than two and half-hours as the interviewee interest and concentration drop. Before concluding the interview, one must also get the interviewee to conduct a self-criticism of its draft map. Are the units truly different or homogeneous? Could some units be merged or other units be sub-divided? The information gathered in the matrix will be very helpful for assisting the interviewee in his self-criticism. Each interview will provide one map and one matrix.

At the end of the interviews, we come up with numerous maps giving a diversified picture of the target area.

The diversity analysis phase: comparative analysis of the different interview maps

The maps must then be combined in order to obtain a synthetic map, based on the comparative analysis of the different interview maps and giving a clue to the questions raised before the start of the exercise and bringing us closer to the objectives set by the zoning. This synthetic map is therefore based:

- on the comparative analysis of the interviewees verbal representations of their environment but also
- on the researchers' hypothesis and analysis of that area, bringing in the analysis of secondary information available on the area.

Practically, each interviewer should present his interview map to the other interviewers, briefly describing all the spatial units that were identified during the interview. Once everyone has a clear picture of everybody else's map, it is possible to start overlapping the maps and look for consistencies between the different maps.

The idea is to start with units that match across different maps. A basic rule is to put more trust in a map that contains more information than the others (possibly more units) did. A constant reference to the accompanying matrices will also be of precious help.

The main problems likely to arise during this phase are the following :

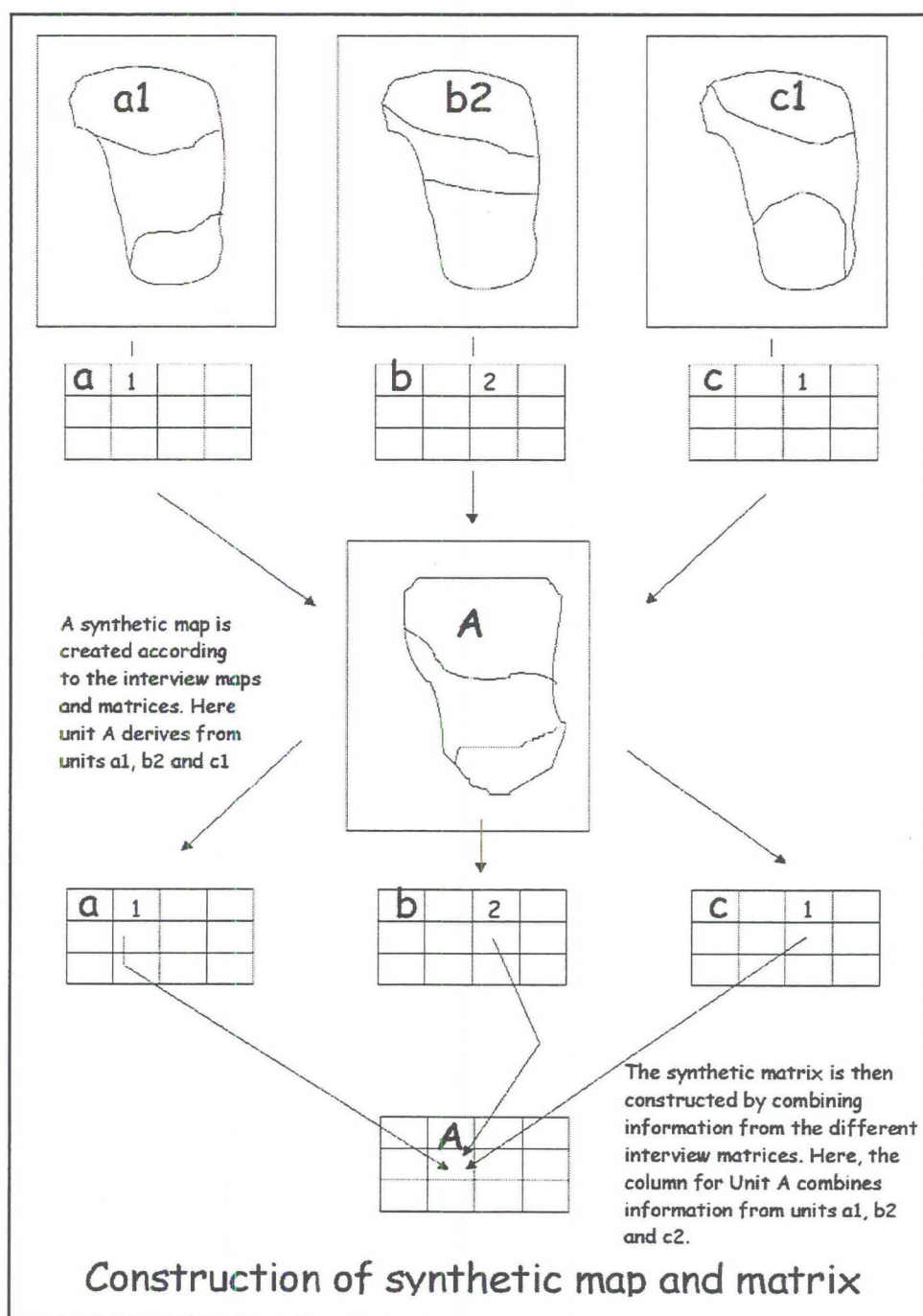
- some areas have not been covered by interviews
- maps contradict each other
- units are similar from one map to the other but the boundaries do not overlap

In that case, the only solution is to resort to further interviews. As it has been said before, one should always rely more heavily on the maps that offer more information. Otherwise, some contradictions can easily be solved through the use of the matrix, the checking of inconsistencies

and the reliance on secondary data (field observations, reports, land use maps etc.). Further interviews could also prove useful. The main idea around the construction of the synthetic map is to look for a set of explanatory variables that define each area and differentiate it from neighbouring

ones. These variables can often be used to redraw the boundaries from maps, matrices and secondary data.

Once a consensus has been reached over the synthetic map, it is time to prepare the corresponding synthetic matrix. The process is quite similar to the building of the synthetic map. The new units of the synthetic map correspond generally to a combination of units from the interview maps. One must therefore combine the information from within each interview matrix into the synthetic matrix. For instance, if synthetic unit A refers to the interview units a1, b2, c2, d4 and e1a (i.e. : HSU 1 from interview a, HSU 2 from interview b etc.), then



the information from those various columns of the respective matrices must be combined into the column of unit A in the synthetic matrix. One will soon find out that information is lacking for some variables or that information is contradictory between interviews. A lot of it can be solved by applying further hypothesis (to be validated during the feedback phase), checking for consistencies and exploiting the available secondary data.

The phase ends up with a synthetic map and its corresponding matrix. The product is often very different from the initial interview maps as researchers have done a lot of interpretation. Furthermore, information might still be missing and some contradictions cannot be resolved during that phase. A validation phase is therefore necessary in order to get the community's approval of the product, to correct inconsistencies and to gather any missing information.

The validation phase: feedback, field observations, random interviews and secondary data

The feedback aspect of this phase is very similar to a participatory workshop. It is very important to stress to the respondents that this not «their» map but a combination of maps analysed through a researcher eye. Their full criticism must be encouraged. Any missing information must be obtained during that phase and any inconsistencies removed.

Practically, it involves organising a further workshop with the communities. Ideally, one should be able to gather once again the people that were already interviewed and also other people that were not able to join the interview session but could give a different insight into the study area.

Confronting the collected and analysed verbal representations with other sources of information (landscape, reports, statistics, and aerial photographs) is crucial. Such sources can provide further information, especially quantitative information that is often lacking from the interviews. They can also solve the problem of conflicting statements. However secondary information is often lacking or outdated in areas where zoning exercises are supposed to be held. The most reliable external sources often remain landscape reading and on-the-spot interviews which enables us to verify a lot of sayings.

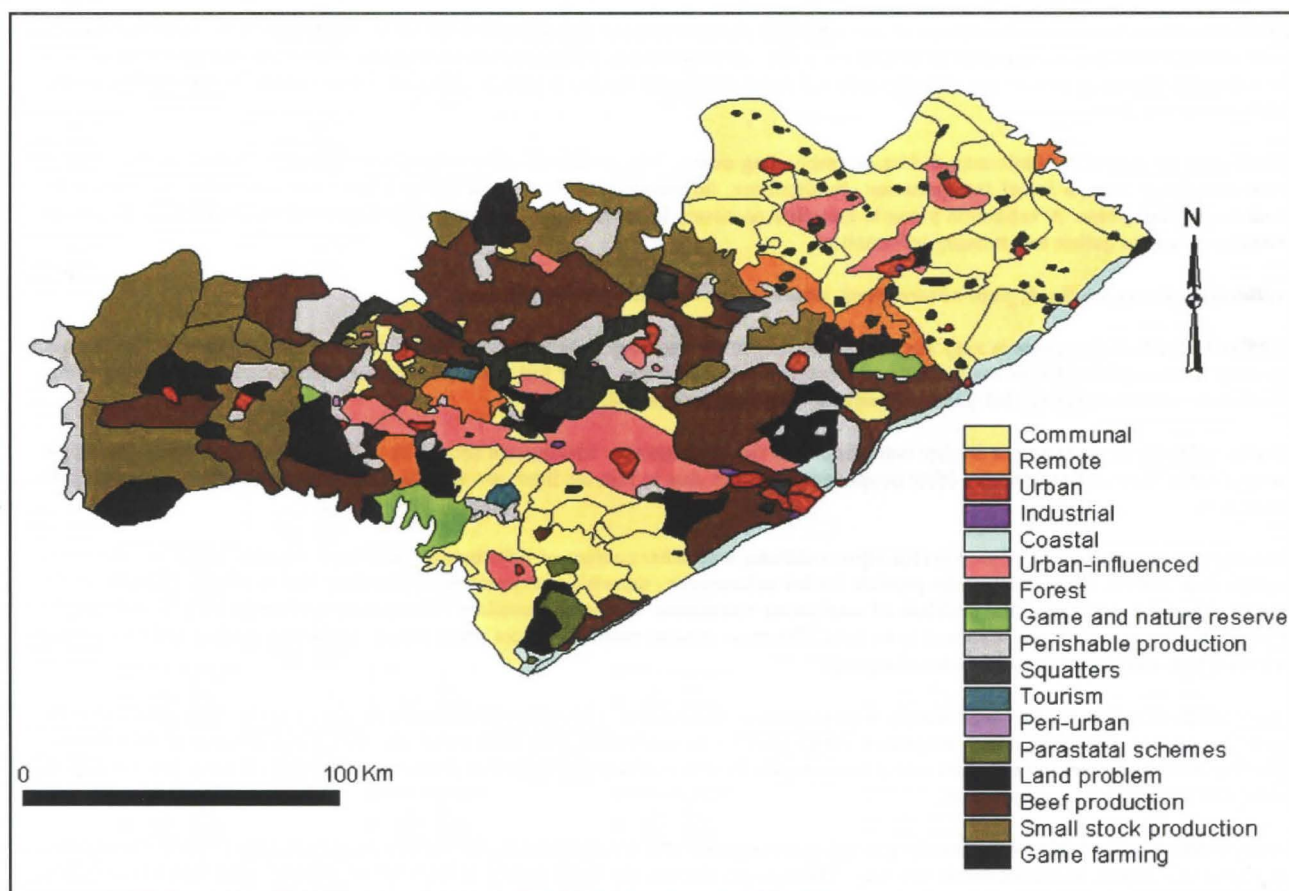
One must understand that one has dealt mainly with subjective information. That subjectivity has to be taken into account and dealt with. It cannot be ignored. However, those subjective views have to be confronted with each other and with other sources of information. Confronting those collected and analysed verbal representations with secondary information (landscape, reports, statistics, and aerial photographs) can further reduce subjectivity.

This confrontation will enable us to identify general characteristics that are common to the various subjective views. Some characteristics or statements cannot be reconciled in any way. These contradictions are also a source of information in itself. One then has to understand why stakeholders are offering contradictory views (what are their objectives, their strategies ?/4). Further interviews, dealing more specifically with those unreconcilable points can assist us in dealing with such issues.

The analysis of the historical construction of such a reality and its dynamics is made possible by the picture of diversity the zoning provides us with. One should then try to build a model of spatial organisation by identifying the basic elements of the diversity and the main relationship between HSU (flows) and putting them into perspective.

The zoning operation can be applied, time and resources permitting, to large areas. The idea is to subdivide that target area into smaller areas where the steps mentioned above can be implemented into each of those sub-areas. However, one has to make sure that sub-areas overlap, albeit marginally. It will enable one to look for consistencies between interviews.

Once one gets a number of maps for each area, one must then overlap them and combine them into a big map covering the whole of the target area. Problems very similar to those arising during the analysis phase are likely to surface. They must be dealt with in a similar way.



A summary of results: the diversity of rural situations in the Amatola district

Urban areas

Urban areas do not fall all under one single category; there is a striking hierarchy of urban centres:

The City: East London. East London is the main urban centre in the Amatola District. It is endowed with all services and industries normally available in major urban centres. It is the only river port in the country and also acts as a very powerful magnet structuring the spatial and economic organisation of the region.

Major towns: King William's Town and Butterworth. These two towns boast an impressive range of industries and services but do not have the influence of East London on the spatial and economic organisation of the region.

King William's Town is in fact part of an urban sprawl linking it with East London through numerous townships and peri-urban areas (Zwelitsha, Mdantsane etc.). Butterworth is the major urban centre of the eastern part of the district. **Agricultural centres:** Fort Beaufort, Adelaide, Bedford, Cathcart, Stutterheim, Idutywa and Komga. These towns offer all the essential range of services of urban centres and the act as structuring elements within their close rural surroundings.

Minor towns: Alice, Peddie and Nqamakwe. Such centres do not offer the range of services of the above but still have a great influence on their surroundings.

Administrative centres or trading posts: Keiskammahoe, Middledrift, Balfour, Seymour, Tsomo, Centani and Willowvale. Remains of a colonial administration, these centres have never enjoyed the development of other centres, either because of the lack of infrastructure development or because of the closeness of a more attractive centre.

Townships exist around most towns but, apart from Mdantsane and Zwelitsha that are becoming urban centres of their own, they have not been considered separate areas as they are strongly integrated to urban areas, because of economic and demographic patterns.

Industrial areas

Industrial areas are neighbouring East London (West Bank and Fort Jackson), King William's Town, Zwelitsha, Berlin, Dimbaza and Butterworth. These areas have developed considerably between 1980 and 1994 in or around the former bantustans, due to fiscal advantages and to subsidies granted to industries in order to promote employment. The effect of the end of apartheid was that this financial support stopped and a drop in the economic activity has been felt with a lot of industries closing down or relocating in other parts of the country.

"Grey" areas

By "grey" areas, we refer to informal settlements spreading around a number of towns, mainly urban centres situated in the former bantustans. Such areas have been identified around the towns of Alice, Idutywa, Nqamakwe and Butterworth. Such settlements are the result of migration of people from the neighbouring rural areas or even from people who used to live within the town but can no longer afford the housing rents. Generally, such settlements have been established on commonage or municipal land.

Peri-Urban areas

The concept of peri-urban areas is a key element for the understanding of spatial dynamics within the District. These are areas that have very often been mentioned during the interviews and frequently referred to as 'urban-influenced areas'. The definition is quite straightforward and highlights the impact of urban centres on the surrounding rural hinterland. These areas have been defined as the ones from which people can commute daily to an urban centre. They appear as spatial rings around urban centres and along the main roads. Welfare payments and wages are the main sources of income for such areas. We are in fact facing a rural population with urban living patterns. Such areas are partly a result of Betterment policies, which created 'closer settlement schemes', and partly a result of the collapse of the rural economy. Not all villages enclosed in the peri-urban ring are former closer settlement schemes.

Communal areas

The main issue in characterising such areas is obviously the land tenure issue. These areas are characterised by the absence (apart from some few isolated areas of freehold or quitrent tenure) of private ownership of land assets and therefore by the existence of communal management of most productive resources (Lasbennes, 1998). Unfortunately, the past tweaking (especially through Betterment Planning policies) of such communal management systems has had a dire impact on the productive base of such areas (De Wet, 1995).

"Communal areas" is a generic term that conceals a wealth of diversity that the zoning has attempted to highlight and characterise. Initially most interviewees would say « everything is the same, employment is rife and pensions are the main sources of income ». However, it turned out that communal areas were extremely diversified and that understanding this diversity was a key aspect in designing proper development plans. Such areas can therefore be sub-divided according to the main productive activities being pursued:

Urban influenced communal areas:

Such areas have been previously described under the peri-urban areas section.

Tourism influenced communal areas:

Such areas are located along the coastline and around the mountain resorts of Hogsback and Katberg areas. The nearby presence of tourism based activities close to such communal areas seems to stimulate a number of local initiatives (arts and crafts) and to offer employment opportunities within such areas.

A peculiar type of area can be found in the Southern part of the Middledrift district. A famous priestess resides in that area and people from all over the country come and visit her. A thriving accommodation business has developed within that area due to the influx of pilgrims.

Remote communal areas:

Some areas were qualified "remote" during the interviews. Obviously the concept of remoteness varies from one area of the District to the other. In the former Ciskei area, parts of the Victoria East district and the Amatola Basin were qualified as remote, the reason being that transport to and from those areas was scarce. However in the former Transkei area, some areas deemed remote can be objectively qualified so as transport infrastructure is totally absent from such areas and people from such areas have to travel by foot for long periods to access the transport network and its related opportunities.

Communal areas with livestock and crop production:

Such areas are further subdivided on the map according to the main production system (cattle, goat, sheep, mixed livestock, and crop^{1/4}). There will not be a thorough description for each of them. The choice of production system is largely related to the ecological conditions within each area. What must be highlighted here is the fact that, although agricultural activities still occupy space, they play a marginal role in most households' income.

State support services are close to non-existent in many areas, fencing is highly degraded and there does not seem to be much livestock management being practised. Most crop production only takes place in residential gardens and there is very little marketing of production.

Commercial farms area

Commercial farming areas also show a great diversity. They differ from the communal areas for their land tenure system is of the freehold type. It therefore offers a great tenure security and the land assets can also be used as collateral to obtain loans for investing in agriculture activities. The main criterion in order to highlight such diversity is the choice of production systems being set up by farmers.

Perishable products production

Such farms are specialised in the production of perishable products (dairy products, vegetables and fruits) destined for the urban markets. These holdings are generally taking advantage of their geographical situation:

- They are often situated in the vicinity of towns or major road networks
- They are also close to sources of water for irrigation purposes

However, some patches of perishable production do not respond to such geographical criteria:

in the Adelaide district, a remote valley in the Northern part of the District takes advantage of excellent agronomic conditions and niche markets to specialise in vegetable and fruit (strawberries) production ; in the Cathcart district, a number of remote farms (i.e. : accessible only by dirt roads) have turned to dairy production. This is due to a reorganising of the dairy sector : Bonnita was keen on extending its dairy production and has therefore approached farmers situated in good agronomic settings for dairy production and offered them incentives to switch to dairy production. It has therefore extended its collection zone to what would seem to be uneconomic areas (because of the costs for storage and transport).

Vegetable production in those districts bordering the former Transkei is also geared towards the huge market that Transkei represents. Traders from Transkei come directly to such farms and collect the goods for the Transkei market.

The irrigated production of citrus is mostly concentrated in the Fort Beaufort and Adelaide districts. It is included in a highly integrated commodity chain with the Kat Co-op and the Outspan export structure in Port Elizabeth. It is interesting to note the creation of a second private co-op in Fort Beaufort by a group of farmers. Furthermore, a group of less than 20 formerly disadvantaged farmers who have inherited Ulimocor farms are still expecting a settlement of their land tenure situation in order to secure the necessary funding for the upgrading and expansion of their activities.

Beef production

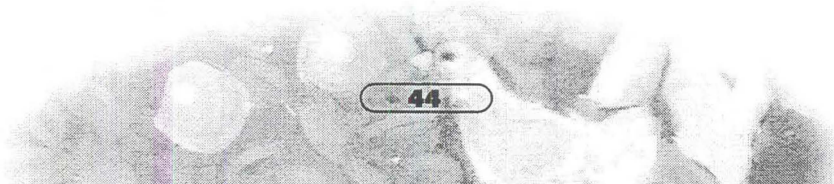
A great number of commercial farms are geared towards the production of beef meat. These are generally situated in areas where the carrying capacity remains good (4-6 ha / LSU), mainly due to sufficient rainfall. Meat is either sold to:

- Abattoirs
- Butchers
- Traders who organise stockfairs

An interesting fact is that such farmers generally buy a number of cattle from the communal areas, mainly through traders and especially during winter and drought period when cattle can be acquired at low prices from communal farmers.

Small stock production

Small stock production occupies the lower rainfall portions of commercial farming districts. The main productions are merino sheep and angora goats although a number of farms also produce meat, mainly for the communal areas market. Wool is marketed through BKB in Port Elizabeth. Most of these farms, especially those close to the communal areas or to the main roads are suffering from stock theft.



Game farms

Game farming is rapidly expanding throughout the commercial farms of the Amatola District. This rapid expansion is mainly linked to two factors:

- the prevalence and increase in stock theft;
- the uncertainty regarding the prices of domestic animals.

Farmers do not switch outright to game farming, it is generally initiated as a sideline activity because of huge capital investment necessary for setting up a game farming venture (fencing costs, building of accommodation). Therefore, game farming ventures are often the result of a grouping of neighbouring farmers into a conservancy scheme whereby each farmer commits piece of land to the conservancy and shares the cost and benefits of his participation according to its share of land given to the conservancy scheme.

Forests

For most, State forests are found in the districts neighbouring the Amatola Range, along the former Transkei coastline and in the Naqmakwe and Tsomo districts and were mostly owned by the former bantustans. They are either "natural" or planted forests. With regard to "natural" forests, inhabitants from neighbouring villages collect firewood from them and send their cattle there for grazing. With regard to planted forests, the locals can be employed as foresters, a situation that has become increasingly rare since 1994.

Tensions between communities and forestry operators are often tense as communities would like to become more involved in the management of forestry. A number of incidents around the Hogsback forest are a reminder of such claims.

The number of sawmills in the area has considerably diminished. The only remaining major sawmill can be found in Stutterheim and provides employment to communities from as far as the Keiskammahoek district. A private sawmill has been set up in the Mpofu district.

Nature reserves and game reserves

The development of touristic activities in this area is limited due to its remoteness and difficulty of access.

Parastatal land

The main issue revolves around the disposal and transfer of the former bantustans agricultural assets (from Ulimocor and Tracor). Unfortunately, the process is not yet finalised and pressures from neighbouring communities around such state assets are mounting. The main assets are:

- the pineapple production farms in the Peddie district ;
- the irrigation schemes along the Fish and Keiskamma Rivers;
- the citrus farms along the Upper Kat Valley.

Land related problem areas

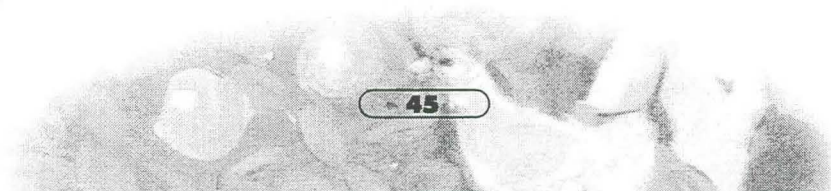
There are a number of areas where land-related issues were seen as the main problem. The issue is that of tenure and land ownership. Most of these areas are situated within what used to be "Released areas", that is land that was retroceded to the homelands. Part of the land was turned into trust tenure to accommodate the displaced and former farmworkers, the rest of the land was either leased or sold to wealthy individuals with connections within the bantustans administrations (Lhopitalier, 1998).

Therefore, land related tensions are very strong between the overpopulated villages and the absentee landlords.

Coastal areas

Due to its particular agro-ecological setting and the tourism potential, the coastal area stands apart as a given area. It can be roughly subdivided into two separate areas:

- the Western Coastal areas that stretches to the West of East London, towards Port Elizabeth along the R56. They include perishable production farms, holiday resorts (especially the Mpekweni Sun) and communal areas benefiting from employment in the tourism sector, income opportunities through the marketing of arts and craft and finally accessibility of urban centres through the presence of a coastal major road ;



- the Eastern Coastal area, stretching from East London through the Transkei Wild Coast. The main difference with the Western area is the absence of coastal road and poor accessibility. In the former Transkei area, tensions are rife between communities and private holiday resorts operators regarding the sharing of tourism benefits. Environmental degradation of the coastline is also a concern.

It is also quite surprising to witness the lack of utilisation of marine resources through fishing or related activities along the coastline, except in the form of casual leisure fishing.

A spatial model for the Amatola District

Our hypothesis is that the Amatola District area can be broken down into three separate sub-systems:

- an urban biased sub-system revolving around East London,
- an agriculture based sub-system in the commercial areas (Border Region, Fort Beaufort, Adelaide and Bedford districts),
- a rural sub-system revolving around Butterworth in the western part of former Transkei.

The East London magnet

The highly urbanised network of towns and townships spanning from East London to King William's Town along the N2 stretches its influence to most rural areas of the former Ciskei.

The whole system relies on two fragile pillars:

- the industrial and services activities of the East London-King William's Town area.
- the huge provincial administration providing civil servants jobs and economic opportunities through various tenders.

The relative wealth of this area acts as a very strong magnet for the whole region as people thrive to reap a little benefit and income from this pole of activity. This obviously has a strong impact on migration patterns as people leave the rural areas to seek a better life in urban centres.

Rural areas of the former Ciskei are not producing any agricultural surpluses. A consumption orientated and income transfer (welfare pay-outs, civil servants salaries and remittances) based economy runs most of these areas. The productive base of such rural areas (mainly agriculture) has mostly disappeared, the little income generating activities, apart from a few agricultural success stories, are centred around the channelling of funds coming from outside (services and trade) and the transport (taxi) industry essential in a smooth running of the whole economic system (assisting migration patterns and the provision of consumption goods).

The crisis in commercial areas

The loose network of rural towns and their rural hinterland in what used to be the former Republic of South Africa is showing clear signs of a mounting crisis. Most of these towns are suffering from a degradation of town services. Numerous businesses are leaving such towns or downsizing their activities. Most of these towns used to benefit from the thriving surrounding rural activities. Money earned on the commercial farms would be reinvested in such urban centres before. New priorities (upgrading of townships) and limited funding have put such towns in a state of jeopardy.

Surrounding commercial farms are suffering from:

- the restructuring of the agricultural sector (marketing boards and co-operatives) which makes profits harder to come by;
- the downsizing of State support services (especially the maintenance of by-roads leading to the farms);
- increased insecurity in the form of stock theft and farm attacks.

A lot of such farms are now very hard to sell, especially those bordering the former bantustans. Most farmers are attempting to diversify production in numerous ways:

- most are abandoning small stock production due to stock theft;
- those neighbouring the former bantustans are engaging in vegetable farming (cabbages, potatoes etc.) to cater for the huge markets that those densely populated areas represent;
- a number of them are attempting to start up game farming ventures.

The building of a rural network in Transkei

Although Transkei is often referred to as a crisis area, the recent dynamics highlighted during the project show a trend in endogenous development triggered by the upgrading of infrastructures. It would appear that the Eastern part of Transkei is undergoing a more spatially balanced development than, for instance, the East London area.

The trading business is thriving and major businesses from Butterworth are now opening branches in the neighbouring towns. The trade and marketing sectors are thriving with the recent development of improved transport infrastructure.

Compared to the former Ciskei's rural areas, it appears clearly that agricultural activities are still playing an essential role in the region's livelihoods. We can also witness embryos of commodity chains being set up, especially around the wool growing areas.

The flows between sub-systems

There are strong linkages between the commercial farming areas (especially Cathcart, Stutterheim and Komga magisterial districts) and the former Transkei. Transkei is proving to be a very lucrative markets for cash crops (especially cabbages) being grown on the commercial farms. The marketing can take place in the following ways:

- either the farmer travels to Butterworth to deliver the goods,
- or traders from Transkei travel to the farms to collect the fresh produce.

Animal production is also a sector where exchanges are strong, during drought periods (especially winter), commercial farmers will drive up to Transkei to purchase cattle from the communal areas at low prices and then raise them on their excess grazing camps. Likewise, traders from Transkei will come and buy cattle and small stock from the commercial farmers.

The commercial farming areas are also very much focused towards the urban centres of East London and King William's Town. There is a weekly agricultural market in King William's Town and a number of agro-industries in East London (dairy, tomato packing factory¹⁴) that provide a number of marketing channels for fresh produce. Animal production is either geared towards the monopolistic butcheries of East London or are sold live to farmers of Free State. A number of livestock farmers double themselves as agents who buy and sell stock, this sideline is proving to be a very lucrative activity.

THE USE AND LIMITS OF ZONING RESULTS

Interest

The interest of the zoning process is to highlight spatial dynamics through the identification of spatial diversity. It is also a very powerful tool in order to organise heterogeneous spatial information through a process of identification, collection and analysis of spatial data, especially in areas on which raw information is not available.

Finally, it is a cheap and rapid method and its participatory approach is also very appealing for local development projects.

Possible uses

One must understand the inherent instability of the final map. As the map tries to record ongoing development processes and dynamics, it is likely to be outdated by the time it is completed. The situation on the ground is very likely to evolve very quickly. Furthermore, the map relies heavily on qualitative and sometimes incomplete data.

The map must be seen above all as a tool to stimulate discussion and debate around development issues. It is not a direct tool for planning and should not be used as such. The map is more like a toolbox for raising and answering questions. One asks a question and lets the map provide elements to answer it. If one want to stress a particular point, the map can present it nicely. The possibility of producing numerous different maps picturing the same studied reality is there to stimulate debate and avoid a technocratic style of planning.

The raw map is only a tool. It can then be used to design dozens of other maps, each of them giving a new, different picture of the area one has covered.

For instance, in the Amatola zoning operation, a map was produced with the following idea: how to cut across the former boundaries of apartheid that are still so present? Drawing a map with land tenure as the main feature that would have basically shown us the historical boundaries between the former Republic and the former bantustans. On the contrary, the idea was to be able to think of development opportunities with an holistic vision of the Amatola district. We therefore decided to concentrate on the main productive activities within the district (bearing in mind the fact that in most communal areas, these activities are not the main source of income as most of the income is being drawn from external sources). We then came across new areas that would include both communal and commercial farming land but shared similar activities, albeit on a different scale. Such a map can assist in thinking of how to integrate small-scale farmers into, for instance, the wool industry by extending the wool collection area.

In order to try and keep the dynamic aspect of the map, it is a sound idea to look for indicators of change throughout the operation. Such indicators will prevent one from conducting the whole operation again in order to update the map.

Identifying such indicators turns the map into a very powerful tool. It can then be used for prospective purposes and modelling. By using those indicators, one can follow-up changes and dynamics within the area and start feeding ongoing planning processes with a scenario approach.

- what impact will a new road have on the area ?
- what impact will a new crop introduction have on the rural economy ?
- is it wise to undertake a new administrative demarcation ?

Linking up zoning within common « mainstream » tools such as Geographic Information Systems can then give a forecasting aspect to the whole planning process. Taking into account current dynamics will enable the anticipation of change on the ground.

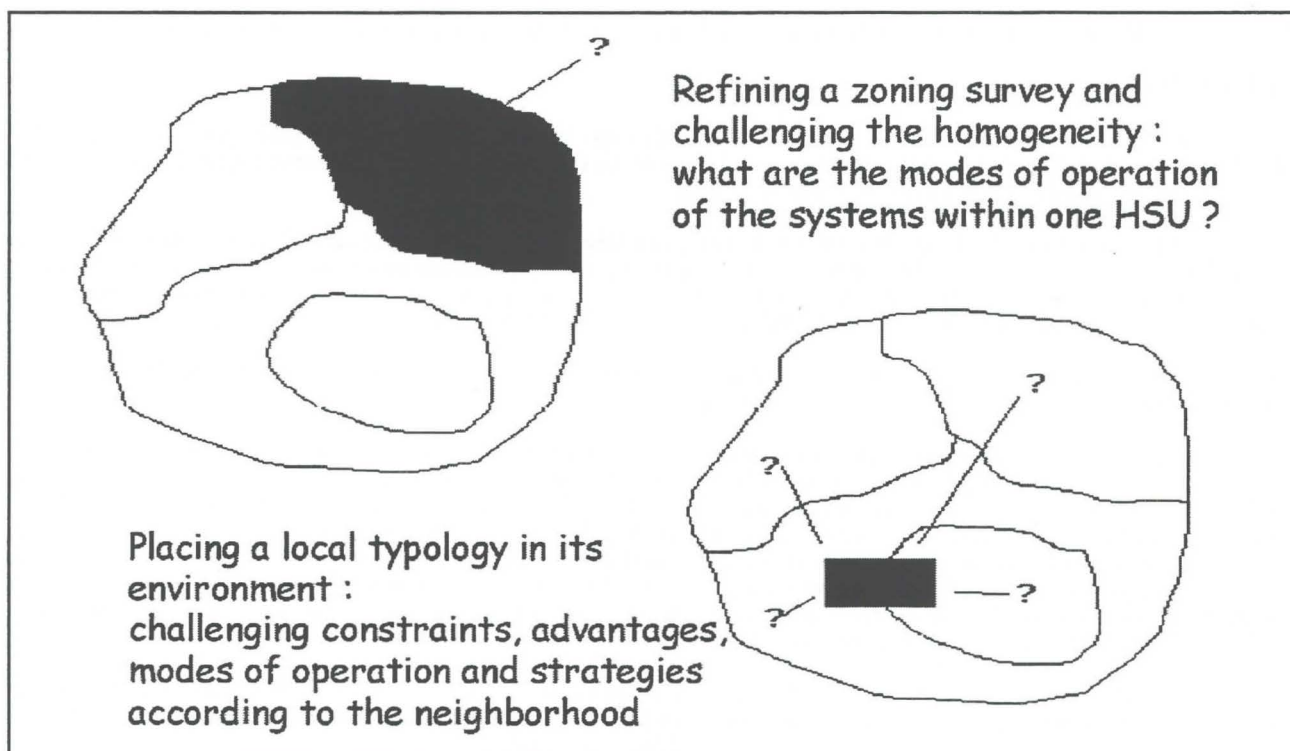
Connection between zoning and other survey techniques

One can put forward that most of the objectives and outcomes of zoning studies are also expected from farm / household typologies, for instance. However, the procedures and the scales are different. Even though zoning procedures often cover larger areas than typological studies, the size of the studied area is not the main and only criteria to differentiate them. Typological studies try to find out consistencies in farms' operation and attempt to group them as reasonably homogeneous groups, mostly according to strategic, technical and economic criteria. Whereas, zoning attempt to find out consistencies in land use patterns and activities. It usually relies on the agrarian system level.

In some areas, the short distance variability can be more important than the long distance variability. For instance, the differences in farms' operation and peasants' strategies within an agrarian system can be more marked than the differences and transitions between agrarian systems at region level. It can be then wise to rely on typologies.

It can be interesting for instance to carry out a typological study within a HSU, previously defined through a zoning process. Conversely, a zoning procedure may include an area previously studied through a typology, in order to locate this area in its environment, by identifying the agrarian systems' patterns and the flows of people, money, products at the region level.

These techniques appear to be complementary to each other.



Inherent limits

The main limit of the zoning exercise is most probably its relative independence from natural resources related information. In the case of the Amatola zoning project, it was partly a deliberate choice by the research team as it was deemed that political, economic and social engineering and interventions had had the most important impact in terms of the spatial organisation of the area.

Another limit is linked to the nature of the whole exercise: its inherent subjectivity. The zoning offers one's perceptions of interviewees' perceptions and nothing else. It is therefore very important to carefully select the interviewees and to be able to gauge each interviewee position and background when confronting it with others. However this limit can also be seen as the strength underlying the whole zoning process. Zoning is about representations. Through a rigorous methodology described previously, the researcher equipped with his own set of hypothesis, analyses, compares and validates various representations of a given areas in order to design and create a new representation of that given area.

Another aspect is the nature of information that is collected. We are only identifying surfaces whereas space is also composed of lines (roads, rivers⁴) and points (clinics, shops, villages⁴). Furthermore, such surfaces or areas are not always defined according to a similar criterion (although various other variables are characterised within the matrix of a given Homogeneous Spatial Unit). For instance, in the Amatola zoning, some areas were delimited according to the prevalence of a given stock type (i.e. cattle) while other areas were delimited according to a functional aspect, the accessibility of urban centres (although there might well be cattle in those urban biased areas). Zoning characterises a number of homogeneous spatial units. However, it only manages to identify and highlight various networks within and between those spatial units.

Regarding the limits between spatial units, one must understand that they are not necessarily precise and should not always be relied on. Obtaining accurate limits would be a very time-consuming and expensive process and is not the objective of the exercise.

The term homogeneous refers to the specific criterion selected to demarcate one spatial unit from the others. However, it still conceals the social differentiation with that unit and the spatial heterogeneity at a bigger scale (built-up areas, grazing areas, arable plots etc.). In the Amatola zoning, areas referred as irrigation schemes are wider than the scheme itself. They encompass all villages that benefit in one way or the other from the scheme, some villages might benefit more from the schemes than others might and, very probably, part of the population within those villages is not involved at all on the scheme.

A further limit is the fact that we are prisoners of the initial framework of spatial units. We will not be able to subdivide those spatial units but we will however be able to interpolate, aggregate and merge them according to various questions and hypothesis.

FURTHER RESEARCH

The scope for further research based on the zoning results is very wide. As it has been mentioned previously, zoning is a base, a framework to highlight networks. Our hypothesis for further research relies on the existence of such interdependent networks that we classify in the following manner:

- Household level network
- Extended Family network
- Resource management network
- "Commercial" network (products, goods, and workforce etc.)
- Civic action network
- A shift of scale towards local case studies within previously identified Homogeneous Spatial Units will be necessary in order to understand the organisation of such networks.

A return to District Council's scale will then put those networks back into perspective. We will then focus on the evolution, creation and dismantling of those networks in a post-apartheid context.

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LAND AND LAND REFORM NEEDS IN PERI-URBAN COMMUNITIES

SOME PERCEPTIONS AND REALITIES OBSERVED DURING RECENT LAND REFORM AND LIVELIHOODS RESEARCH OF EIGHT LOCALITIES IN THE EASTERN DISTRICT OF THE NORTH-WEST PROVINCE

by

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INTRODUCTION

The Eastern district, comprising the magisterial districts of Brits (former Transvaal), Odi I and Moretele (former Bophuthatswana) has an area of roughly 6 000 km² (6% of land area of North-West Province), but carries one third (approximately 1,1 million) of the province's population. This population is scattered across some 40 settlements ranging from small and relatively remote villages with populations of around 1 000 to 5 000 people such as Thlolwe, Jonathan and Kwarriekraal to the sprawling peri-urban concentrations adjoining Brits and forming a crescent along the north-western edges of the Greater Pretoria Metropolitan area. These include "towns" such as Jericho, Maboloka, Modderspruit and Stinkwater with populations from 1 500 to 15 000 households. (The very large settlements of Winterveld, Mabopane, Garankuwa and Themba/Hammanskraal were excluded from the research).

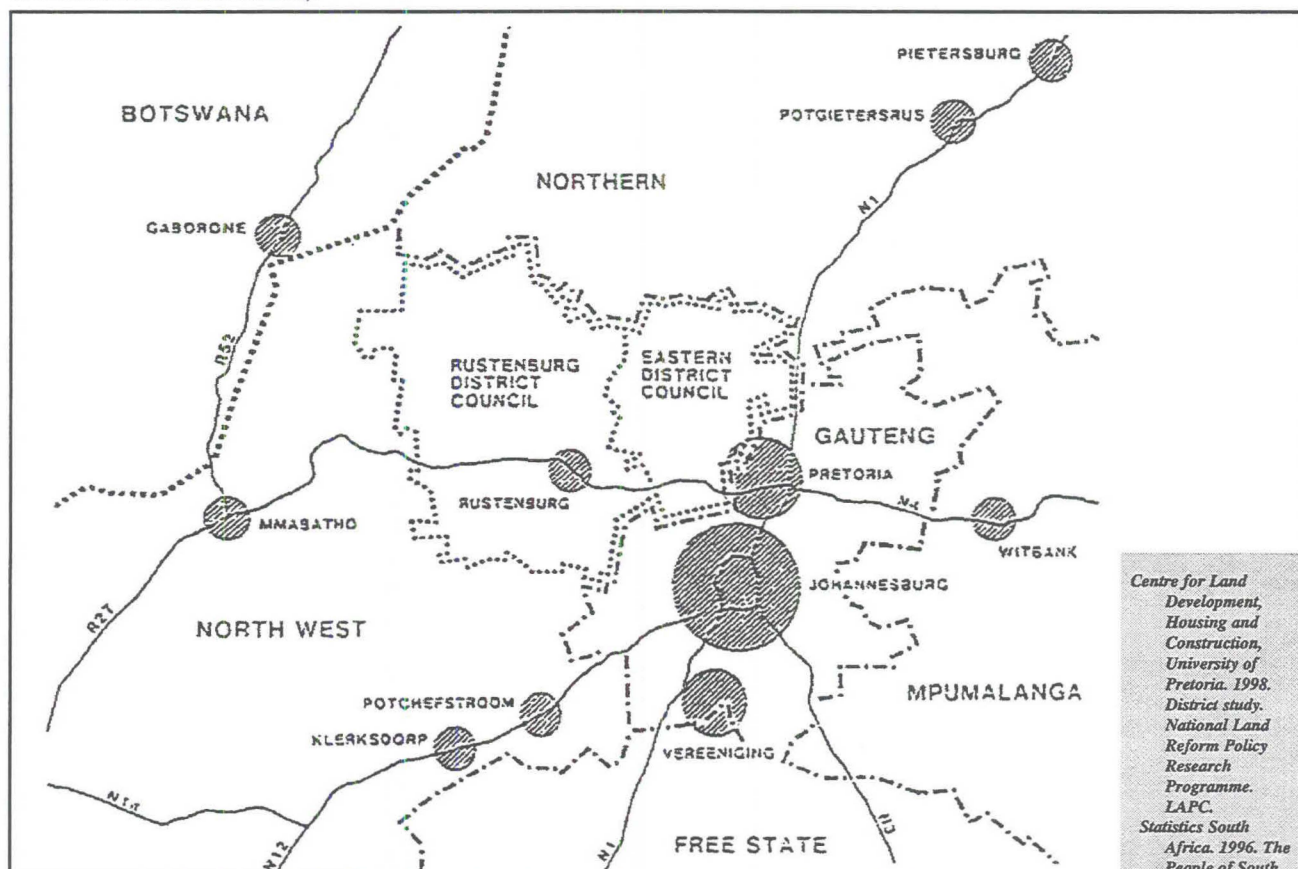


Figure 1: Eastern District, North-West Province: Regional context with acknowledgement to Africon/Plan Associates

Observations from the above-mentioned research suggest that the land tenure situation in the district is complex, with only 29% of respondents in a household survey of 236 families claiming to hold registered title, but 71% firmly believing they "own" their land nonetheless, and only 3% perceiving a problem with long term security of tenure.

Our research combined a number of studies (base-line, PRA, key-informant interview and mapping, household survey and anthropological participant observation) and it soon became clear, perhaps not unsurprisingly, that the overriding factors guiding peoples' decisions and aspirations with regard to land acquisition and settlement are based on sound economic and "value for money" considerations linked to quality of life. In the survey only 15% of respondents said that they had to budget anything for cost of accommodation, 54% said they settled here because they could find living space, 81% believed it was possible to make a living where they were through home business and 79% had no desire to leave to go to the city. The anthropological study confirmed the above through intimate observation of life-style, consumption patterns and extensive ongoing investment in housing and improvement of properties, whether held in formal title or some other form of permission to occupy.

Despite the above positive indications, there is an expressed need for formalisation of land rights and transactions, some conflict exists around overlapping rights, and vulnerable groups such as long-term "tenants" and women do face potential threats to their security of tenure.

KEY RESULTS FROM THE HOUSEHOLD SURVEY

The survey focused particularly on the following topics:

- demographic features
- quality of life
- development and land reform

The survey was conducted by way of a comprehensive questionnaire. The questionnaire comprised both structured and open-ended questions. A first draft was tested on a small sample of respondents and refined before proper application on the sampled population. The sample represented eight localities:

- Kwarriekraal
- Maboloka
- Majakaneng
- Modderspruit
- Moeka
- Mothutlung
- Stinkwater
- Thlolwe

In total 236 questionnaires were completed successfully. The questionnaires were completed by way of an interview between 13 trained and experienced fieldworkers and a representative of the selected households. Households were selected on the basis of a structured-random sampling technique with the full co-operation of community leaders.

The respondents included both males (35%) and females (65%). The age of the respondents vary between 16 years and 89 years with an average age of 40 years.

The following are experts from the tabulated results of the survey, selected to represent some key indicators of perceptions and realities around settlement dynamics and land issues in the localities surveyed:

HOW LONG FAMILIES HAVE BEEN LIVING HERE				
YEARS LIVING WHERE THEY ARE NOW n = 236				
0 - 1 15%	2 - 5 18%	6 - 15 18%	16 - 30 36%	30 + 13%
Average = 16 years				

The majority of families (67%) are living where they are at present for more than 6 years. On average families are at their present locations for 16 years.

WHERE FAMILIES LIVED BEFORE THEY CAME HERE

LOCATION OF PREVIOUS RESIDENCE n = 236										
1	2	3	4	5	6	7	8	9	10	11
5%	4%	7%	10%	6%	28%	16%	12%	6%	2%	4%
1	Greater Johannesburg				6	Other Black villages in the region				
2	Greater Pretoria				7	Black rural parts of the region				
3	Brits town and townships				8	Big Black towns in the region				
4	White-owned farms				9	Another site in the same village				
5	Big town or city outside the region (not Johannesburg or Pretoria)				10	Rural outside the region				
					11	Another country				

Before settling where they are at present a significant proportion of families (28%) resided in other Black villages in the region as well as in the Black rural parts of the region (16%). Twelve percent relocated to the present site from big Black towns in the region and 10% relocated from White-owned farms. A large proportion of families resettled here from formal cities and towns in the former White-controlled areas: 5% from Johannesburg, 4% from Pretoria, 7% from Brits and 6% from other cities and towns outside the region. Only 2% came from rural areas outside the region and 4% originate from foreign countries.

WHY FAMILIES SETTLED HERE

REASONS FOR SETTLING HERE n = 236							
1	2	3	4	5	6	7	8
5%	10%	4%	4%	47%	7%	9%	14%
1	Evicted by the former government			5	Could find living space here		
2	Evicted by white farmers			6	We liked it here		
3	To escape crime and cost of living in the big cities and towns			7	Kinship relations		
4	To escape deprivation in deep rural areas			8	To find work		

The majority of families relate the reasons why they originally settled at present localities to the availability of space to settle, to find work, because they liked it here, and because of kinship relations. Only 15% ascribe their present location to evictions and only 8% tried to escape either conditions in the deep rural areas or in the cities and formal towns.

EXPENDITURE ON SPECIFIED ITEMS

Item	Indicating no expenditure	n = 236 Total number of families Families spending	Average expenditure R/month
Accommodation	85%	5	32
Electricity	42%	52	94
Water	35%	19	29
Food and household necessities	-	357	

The most important deduction is that accommodation is cheap and only 15% of families have to budget for accommodation at an average rate of R32 per month. Food, household necessities, furniture, appliances, transport, clothing and electricity are the most important items on the family budget. Theoretically, the average family spend R969 per month on the items included in the table.

HOUSE: BUILT BY ...

BUILDER OF THE HOUSE n = 236		
State 5%	Previous owner(s) 9%	This household 86%

HOUSE: SIZE

NUMBER OF ROOMS IN THE HOUSE n = 236				
1 3%	2 9%	3 - 4 32%	5 - 9 52%	10+ 4%
Average number of rooms per house = 5				

HOUSE: ALTERATIONS

DOES THIS FAMILY PLAN TO ... n = 236			
1 8%	2 22%	3 29%	4 41%
1	Improve the house	3	Build a new house
2	Extend the house	4	The house is complete, like it as it is

A total of 41% of households are happy with their houses as it is whilst 30% want to improve or extend it and 29% want to build a new house.

BETTER LIVING

IS IT TRUE THAT FAMILIES CAN HAVE BIGGER AND BETTER HOUSES HERE THAN IN THE FORMAL TOWNS? n = 236		
Uncertain/no opinion 23%		
Yes 53%		No 24%
Reasons in order of priority		Reasons in order of priority
1	More land and bigger plots	No pattern emerged that explains this view. Not a single respondent indicated land insecurity as a factor
2	Cheaper living in general	
3	Cheaper to build	
4	Cheaper land	
5	No building restrictions	

A total of 53% of the respondents are certain that living conditions is better here than in the bigger formal towns. The main reasons are the availability of land and cheaper living in general.

RESETTLING

DO PEOPLE WANT TO STAY HERE OR MOVE ELSEWHERE? n = 1531 persons		
Stay here 79%	Move elsewhere 7%	Uncertain 14%

According to the respondents almost 80% of people in their households want to stay here where they are rather than moving to the bigger cities and towns. Those who want to stay represent all generations. Those who want to move (7%) are predominantly of the generation 20 - 49 years (59%) and the younger generation (37%). Only 12% in this group clearly express the intention to move to metropolitan areas.

PRIORITISING OF WANTS

WOULD THIS FAMILY LIKE TO ... n = 236		
Want	Yes	No / less important
Get a subsidised RDP house	28%	72%
Buy a bigger and better house	5%	95%
Get land to build an own house	10%	90%
Rent accommodation	1%	99%
Rent private land and build a house	1%	99%
Get extra land for farming	11%	89%
Get extra land for gardening and crop cultivation	2%	98%
Get extra land for business	13%	87%
Buy your own farm	2%	98%
Get old land back	3%	97%

From the above it can be deduced that other forms of development are secondary to employment and basic services. Only 28% of families express a particular need to build a new house with the RDP housing grant. The need for land for business purposes are considered more important as the need for agricultural land. Although 11% show some interest in land for agricultural purposes only 2% want an own farm. Hence, the keeping of stock and crop cultivation are perceived as supplementary small scale activities rather than ways as to sustain life.

LAND RIGHTS: THE LAND

DOES THIS FAMILY LIVE ON ...				
1	2	3	4	5
17%	71%	1%	3%	8%
1 Rented land		4 Tribal land		
2 Owned land				
3 Community property		5 Other forms of occupational rights		
Seventy-one percent of families view the land they occupy as their owned land.				

PROPERTY RIGHTS: THE HOUSE

DOES THIS FAMILY ... n = 236		
Rent this house	Own this house	Other
4%	92%	4%

Ninety-two percent of families perceive the house they occupy as their property.

RENTING OF LAND AND HOUSE

From the group (n = 40) indicating that their families rent the land on which they stay 82% provided further detailed information. Land is rented from landowners (51%), the government (20%), other tenants (11%) and tribal authorities (9%). The average period of this rental agreement is 13 years. A total of 67% honour the rental agreement while 33% acknowledge that they no longer pay rent, on average for 7 years. The main reasons for not paying rent are: refusal to pay (60%) and landowners not requiring rent any more (30%).

PROPERTY OWNERSHIP

Seventy one percent of the 236 households claim ownership to their land. Twenty nine percent base their claim on possession of registered title and deed, a further 51% possess a receipt, three percent base their claim on a verbal agreement and as many as 17% base their claim on the occupation of the land and other reasons.

PROBLEMS WITH LAND OWNERSHIP

WHAT PROBLEMS DO YOU HAVE WITH YOUR RIGHTS OF LAND?		
Open ended question		
1	Proof of ownership	21%
2	No ownership	7%
3	No problem	65%
4	No problem yet	3%
5	Lost documents	1%
6	Lack of long term security	21%

Almost 70% of respondents have no problems or no immediate problems with their land rights. Twenty-one percent perceive the lack of proof of ownership as a problem and only 3% are troubled about the lack of long term security.

PREFERRED TYPE OF LAND OWNERSHIP

PREFERRED TYPE OF LAND OWNERSHIP n = 236			
1 47%	2 38%	3 12%	4 2%
1 Stay as it is		3 Communal ownership	
2 Private/individual ownership			
4 Other			

Almost 50% of respondents are not troubled by existing arrangements with regard to land ownership. Another 38% prefer private or individual ownership as to communal ownership (13%).

WHO SHOULD ALLOCATE LAND

On the open ended question as to who should allocate land for settlement 66% trust the government with this task, 19% entrust it to tribal authorities, 5% to the Civics and 5% to SANCO.

KNOWLEDGE ABOUT THE LAND REFORM PROGRAMME

KNOWLEDGE ABOUT THE GOVERNMENT LAND REFORM PROGRAMME n = 236		
Informed 14%	Uninformed 74%	Misinformed 12%

Surprisingly, 74% of respondents are completely uninformed about the government's land reform programme. The standard answer is 'I don't know anything about it'. Another 13% are misinformed and almost without exception associate land reform with the RDP subsidised housing scheme. Only 14% of respondents have some knowledge about the programme. The informed basically perceive land reform as a mechanism 'to get people their land back'.

INTEREST IN AGRICULTURE

Although 51% of respondent believe that families could make a living from gardening and crop cultivation it is not a major enterprise in the communities. It is by and large (81%) a private rather than a co-operative venture. Only four out of 236 families indicated that they make any income from crop cultivation. Produce is for own use.

Only 17% indicate an interest in commercial stock farming. Of this group (n = 41) 64% believe that it could take place here; 92% consider it as

a private/individual possibility; and the majority have taken no action apart from entertaining the idea. The biggest constraint is perceived to be lack of water (20%) and only 12% consider land shortages as a problem.

INTEREST IN BUSINESS

In contrast to the relative lack of interest in farming activities 81% of respondents believe that it is possible to make a living through home businesses because they believe that the market and buying power exists. Few respondents (25%) object to the mixing of home businesses and residential functions in the same area.

KEY OBSERVATIONS AND INTERPRETATIONS FROM THE PARTICIPATORY RURAL APPRAISAL (PRA)

The PRA was conducted for the Centre by The Rural Action Committee (TRAC) in four of the eight localities, namely GaMoeka, Maboloka, Majakaneng and Modderspruit. The main objectives were:

1. To investigate local perceptions on *inter alia* the following issues:
 - Land needs and aspirations;
 - Existing tenure arrangements and future tenure aspirations;
 - Local level understanding of land reform policies and processes; and
 - Current and envisaged roles for local and external role-players.
2. To analyse the information gathered through this process to identify problem areas and opportunities in the implementation of land reform.
3. To assess the existing capacity and future capacity needs at local level to drive land reform processes.

Key land reform and development issues

• Land Tenure Issues

Tenure aspirations differ between and within communities, and includes a desire for:

- A clear set of autonomous rights over their individual land allocations while maintaining a more communal community-orientated system of administration.
- Support for a more individualised tenure system.

Recommendations

- There is a lack of information on the various tenure options which are available. The tenure reform process should provide an opportunity for residents to explore the tenure options and alternatives, as well as the implications of these systems - the weight of community controls, the right to alienate and lease land rights in the case of freehold, etc.
- When communal resources are few and when land rights are relatively individualised, it may be appropriate for land rights to be converted to individual freehold over time.
- It would be important given the size of the settlements to look at formal sub-division into smaller, more manageable portions, or the creation of a number of local-level administrative units for the management of rights at the micro-level.

• Tenants and other Vulnerable Interest Groups

Tenants' status differ depending on whether they are in the minority or majority.

- In some communities, tenants are largely invisible and extremely hard to reach. Their tenure aspirations have not yet been established. The solutions pursued by tenants may be relatively diverse - an upgrade where people are now, the purchase of land for settlement, and secured tenancy agreements or contracts.

Recommendations

- Where tenants are in the majority, rights to the land which they currently occupy and use must be secured.
- Land Administration and Tenure Security
- Land transactions in most of the communities are informal which leaves buyers extremely vulnerable to dispossession.
- This problem cannot be resolved until the tenure systems have been formalised and people's rights have been secured. The system of land administration will, however, need to provide security in land transactions, also determined by the proximity and appropriateness of the reg-

istration system; clear and agreed upon systems and procedures; effective, accessible dispute resolution mechanisms amongst other aspects.

Recommendations

- An appropriate decentralised system of land administration, which is adequately resourced, provides certainty to rights holders and underpins tenure security.
- *Individual Rights*
 - Emphasis on the rights of individuals (especially women) within households.
 - Rights of both the husband and wife (or co-habitants) should be registered regardless of the tenure system.
 - Land rights should be held by both the husband and wife.
 - Women should be included on the title deed/list of buyers.

Recommendations

- Rights should be held under family title, i.e. that the names of all immediate family members should be registered to protect their interests.
- Family title is regarded as an important registration option.
- Inheritance practices undermine women's interests in land and leave women extremely vulnerable. They should be changed.

• *Tenure Reform Process*

- Emphasis on seeking negotiated solutions through a well designed and appropriately resourced process. The process is not a technical one - while there may be need for certain technical skills (surveying, engineering, research, etc.), quality facilitation, mediation and gender skills occupy centre stage.

Recommendations

- A key element in the tenure reform process is information dissemination on protective legislation, grants, policy and different tenure and development options.

• *Sectional/Micro-level Interest*

- Population in the various communities are extremely large: Modderspruit - 18 000 people (1996) and Majakaneng - 2 000 to 3 000 households.
- In such large settlements it would be extremely difficult to find sustainable tenure solutions at the macro-level.

Recommendations

- Extremely diverse communities micro-units will need to be drawn with which facilitators can engage around tenure aspirations and development needs.

• *Tenure Problems derail Development*

- Until land tenure and administration problems are resolved in three of the four communities, development will be undermined due to: conflict regarding the administration of the settlement, conflict between landowners and tenants, confusion regarding the jurisdiction of the different local authorities or structures, uncoordinated interventions by government departments and conflict between the different stakeholder groups.

• *Land Needs*

- Land is needed for settlement purposes across all four communities in order to alleviate overcrowded conditions.
- Problems related to uneven stand sizes also need to be addressed.
- Variable rates could be levied depending on the size of plots should physical standardisation not be possible.
- Land is also urgently needed for other social services and facilities.
- Development and land-use planning in the various communities will need to consider development needs and reserve land accordingly.
- The need for land for ploughing and grazing was identified by different interest groups: local government could be encouraged to purchase grazing commonage using the DLA grants.

Recommendations

- Once vulnerable residential interests have been secured, development planning may enable more attention to the creation of sustainable livelihood in the settlement.

• *Land Administration*

- Land administration: "the operationalisation of land tenure, i.e. the systems which are needed to provide support to and enable sustainable,

equitable land tenure". Land administration would include functions such as land-use and fiscal controls, registration, monitoring, enforcement and dispute resolution.

- A diverse range of land administration options will need to be pursued in the four localities under study.

Recommendations

- Land administration functions could be performed at the local (community) and district (beyond the boundaries of individual communities) level. The different land administration functions which must be performed should be identified and a decision made as to where to locate the performance of these functions.
- *Service Delivery and Administration*
 - In GaMoeke, CPA Constitution has empowered the CPA to perform a broad range of development functions resulting in confusion regarding the respective responsibilities of the CPA (a newly established structure) and the local SANCO structure (which traditionally has performed many of these development functions).
 - The property, held under the CPA, is privately owned and a broad range of development duties will need to be performed by the CPA or another development structure.
 - The consequences of establishing a system of communal tenure under freehold ownership: the rights are privatised, as is the responsibility to deliver and maintain services.
 - The EDC has suggested that they would support a titling process in dense peri-urban settlements in the North-West Province. The revenue base of the EDC is limited by the large rural areas under its administration; a process of titling will expand the revenue base of the Council.

Recommendations

- Options for service delivery and administration are determined by the tenure system and also by the capacity of local government. Under a freehold system (with a dense peri-urban layout, for example), development administration demands are high. At what level should development be administered? It may be appropriate to consider small, local-level administrative units which complement the work of local government.
- *Local-level Institutions*
 - Large number of community-level structures performing civic, developmental, social support and other functions.
 - In many of the communities, institutional relations are characterised by conflict arising from overlapping functions.

Recommendations

- An organisational analysis should be undertaken leading to the co-ordination of functions, capacity-building and possibly also the rationalisation of structures where this is considered necessary.
- *Integrated Land Reform and Development*
 - Need for an integrated, developmental approach to land reform.
 - Need to explore further what people's (in particular, those who are most vulnerable and poor) development aspirations are.
 - The local economic development options and possibilities in these areas should also be investigated as part of the land reform process.
 - Need to pursue an integrated approach at the planning level.
 - Need for some flexibility in how criteria are applied to assess the sustainability of proposed land reform initiatives. It may be appropriate to assess the sustainability of proposed land reform in a community across a number of projects (not just those initiated by the DLA), including the purchase of commonage by local government.
 - Broader strategic questions regarding the sustainability of dense peri-urban settlements in the former homeland areas. Land reform (including tenure upgrades) in these areas are consolidating settlements which have never, and will probably never be, viable. What is the broader vision for the development and governance of these dislocated urban settlements?
 - Problems of co-ordination between government departments and levels of government.

Recommendations

- A more integrated, co-ordinated approach to land reform must be followed.
- Across all four communities, tenure reform must be placed at the centre of the land reform process.

CONCLUSION

- Development and consolidation of appropriate systems for the administration of land rights as key to the achievement of the goal of tenure security. The relationship between the tenure system and the administration of development, particularly in dense, peri-urban settlements, has been raised as a key concern which requires more attention in the land reform process.
- An integrated approach to land reform (one which bridges the three legs of the land reform programme), and peri-urban and rural development.
- Resolution of conflict regarding the governance of peri-urban and rural settlements, and the role of tenure reform in this process.

KEY OBSERVATIONS FROM THE ANTHROPOLOGICAL STUDY

Introduction

Interpretations are based on extended stays with families in the selected localities, informal observations of, and interviews on:

- current quality of life of residents in selected localities
- their existing livelihoods base
- impact of land reform on quality of life and livelihoods
- demand for land and land reform, and for what purpose
- potential for changing/improving quality of life and livelihoods in these settlements
- potential for land reform

Localities selected for anthropological fieldwork (in order of first visits) are Stinkwater, Kwarriekraal, Thlolwe, Mothotlung, Majakaneng, Moeka, Mabaloka, Modderspruit, Jonathan.

General findings: quality of life

From the first 'observation' of all nine localities it was apparent that the conventional stereotypes about such communities were somewhat off target, and that residential quality of life was considerably better than expected.

Property sizes vary from place to place and even within localities but are generally larger to much larger than urban or formal township residential sites. They are extremely well kept.

There is evidence everywhere of what can only be called a housing renaissance in these settlements; as it is probably occurring in similar settlements countrywide. This involves an explosion of self-initiated, self-funded, self-built improvements and extensions to existing dwellings as well as construction of many entirely new cement, clay and facebrick homes of all sizes and architectural styles.

Use of land for agriculture is extremely limited, even in Jonathan and Kwarriekraal, the only real smallholding settlements. A few residents grow mielies and some vegetables but the majority of households grow no crops and express disinterest in crop cultivation. Unpredictable rainfall and droughts of recent decades and lack of access to alternative water; invasions by chickens, goats, donkeys, cattle and human crop-thieves; the full range of 'normal' agricultural setbacks; the considerable time and labour costs involved; the cheapness and ready availability of vegetables and fruit from hawkers are given as reasons for why this is not a sensible option.

Paradoxes and paradigms

A widely accepted paradigm in South Africa is that there is an inevitable, painful, slow evolutionary process of 'urbanisation' to which it is claimed only half of the South African population has adapted, but to which all aspire. There is said to be rural 'push' and urban 'pull'. The theory is that settlements such as these are a stepping-stone on this route; a gradual process of becoming urbanised, of inching towards the cities.

Another widely-accepted theory is that these 'rural' populations would if given half a chance involve themselves in agricultural activities with gusto; feeding not only their families from their own crop production, eggs, chickens, milk and meat but also going commercial with their surplus and thereby transforming their livelihoods base. It is sometimes rather patronisingly assumed that these simple rural folk have forgotten or don't know how to succeed in vegetable growing.

This fieldwork reveals a reality which differs from both these perspectives. Few if any families have not had a long-term hands-on relationship with urbanism, and this is ongoing. For most, urbanisation occurred a long time ago and was not half as difficult as made out. Actual physical locality has little to do with it.

All nine settlements reveal less of the one-way rural-to-urban flow generally assumed of urbanisation. Many residents have been there ('real'

urban) and back or are currently going there and back on a regular or irregular basis. Many families have one or more members who have relocated and have permanent homes in urban centres.

It could be argued that these are the urbanisation success stories and that all things being equal there would be less 'pull of place' and more migration from such settlements to better-endowed urban centres.

That is possible, but as things stand the local attitude including that of many younger adults is that apart from water, electricity, and consumer facilities city living is no bed of roses: the same low-income/unemployment realities and in addition crime, congestion, noise, more temptations to lead youth astray, much higher costs for far less comfortable residential quality of life and other amenities.

Factors such as this do not merely exert a 'rural pull' on existing residents but also produce in-migration from urban areas which over time may increase as it has among more affluent ex-urbanites such as those now permanently based around Hartebeespoort Dam and commuting daily to their employment in Pretoria.

This 'pull of place' can be related to the considerable economic investment in housing: the preoccupation with obtaining individual title deeds speaks of a wish to protect this investment as well as a possible means of accessing funds with property as surety.

'Pull of place' has also clearly been influenced by improvements to infrastructure and the expectation that this process will continue, to eventually include indoor flush toilets, tarred roads and other amenities available in urban residential areas as well as Soshanguve, Mabopane, etc., further enhancing quality of life as well as the self-initiated investment in housing and upgrading of properties in these localities.

Peri-urban life and land reform

It seems that subjective reality for most people of this region is that land reform happened in 1994, with de facto security of tenure. They have apparently wasted no time in building (literally) on this base, proclaiming their roots and attachment to their own particular locality, insisting that no other will do as well. They express a sense of being in control of their own destiny and do not anticipate any further pushing about like pawns on a chessboard by players in Pretoria or elsewhere designing development blueprints which take no account of people like them or what people like them want. They appear to be making their life and wanting to improve on it in these settlements.

This cluster of circumstances surrounding land values, costs, and tenure entitlement rather than merely a 'culture of non-payment' seems to influence and justify a general outlook that cheapness of land tenure is an intrinsic, key economic advantage of living in such localities. "We love the country because we can live here so cheaply" is stated not with any overt sense of exploitativeness or advantage presently being taken of existing circumstances but more as a fact of life.

Yet there is the paradox that - including all residents of Moeka who have supposedly chosen the communal property option; including Mabaloka residents with no quibbles against the traditional authority under whom they fall; one and all want individual title deeds to their own properties. Some informants stated that this would qualify them to obtain bank loans to start businesses; others tie this to protecting their housing investment or obtaining building bonds or enabling them to upgrade their accommodation at no risk. It also seems that there is understanding that although present costs of acquiring or occupying land in these localities are low the future will be otherwise, to the advantage of those getting in on the ground-floor now.

Cheaply acquired land ownership in settlements within reasonable striking range of main labour centres; without the hassles of residing in cities; containing good to top-of-the-range housing in attractive garden settings; with proper infrastructure which includes a convenient local commercial base benefiting consumers as well as local entrepreneurs; appear to be the governing principles defining land reform as a meaningful long-term investment in upward mobility; indeed, seemingly a sounder 'provident fund' than ownership of cattle.

It seems that regardless of distance to main urban centres or existence of some subsistence agricultural activities, quality of life orientations and aspirations as well as the incomes base in all localities are mainly those of people generally described as urbanised.

With the exception perhaps of Jonathan's previously smallscale commercial farming community a number of whose inhabitants succumbed to an imposed 'push', most residents in these nine localities do not appear to be moving gradually along a rural to urban continuum. They have strong roots in their own localities and most (including many young adults) have no desire to migrate elsewhere.

In opting for continued existence in ex-urban locations residents appear largely to be following economic forces in two key domains: better-quality housing and land ownership, both perceived to be much more easily and cheaply accessible and therefore with a better long-term value than in towns.

Livelihoods and land reform

All nine localities depend on multiple livelihoods involving outside and self-employment but many households seem dependent on one breadwinner only. Outside and self-employment can seemingly fairly often produce similar income levels but regardless of possible latent entrepre-

neurial spirit in such communities there would appear to be a limit to the number of sustainable income-generating self-employment niches and this limit is symbiotically related to incomes earned in the formal economy. In short, rather than stimulating further self-employment, job shrinkages in the formal employment sector tend to diminish local economic activities as well. It seems in fact to be not the scene for most adult members of the nine communities surveyed.

Assumptions that new livelihoods opportunities can be created for essentially urbanised and increasingly well-educated populations through subsistence/small-scale commercial/co-operative farming ventures appear unrealistic and are attracting only a thimbleworth of grassroots interest in this region.

Outside of mainly conventional agriculture the land reform programme looks to an extension of local self-employment as the means of linking land ownership to a productive economic base but as already stated, this does not seem viable as long as formal employment is static if not actually diminishing and wages are generally pegged at the lowest level permitted. Ten spazas in one community may be sustainable, twenty would not. Introducing new types of enterprise could be of some benefit.

Land reform policy ties land ownership to either agricultural or home-based economic productivity. No such conditions have ever applied to property ownership among other population groups many members of whom have successfully seen to their own material advancement not simply through employment but also by being property owners. For example, rundown Mayfair was upgraded by immigrants whose individual residential investments bought them upward mobility.

LAND REFORM NEEDS OF PERI-URBAN AND RURAL DWELLERS IN THE EASTERN DISTRICT: SUMMARY

General

There is widespread ignorance of the whole Land Reform process. Community and beneficiary education is needed on all aspects of Land Reform, but especially about *tenure options* and their implications (legal, financial, practical), protective legislation, and grants and other assistance available. In Moeka for instance, the CPA is widely seen by its members as a kind of general development forum, without any clear understanding of what communal ownership entails.

People in many respects are not waiting for government, but are engaging on a large scale in self-initiated, unsupported upgrading of their homes and plots. What is expected of government is to remove obstructions and facilitate access to finance, services, etc., in order to free peoples' own energy and initiative.

Except in the most remote rural villages where there are serious problems such as lack of water, etc., people on the whole want to stay where they are. Rural and peri-urban life is perceived to be cheap and relatively pleasant, and residential quality better than in urban townships (larger plots, homes, etc., more autonomy). One doesn't know however, how this will change once the District Council and other authorities start levying rates, service charges, etc. More research is needed in this regard, and the positive image of peri-urban living needs to be reflected in order to start preparing people for paying more for this amenity.

For them to be able to stay though, people do need:

- Formal recognition of land rights (tenure upgrade)
- Some land for expansion (redistribution)
- Infrastructure and services
- Ideas and assistance to make communities more economically viable. What can they do on the land to make it more productive (other than purely agricultural use)?

We need greater understanding of peoples' strategic access to and use of land (springboard to access urban opportunities and resources, while still residing outside urban areas). This impacts on planning for land-use, infrastructure development, transportation and economic investment.

It is important to keep in mind that access to, and the economic and other linkages with Gauteng urban centres are vital to support and sustain local economic development and continued viable habitation in the peri-urban areas of the Eastern District.

There appears to be a need for greater and more formal intergovernmental co-ordination of planning for land-use, infrastructure and facilities.

Land needs

It appears land is needed mainly for residential expansion, especially in the closer settlements where populations are growing, although in some settlements a desire also exists among certain sections of the communities for more ploughing and grazing land.

A large section of at least two of the communities (Modderspruit and Maboloka) would like to see their areas established as formal townships.

They believe this will sort out problems to do with tribal authority who administers the land, standardisation of plot sizes, provision of land for social facilities, etc.

Tenure aspirations and land administration

Most people aspire to some form of individual control over their plot of land, but do not mind a local communal form of general land administration. Some say they would like democratically elected local structures to administer the land according to communally decided rules and guidelines. Others trust only government to fulfil this function.

People on the whole are fairly sure about their right to remain on the land where they are, as witnessed by the degree of investment in residential upgrading. There are problem areas though where there is tension for instance between "landowners" and "tenants" (Majakaneng, Stinkwater).

The biggest problem is that tenure rights, land transactions, and relationships between stakeholders are either informal and/or based on pre-1994 arrangements which make people at least in law very vulnerable to dispossession and conflict.

Women and other family members are also vulnerable. Many say rights to land should be registered in the name of a family, or at least with the women as co-holders of rights.

It appears any land administration system would have to recognise and deal with the great diversity of tenure at a very local and micro level. People need clarity and certainty about who will administer land rights and in what way. Currently there is confusion around the role of traditional chiefs, civic organisations and other community forums, elected local government, DLA and other government departments.

Some practical things that could be done

Organisational analysis at local level to clarify roles, reduce overlapping and conflict, and improve capacity and skills (Identify training/information needs for further action from universities, NGOs, EDC and DLA).

Following from research co-operation, set up a forum for ongoing intergovernmental collaboration and consultation (Investigate devolution of responsibility for some land-related issues to the District Council).

Joint venture (JV) between EDC and provincial DLA (assisted by the Centre, TRAC, etc.) to create a "support centre" where people can get ideas/information/assistance in what to do with land (productively) à realistic practical advice and assist with business plans, etc.

SUMMARY

The more important Land and Land Reform needs of people in the District could be summed up as follows:

- Information/education on Land Reform generally, tenure options, registration, grants and other assistance. Informed communities are needed.
- Formal recognition of tenure rights and land transactions, also of women and other vulnerable groups.
- A land administration system which recognises local diversity, is close to the people, and which offers quality facilitation, mediation, etc., to ensure negotiated solutions to tenure issues and conflicts.
- Some additional land for especially residential expansion, business use and social facilities and to a limited degree for agricultural use (redistribution).
- Integrated land-use, development and economic planning (intergovernmental co-operation and co-ordination).
- Ideas and assistance for economic development initiatives (ecotourism, etc.).
- Access to finance, services and support for local economic development.

WORKING WITH LOCAL KNOWLEDGE SYSTEMS IN A GIS FOR NATURAL RESOURCE ASSESSMENT, PLANNING AND MANAGEMENT IN NORTH CENTRAL NAMIBIA

by

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Participatory rural appraisal work indicated that there exists an elaborate indigenous knowledge system in North Central Namibia on the environment resulting in a classification of land units that serve various purposes. This recognition was followed up by a study exploring the possibility of linking this indigenous knowledge system with conventional scientific classifications and observations in a participatory GIS. The linkage was possible and it appeared that the presence, distribution and abundance of the land units, eventually mapped out using Landsat TM imagery, are more decisive factors in farmers' resource management strategies than previously thought. The knowledge appeared to be not gender, wealth or age specific and very widespread. The local knowledge systems do not differ to a great extent from conventional knowledge. The approach improved the understanding of rural livelihood strategies at individual and community level and pointed to the importance of rules and norms for the management of resources in shortage that were previously not recognised. Those norms are adapted to changes in local conditions with respect to rainfall, water availability, grazing and new opportunities. The norms point to the existence of a social organisation within communities regarding use and control of resources. Further work should explore the possibility of strengthening the local social organisation to control and manage natural resources, as part of development projects and local government initiatives.

1. INTRODUCTION

1.1. Study area

Northern Namibia is a relatively densely populated (12.9 people/sq. km with a central area having over 90 people/sq. km) communal area bordering with Angola. It is situated in the Cunene River basin, is part of the Mega Kalahari basin and has a unique fluvial/aeolian environment on the west coast of Southern Africa. The central portion of the area is occupied by a low-angle alluvial fan system (the Oshanas) in Southern Africa, formed possibly much like the present Okavango (McCarthy 1993). The eastern and western portions are covered by linear Kalahari dunes or dune remnants.

North Central Namibia was a main area of armed conflict for over 20 years before independence in 1989. Consequently, little development work to benefit local communities could be undertaken and the area remained largely neglected until after independence.

1.2. Environmental and socio-economic profile

The main environmental constraints identified in the region are:

- lack of perennial surface water resources within the region
- low and often erratic rainfall with a very long dry season
- high potential evaporation rate
- most arable areas are covered with sandy soils with low fertility, low water retaining capacity and deficiency in some important nutrients
- high salinity of soils in many seasonally flooded oshanas and pans
- limited resources of potable groundwater and high salinity of deep groundwater in the Cuvelai basin area

The most important natural resources that people depend on are:

- fresh and potable water
- grazing for livestock
- suitable soils for crop cultivation
- trees for firewood, construction, fodder and edible fruits
- fish in 1 out of 3 years

High population pressure results in the following environmental problems:

- deforestation in most densely populated areas
- local depletion of grazing land around water points and pipelines
- unplanned development of water points
- declining soil fertility in cultivated croplands due to land shortages
- changes and disturbances to surface flows in oshanas due to infrastructural developments
- unsustainable use of groundwater resources in some areas
- contamination of surface waters due to human and animal waste
- uncontrolled accumulation of solid waste and rubbish within and around settlements and in oshana beds
- the virtual disappearance of wildlife as a major resource
- uncontrolled fires in specific livestock areas away from the Oshanas

Socio-economically, the land-use system can be characterised as an agro-silvo-pastoral system that combines crop cultivation, livestock rearing, management of trees that provide edible fruits, fodder, construction and firewood. Diversification is a major strategy in coping with low soil fertility and high uncertainty (climate, economy).

Since the beginning of this century an important element in the central northern economy has been migrant labour. This transition from subsistence to a cash economy leads to increased pressure on women and increased dependence of income from employment. There is a breakdown of the extended family, based upon matrilineal descent, leading to reduced support systems, essential during droughts, and to a culture of independence in which some families do well and become rich, while others fail and become poor. In the regions, a lot of exchange of goods and services is done by bartering without money, although the extent is unknown. Although the contribution of agriculture to GDP is small, an estimated 70 %, mostly women, depend to a greater or lesser extent upon it. An estimated 40 % of the households are female-headed. Unemployment is estimated to be as high as 45 % in the rural areas. Households without off-farm income are stuck in a poverty trap in the central area. Individual household strategies to cope with these changes have not been studied thoroughly.

More and more cattle are owned by fewer people, and it is estimated that 50 % do not own cattle. Larger herds are generally considered less productive, although it appears that in the fenced areas a trend towards commercial ranching is present. Traditional transhumance systems have broken down to a high but unknown extent because of the development of water supply systems and fencing of huge portions of traditional dry season pastures. The ripple effect originating from the restriction of boreholes and grazing land through large-scale enclosure is inducing some communal farmers to more closely define their own property rights in relation to water and grazing land. It is likely that these changes in livestock management are affecting and changing the environment to a great extent.

The unclear status of land tenure and resource usage rights is thought to lead to abuse of common resources, especially of common woodlands, water and grazing land. The introduction of secure, exclusive tenure at the community level is considered the most important policy reform needed. Local bodies capable of sustainable management of natural resources within their community should be strengthened.

Opportunities lie in the region of improved environmental management and land-use planning. Legal and institutional frameworks for effective land-use planning are still rather weak in Namibia, as is environmental awareness. However, there appear to be no major institutional constraints to initiate a planning process by starting to develop the professional capability to carry out the tasks involved in overall land-use planning and development of the institutional framework. The lack of information-sharing is seen as a major stumbling block in sustainable environmental planning and management.

1.3. Institutional background

The Northern Regions Livestock Development Project (NOLIDEP) is a 7 years programme started in 1995. It works in the 4 Northern Communal Areas bordering with Angola. Its budget is provided by the Government of Namibia, IFAD, the Governments of France, Belgium, and Luxembourg, as well as by the involved communities themselves. The NOLIDEP operates with the Directorates of the MAWRD (Ministry of Agriculture, Water and Rural Development of Namibia).

The NOLIDEP aims at improving people welfare through livestock development, through 5 main components, of which the development of sustainable management of pastoral resources by communities themselves (water point development, range management, etc.) is the most important for the present study.

The Northern Namibia Environmental Project (NNEP) is a 3.5 years project of the DfID (British Co-operation) started in 1997. It works in North

Central Namibia in the most populated communal area formerly called "Owamboland". The NNEP aims more generally environmental sound management practices of natural resources at regional and local (community level). The NNEP has established a Planning Resource Center within the Ministry of Environment and Tourism (MET) providing the various Ministries with various databases on issues of their concern, especially through the use of Geographic Information Systems (GIS).

At its inception, NOLIDEP was supposed, according to the initial design by IFAD, to extend techniques used in private commercial farms. However, it was soon realised that this approach was not suitable to the situation.

Based upon the technical assistance assessments, an approach has been chosen allowing technicians and farmers to comprehensively and jointly address the main constraints and opportunities, based on the assumption that "farmers have good reason to do what they are doing", due to the knowledge of their environment they have got. As a result, the project started relying at an early stage on indigenous knowledge of the farmers.

As part of the Farming Systems Research and Extension, an approach involving Community Based Organisation (CBO) is preferred, as part of devolving authority of resources to the local communities.

A decentralisation process has started in Namibia with handing over more power to regional governments. For example, a far-reaching decentralisation process has started in the Department of Rural Water Supply with the final aim of handing over responsibility, management and maintenance of all rural waterpoints to communities.

1.4. Integrating local knowledge for resource management and planning

NNEP had quickly success in addressing the needs for information at higher decision making levels at national and regional local government levels, but was much slower in reaching farmers and communities with the information. The main reason is that only little research work has been undertaken to date to develop a community-integrated GIS (Abbot et al. 1998). Initial work concentrated on improving maps produced during Participatory Rural Appraisal (PRA) work in order to integrate the information into a land information system. Aerial photographs and GPS were the main tools to improve the diagrams drawn by people. This resulted in scaling up of most of the locally obtained information through Participatory Rural Mapping (PRM) due to the higher precision and scale of the GIS. However, the need to develop a true community-integrated GIS was recognised in the early stages of the project. Capturing local knowledge and integrating this in a GIS is one step in such a process. Such a participatory GIS could simply be extractive and not empower local voices to more effectively influence policy (Abbot et al. 1998). A GIS can turn local knowledge out of local control, as it might distribute the extracted information without permission. The approach we followed here was to develop such a GIS together with strong communities, together with community based projects who were working with CBOs or in the process of establishing these. This ensured the local control of the GIS products. During our field work, we found that the local or regional wealthy had long before us worked with information obtained from local people to their own benefit. This leads to the suggestion that a wider distribution of local information, controlled by communities could empower, rather than disempower.

A breakthrough in the approach of working with local knowledge on the environment for a community-integrated GIS came through a collaboration between NOLIDEP and NNEP in 1998 in a grazing management study (Dayot & Verlinden, in press). This was expanding previous research work carried out by Dayot (1998), Rigourd et al (1998) and Shitundeni & Marsh (1998) in farming systems studies and local tree management studies where local names were noted that were thought to represent soils. Although some names indeed represent soils, some field work and training sessions with extension staff carried out at the same time by NNEP indicated that the names represented the way the farmers see their own environment and that the names are part of a more holistic knowledge system of the environment than a soil classification system, a notion also put forward by Dayot (1998). Rather than trying to translate the units in western concepts on the environment, an approach was developed to describe the units in detail in a participatory way. Most units found so far can be best understood as representing a landscape. Interestingly, in contrast with the soil names that only relate to particular uses and do not cover all soil types, local people classify all the land into landscape units that serve various purposes. They differ in suitability for resource use and are recognised on the basis of vegetation structure, geomorphology, soils and sometimes indicator species. It was established during discussions with communities and key informants that resource management and management strategies vary according to the presence, abundance and geographical distribution of these units. Initial tests with a limited number of descriptions suggested that the land units could be scientifically described, analysed and possibly even mapped using high-resolution satellite imagery, as Landsat TM imagery is good in capturing vegetation structure. This initial work was expanded to 5 pilot communities in 1999 to cover more agro-ecological zones and more local language groups.

Central to the approach followed here is an attempt to describe and analyse the local knowledge with scientific methods. If this could be done, the comparison with the indigenous and conventional knowledge systems becomes possible. The indigenous knowledge enables to understand better the local constraints and opportunities, while the conventional knowledge systems allow information transfer to the local farmers from similar, better known environments elsewhere. The comparison would also improve the discussion and knowledge transfer between scientists, extension technicians and farmers.

As it appeared that the geography and distribution of the land units is important in resource management decisions and management strategies at local level, mapping these units becomes crucial in understanding the management and resource use at community level. The work presented here explored the possibility of mapping of the local land units using Landsat TM imagery and the possibility of linking the local classifications with the Geographical Information System (GIS) being set up for North Central Namibia. Furthermore, because land units serve various purposes or

are characterised by various potential uses, the potential of deriving thematic maps to assess the quality and the distribution of the resources according to farmers' point of view was explored.

Integrating the indigenous knowledge of natural resource management within a broader socio-economic framework in the GIS could result in several practical management applications to assist rural development and improve the livelihoods of rural people that would otherwise be very difficult to obtain.

The approach followed here also concentrated on linking the findings of the study with practical management implications. Most of these emerged during discussions at various stages with the local people. Initially, work concentrated on integrating information from communities in the GIS and on information exchange, but not on implementation of management options to improve rural livelihoods. Work has recently started on those topics, although it was outside the scope of the initial study.

2. METHODOLOGY

Preliminary field work indicated the need of an ecological approach to the identification and description of the local landscapes, in addition to the participatory appraisal of the various uses of the units. As this appraisal needs travel, working with an entire community in the field was not feasible. It was decided to work with communities that were already in the process of mobilisation and were working with development projects like NOLIDEP and NNEP. At least one of the researchers and many outside team members were known to the 5 communities and farmers during work carried out previously (Dayot, 1998, Dayot & Talavera, 1998).

Field work started with discussions with community leaders leading to identification of key informants to work with in the field. The team consisted of an agronomist, an ecologist/GIS specialist, a representative of MET, representatives of MAWRD, NOLIDEP, extension technicians of the area, a facilitator and key informants. The key informants took the team to examples of local landscapes. The team frequently asked to identify landscapes encountered on the way. At each site identified by the informants, a detailed description of the vegetation and some environmental characteristics were noted.

All sampled locations were positioned using GPS. The vegetation was assessed with the NOLIDEP manual for natural resource assessment (Sweet and Burke, 1998), but incorporating all woody species and grasses instead of only the main species. The key informants supplied the vernacular names of species. These were combined with scientific names and assessments of cover (Coates Palgrave, 1990, Drummond, 1995, Mueller, 1984, Van Wyk & Van Wyk, 1998). Notes on the physical environment included land form, soil characteristics (texture, colour, hardness). Open-ended discussions on management and resource uses provided understanding of the local management, the available resources (plants, animals, soils) and differences in suitability for various uses. The information concentrated on functional knowledge, and did not include details of uses based on belief (e.g. the use of *Croton gratissimus* to protect a home from lightning). A critical assessment and discussion of the notes with the team helped in making this distinction. Collaboration during fieldwork with the Spanish sponsored soil survey project within the MAWRD from The Cartography Institute of Catalonia added a soil science component to the ecological work. The soil profiles in different local landscapes were described and soil samples of the different horizons were taken for subsequent physico-chemical analysis in the laboratory. The results are not yet available.

The vegetation and environmental data collected were analysed with Canonical Correspondence Analysis, using CANOCO for Windows (ter Braak, 1998). This provided insight in the consistency of the local units using the ecological descriptions. The initial work concentrates on the scientific analysis of the indigenous knowledge on the land units, as this is an essential step in the comparison between indigenous and conventional scientific knowledge.

The samples provided the training sites for a supervised classification of a portion of a Landsat-TM scene of 29 April 1997 for all study sites. The scene is representative of an average rainfall year. The supervised classification, using the Maximum Likelihood classification method, was carried out on bands 3, 4 and 5 simultaneously using ER-Mapper software (Earth Resource Mapping, 1997). As our initial field work indicated the importance of vegetation structure characteristics, the choice of satellite imagery is clear. Successful classification of a satellite image is an additional test for the internal consistency of the landscape units. Inconsistent units would provide unreliable training sites and classification results. The classified image would be incomprehensible for the local people.

The classified images were incorporated in a Geographical Information System, allowing overlays with information on settlement, water points, road networks and other relevant information for planning and management purposes. A hardcopy of the resulting classified image with overlays of villages and tracks was taken back to the community and farmers for discussions on farming systems woodland and grazing management, with emphasis on local cattle movements between landscapes in different seasons. Two community meetings and ten small farmer group discussions were held, each taking several hours. The discussions with small groups of farmers focused also on local norms and rules on resource use and management using maps detailing villages, homesteads, water points, tracks and pans. Sociological norms and rules were identified by discussing these maps, while combining them with the information on the landscapes.

When all people appeared satisfied with the resulting classification, on-screen digitising was used to vectorise and simplify the classified image. Vectorised maps consisting of lines and polygons are easier to understand and to work with. Some thematic maps were produced, indicating land

suitability for cropping, for finding surface and ground water, of grazing quality and of the intensity of bush encroachment. Together with land issues, these were the main environmental issues identified in PRA sessions and subsequent in-depth interviews.

3. RESULTS

3.1. Description and evaluation of a land unit: the example of "Omutunda-Ekango".

Over 30 land units have been described so far in the pilot areas. It is outside the scope of this paper to give a full description of the landscapes and species lists encountered in the study areas. An example of one unit is given below.

Table 1 . general description of "Omutunda-Ekango"

Criteria	Description		
Landform	Elevation		
Topsoil texture	Loamy sand		
Topsoil colour	Grey brown to darkish grey		
Vegetation class	Acacia erioloba - Combretum hereroense wooded shrubland		
Vegetation structure (% cover on the ground of each layer)	Tree: 10	Shrub: 23	Grass: 22

Table 1 presents the general description of the land unit "Omutunda_Ekango". The unit can be found on elevations next to "Ekango" (a pan). Soil characteristics do not indicate that the unit can be found on a unique soil type, although descriptions of the profiles of "Omutunda_Ekango" had in common the presence of a shallow duricrust (a petrocalcic horizon consisting of calcrete) within 1 m of the surface and a heavier structure and texture than the sand of the dunes.

Table 2 details the species composition of the vegetation layers. *Acacia species* and *Ziziphus mucronata* are the most conspicuous species in the tree layer. The most abundant shrubs are *Combretum hereroense*, *Croton gratissimum*, *Acacia species* and *Baphia massaiensis*. Typical abundant grasses are *Urochloa brachyura*, *Brachiaria nigropedata* and *Cynodon dactylon*.

Farmers explained that livestock first graze this unit in the wet season, because of the high palatability of some of the grasses. It is potentially a very valuable landscape for grazing and browsing, but as it is also the most suitable land for cropping, most of the farms are found here. Farmers indicated that the land unit is considered to be of high fertility. Some farmers of cattle posts indicated that the decreased availability of the land unit for grazing caused them to move away from the small villages in search of unfenced and not farmed "Omutunda_Ekango".

Table 3 and Table 4 gives some examples of the local uses of the woody species and grasses. In both tables the common uses and available scientific evaluations and the indigenous assessments of value are compared. Both tables serve as a demonstration of how conventional knowledge can be compared with local knowledge at the species level. The tables are used as a cross check with the assessments of suitability and ranking of uses at the land unit level.

Table 2. The detail of the vegetation composition and structure

Tree layer		
Vernacular name	Scientific name	Cover
Omwoonde	Acacia erioloba	2.25
	Acacia hebeclada	0.25
Omupapa	Baikiaea plurijuga	0.25
Omungudi	Boscia albitrunca	0.50
Omutundungu	Burkea africana	0.25
Omupupwaheke	Combretum collinum	0.75
Omukadhikuku	Combretum hereoense	0.25
Omushendye	Combretum zeyheri	0.75
Ombango	Croton gratissimus	0.50
Omupanda	Lonchocarpus nelsii	2.00
Omuwe	Ochna pulchra	0.50
Oshifiku	Ozoroa insignis	0.50
Omwoolo	Terminalia sericea	0.75
Omusheshete	Ziziphus mucronata	0.50

Shrub Layer		
Vernacular name	Scientific name	Cover
Omwoonde	Acacia erioloba	1.75
Omangandjamba	Acacia fleckii	1.50
	Acacia hebeclada	0.50
	Acacia nilotica	0.25
Ofufe	Baphia massaiensis	0.75
Omurtwankuta	Bauhinia petersiana	0.50
Omungudi	Boscia albitrunca	0.50
Omunaluko	Combretum apiculatum	0.50
Omupupwaheke	Combretum collinum	1.25
Omumangahupa	Combretum engleri	0.50
Omukadhikuku	Combretum hereoense	2.00
Omushendye	Combretum zeyheri	0.75
	Commiphora africana	0.25
	Commiphora pyracanthoides	0.25
Ombango	Croton gratissimus	3.00
	Croton menyhartii	0.50
Ongete	Dicrostachys cinerea	1.50
Omuhe	Grewia flava	0.75
Omupanda	Lonchocarpus nelsii	0.50
Oshifiku	Ozoroa insignis	0.75
Omupombo	Rhus tenuinervis	3.00
Omwoolo	Terminalia sericea	1.25
Oshimbu	Vangeria infausta	0.25
Omusheshete	Ziziphus mucronata	0.25

Grass layer		
Vernacular name	Scientific name	Cover
	Acrotome inflata	0.75
	Antheora pubescens	0.25
Olukateko	Aristida adscensionis	1.75
Omushoke	Aristida stipioides	0.75
	Asparagus sp.	0.50
Oshilundunde	Brachiaria nigropedata	1.75
Ongwena	Cynodon dactylon	1.75
	Dactyloctenium giganteum	0.25
	Eragrostis dinteri	0.50
	Eragrostis rigidor	2.00
Omulyanana	Eragrostis tricophora	4.00
	Hyparrhenia rufa	0.50
Okombambi-komasha	Melinis repens	0.25
	Perotis patens	0.25
Ombambi	Pogonarthria fleckii	2.00
Oshinaukali	Schmidtia pappophoroides	0.25
Oknamanga	Stipagrostis uniplumis	0.50
Epele	Urochloa brachyura	3.50

Table 3 . Use and potential of the woody species locally exploited

Scientific name	English	Kwanyama	Common uses and evaluation (bibliography)	Vernacular use and evaluation
<i>Acacia ataxacantha</i>	Flame thorn	Enghono		Goats eat leaves and pods. Cattle also eat pods. Wood used for utensils like knobkerries and fence material. Fibre sometimes used for ropes.
<i>Acacia erioloba</i>	Camel thorn	Omwoonde	Pods are edible bay stock. Wood strong and durable. Gum edible. Bark and pods used medicinally.	Pods eaten by cattle (salty taste). Wood used for making pounding sticks and poles for fencing.
<i>Acacia erubescens</i>		Okadilanghono		Bark or fibres are used for making ropes. Wood is used for fencing poles.
<i>Acacia fleckii</i>	Plate thorn	Omumanaandjaba		Bark used as building material.
<i>Acacia hebeclada</i>	Candle thorn			Leaves and pods are browsed by goats. Pods are soaked in salt water to be given to young goats as supplement feeding. Wood is used as fencing material.
<i>Acacia hereoensis</i>	False hook-thorn			Cattle browse sprouts. Wood or bark or fibre is used for making ropes. Gum is edible.
<i>Acacia kirkii</i>	Flood-plains thorn	Omuhaluveya		Goats browse leaves.
<i>Acacia reficiens</i>		Omuhu		Wood, fibre or bark, used for making ropes or as construction material. Seen as an indicator of fertile soil.
<i>Acacia tortilis</i>	Umbrella thorn	Omuxu	Leaves and pods make a very nutritious fodder and are browsed by stock. Bark is used medicinally. Wood provide also good fuel.	Wood, fibre or bark used for making ropes and as construction material.
<i>Albizia anthelmintica</i>		Omuhanguti		Browsed by game and occasionally goats. Bark is used medicinally for both human and animal intestine deworming. Wood is used for making small utensils like spoons. Also used as fencing material.
<i>Baikiaea plurijuga</i>	Zambezi teak	Omupapa	Important timber tree. Wood is dark red-brown, hard, strong and durable.	Wood is used as fuel and construction material.
<i>Baphia massaiensis</i>	Sand camwood	Ofufe		Sprouts are browsed by stock. Leaves are browsed by cattle. Top branches are even cut and distributed as fodder to stock at the end of the dry season. Ofufe is seen as the main forage during the dry season.
<i>Bauhinia macrantha</i>		Omutwanghuta		Leaves are browsed by cattle.
<i>Berchemia discolor</i>	Brown ivory	Omuve	Browsed by game. Wood yellow-brown, hard is attractive and suitable for furniture. Bark and leaves are used medicinally. Fruit edible fresh or processed; sweet-tasting and used in making beer; also boiled in water which, after the fruit is removed, is used to make a pleasantly flavoured porridge.	Sprouts are browsed by stock. Fruit (eembe) are edible and harvested.
<i>Boscia albitrunca</i>	Shepherd's tree	Omumghudi	Heavily browsed by stock. Roots and fruits are edible; roots pounded and made into porridge, or roasted and used as substitute for coffee; fruits pulp mixed with milk and used as side dish) Leaves and roots used medicinally.	Green leaves are browsed by cattle and small stock. Leaves and roots are used for medicinal purposes; leaves are used to treat flu or headache. Roots are put in milk to make it sour.

Table 3 (part 2). Use and potential of the woody species locally exploited

Scientific name	English	Kwanyama	Common uses and evaluation (bibliography)	Vernacular use and evaluation
<i>Burkea africana</i>	Wild seringa	Ornutundungu	The dried and crushed bark is used as a fish poison. Bark and roots used medicinally and for tanning. Wood is pale brownish to reddish brown, hard, heavy and tough but prone to borer attack.	Plants are browsed by cattle. Wood is used for making mortars, yoke for ploughing and as general construction material (same quality as omupapa). Okavakole worms are collected from these trees (dry season food).
<i>Combretum collinum</i>	Variable bushwillow	Omupupwabeke,	Leaves are browsed by game.	Sprout leaves are browsed by large and small stocks. Wood is used as fuel.
<i>Combretum engleri</i>		Orahatanga		Important browse tree. Cattle and goats browse leaves when they are green.
<i>Combretum hereroense</i>	Russet bushwillow	Omukadikuku	Browsed by cattle. Roots used medicinally. Fruits can be made into tea. Seeds should be considered as poisonous.	Sprout leaves are browsed by stock. Wood is used for making handles of various implements.
<i>Commiphora angolensis</i>	Sand corkwood	Ornboo	Roots are edible. Wood used for carving household utensils.	Wood is used for making small utensils like cups. Wood is also as live and dead fencing material.
<i>Dicrostachys cinerea</i>	Sickle bush	Ongete	Pods eaten by stock. Bark yields a strong fibre. Wood is hard and durable, used for fence poles and much sought after as firewood. Various parts used medicinally.	Pods are collected and mixed with salt to be given to goats as a supplement during the dry season. Wood can be used as fencing material and fuel.
<i>Lonchocarpus nelsii</i>	Kalahari apple-leaf	Ornupanda	Leaves are browsed by stock.	Browsed by cattle mainly from August to October. Wood is used to make yokes.
<i>Mundulea sericea</i>	Kurkbos	Ormumbaganyana	Leaves browsed by stock. Bark contains retanone and is used as fish poison. Leaves, bark and roots are used medicinally.	Leaves are browsed by stock throughout the year because they remain soft even dried-up.
<i>Ochna pulchra</i>	Peeling plane	Orauwe	Wood is pale brown with a curious papery feel when planed smooth; suitable for small ornaments. Seeds yields an unpleasant-smelling greenish brown oil which is used to make soap.	Leaves are browsed by cattle at the end of dry season. wood is used to make small utensils like shallow bowls, spoons, snuff containers, pipes.
<i>Pterocarpus angolensis</i>	Wild teak	Orauuva	Heartwood is attractive, moderately dense, easily worked and widely used for high quality furniture and ornaments. Leaves and pods eaten by game.	Wood is used as general and valuable construction material.
<i>Rhus tenuinervis</i>	Kalahari currant	Ornupombo	Heartwood is pink or reddish brown, dense and hard, very attractive and excellent for carving. Leaves used as flavour condiment. Ripe fruits are edible.	Leaves are browsed by goats. Fruits are edible. Leaves are also used for medicinal purposes.
<i>Schinziophyton rautanenii</i>	Manketti tree	Oranghete	Dried fruit pulp used to make porridge. Seeds are rich in oil.	Fruit (Oranghete) are edible and mainly collected from June up to July. Nuts are eaten and used to make sauce.
<i>Terminalia prunoides</i>	Lowveld cluster-leaf	Omubama	Browsed by game. Wood is hard, tough, and used for implement handles and in hut construction.	Wood is used as construction and fencing material. Leaves bark and roots are used for medicinal purposes.
<i>Terminalia sericea</i>	Silver cluster-leaf	Orawoolo	Wood, yellow and hard, suitable as a general timber. Roots widely use medicinally.	Spouts are browsed by cattle at the end of the dry season.

Table 4 . Use and potential of the grass species locally exploited

Scientific name	Kwanyama name	Local use	P-A	Scientific assessment
<i>Antheophora pubescens</i>			P	Highly palatable. (2) Very high : valuable and palatable, high nutritive value, high potential production.
<i>Brachiaria deflexa</i>			A	High forage acceptability.
<i>Brachiaria nigropedata</i>	Oshilundunde or Etolongolo	Valued because first shooting	P	Valuable and palatable. (2) Very high: palatable and high production.
<i>Cenchrus ciliaris</i>			P	Mostly high: palatable, high leaf production.
<i>Cynodon dactylon</i>	Ongwena	Valued for high palatability, nutritious	P	Provide good grazing.
<i>Digitaria eriantha</i>	Onhuululu	Valued for high palatability, nutritious (salty in Apr), mainly grazed in March-Apr	P	Palatable but dispersed in the veld. (2) Mostly very high: highly digestible and palatable, high leaf production.
<i>Digitaria seriatata</i>	Omundjaju	Valued for first shooting, best grass in Apr-Jun	P	
<i>Eragrostis</i> spp. (trichophora)	Omulyanana	Valued for its abundance and palatability	P	Fairly well utilized in the absence of other palatable grasses.
<i>Panicum coleratum</i>	Wanenuna	Dry food in dry season (cut it as forage)	P	Very valuable. Mostly very high : palatable with high production.
<i>Schmidtia appendiculata</i>	Omutiwongombe		P	Valuable, palatable, high nutritive value.
<i>Schmidtia pappophoroides</i>	Oshinukali	Valued for high palatability, nutritious	P	Variable. Mostly high: very palatable with a limited leaf production.
<i>Stipagrostis uniplumis</i>	Okanamanga	Valued because present in big quantity in the veld.	P	Palatable and valuable grass, widespread in occurrence. (2) Average to high: Fairly valuable pasture grass of variable palatability (well utilised at young stage)
<i>Urochloa brachyura</i>	Epele	Valued for its palatability, dry season food		
<i>Schmidtia kalihariensis</i>	Oshinamume	Thatching	A	Reasonably valuable as fodder in the dry condition. Grazed before flowering stage and later, when dry.
<i>Echinochloa holubii</i>	Eyangwa	Thatching, grazed if shortage of other, emergency food	P	Fairly palatable.
<i>Aristida congesta</i>	Okashilakanyanga	Grazed when fresh	P	Low: can be palatable in semi-arid areas.
<i>Aristida stipioides</i>	Omushoke	Thatching and grazed when fresh	A	Worthless
<i>Aristida stipitata</i>	Okanamanga	Thatching and grazed when fresh	P	Little value. Very low: owing to its general hardness and low leaf production.
<i>Eragrostis pallens</i>	Omaoleole	Valued for being eaten all year round, early shooting	P	Valueless (hardness). Low: unpalatable.
<i>Eragrostis nindensis</i>			P	Valuable and palatable. Average: relatively palatable, tends to sprout early in the rainy season.
<i>Echinochloa colona</i>	Ombode		A	Palatable.
<i>Aristida meridionalis</i>		Thatching, broom making.	P	Not good but leaves sprout early in spring. Low: fibrous utilised in young stage
<i>Asparagus</i> spp.				
<i>Chloris virgata</i>	Kakalahambo		A	Low: fast growing palatable grass but low leaf production.
<i>Cymbopogon</i> sp.				In general poorly utilised.
<i>Dactyloctenium aegyptium</i>	Kakalahambo		A	Average: palatable but rarely important in the veld, eaten at young stage.
<i>Enneapogon cenchroides</i>			A/P	Usually low: hardy spp., particular value in low rainfall areas.
<i>Eragrostis curvula</i>	Type of Omaoleole		P	Average: Highly productive, early grazing in spring, easy establishment, palatability medium to low.
<i>Eragrostis echinochloidea</i>			P	Valuable while still green. Low to average
<i>Eragrostis lehmanniana</i>			P	Mostly average: reasonably palatable, withstand to heavy grazing, well grazed in young stage
<i>Eragrostis rotifer</i>	Omukashulwa	Thatching grass	P	Remains green for a long time (readily eaten in dry times)
<i>Eragrostis viscosa</i>	Okaheneidi		A	Poor: low leaf production
<i>Heteropogon</i> spp. (contortus)			P	Reasonably good before flowering (hardness). Average to high
<i>Heteropogon</i> spp. (melanocarpus)			A	Valueless (hardness)
<i>Hyparrhenia rufa</i>		Thatching	P	Unacceptable: fibrous and hard

3.2. Consistency of local landscape units

To test the internal consistency of the units three vegetation layers were recognised: a tree layer, a shrub layer and a herbaceous layer. Woody plant species in the shrub layer were treated as different from individuals of the same species occurring in the tree layer. This serves the purpose of recognising that structural differences influence the classification, while also enabling to trace regeneration of tree species. This is a simplification, local people recognised at least the following possible layers: a herbaceous layer, a layer of shrubs not higher than about 1 meter, a shrub layer of between approximately 1- 3 or 4 meter, a lower tree layer and an upper tree layer. To test the consistency in detail, one has to recognise 4 woody layers instead of only 2. To test the consistency with only 2 layers, those units that were differentiated on the basis of more vegetation layers were grouped.

A Canonical Correspondence Analysis of the species composition with cover rates not transformed was carried out on 74 samples of Eastern Ohangwena woodland. The result of the two main axes of sample ordination is presented in Fig. 1. Each dot represents one sample. The closer samples are situated to each other, the closer they resemble each other. The different locally recognised units are marked with different symbols. The graph shows that most samples belonging to the same local unit are found close to each other. There are a few exceptions though. Closer investigation showed that some were misjudged (or misunderstood). In other samples the reason for anomalies were related to the importance attached to some species (which could be solved by weighing those species in the statistical analysis), or related to the fact that some samples were transitions between units. The key informants frequently indicated these transitions in the field. Nevertheless, the majority of local units (over 90 %) are consistent. In other study areas no anomalies were found, because of a clear differentiation between the recognised units based on a simpler vegetation structure.

The findings presented here suggest that consistency of local units can be tested statistically. Results should improve when taking into account all the structural layers recognised by the local people.

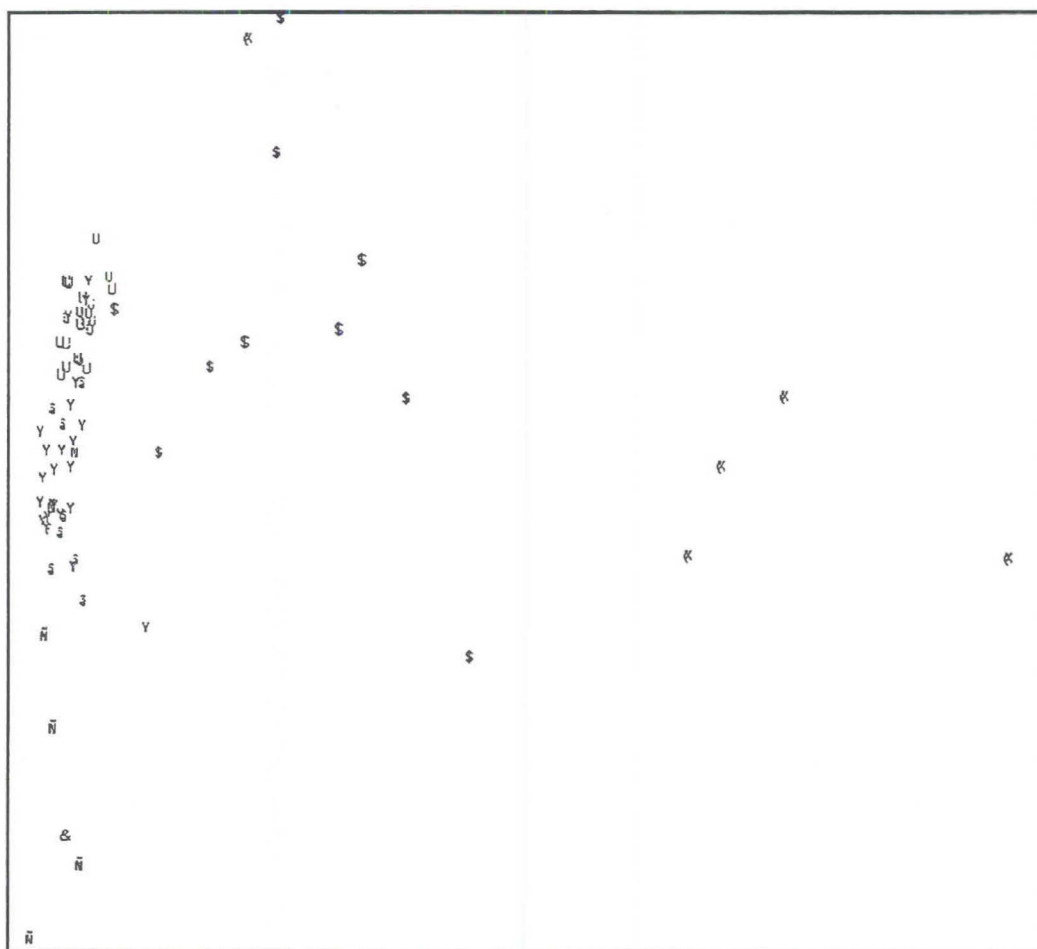


Fig. 1. A canonical correspondence analysis (CCA) of 74 vegetation samples in Eastern Ohangwena. Local land units are marked with different symbols.

3.2. Supervised Classification of Landsat TM satellite images

Up to now, 4 areas have been classified using portions of Landsat TM imagery in three different language groups. The classification of the Eastern Ohangwena portion of the satellite image resulted in 18 units. The classified image was taken to feedback meetings with communities where a first checking of the units was carried out. There was overall agreement with the units and a few test sites satisfied the community members of the validity of map. Four thematic maps were derived from the classified image. Fig. 2 is the result of the participatory ranking of the local units with respect to suitability for cropping. Fig 3 locates the landscapes most suitable for finding surface water in the wet season and for finding shallow potable groundwater. Fig. 4 ranks the land units with respect to grazing quality, a result of participatory ranking and checked by the presence and cover of palatable species in samples. Because of the influence of water points on the grazing quality, there are some differences within units. Using GIS analysis, one could correct this, based upon established relationships between cover and water point distance (Verlinden *et al.* 1997). These relationships have not yet been established for this area at species level. An overlay of existing fields with suitable cropping land in Fig 2 demonstrates that in the study area already a large proportion of most suitable areas for cropping, have been converted into crop fields and fenced. A comparison of Fig. 2 and 3 suggests that most of the land units suitable for cropping, are also the most suitable for finding surface water or shallow ground water. A comparison of Figs 2, 3 and 4 shows a high degree of overlap in the distribution of the highest quality areas for the three main resources. This suggests the possibility of competition for resources in a limited number of crucial areas. This notion was confirmed in discussions on grazing management, were informants pointed out that the main reason for leaving more densely populated areas like the larger villages was the shortage of good quality grazing areas that were increasingly converted to crop fields.

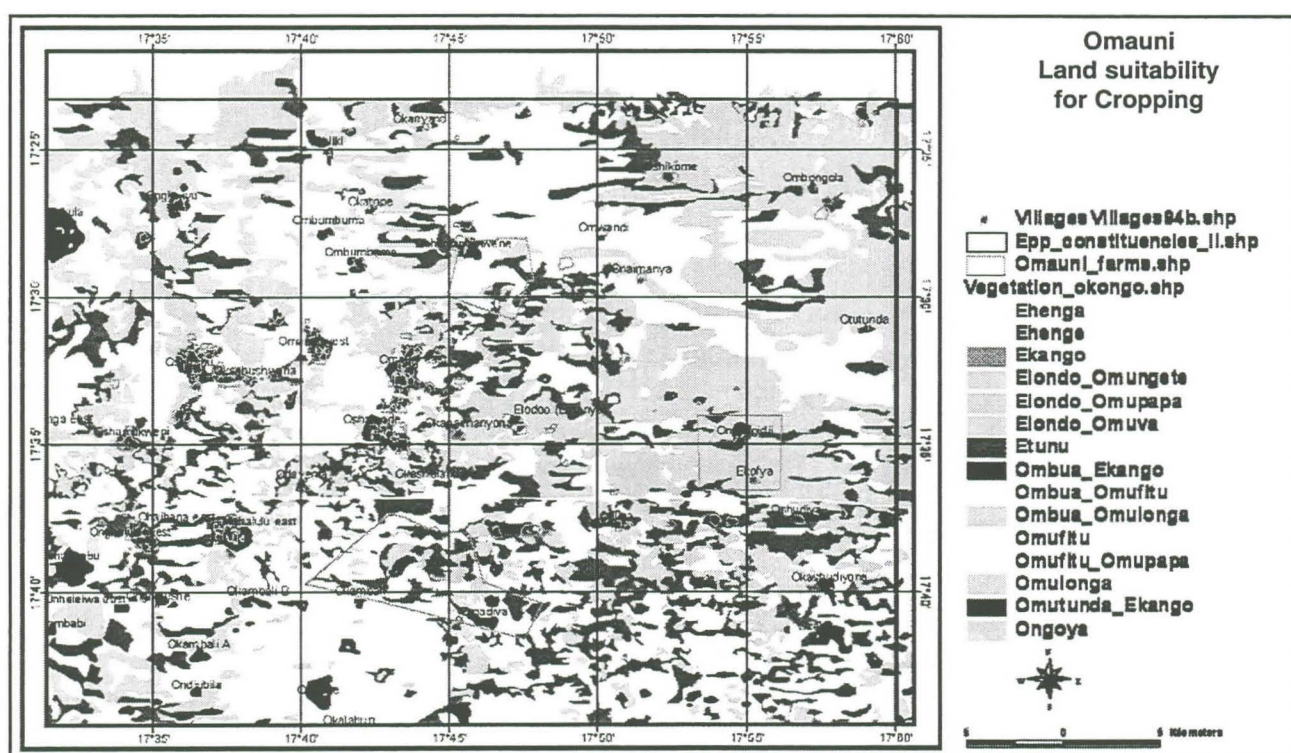


Fig. 2. Landscape unit suitability for cropping (mainly Pearl Millet Omahangu)

White areas are unsuitable, lighter hatches indicate very low suitability, while only the darkest hatches indicate high suitability

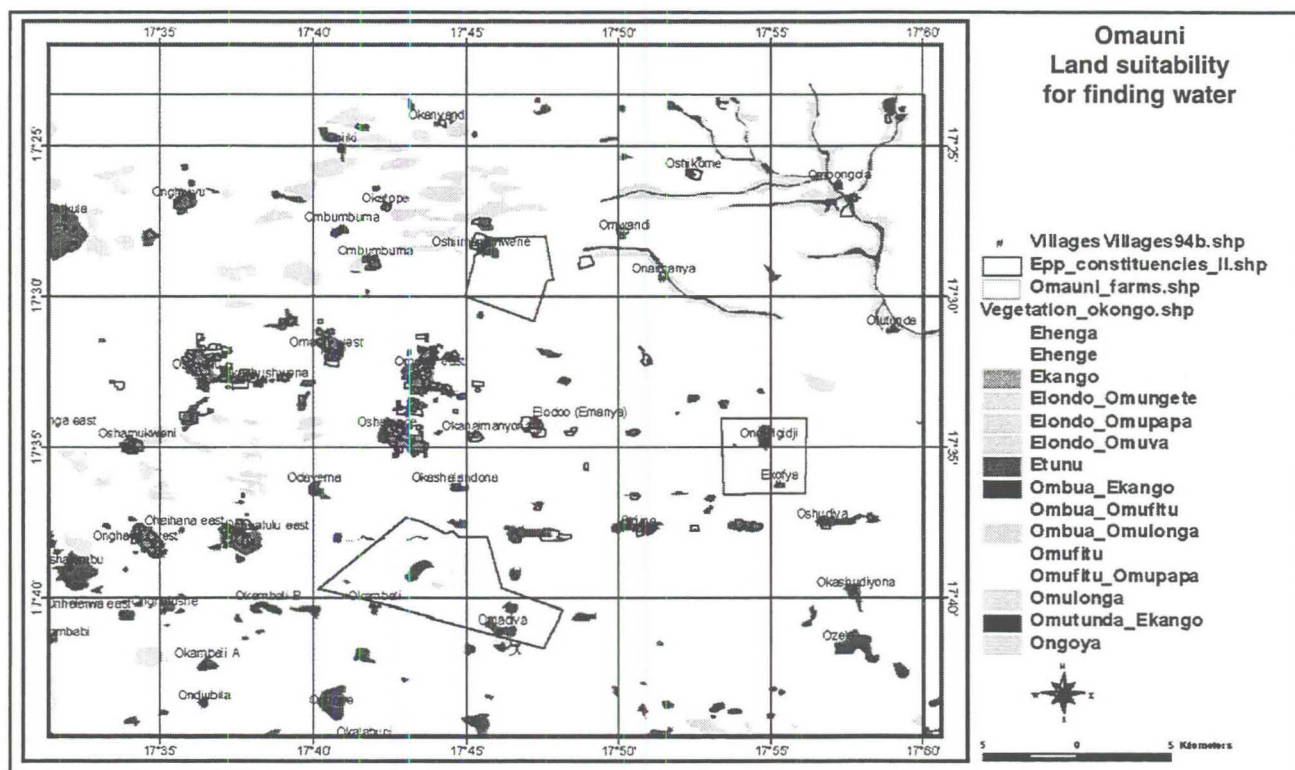


Fig. 3. Land unit suitability for finding shallow groundwater or surface water (mainly during the wet season). White areas are unsuitable, lighter areas indicate very low suitability, while only the darkest areas indicate high suitability.

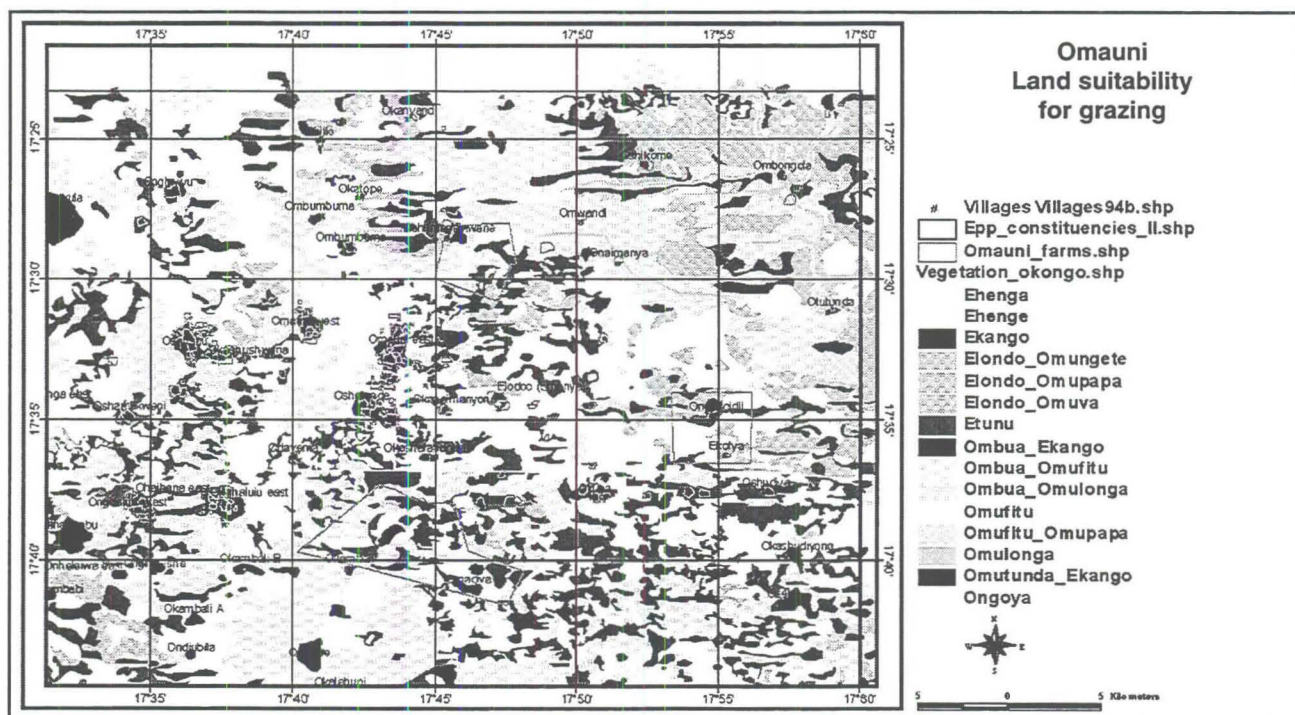


Fig. 4. Land unit suitability for grazing. White areas indicate a low number and low cover of palatable grasses, light areas have medium suitability, darker areas have high suitability and darkest areas have a very high suitability for grazing.

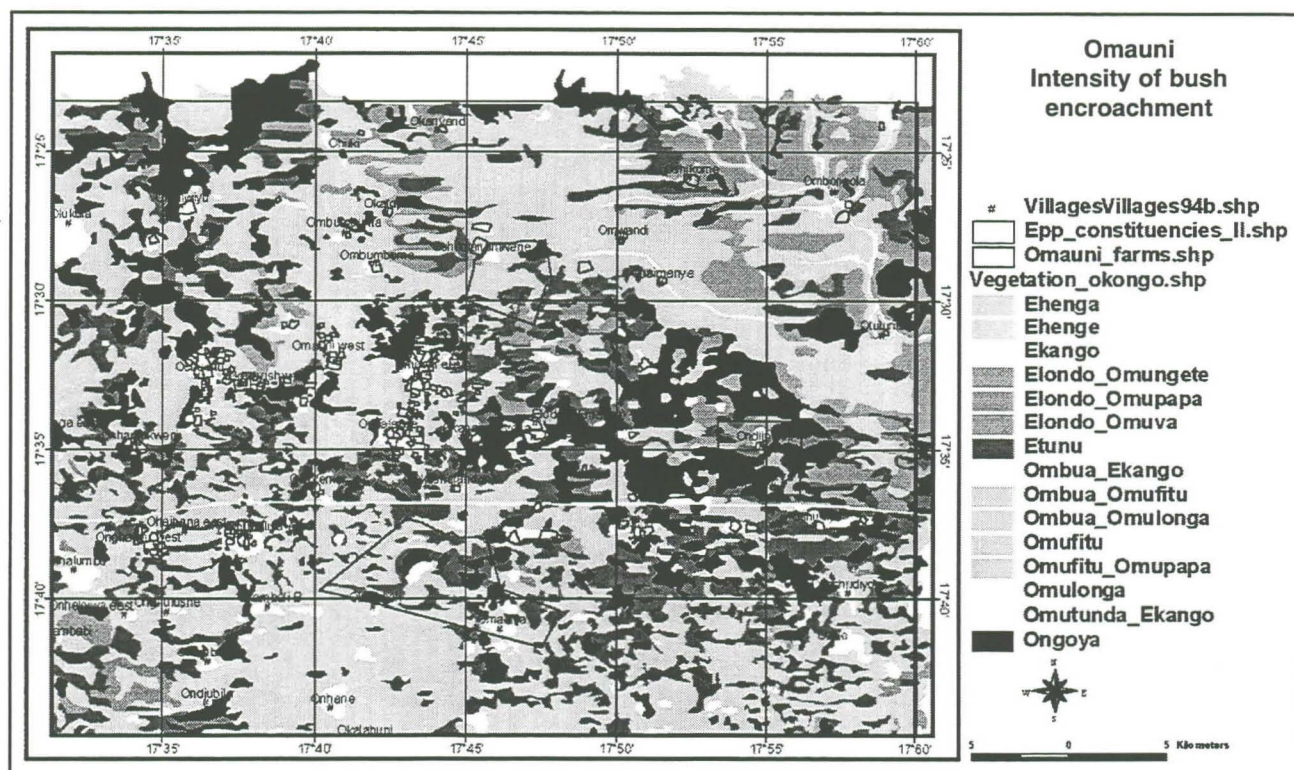


Fig. 5. Intensity of bush encroachment in different land units. White areas indicate only a slight degree of bush encroachment, light gray a medium degree of bush encroachment, dark gray a high degree and black indicates bush encroached areas ("Ongoya").

3.3. Rules and norms in resource management

One of our findings of the PRA approach when not enough time is spent on indigenous knowledge on resource management, is that existing rules and norms on resource use are not fully captured. Only when the informants and communities understand that the interviewers work with the local understanding of the environment, bits of information that are crucial for understanding management approaches in a communal area are shared. Good baseline maps with detailed farm boundaries, villages, water points and local landscapes appeared essential during these discussions. Again, only a few examples can be presented as a systematic overview cannot be given due to the large variations between the studied communities.

In one community with only traditional wells, rules on water use were agreed at the water point over a period of a few weeks at the end of the wet season. Depending on the water level, the labour provided by community members for digging wells, family ties, having a cattle post or not, the following rules are agreed: watering frequency and timing of the livestock, number of stock watered, exclusion of people (depending on labour provided or on voluntary basis, also based on lineage). Community members know at that time who is going to the cattle post with their livestock, who will be using the wells at what time and frequency, who will move to permanent waterpoints. People from outside entering the grazing area can be asked to leave or not to come back the next year. The grazing area is to different extents shared. Grazing areas around farms have almost exclusive access, the norm is that one avoids crossing farms and the surrounding area, except when necessary for watering livestock. The further away from the farm, the less access to grazing. One is frowned upon when infringements happen regularly and it might cause conflicts with neighbours and traditional leadership with limits posed on access in the future. When there is a drought these norms relax and there is a reluctance on enforcing rules or formalising the rules because of risks of limiting access to other areas in bad times.

When discussing grazing management in an area with 4 cattle posts close together, it appeared that the presence and size of certain landscapes had consequences for the grazing patterns followed by livestock. The main active management is herding the animals separately for a short distance in 4 different directions after watering the livestock on the common water point. Cattle however then select the best grazing areas. When they are available in sufficient size, cattle will not move quickly to other areas. When depleted, cattle will move to the second best areas and only end up in the less suitable grazing areas at the end of the dry season. In cattle posts without enough grazing areas of high quality, cattle end up much earlier in less suitable grazing areas. In such cases there is no grazing reserve or resting period. This serves as an

example that farmers very close together will have very different attitudes and needs towards range management, based upon the difference in grazing quality of their areas. Some farmers will have more need to manage bush encroachment, or to manage browse species than others. Knowledge of the geographical distribution of the local landscapes will assist addressing the right people with the right messages.

The data so far collected suggest that there is a more elaborate social structure regarding resource use and management than usually thought in a so-called "open access" area. Current discussions on how to devolve authority of resource management from government to communities currently move in the direction of strengthening this social structure through more formalised committees where traditional authorities form part of the membership. The Traditional Authorities Act of Namibia empowers traditional authorities control over various aspects of land use.

3. DISCUSSION

Incorporating local knowledge in conventional planning systems and especially GIS is a new development (Weiner et al. 1995). Although the approach used here to link indigenous knowledge with conventional knowledge is new as it has local descriptions as the basis, rather than interpretations ("locals say you find good soils here"), the methods used to describe and analyse the indigenous knowledge are not new and have demonstrated their use in various areas and applications. PRA, Canonical Correspondence Analysis has been used in a very wide range of applications and so has the Maximum Likelihood Analysis of Landsat TM imagery. Where previously research on indigenous knowledge has concentrated on ethnobotany and on local ideas of suitability of soils without an apparent in-depth analysis of the locally used characteristics to define the units, the scientific analysis of land units approach followed here has demonstrated that many farmers and communities in the study area have a holistic, consistent and meaningful thorough picture of their environment. The units were found to be consistent within Owambo language groups with many units common between Owambo languages. For North Central Namibia this means that one has to expect up to 5 local classification systems with many common units and some language-specific units. Preliminary research with Ovahimba and other Herero speaking people indicated the existence of a similar classification system, based more on landform than other characteristics. This is possibly the result of their areas being more mountainous. It was observed that people look at the most conspicuous characteristics first in order to recognise the land units. It is likely that similar land unit classification systems exist or existed in many areas in Southern Africa (a recent war zone is not likely to be an ideal environment to encounter culturally little changed people). Although each system will be unique, the approach to detect, describe and analyse will be applicable throughout the region.

It was found that people had in several cases difficulties with changes in the environment and resulting changes in the landscape, due to changes in management caused by less well understood factors. Although it was obvious from descriptions that the land units had changed in such cases, they still referred to the land units that occurred there before. This led however to interesting discussions during the community feedback between people who understood the changing environment better and could indicate possible management solutions. This is perhaps the main advantage of the approach: an increased ability to understand the environment the way local people have learnt it, to understand the social structure related to resource use and management and an increased ability to discuss environmental issues with local resource users. Without this approach, one would not quickly understand that land most suitable for cropping, was also most suitable for grazing and suitable for finding water. Without using the satellite image, it would have been very difficult to assess that these suitable areas are very small.

It was found difficult to incorporate the social structure into the GIS. Although it is possible to produce layers of informal boundaries of access, the lack of definition and the highly dynamic nature (GIS has problems with process) make it difficult to produce a clear picture of the social structure. Schematic drawings with arrows and informal boundaries on top of maps produce however understandable schemes. More research seems to be needed to incorporate this dynamic social structure as layers into a GIS.

Institutionally, the collaboration and teamwork between two ministries improved the links between the research team and the communities and farmers concerned. The network of extension technicians in MAWRD and the Directorate of Forestry is essential in the approach, although the average number of farmers of around 2000 per MAWRD technician is very high.

Because of this, implementation of projects is delayed. It is possible that projects might have to encourage the set-up of NGOs involved in rural livelihoods or rural development projects to assist ministry staff in implementation to avoid sector-oriented approaches.

4. MANAGEMENT IMPLICATIONS

4.1. Eastern woodland areas

The approach followed in this study allowed to name, locate and assess jointly with farmers and communities those factors that contribute to the restrictions in natural resource management options and livelihood strategies, resulting from the decreased access to crucial areas.

The work carried out in the Eastern woodlands shows that suitable land for cropping, grazing and finding water is restricted to a few land units that are scarce. In addition to this, it appears that good grazing land occurs mainly on the same land units that are most suitable for cropping. As a consequence, the more suitable grazing land is cleared for cropping, or fenced off, the less options are open for the poorer households with livestock to manage their livestock and the environment in a sustainable way. This has resulted in a vast increase of a certain unit, "Ongoya" characterised by high, impenetrable bush cover.

Previous grazing systems studies have pointed out that by large-scale fencing and increased land clearance, traditional livestock management might become unbalanced, yet they remain vague about the environmental factors contributing to this possible imbalance. The present study demonstrated the imbalances, an increase of "*Ongoya*" and an increase in fencing "*Etunu*" and "*Omutunda-Ekango*" areas (Figs 2-5). Additionally, it became clear that there exist norms and rules regarding uses of grazing land and wood use. The systems studied were not "open access". This might pave the way for more sustainable resource management on community basis, starting from existing social structures, rather than setting up new ones that might conflict with the existing ones.

The increase of fencing was of particular concern, as was the increase of the "*Ongoya*" unit at the expense of "*Epumbu*" and "*Etunu*", who had a much higher grazing value. "*Ongoya*" means literally "one cannot pass" and indicates a high degree of bush encroachment and the indicator to decide if a land unit can be characterised as "*Ongoya*" or not. Various plants were recognised as having better grazing value. The scientific analysis suggested that various potentially nitrogen-fixing species were involved. Several management options to increase some valuable, indigenous species were proposed by the informants (burning, reseeding, rotational grazing).

It was also recognised that "*Ongoya*" has a high grazing potential, provided appropriate management measures are carried out. These are mainly concerned with bush cover reduction. Further discussions have addressed the options of firewood sale, charcoal making, selective debushing, and burning. The community of one village has shown interest to set up a pilot project allowing these applications to be implemented in the field. Based upon the existing CBOs and its strong leadership, the context looks very favourable to carry out some activities resulting from the present work findings.

4.2. Recognising indigenous management units in Community Forest Management Plans.

Work in 4 villages with Community Forestry projects resulted in a keen interest to base management of these community forests on the indigenous management units. Instead of putting up artificial boundaries, it was recognised that the indigenous land classification in those areas was the most appropriate starting point for the zoning of the management units, facilitating the mutual understanding of the environment the way the local people see it. A consultant is now working in one village to implement this approach. Progress is followed closely to be able to implement it in other Community Forests.

4.3. Transferring knowledge from on-farm FSRE experiments to other farms

Farmers informed us about the differences in suitability for cropping of the various land units. Within some good cropping units ("*Omutunda*", "*Etunu*") variation between regions in species composition and soils was found. This led to differentiation to subunits (e.g. "*Omutunda_ekango*", "*Omutunda_okuti*") which were accepted by farmers during the discussions. Differences in farming practices between these subunits need to be researched and taken into account in extension messages.

With the decrease in availability of land, a trend towards the cultivation of less suitable units becomes apparent. The increased heterogeneity of cultivated land units will require adaptive management (e.g. levels of fertiliser, soil preparation techniques). Integrating FSRE experiments with the indigenous knowledge on land units and especially their potential for cropping and grazing will facilitate the choice of relevant extension messages. Research with the FSRE unit in the region is now underway to investigate this.

4.4. Participatory assessing erosion in the central alluvial fan (Oshanas)

Although the alluvial fan is very flat and therefore not at very high risk of accelerated erosion, the infrequent occurrence of flooding events in a heavily grazed area might induce such a process. In the Oshanas area, the presence of a shallow hard pan is an influential factor in suitability for cropping and grazing and observations indicate that its much lower permeability causes sheetwash of the thin sand layer on top of it. Local landscape units link the vegetation structure directly to the depth of the hard pan. In units unsuitable for cropping ("*ehenene*", "*ehalala*") woody plants are absent and the hard pan is found within 20 cm of the soil surface. Sheet erosion is observed frequently in these units in heavily grazed areas, especially where no biomass is available to fence of cropped areas. Lack of fencing might accelerate erosion. These local land units could be mapped using satellite imagery and aerial photographs. Research is now ongoing using aerial photographs and GIS to verify if local land units being eroded are larger in deforested and heavily grazed areas in similar environments.

5. PERSPECTIVES FOR FURTHER ACTIVITIES TO BE IMPLEMENTED

The research into the potential of linking indigenous knowledge systems on land unit classifications and resource management with GIS is planned to continue until June 1999.

Because of the importance of the involvement of communities and extension workers in the work, a process approach rather than an output oriented approach is preferred. Otherwise the study would be limited to extracting information from communities. Rather than producing a landscape classification map covering North Central Namibia, it is proposed to explore how the approach could assist processes by which communities could strengthen social structures to increase control and management of the resources. This means spending time on the follow up of the processes

already underway in the community forestry projects and spending time on the implementation of some of the above mentioned management implications. It is possible that attempting to cover the whole area without involving agriculture and forestry extension staff together with farmers and communities will result in just one more of these maps gathering dust. Moreover, the vast amount of field work involved precludes the production of a reliable information system on such a short time span.

The approach and method should be considered as only part, but an essential one, of the process to understand the livelihood strategies of rural people and to start a participatory planning process. The current methods allow to understand and exchange views on the biophysical environment the way local people see it and can give insights in some of the existing social structure around resource use and management. The work should be complemented with research on local institutions and the way people cope or fail to cope with changes in the environment, policies and institutions.

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LESSONS FROM THE CASE STUDIES AND THEIR COMPARATIVE ANALYSIS

Patrick Caron

The workshop organised in Pretoria from 24 to 26 November 1999 aimed at reviewing and drawing lessons from research and development experiences focussed on spatial approaches for land use and local governance. The case studies have been chosen to provide a diversity of approaches that have been tested for supporting agriculture and rural development planning at community and local government levels.

It is therefore not a surprise to acknowledge that all these case studies pay particular attention to the involvement of researchers in the different steps of the development oriented research process, i.e. the three inter-related functions that have been discussed in the Introductory Note (Caron et al., 1999), namely: analysis, experimentation and planning.

Nor is it a surprise to confirm that the use of spatial approaches for land use and local governance lead the researchers to take into account and integrate different levels of social and spatial organisation and the interactions between them. These scales further refer to both public and non-governmental organisations and rely on the existence of formal and informal stakeholders' networks.

Yet, the context, the challenges faced by research and the approaches are different in each situation. After analysing some commonalities highlighted through the presentation of the case studies, this synthesis proposes in the second part a framework for initiating a comparative analysis. Through the application of this framework, a typology of the trajectories of spatial approaches for land use and local governance is proposed. Some lessons and questions arising from the comparative analysis are then drawn in the last part.

SPATIAL APPROACHES FOR LAND USE AND LOCAL GOVERNANCE: SOME COMMONALTIES

A rural world in motion

The first common issue that should be noticed relates to the important and in-depth changes that characterise the situation of rural populations. In the recently created Amatola District (Eastern Cape Province, South Africa) for example, Lhopitallier (1999) shows that the demographic patterns, economic flows and agricultural production practices have considerably been transformed in the early 1980s' when the Ciskei and the Transkei became "independent". The same areas are undergoing rapid changes since the end of apartheid in 1994. Similarly in Zimbabwe, the land use patterns have rapidly evolved as a result of the migration of rural population into the Guruve District (Zambezi Valley, Zimbabwe) since tsetse flight has been controlled in the 1980s' (Ricard et al., 1999). This second example rises new questions in terms of planning, related to the land tenure and the relationship between the development of crop production and the conservation and use of biodiversity.

Local dynamics in a changing environment

Although they take place in a changing environment, these evolutions are not only externally imposed. They also result from local stakeholders' strategies and activities, whether individual or collective. The building of a rural network in the eastern part of the Amatola District (former Transkei) is a clear example of endogenous development triggered by the upgrading of infrastructures. As shown by Lhopitallier (1999), the trading business is thriving and major businesses from Butterworth are now opening branches in the neighbouring towns.

Such evolutions result from the development of formal and informal networks of agents who manage flows of knowledge and information, capital, labour and products. These networks or their members make decision and act individually or collectively through alliances and conflicts. As shown by Verlinden & Dayot (1999) regarding the management of common natural resources in shortage in North Central Namibia, one can identify a dynamic process through which systems of norms, values and rules are locally created. Innovations result from this process and involve multiple stakeholders, relationships of competition and co-operation, learning collective processes and representations shared by a community of stakeholders. The co-ordination process between local stakeholders results in the establishment and development of *localised productive systems*, as defined by Courlet & Pecqueur (1996). According to the authors, the *localised productive system* (LPS) presents the "three following characteristics:

- (i) it structures the stakeholders strategies and impact on their behaviours;
- (ii) it ensures its own reproduction on the basis of specific institutional arrangements; and
- (iii) it is subject to the influence of global constraints and regulations, whilst contributing to them".

The LPS involve local stakeholders for exchanging technologies, products and services for example. They also involve external ones either to mobilise financial support as in the Biodiversity Project in the Guruve District, or to organise migration flows as in the Amatola District.

Co-ordination and public institutions

Besides, the role and involvement of public stakeholders, i.e. local and central governments and their institutions, is of particular importance, as one refers to local governance and planning. The case study from Zimbabwe (Guruve District) clearly shows that some traditional authorities have control over the use of natural resources at the local level and how land use patterns result from individual and collective strategies. However, Ricard et al. (1999) highlight the importance and the legitimacy of the local government for all matters related to land use related issues. The way individual, collective and public stakeholders co-ordinate to each other for elaborating legislation, promoting innovations, mobilising and distributing resources, providing services and infrastructure, etc, therefore appear of fundamental importance. Lhopitalier has for example suggested during his presentation that public actors should act on levers identified within the co-ordinating networks.

In addition, it became obvious through the presentations that the social organisation levels, which are relevant to explain the dynamics of change, do not usually match with the limits of political and administrative units. This turns the co-ordination process between stakeholders even more challenging.

Spatial approaches for development oriented research: local as one of stacked organisation levels

The expression and the consistency of this organisational capacity can be looked at through the existence of territories that rely, each of them, on specific organisation levels. Brunet (1990) refers to the "system of actors" to explain how the "production of new spaces" can be regarded as a social process and that the organisational patterns and characteristics produced as a consequence reflect the complex interactions between stakeholders. These considerations make spatial approaches particularly relevant to analyse the changes that rural populations are going through.

There are indeed stacked organisation levels which interfere and contribute to change according to the specific common interest to be promoted (Caron, 1998). Although difficult to identify since its limits, geometry and organisational principles constantly vary and are often multiple, the local level can be understood as an environment constituted from functional inter-dependencies between stakeholders. They are part of a single territorial unit, which offer them an organised framework for reducing uncertainty and developing collective learning processes (Camagni, 1991). Local institutions also offer opportunities for conflict solving, as shown by Ricard et al. (1999). It is therefore a level of particular interest for the analysis of technical, economic and social change, for identifying the social demand and for the design of appropriate interventions by involving stakeholders into plans and programmes. It was also often suggested during the discussions that the local level is the one where the development support approaches and activities from different institutions can be integrated and made consistent through planning.

Participatory approaches and indigenous knowledge for development oriented research

The analyses conducted in the Eastern Cape and North-West Provinces in South Africa, in the Guruve District in Zimbabwe and in the North Central Namibia all prove the interest of elaborating specific methods for taking into account the indigenous knowledge and practices. Referring to the generic term of participatory approaches, these were efficiently used to understand the complexity of the situations and their changes, the strategies of the stakeholders that induce them and the diversity that characterise the management of productive resources. However, Verlinden and Dayot (1999) and Pienaar highlighted the need for different and specific methods to be combined into consistent approaches for dealing with such a challenge and complex research subjects.

Some conclusions contradicting common assumptions

The results of these analyses often bring some conclusions that infringe general assumptions commonly shared by the scientific and political communities. Verlinden & Dayot (1999) for example demonstrate how local communities elaborate rules to manage common natural resources. During his presentation, Pienaar has shown that the analysis of the changing rural situations contradicts the traditional dichotomy between rural and urban spaces. This is also particularly evident in the case of the Amatola District. The model proposed by Lhopitalier (1999) highlights the importance of urban centres that act as magnets for rural areas. The author shows that there is in fact a continuum of situations.

A FRAMEWORK FOR A COMPARATIVE ANALYSIS FOCUSING ON SCALES AND RESEARCH FUNCTIONS

Each experience presented during the workshop has been designed and implemented in a different context. This refers to the geographical, economic, social and political environment. In the Zambezi Valley, land use patterns evolve as a consequence of pioneer dynamics developed by farmers recently arrived in a low-density area. On the contrary, in the Eastern Cape and North-West Provinces in South Africa and in the North Central Namibia, historical forced removal of population have implied in very high demographic pressures. High concerns relate to land degradation and economic and social transfers from the external environment.

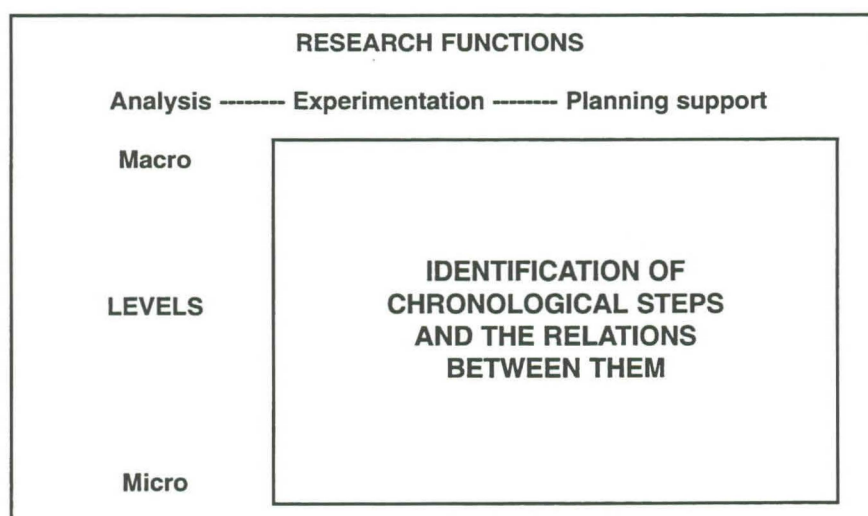
This also refers to the institutional and scientific environment. Each experience accepted different research subjects and relied on particular objectives (e.g. conservation and use of the biodiversity, improved management of natural resources, local development, transfer of technology), resources and approaches.

Initiating a comparative analysis, although limited by the number of case studies, is foreseen as a collective challenge. It is however not intended to identify best practices but to draw lessons to be shared between each other.

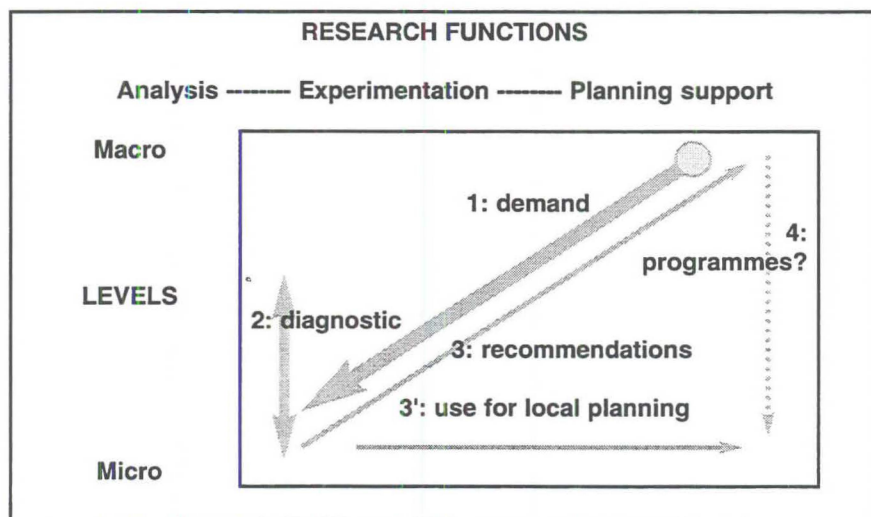
There are different ways to conduct a comparative analysis. The choice is here to primarily focus on two issues:

- the different scales at which activities were undertaken during the experience, from macro to micro-level; and,
- the involvement of researchers in different research activities, according to its functions, i.e. analysis, experimentation and planning support (see Introductory Note of the workshop, Caron et al., 1999).

This choice is intended to ease the elaboration of conclusions regarding the methodological and operational lessons that can be drawn from the case studies. To identify issues of common interest for future collaborative activities, the researchers involved in each case study were asked to represent the history of their experience on a graph, as follows:

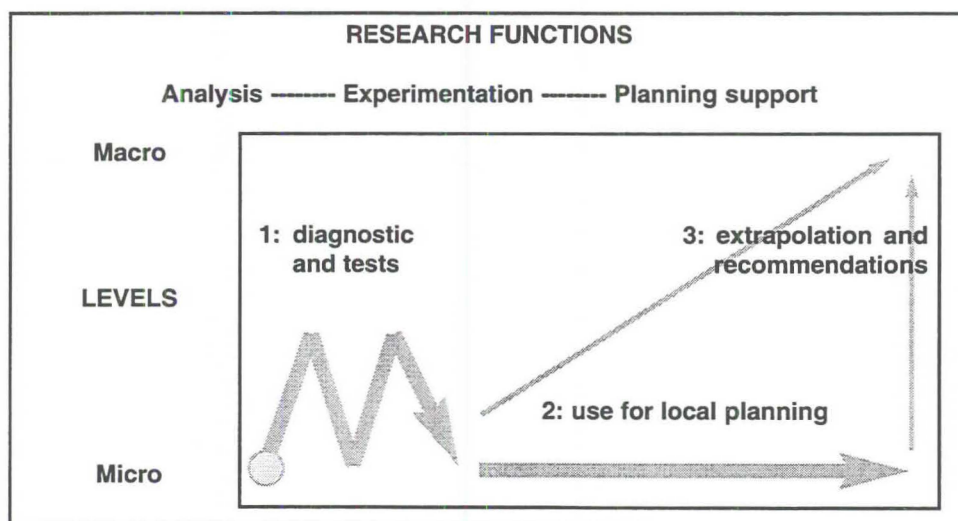


This exercise lead to the elaboration of a preliminary and temporary typology of possible trajectories for implementing spatial approaches for land use and local governance. The following types were identified:



Type 1: Initiative taken at macro-political level; analysis conducted at various levels with special emphasis on local level for elaborating recommendations to be used for macro-planning.

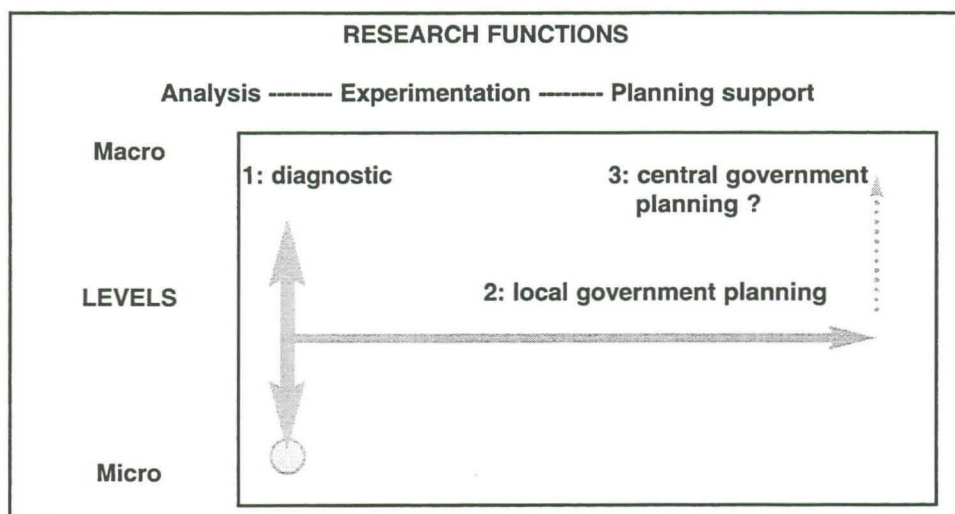
Ex: (i) North-West Province case study (South Africa) for assessing land reform programme opportunities.



Type 2: Initiative taken by researchers involved in Research-Action activities; analysis undertaken at various levels, with or without experimentation, for local planning and further attempts to elaborate recommendations for macro-planning.

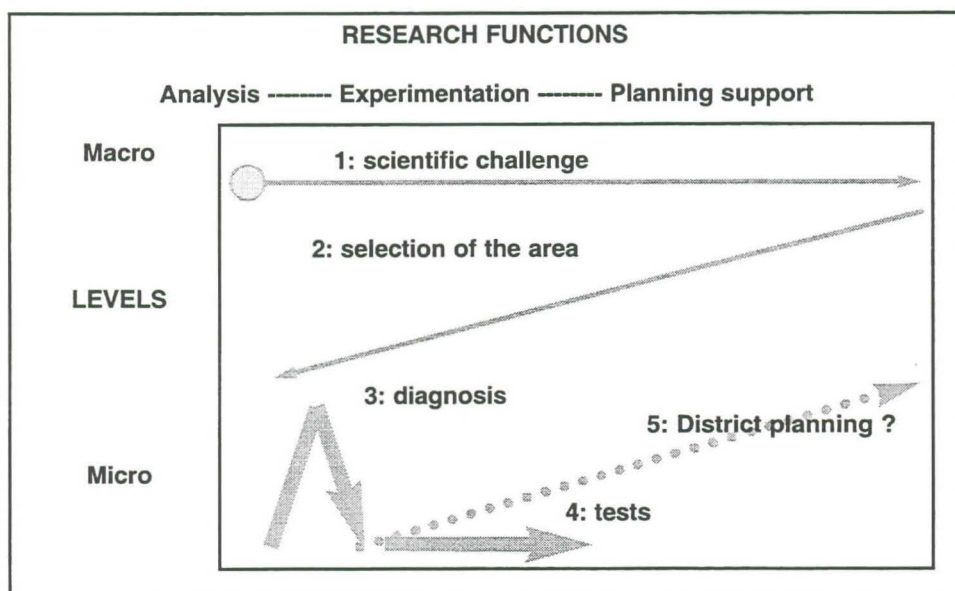
Ex: (i) North Central Namibia case study for managing natural resources.

(ii) Eastern Cape Province case study for planning the introduction of hemp through the use of GIS (Morgan, 1999).



Type 3: Initiative taken by researchers involved in Research-Action activities; analysis undertaken at various levels, for planning at local government level.

Ex: (i) Eastern Cape Province case study for planning at Amatola District level.



Type 4: Initiative taken by research institutions at central level; analysis conducted at various local to meso levels for testing innovations at local level and elaborating recommendations to be used for local government planning.

Ex: Zambezi Vally case study for biodiversity conservation and use and land use planning at Guruve District level.

Lessons and questions arising from the comparative analysis

SCIENTIFIC LESSONS AND QUESTIONS

by
Patrick Caron

The challenge of dealing with complexity

All the case studies that have been presented and discussed proved to be complex. The complexity relates to the situations scientists want to interact with. In all cases, one observe a multiplicity of stakeholders developing their strategies to produce, consume and manage their own resources as well as collective ones, a multiplicity of resources and a multiplicity of uses of the same that are inter-dependant. There is also a multiplicity of institutions that have a specific mandate and strategies and which actions is designed to impact at different levels (local, regional, national, etc).

It also relates to the approaches designed by scientists to address the objectives, both scientific and operational. The type of activities implemented (research, research-development, research-action, etc) always relies on the integration of various disciplines, methods and tools. Dealing with this complexity both in terms of analysis and support for decision making therefore appears as a scientific challenge.

From one scale to another

The typology proposed above shows that it is necessary to integrate activities conducted at different scales to fulfil each of the three research functions. In addition, integrating the results of analysis and experimentation activities undertaken at different scales makes it easier to address the planning support function at a particular level. For example, planning support to local governments (e.g. Gurube, Amatola) involves the packaging of information produced at the administrative unit level. It also takes into account the analysis conducted at some of the stacked organisation levels that are relevant to explain the evolution observed at the administrative unit level. Particular attention is usually paid to the environment as well as micro situations. When available, the results of tests can usefully provide further information regarding possible solutions for problem solving.

In the case of Northern Namibia, outputs for planning derive from observations and participatory interviews conducted at the plot and the community levels. Using remote sensing and Geographic Information System (GIS) and elaborating specific methods to stratify the situations, sample some of them and extrapolate the information obtained locally, made it possible to produce results that might be used for decision-making at regional level. The whole process thus relied on specific methods and tools for each particular level and culminated into a consistent approach.

However, one should notice that the level of marketing channels of organisations is rarely taken into consideration. This might offers opportunities for future development.

Spatial representations: what for?

In all the case studies, spatial representations were discussed by scientists to formalise and share the information produced. Yet, they varied considerably from drawings made by local people themselves to the most sophisticated computerised outputs.

Similarly, their level of use strongly differ from one experience to another, as well as for each type of representation developed by a team. They might be tools for collecting primary data, for scientists to integrate heterogeneous data and conduct the analysis, for representing the information derived from analysis, for packaging and disseminating this information, for stimulating a negotiation process or for supporting decision-making. The choices regarding the objects to be represented and the way to represent them (drawings, maps, models, etc) were illustrated accordingly.

In each case, the contribution of non-scientific stakeholders to the discussion of spatial representations is also varied. They might elaborate a demand, provide information, discuss and validate research outputs, use them for designing new activities or planning.

From spatial approaches to territorial development: a challenge?

Spatial approaches were thoroughly used by scientists involved in the workshop. However, as noticed by Lardon & Moquay (2000), such practices do not necessarily refer to territorial development, understood as an increased control from a social group of the processes that affect their territory. The authors highlight that, although the territory might be considered as a support of activities and as a product of these activities and history, this does not imply looking at it as an organisation factor for such activities, nor as a factor of evolution. The territory is then considered as an object, rather than the subject. According to the authors, it is then a passive rather than active territory and does not account for its capacity of acting, promoting the innovation and the change and participating in the control of evolution processes.

Participatory approaches: different interpretation

During the workshop, participants often referred to participatory approaches which, apart from becoming a fashionable and necessary justification of the research activity, proved to bring in very positive input. Yet, participation covers a great deal of different understandings. For some scientists, it is essentially based on the recognition of the value of indigenous knowledge and a way of accessing and integrating it into the analysis. For others, participation is promoted as an opportunity to ensure the operability and use of research output through the establishment of partnerships with decision-makers. Stakeholders are then involved in feed back and validation of the results and scientists aim at providing them with elements for decision-making. Finally, although little explored, scientists might have an interest in analysing how the spatial representations they produced change the interpretations stakeholders have of their environment, their situation and their activities and impact on their decisions.

PARTNERSHIPS AND RELATIONS BETWEEN RESEARCHERS AND DECISION-MAKERS AND OPERATIONALITY OF RESEARCH OUTPUTS

The issue of partnerships between researchers and decision-makers have already been mentioned, but further observations are necessary to address it. They relate to:

The interface between the social demand and the research offer?

To promote the use of research output based on spatial approaches for local planning, scientists might follow different ways, as illustrated by the typology discussed above. The first one consists of identifying the social or political demand and then design approaches and implement methodologies adapted to the research objective. The second one is more common and stems from an attempt made by scientists based on previous achievements or assumptions and brought to policy-makers for further development. They might indeed be complementary, as part of an interactive process.

In all the case studies, scientists have voluntarily and deliberately tried to establish such an interface between the social demand and the research offer. The success of such an enterprise is often moderate and rarely matches the expectations of all partners.

The rationale developed by scientists on the one hand and policy-makers on the other hand, whether individuals, informal local institutions, etc., are specific and sometimes conflicting. The social demand relates to problems to be solved and therefore relies on different principles than the scientific ones. Researchers need to be recognised by their community and thus formulate their offer according to disciplines, concepts and methods. The necessary interface is frequently miss-interpreted.

The rationale developed by decision-makers, financing agencies or end-users of the research results also differ from one another, depending on interest, strategies, alliances and conflicts. This should lead scientists to systematically question who is responsible for the formulation of the demand, and to whose agenda it adheres to. In the case of the Gurebe District (Zambezi Valley, Zimbabwe) for example, the conservation and use of biodiversity appears to be a concern for scientists and the national institutions. For the local government, the project offers an opportunity to strengthen their legitimacy and control of land resources and use, while communities are mainly interested in the direct benefits they could get from the project. Dealing with such diverse demands and objectives is not an easy task for designing research activities. Once again, the integration of scale is of fundamental importance for implementing a consistent approach based on heterogeneous demands. As shown by Pienaar in the case of the North-West Province in South Africa, the formal request and the financing of research might be central because of the prevalence of a specific problem such as land related issues in a large number of localities. Addressing this central demand calls for central but also local innovation and, in no case, prevents from using participatory approaches. The example developed by Verlinden & Dayot in Northern Namibia and discussed above shows the path towards possible extrapolation of local studies in order to impact significantly at the regional level. Such an experience also offers an opportunity to explore possible ways of addressing the demands expressed by diverse stakeholders.

In addition, timeframes for scientific production and development might differ significantly. There is a time needed for producing information, another one for conducting the negotiation process or implementing new activities. Scientists are often reluctant in delivering information that has not been validated, while stakeholders involved in development urge them to do so, since they have to make decisions in situations where they cannot rely on incomplete information.

Finally, the terms of reference for the scientists involved in land use and local governance research activities are rarely formalised. Negotiation with stakeholders is usually not undertaken, except between scientific and financing agencies. This situation might lead to suspicions of hidden agenda, as in the example of the Zambezi Valley. On the contrary, it is important to reach a formal agreement, which includes the objectives of the research activity, the property and use of the information produced, the involvement, responsibilities and limits of researchers in decision-making. This certainly raises a challenge for improving partnership and the efficiency of research.

The use of information for decision making support

Methods and information are the main output of the research activities that have been discussed. They aim at modifying the interpretation that stakeholders have of their environment and their own situation and activities by taking into account the factors inducing change in the rural situation, the rules and modalities for such transformation to occur and the consequences they bring. To fulfil this objective, the role of models, designed as theoretical frameworks based on observations, have been highlighted, as in the case of the Amatola District (South Africa). Models also provide generic information that might be used for extrapolation, as in the case of Northern Namibia.

Such an ambition calls for adopting certain steps when implementing the research process. First comes the need to identify, together with the decision-makers and end-users, what type of information should be produced and what it should be used for. Scientists can then elaborate the methods to collect and process data. Finally, the type of representation and support used to translate scientific into operational information is fundamental for turning the information into an input for decision-making and highlights the social responsibility of the researcher.

Participatory approaches and consensus: avoiding the confusion

Behind the notion of participation, one can often identify the explicit or implicit search for consensus, as a way to promote collective and public action. One should then question whether this search is part of the scientific process or of the social process of using the research output.

During the Amatola District case study presentation, Lhopitalier highlighted for example that the planning process belongs to stakeholders involved in decision-making. Nevertheless, scientists might play an important role by identifying conflicting issues for decision-making, providing information related to these issues and proposing adequate specific methods and tools to be applied in the negotiation process. The map and other spatial representations can be used for integrating heterogeneous data, stimulating the dialogue between stakeholders, identifying problems, imagining scenarios or solutions, making decisions and strategic choices, planning the allocation of resources, etc.

In addition, divergences in representations might be meaningful and relevant to be taken into account in the planning process. Looking at consistencies and inconsistencies between different sources of information and different stakeholders' representations proves to be a powerful way of elaborating information. Men and women respectively look at sources of water in a very different way in the Zambezi Valley according to the way these places are used, and this very clearly comes to bear when they are asked to represent their community through drawing.

Similarly, it was suggested that the mapping of conflicts or strategic interests vis-à-vis productive resources, might be a powerful output to stimulate decision-making.

CONCLUSION

By organising the Workshop "*Spatial approaches for land use and local governance*", the choice was to explore case studies and draw lessons from them, rather than conducting a theoretical process. The intention was to identify generic outputs and common interest and problems for possible valorisation and collaboration.

The experiences presented and discussed during the workshop were all part of **Research-Action** programmes, in which researchers work together with rural development stakeholders. The role of the latter is recognised as central. The research output aims at supporting decision-making in a changing and uncertain environment by providing stakeholders with relevant information.

The case studies clearly demonstrate that stakeholders' strategies contribute to the production of new and diversified spaces and territories. In return, identifying the diversity of such spaces help in characterising stakeholders' strategies and practices. The approaches that were developed usually involves the identification of the diversity that characterises the research subject as the first step. An attempt is then made to analyse the factors, the actors and their activities that contribute to this diversity: Who is doing what? Where? When? How? Why? With (or without) who? The approaches pay more or less attention to the changes along history, but all explicitly refer to various geographical scales and to the integration of spatial, social, economic, ecological, technical and political factors. Specific methods and tools are tested for each component of these approaches, which lead to the development of rural development models to represent the collective process of transformation of local societies and management of resources. These models integrate the factors that contribute to changes, including the intervention of local and central governments, the rules and modalities for such changes to occur and their consequences.

The experiences discussed are all innovative. They rely on proactive initiatives from researchers, which try to make their results available to decision-makers in order to impact on development. However, as discussed above and for reasons that have been explored, the junction between the social demand and the research offer is facing limits and raising challenges.

These experiences are at different stages of advancement. Some of them are still intentions (Mozambique, use of GIS in the Eastern Cape Province), other ones are on-going and their results still lack validation and valorisation. The more advanced offers a good basis for extrapolation of the methods and knowledge produced. Actually, all of them were conducted in one single locality. One can easily foresee the amount of work to be undertaken before applying similar approaches in a large number of situations or deriving from them activities to be undertaken at national level in order to impact significantly on development. This was however identified as a major challenge by Prof. Van Zyl during the opening speech of the workshop.

The workshop offered a good opportunity for exchanging information, methodologies and experiences, promoting the scientific production derived from each experience through their formalisation and publication and initiating a comparative analysis of approaches implemented in different and specific contexts. The development of a scientific and institutional framework for improved collaboration and interaction between scientists might now show the path for addressing the numerous questions raised by this analysis. Such exchanges will also have to involve in the future other partners that could not participate in the workshop.

There is a need to analyse other experiences, implement new ones and explore further their scientific contribution to research and development. As stated by Verlinden, the question is "how to be collectively creative in the future?" Collaborative activities might be designed to address issues of common interest, such as the valorisation of approaches, concepts, methods and results or the improvement of methods for integrating different scales of analysis, experimentation and planning.

Unanimously, the local level is recognised as particularly relevant for analysing the changing situations, co-ordinating individual, collective and public stakeholders' initiatives through negotiation and programming the appropriate resources and actions to support development. To do so, spatial approaches prove to be operational and provide adequate information for natural resources management and land-use related decisions and local governance, not only because of the very nature of the research subject, but also since they make it possible to integrate different scales in the process. However, such approaches raise numerous questions and therefore challenges. They relate to concepts, methods and tools to be designed, adapted and validated. They also relate to partnerships and, more specifically, to the relationships between the scientific community and the society, even more so because of the public good characteristic of the information produced.

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