THE STATE OF SPATIAL INFORMATION FOR LAND REFORM IN SOUTH AFRICA

A CASE STUDY OF THE AMANTUNGWA LAND REFORM PROJECT

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2006

Abstract

Many authors and practitioners involved in rural or local development agree that co-operation and the integration of efforts by the delivery agents is crucial for sustainable development programmes. The delivery of Land Reform as initiated by the new government in South Africa (SA) is one programme that has been faced by a number of challenges including the slow pace of delivery, lack of support and co-operation from the key stakeholders, negligible impact on the improvement in the lives of its beneficiaries and many others. Many Land Reform participants including the government argue that among the challenges facing this programme is a lack of co-operation between the key stakeholders including the different spheres of government involved or impacted upon by the delivery of the Land Reform programme. The Department of Land Affairs (DLA) which is responsible for Land Reform delivery is facing challenges in integrating Land Reform with the rural or local level development which is facilitated by the local and district municipalities through the Integrated Development Planning (IDP) process. This thesis seeks to look at how the Land Reform planning process and the internal spatial data systems within the DLA can be used to integrate Land Reform delivery with the municipal IDP processes to attain integrated rural development.

There is a growing realization of the fact that the development of an integrated spatial data is critical for sustainable development in SA. A number of initiatives have been embarked upon by various organizations to establish the spatial data infrastructure. However these efforts have been reported to be often fragmented and isolated in the areas of operation and focus. Thus, the challenge is to develop a strategy to develop an integrated spatial data infrastructure that would be used to support sustainable development programmes such as the Land Reform programme. This thesis therefore proposes to look at the various data sources particularly within the DLA and from other organs of state involved in Land Reform and local development with a view to highlight the limitation and shortcomings that can be addressed in integrated spatial data infrastructure.

To assess the current status of the spatial data sources and usage for Land Reform implementation, an analysis of the spatial data sources within the DLA was conducted to determine its suitability for the development of an integrated spatial data infrastructure. Different sections of the DLA responsible for acquiring and providing spatial data were assessed to ascertain whether their data can be shared, transferred or integrated to support the Land Reform implementation. An integrated spatial data infrastructure is then proposed as a solution to forge co-operation and collaboration among all users involved in Land Reform implementation.

Disclaimer

This research is a study conducted as part of the Land Information Management programme in the Centre for Environment and Development at the University of KwaZulu-Natal. The views expressed in this study do not represent the views of any of these institutions but those of the author.

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Acknowledgements

First of all I would like to thank God for giving me the strength and courage to undertake this mammoth task and all the Kubheka ancestors for blessing and guiding this effort. I want to give many thanks to my wife lovely Phindy and my daughter Nomaswazi for their enduring support and love that enabled me to push through even during the most challenging times on this work. I also want to dedicate this work to my dearly departed parents William Mkhithika Kubheka and my mother Elizabeth Kubheka for the wonderful upbringing that I got from them and all the good things they taught about life. I would also like to thank all those who have contributed academically to this work starting with my supervisor Dr. Rugege, officials of the Department of Land Affairs particularly Mr. V Z. Mngwengwe, officials of the Amajuba District Municipality, particularly Mr. S. Duma and Mr. I. Scholtz, Mr. Sbongiseni Maseko of Maseko Hlongwa and Associates, Inkosi Khumalo of the Amantungwa Trust and many others whom I would not be able to mention.

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ACRONYMS USED:

ADM: Amajuba District Municipality
BRG: Bio-resource Group
BRU: Bio-resource Unit
CBPWP: Community Based Public Works Programme
CD: Chief Director
CODI: Committee for Development Information
CIS: Cadastral Information System
CMIP: Consolidated Municipal Infrastructure Programme
CSI: Committee for Spatial Information
CSIR: Council for Scientific & Industrial Research
CV: Curriculum Vitae
DLA: Department of Land Affairs
DOA: Department of Agriculture
DOA & EA: Department of Agriculture & Environmental Affairs
DOH: Department of Housing
DOT: Department of Transport
DOTLG: Department of Traditional & Local Government
DPLG: Department of Provincial and Local Government
DWAF: Department of Water Affairs & Forestry
ECA: Economic Commission for Africa
FAO: Food and Agricultural Organisation
GIS: Geographic information System
HSRC: Human Science Research Council
IDP: Integrated Development Plan
KZN: KwaZulu-Natal
LED: Local Economic Development
LRAD: Land Redistribution for Agricultural Development
MASEKO HLONGWA AND ASSOCIATES: Maseko Hlongwa and Associates (PTY) Ltd
NSIF: National Spatial Information Framework
PAR/PRA: Participatory Action Research
PIMS: Planning & Information Management Support
PLSS: Public Land Support Services
SA: South Africa
SDI: Spatial Data Infrastructure
SDDF: Spatial Data Distribution Framework
SGO: Surveyor General's Office
SPI: Spatial Planning and Information
UN: United Nations
UNEP: United Nations Education Programme
USAID: United States Agency for International Development

INTRODUCTION

1.1 Historical background to the Land issue in South Africa

It is estimated that more than 3.5 million people and their descendants have been victims of racially based dispossessions and forced removals during the years of segregation and apartheid in South Africa (SA). These were carried out by the successive colonial era regimes and the nationalist government which enforced the apartheid system. Urban removals were mostly dealt with in terms of the Group Areas Act or the Urban Areas Act. Rural removals consisted of various categories, such as black spot removals, removal of labour tenants, removals from mission stations, removals for the sake of forestry requirements and internal removals in the scheduled and released areas [later to become the homelands]. Legislation applicable to rural removals include the Black Land Act No. 27 of 1913, the Development Trust and Land Act No. 18 of 1936 and the Prevention of Illegal Squatting Act No. 52 of 1951(White Paper on Land Policy, 1996).

The Land Reform programme was introduced by the new SA government when it came into power in 1994. The objectives of the Land Reform programme are outlined on the White Paper on Land Policy as follows:

Land is an important and sensitive issue to all South Africans. It is a finite resource, which binds all together, in a common destiny. As a cornerstone for reconstruction and development, a land policy for the country needs to deal effectively with:

- the injustices of the racially based land dispossession of the past;
- the need for a more equitable distribution of land ownership;
- the need for land reform to reduce poverty and contribute to economic growth;

- security of tenure for all; and
- a system of land management which will support sustainable land use patterns and rapid land release for development.

Land policy should ensure accessible means of recording and registering rights in property, establish broad norms and guidelines for land use planning, effectively manage public land and develop a responsive, client-friendly land administration service (White Paper on Land Policy, 1996).

The provision of support services, infrastructural and other development programmes, is essential to improve the quality of life and the economic opportunities resulting from land reform. This necessitates a constructive partnership between national, provincial and local level administrations. The successful delivery of land reform depends not only on an integrated government policy and delivery systems, but also on the establishment of cooperative partnerships between the state, private and non-governmental sectors (White Paper on Land Policy, 1996).

In terms of the White Paper on Land Policy, South Africa's vision is of a land policy and land reform programme that contributes to reconciliation, stability, growth and development in an equitable and sustainable way. Land reform aims to contribute to economic development, both by giving households the opportunity to engage in productive land use and by increasing employment opportunities through encouraging greater investment. We envisage a land reform which results in a rural landscape consisting of small, medium and large farms; one which promotes both equity and efficiency through a combined agrarian and industrial strategy in which land reform is a spark to the engine of growth (White Paper on Land Policy, 1996).

1.1.1 Restitution

According to del Grande (2003), the Restitution programme aims to:

- provide redress to those dispossessed through racist legislation and practice after 19th June 1913.
- have persons or communities dispossessed of property after 19 June 1913, as a result of past racially discriminatory laws and practices, restored to such property or receive just and equitable redress.

In terms of the description in the Department of Land Affairs of SA (DLA) website (www.dla.gov.za), the Land Restitution programme aims to:

- promote equity for victims of dispossession by the State, particularly the landless and the rural poor;
- facilitate development initiatives by bringing together all stakeholders relevant to land claims;
- promote reconciliation through the restitution process; and
- contribute towards an equitable redistribution of land rights.

1.1.2 Redistribution

In the DLA Redistribution Support Systems (www.dla.gov.za), the aims of the Redistribution Programme are described as to:

- improve access to land;
- secure rights to land for residence and for productive purposes to improve income and quality of life (increase black ownership of commercial agriculture and increase equitable distribution of land), so as to enhance household income security, provide employment and improve nutrition; and
- promote economic development of rural areas.

1.1.3 Tenure Reform

According to the Tenure Support Systems of the DLA (www.dla.gov.za), the Tenure Reform programme is briefly about the improvement of terms and conditions through which people hold, use, occupy and access land and it also aims to:

- improve tenure security for all;
- accommodate diverse forms of land tenure, including communal tenure;
- develop and co-ordinate tenure policy;
- develop and manage tenure reform programmes;
- build capacity and disseminate information to support tenure security;
- promote support and co-ordinate land rights for labour tenants in terms of the Labour Tenants Act (Act 3 of 1996); and
- provide support and co-ordinate land rights for farm workers and occupiers in terms of the Establishment and Security of Tenure Act.

1.1.4 Municipal Integrated Development Planning (IDP)

The Integrated Development Planning (IDP) introduced in SA by the new government in 2000, is a process through which a municipality can establish a development plan for the short, medium and long-term. According to the Municipal Systems Act of the Department of Provincial and Local Government (DPLG) which governs the operations of the municipalities, all the municipalities in SA are obligated to have an IDP (Municipal Systems Act, 2000).

In effect, the IDP is a planning and strategic framework to help municipalities fulfill their developmental mandate. It enables municipalities to align their

financial and institutional resources behind agreed policy objectives and programmes (White Paper on Local Government, 1998).

The White Paper on Local Government further describes the IDP as a vital tool to ensure the integration of local government activities with other spheres of development planning at provincial, national and international levels, by serving as a basis for communication and interaction. The IDP therefore provides a potential for the integration of Land Reform delivery with local level delivery of services and infrastructure to the Land Reform beneficiaries.

The IDP has been designed in terms of the Municipal Systems Act (Act 32 of 2000) to ensure that there is strong representation from affected communities and to provide for a transparent planning and development process. The IDP is intended for review annually against the council's performance measures and to give expression to any changes that are needed to the IDP as these may arise from time to time (Isikhungosethu Environmental Services, 2002)'.

According to an article by the Isikhungosethu Environmental Services (2002), in the past, planning largely took place in isolation from the citizens of the area being planned for and integration of effort between line departments and the municipalities seldom took place. The institutional environment created for the preparation of the IDPs is vastly superior to that previously in place because it secures the place of planning as a strategic function at the heart of municipal management and responsibility. Furthermore plans emanating from the planning process have legal standing requiring co-ordination and integration of the different sectors in the delivery processes.

1.2 Problem description

The objective of the Land Reform Programme in SA as described in the White Paper on Land Policy, apart from securing tenure for all and to deal with the need for a more equitable distribution of land ownership, is to ensure that Land Reform contributes to the reduction of poverty and to economic growth.

The SA Department of Land Affairs (DLA) is obligated with the implementation of the Land Reform programme through the restitution, redistribution and tenure reform programmes. The DLA adapted a project approach in implementing the three programme components through its provincial and district offices. However, the process has been often criticised as too slow and that the intended reforms have in many cases failed to be realised after the projects has been completed with respect to providing the expected improvement of livelihoods as well as in the provision of basic municipal services and infrastructure to the beneficiaries (del Grande, 2003).

Del Grande (2003) argues that the perceived inability of Land Reform to provide the expected benefits is mainly due to the lack of sustainability on the Land Reform projects. Once the Land Reform beneficiaries are allocated land, there is little or no support system put in place to ensure that the projects identified in the planning stages are carried out in a manner that would result in tangible delivery of community needs in the form of roads, water, clinics or any municipal services (del Grande, 2003).

According to del Grande (2003), the deficiencies in the development of project plans specifically and the manner in which DLA projects are developed and managed does not provide effective responses to a variety of issues pertaining to local community needs and dynamics. Such issues would include land tenure security problems, access to resources and infrastructure, and the lack of or inadequate internal institutional structures of communities. The gaps in analysing and understanding current and historical situation of the communities needing land inadvertently lead to flawed formulation and implementation of intervention strategies and projects through the available policy instruments. The Land Reform projects hence in many cases fail or fall short in addressing the needs of the communities.

The other Land Reform project planning deficiencies has been identified as emanating from a lack of mechanisms to facilitate the integration of project planning information with other planning activities by other government and non-government bodies in the local area of the Land Reform project (Mngwengwe et al, 2003, pers. comm.). As explained in paragraph 1.1.5 (Municipal IDP), the Municipal Systems Act (2000) empowers all local municipalities to facilitate all development activities including Land Reform within its area of jurisdiction using the IDP.

The IDP is a vital tool to ensure the integration of local government activities with other spheres of development planning at provincial, national and international levels, by serving as a basis for communication and interaction (White Paper on Local Government, 1998). Presently the legal framework and tools exists at a national level that promote the integration of the DLA spatial data with that of other organizations for the planning and delivery of Land Reform, however there are no effective internal instruments within the project planning level as well as the necessary partnerships or arrangements to support and promote the integration of the Land Reform spatial information with other organizations such the municipalities (ADM interview: Annexure 1).

Failure to put in place instruments to integrated Land Reform planning process and information with the municipal IDP, would result in the perpetuation of the current duplication and inconsistent planning processes that would further result in the unsustainable and ineffective Land Reform delivery.

1.3 Research objectives

This thesis looked at the state of existing DLA spatial information that is used to support the Land Reform delivery and the constraints that limit the integration of the DLA spatial information systems with other systems crucial for sustainable Land Reform delivery. More focus would be on how the DLA spatial information system could be effectively used to facilitate the integration of Land Reform planning with the IDP to promote sustainable Land Reform delivery programme.

To achieve this, an analysis of the state of spatial information management for Land Reform planning within the DLA was made, looking at the processes involved, the spatial data requirements of each process and their data sources, the existing DLA infrastructure and its utilization.

The case study conducted on one of the DLA Land Reform projects implemented in the Vryheid District office of the KwaZulu-Natal Provincial Land Reform Office known as the Amantungwa Land Redistribution Project, was used as evidence to indicate how the current disjointed planning impacted negatively on the delivery of Land Reform projects. The Amantungwa case study was undertaken to obtain an in-depth assessment of the demand and supply of spatial information in Land Reform project planning, the existing shortcomings, and the possible solutions.

The key research objectives are to:

- assess the spatial information requirements, spatial data sources and the state of Spatial Data Infrastructure for Land Reform planning and implementation within the DLA and externally;
- identify shortcomings with respect to spatial information management for enhanced Land Reform planning and implementation;
- describe the existing and desired linkages between the Land Reform planning and Municipal IDP generally, and in respect to spatial data exchange; and
- look at the requirements for effective spatial information management for sustainable Land Reform planning and implementation.

1.4 **Methodology**

1.4.1 Data Collection:

The data collection process involved the processes described hereunder:

Primary data was sourced through one on one discussions held with the various officials and members of the service providers that were involved in the planning and/or implementation in the Amantungwa Redistribution project. The following are the key informants:

- Mr. V. Mngwengwe who is the District Manager of the Vryheid Land Reform District Office in KwaZulu-Natal Province and other officials who are the DLA project managers involved with Amantungwa project and on other Land Reform projects (Mngwengwe V. et al. pers. comm.). This mainly took form of personal discussions and communication with these officials based on their experience on the planning and implementation of the Amantungwa project. Discussion also dealt with their perceptions and experiences on the land or spatial information management in Land Reform delivery and how it impacts on their project planning and implementation activities;
- Maseko Hlongwa and Associates (Annexure 3), a Town and Regional Planning consultancy firm that is occasionally contracted by the DLA

(Vryheid office) to facilitate planning of Land Reform projects. Maseko Hlongwa and Associates was involved in compiling the revised Business Plan for the Amantungwa Land Reform project;

Structured interviews (interview schedule: Annexure 1A) were held with other officials who are also involved in the management of spatial information that is used for Land Reform planning and the IDP processes. The interviews were mainly aimed at obtaining information regarding spatial information requirements, acquisition and use as well as constraints experienced by the different stakeholders or practitioners involved in Land Reform planning and or implementation. The officials listed underneath are the key informants:

- Officials at the Spatial Planning and Information unit in the DLA KwaZulu-Natal Provincial Land Reform Office based in Pietermaritzburg (SPI – KZNPLRO) (Annexure - Annexure 4);
- Officials at the Surveyor-General's Offices based in Pietermaritzburg, KwaZulu-Natal (Annexure 5);
- Officials at the Deeds Office based in Pietermaritzburg, KwaZulu-Natal province (Annexure 6);
- Officials in the National Spatial Information Framework (NSIF) unit in the DLA National Office in 2);

- Officials of the Amajuba District Municipality (ADM) Planning Unit based in Newcastle (KwaZulu-Natal). Some of these were officials involved in the implementation of Land Reform projects including the Amantungwa project (Annexure 1).

The information obtained from the above-named discussions and interviews were not part of the data collection process but were mainly used as reference in the various parts of the text in this paper.

1.4.1.2 Secondary data was also collected from the following databases:

- DLA spatial data systems;
- Amajuba District Municipality IDP and GIS data; and
- Amantungwa Land Reform plans

1.4.13 Additional secondary data was obtained through the review of the relevant literature. A list is provided in the reference section of this paper. The literature review mainly focussed on the following topics:

- Land Reform policies and procedures;
- Spatial data requirements for Land Reform planning;
- Overview of the DLA data sources and outputs;

- Development of Spatial Data Infrastructure both internationally and in SA, and
- Requirements for integrated spatial data systems.

1.4.2 Analysis method

1.4.2.1 Research

Through the Amantungwa case study, an analysis of the impact that the spatial data management constraints had on the planning and implementation of the Amantungwa Land Redistribution Project was done. The objective of the analysis was to:

- assess the sources of data used in planning the project;
- find out how the data was accessed;
- assess the constraints encountered in data accessing and usage thereof; and
- assess the impact of constraints on the planning and implementation process.

The use of the Amantungwa project as a case study was also aimed at providing practical problem identification with the current land Reform planning and provide a practical resource towards formulating possible solutions in consideration of on-going Spatial Data Infrastructure development.

1. LITERATURE REVIEW

2.1 Conceptual Framework:

In this section, the literature promoting the Integrated Spatial Information models both internationally and locally with an objective to show how integrated spatial information management is conceptualised globally is reviewed. With this literature review it is also intended to indicate how the development of spatial information models globally could fit in with the development of effective spatial information management in support of the Land Reform programme in SA.

The concept of a comprehensive spatial information management system is defined by Dozie (2002) as the technology, policies, standards and institutional arrangements necessary to acquire, process, store, distribute, and improve the utilisation of geospatial data.

According to Barry and Ruther (2001), it is estimated that about eighty per cent of all information used by planners today is geographical, either in the sense that it contains a key geographic reference in the form of a coordinate system, a street address or a reference to a particular administrative area.

The importance of spatial information management is further clarified by Nori (2003); wherein he argues that it is common knowledge that without accurate information about the lands and water, without an up to date inventory of the country's resources and what is happening to them and to the environment, the government and the people of a nation are handicapped in controlling their own destiny. It is impossible for even the best of governments to make excellent use of the land and its natural wealth or to prevent its misuse, without good, factual knowledge of the country's features.

In analysing the state of land information management systems in SA, Fourie and van Gysen (1992), highlighted the following issues:

- Many people exist outside the formal system of land registration due to Apartheid land laws which denied access to land to the majority of South Africans;
- The land registration records are not current. The situation on the ground differs from the Deeds Registry records due to the following;

    - access to the registry is difficult (location of the Deeds offices);
    - land transfer process not transparent to the poor, thus untrustworthy;
    - re-registration too costly to the poor;
    - long Land Reform process;
    - no re-registration due to conflicting claims on land; and
    - conflict of women's dejure rights despite their defacto rights.

- Weak local government structures which allow development to occur without proper land-use control measures;
- Structural conflict between group versus individual rights; and
- No systematic dispute resolution mechanism over boundaries.

According to a paper named "The future of Our Land – Facing the Challenge" drafted by the Food and Agriculture Organisation (FAO) and the United Nations Education Programme (UNEP) (1999), continuing land degradation and increased number of people living in poverty are among the symptoms of the current pressure on land resources. To date, the world's response to the two challenges of satisfying human needs and maintaining the integrity of ecosystems has been less than successful. The problems were clearly recognised during the United Nations Conference on Environment and Development (UNCED) in 1992, which called for an integrated approach to the planning and management of land resources (FAO and UNEP, 1999).

Many proponents of an integrated land information system propose a rethink on the current land systems. Ravindran and Jaishankar (2003) argue that in order to provide a more effective and meaningful direction for better planning and development, necessary support of the organisation has become essential. Hence a need for a suitable information system is being felt in all planning and development activities.

According to Nori (2003), in many countries, the land data has until recently been based on manual compilation, retrieval, updating and analysis involving millions of man hours spent by government agencies over several decades. The conventional Land Information System is typically in the form of a printed map and related text records describing the features on the map. Almost without exception, land information worth hundreds of crores of rupees remain in government archives and filing cabinets, instead of being used to dynamically supplement current knowledge.

In Africa, the establishment of a National Spatial Data Infrastructures (NSDIs) has been pioneered by a number of organizations and groups, encompassing United Nations (UN) organizations, professional associations and the government and non-government institutions, notably the UNEP and ECA among others. A number of awareness raising and capacity building seminars and workshops have been organized regionally and nationally in the last two years to make people understand what these infrastructures are, how are they built, how they work, and why they are important. Preparations of many others are underway (SDI Africa, 2002).

The delegates at the second meeting of the Committee for Development Information (CODI), a legislative body of the UN ECA, whose functions have subsumed those of the United Nations Regional Cartographic Conferences for Africa, noted that there was a compelling need to build Regional Spatial Data Infrastructure (SDI) that would provide for African countries the capacity to

acquire and process spatially referenced information. In this regard, the Committee adopted a resolution urging member states to give priority to establish their National Spatial Data Infrastructures (NSDIs) with all the necessary components. In subsequent regional conferences FIG/HABITAT/ ISK, Nairobi, Oct. 2001; AFRICAGIS-, Nairobi, Nov. 2001; representatives from member states, academia, professional bodies, and other sectors have endorsed these recommendations of CODI or have made similar appeals to member states. However, what is lacking according to Barry and Ruther (2001) is a single source of information or instruction on how to proceed to set up a national spatial data infrastructure.

One of the means to build an SDI is through urban development and land administration programs. For instance, the Nyahururu Municipal Council in Kenya is implementing a Land Information Service. The service is meant to improve the council's capacity to serve users quickly with reliable, up to date, consistent and user-friendly and computerised land information. The computerisation of the Land Registry is expected to ease transactions and enhance revenue collection which is a "selling point" to those who decide what programs to implement (SDI Africa, 2002).

2.1.1 Policy and Legislation

More common in Africa are countries preparing policy documents in support of geo-spatial data management such as South Africa's Draft Custodian Policy and Pricing Policy (SDI Africa, 2002).

Nori (2003) argues that the pressure on rural land and uncontrolled urbanisation has led naturally to a clearly perceived inadequacy of formal legal and administrative structure for land, which our planners fear, may hinder or even compromise the basic ability of our country to compete in the modern market economy. This, according to Nori (2003) is because an efficient land records or information system is a key part of the legal,

regulatory, institutional infrastructure of the state that provides security of tenure, without which the landholders have no incentive to plough, weed, and harvest or to invest in irrigation and other improvements that would repay investments over a period of time. By defining and legally protecting formal property rights, the land information system provides for social stability, property taxation, land improvement credit, land development, productivity, liquidity, labour mobility, and resource management thus facilitating functioning of dynamic land markets, increased agricultural productivity, environmental management, political stability and social justice (Nori, 2003).

2.1.2 Limitations to Data Integration

With the development of new data acquisition and generation techniques, numerous types of data have become available in digital format for spatial databases. The differences in spatial data models have made spatial data sets incompatible. Due to differences in the way data is acquired, spatial data can vary in terms of the data structures within the database (vector/raster), the data types involved, the spatial resolutions and geometric characteristics, and the levels of generalization (Burrough, 1986).

Kandeh (2002) argues that organizations and people use different methods of acquiring, storing, processing, analysing, classifying and viewing spatial data. Various standards are used by organizations and spatial data and information are stored in different formats. This has resulted in the duplication and increase in cost of data acquisition. Today, exchanging, sharing and integrating spatial data from multi-sources has become increasingly important.

2.1.3 Developing Common Standards

Through the FAO/Africover project, the multi-purpose Land Cover Classification System (LCCS) was developed. Countries were encouraged to embark on this project within their countries. It enables a comparison of land cover classes regardless of data source, economic sector or country. Most

other land cover classification systems are single-purpose systems, tailored to the requirements of a specific project or sector. Ten countries in Africa now have completed land cover data sets following this standardised classification scheme. They have received training for updating the datasets when the time comes (SDI Africa, 2002)'.

The USAID and US State Department, with supporting sponsorship from National Resources Canada and the US Federal Geographic Data Committee funded an interoperability pilot project for the World Summit on Sustainable Development (WSSD) in 2002. Coordinated by Open GIS Consortium, the project's aim was to install and leave behind an interoperable web-based framework to improve data sharing and use in Africa. This was a significant undertaking in Africa to increase awareness about interoperability and demonstrate the use of industry common protocols to allow communication between software produced by different companies (SDI Africa, 2004).

2.2 Development of South African Spatial Data Infrastructure (SDI)

2.2.1 The National Spatial Information Framework (NSIF)

The DLA has, amongst other things, the responsibility for mapping and cadastral surveys. Through carrying out these responsibilities, the DLA came to the realisation that considerable duplication within the public sector was taking place with respect to spatial information capture and management. Public resources housed in the different government departments and other organisations were being wasted and inefficiently utilised (Pillay, 2000).

The Directorate: NSIF (of the DLA) was established in 1997 in order to direct the development of a national spatial infrastructure for South Africa, which is the framework enabling the utilization of and access to spatial information. The aim of this is to improve efficiency and effectiveness of government through the alignment of investment, integrated planning and integrated service delivery, and through promoting the exchange and sharing of spatial

data, elimination of unnecessary duplication in the capture, storage and maintenance of spatial data sets within the public service (SDI Africa, 2003). A component (sub-directorate) within the Directorate: NSIF focuses on the needs of the DLA with regards to enabling access to and use of spatial information, as well as the provision of spatial information in the form of maps to support Land Reform (NSIF interview: Annexure 2).

2.2.2 Components of the NSIF

Two years ago, borrowing much from the SDI programmes internationally, the building blocks proposed at the workshop for building an NSIF were identified as (SDI Africa, 2004):

- developing a system for providing access to data, a *"clearinghouse"*;
- developing standards to facilitate the integration of datasets of different origin;
- identifying core or framework data sets;
- the development of a policy pertaining to spatial information management, dissemination and utilisation; and
- setting up institutional arrangements.

2.2.3 The NSIF Vision

The vision driving the NSIF was recently phrased as "Geo-information driven decision making, planning and service delivery, for an improved quality of life for all in South Africa" (SDI Africa, 2004).

There is also a clear need for providing access to and encouraging the use of spatial data by non-GIS specialists in an unsophisticated mode, i.e. what can be gleaned from looking at a map, without using any advanced spatial analysis tools. This impacts on the "shape" of some of the above building blocks: for example, providing access to spatial data through a spatial data catalogue for "Do It Yourself GIS builders" needs to be supplemented by providing direct access to "viewing data". Also, developing standards which

will support the exchange of spatially related information, without the concomitant transmission of a spatial data file, becomes even more important (SDI Africa, 2004).

2.2 Recent Developments

The following are achievements realised in developing an integrated spatial information system in SA within the NSIF thus far (SDI Africa, 2004):

- There is an operational system enabling a user to search for data sets, as described by standardized metadata records, and made available through the Spatial Data Discovery Facility (SDDF) on the internet.
- Formal channels for deriving national standards for Geographic Information, grounded in international standards, as well as purely "home grown" national standards, have been established, in conjunction with the SABS.
- Core/framework data sets have been defined – standards agreed upon regarding these datasets have been circulated, and are entering the process for becoming "national standards". A project to provide "viewing" access to these core datasets via the Internet is underway.
- The South African Cabinet endorsed the creation of the NSIF on 29 April 1999. Government departments were urged to co-operate with the DLA in building the NSIF. Through the same Cabinet Memorandum, the formation of a Committee for Spatial Information (CSI) to represent the interests of all spheres of government was also set in motion.
- Policy guidelines developed through a series of open workshops have been collated and are available through the NSIF web-site. Discussions on legislation relating to spatial information collected using public funding was expected to result in a first draft before the end of February 2000. The legislation was expected to be based on the policy guidelines as described in the "interim policy guidelines" document.

2.4 Legislation governing the establishment of SA Spatial Data Infrastructure (SDI)

According to Dozie (2002), policies that promote effective Spatial Data Infrastructure should among other things, address the aspects mentioned underneath:

- data access policies (freedom of information legislation, public 'right to know', pricing and cost recovery)
- legal issues
  - copyright
  - intellectual property
  - liability
- data sharing agreements.

The Spatial Data Infrastructure Act, 2003 defines the objectives of the Spatial Data Infrastructure as to:

- facilitate the capture of spatial information through co-operation among organs of state;
- promote effective management and maintenance of spatial information;
- promote the use and sharing of spatial information in support of spatial planning, socio-economic development and related activities;
- create an environment which facilitates co-ordination and co-operation among all stakeholders regarding access to spatial information;
- eliminate duplication in the capturing of spatial information;
- promote universal access to such information; and
- facilitate the protection of the copyright of the state in works relating to spatial information.

2.5 Implementation of the SA SDI

2.5.1 NSIF Involvement with GIS Related Projects (SDI Africa, 2004):

The Interdepartmental Project Viewer Initiative (IDPV) is a pilot project co-ordinated by the NSIF within the DLA. The goal of the pilot project is to capture development project information from the DLA, the Department of Water Affairs and the Department of Public Works and to display these projects together with relevant project details on a web based GIS system. The purpose of spatially enabling projects from different organisations will benefit users in that it will enable co-ordination of efforts and allow for assessments of feasibility of projects in terms of infrastructure.

The need to have access to a system indicating the location of development projects of the national government departments as well as investments linked to these projects is nothing new. Previously the Department of Trade and Industry started an initiative with the similar aim in mind. After this project was ended other initiatives, co-ordinated by other Government structures were embarked upon, some of which are still in progress.

As it is of vital importance to identify the exact location of these development projects, in order to do proper spatial planning across government departments and get an idea of government investments, it is obvious that a Geographical Information System (GIS) needs to form the core of the system.

The Committee for Spatial Information is developing a Project Registry to serve a function of eliminating, overlapping and duplication with regard to collection, management and supply of spatial information by public bodies, and achieve the alignment of spatial information systems under development (SDI Africa, 2004).

The NSIF also manages the Link viewer system which enables the viewing of Land Reform projects on a map by linking the land information contained in the Land base system of the DLA to the spatial datasets containing land data (NSIF interview: Annexure 2).

3. LAND REFORM IMPLEMENTATION PROCEDURES, SPATIAL DATA REQUIREMENTS AND DATA OUTPUTS

In this section, the Land Reform implementation procedures in the form of project cycles that are used by the DLA to implement its Land Reform programmes as projects are discussed.

Through this discussion it is intended to highlight the shortcomings in the DLA project planning processes and to look into the proposed alternative project implementation strategies that seek to promote comprehensive data collection to improve decision making in Land Reform planning process.

3.1 Procedures in Land Restitution implementation

Outline of the Restitution Project Cycle in Systems and Procedure for Restitution Projects (www.dla.gov.za).

The Restitution project cycle is composed of the following project phases as

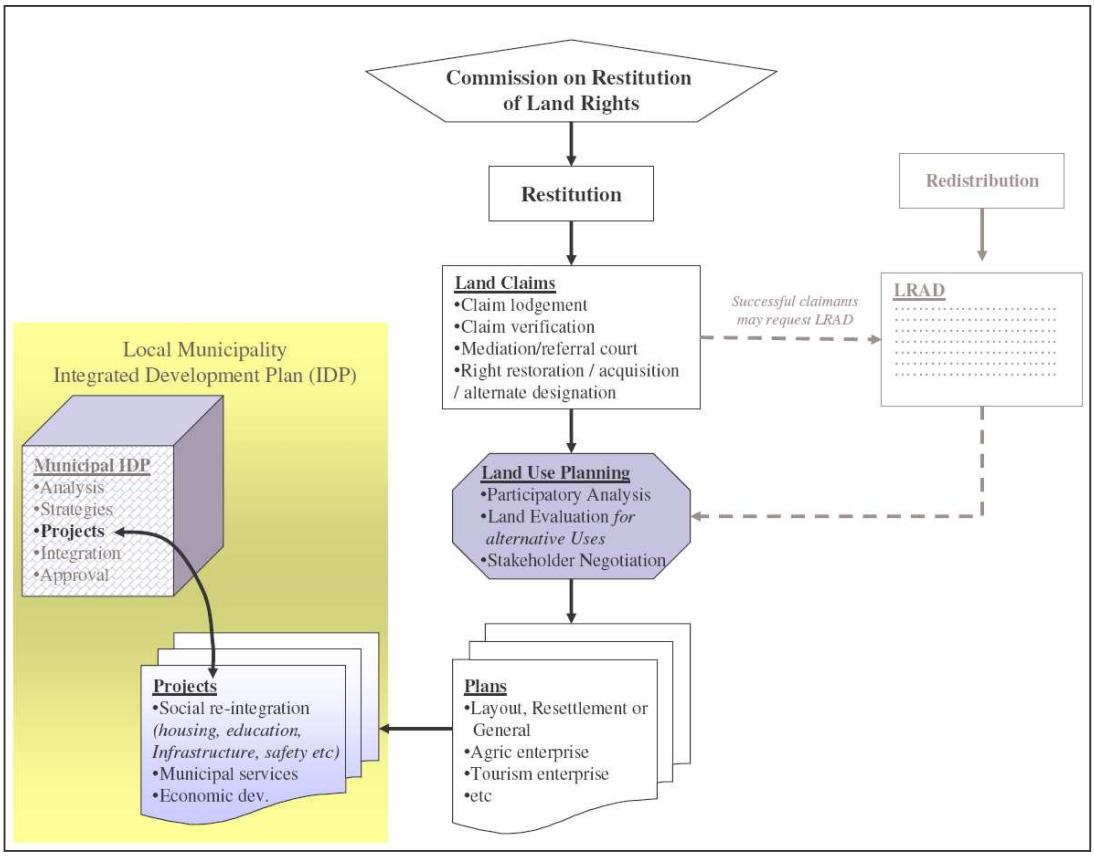


Figure 1. Procedures in a Land Restitution project cycle (Source: Rugege, 2004 LIM lecture notes)

shown in figure 1:

Phase One

Lodging and registration of a claim by the applicants who were forcefully removed from their land or their descendants.

Phase Two

Screening and categorisation of the applications in terms of whether it is an urban or rural claim, type of farming operation on the claimed land, type of current land use.

[This phase includes the following: Initial Screening, Preliminary Option, Advanced Screening, Preliminary Feasibility, Batching and Prioritisation.]

Phase Three

Determination of qualification in terms of Section 2 of the Restitution Act. This section determines the criteria for qualifying as a claimant in terms of the Restitution Act.

[This phase includes the following: Assessment of Gazette needs Assessment of Notification needs and the Gazetting / Notification of the interested parties.]

Phase Four - Negotiations

[This phase includes the following: Project plan for claimants, Representation of claimants if required, Research in order to obtain any outstanding information, Valuations, Monetary Value of Claim, and Verification, Preliminary planning with regard to land use and development, Preliminary case report and negotiation position, Preparing and obtaining mandate, Preparation of Memorandum for approval, Obtaining Ministerial Approval.]

Phase Five - Settlement

[Agreements signed in terms of Section 42D (Ministerial Approval) or a decision made by Land Claims Court in the form of a Court order]. Section 42D determines the conditions under which the Minister of the DLA may enter into an agreement with the parties interested in the claim upon his/her satisfaction that the claimant is entitled to restitution of a right in land of section 2 of this Act (Restitution of Land Rights Act 22 of 1994).

Phase Six - Implementation of Settlement

Following the Transfer of Land, Detailed Land Use Planning is conducted based on the initial preliminary plan that was designed in the negotiations phase. Development Funds from the Grants awarded for the claim by the Minister are released to conduct development projects as determined by the Detailed Plan. Post-award Support is arranged through an independent agent or a municipal structure and the project finally handed over to the structure negotiated and agreed to with the claimants. Financial compensation or other redress is implemented in cases where claimants are not restored to the claimed land.

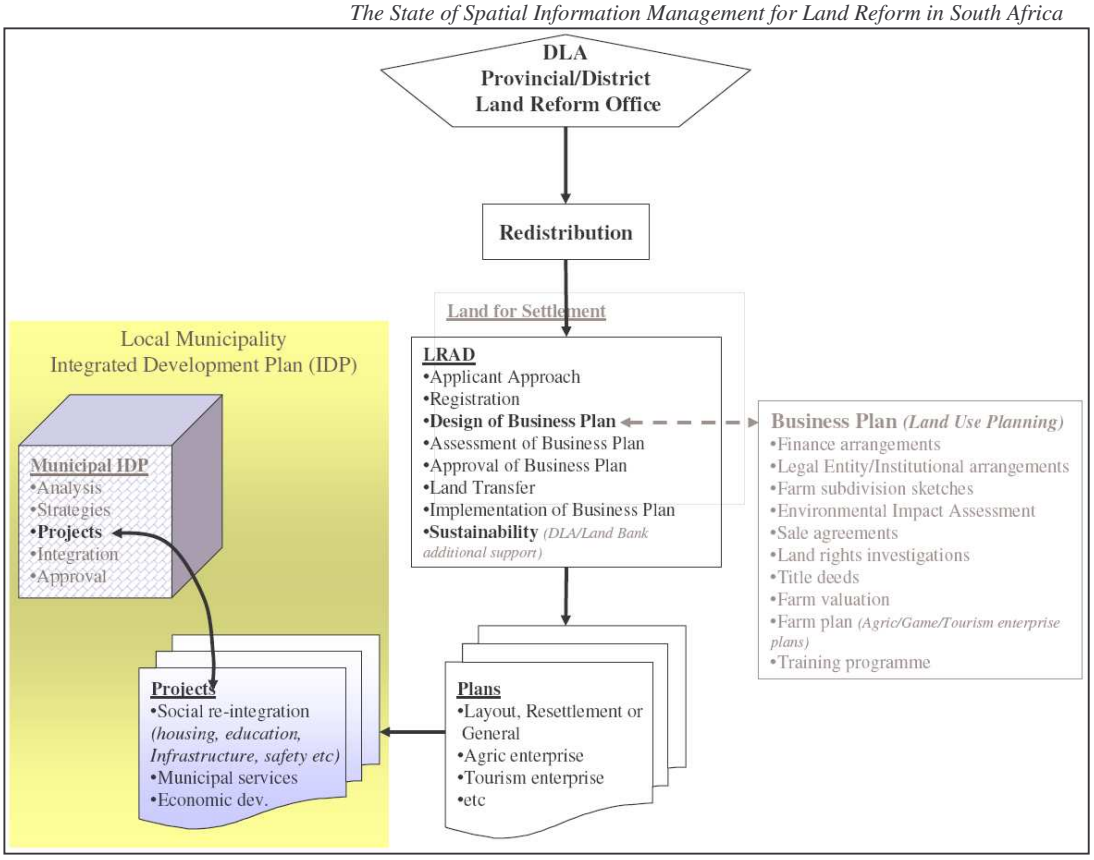


Figure 2. Procedures in a Land Redistribution project cycle (Source: Rugege, 2004 LIM lecture notes)

3.2 Procedures in Land Redistribution Implementation

Figure 2 depicts the project cycle of Land Redistribution projects as outlined in the Systems and Procedure for Redistribution Projects (www.dla.gov.za).

1. Project Initiation

Once the application satisfies the criteria for accessing land under the LRAD programme, it is prioritized and the planning process commences upon the availability of funds. The applicant(s), once informed about the options available within LRAD, select the desired amount of the grant according to their preferred own contribution. They will also decide whether to apply individually or as members of a self-selected group.

2. Land Identification

The applicants will then locate an available area of land, either through their own knowledge, or through the assistance of an estate agent, the DLA or agricultural officer. The land should have the necessary water rights if irrigation is contemplated, and the rights should be specified in the sale contract and reflected in the land price.

3. Purchase Agreement

Once a suitable area of land is located, the applicant(s) will enter into a contingent contract with the seller, with the contingency consisting of approval of the project under LRAD.

4. Farm/Land Use Plan

With or without assistance of a design agent, the applicant(s) prepares a farm plan or land use proposal (project proposal), indicating the intended agricultural use of the land and estimating a rough projected cash flow. The applicant(s) obtains evidence of additional financial resources (loan, own resources, or both).

5. Agricultural Report and Land Valuation

The applicant(s) then submits all documentation to the local agricultural officer to receive his or her opinion regarding the feasibility of the farm plan (project), including its agricultural potential, value of the land relative to market prices for that of comparable quality and access to water, cash-flow projections, and environmental assessment.

6. Project Approval

Once the local agricultural officer has provided an opinion, the participant submits the proposal package to the provincial grant committee (which

comprises officers of the DLA and the DOA), which meets as required. This committee would then approve or disapprove the application. Upon approval, the provincial Director of the DLA would then designate that the land be transferred to the applicants and for the release of the development funds.

7. Land Transfer

Upon designation, a process to transfer the land to the applicants is commenced. Once the land is transferred, the funds are released to an independent agent or a local or district municipality to commence the implementation of the development projects identified in the project proposal.

3.3 Procedures in Tenure Reform implementation in DLA: Tenure Systems and Procedures

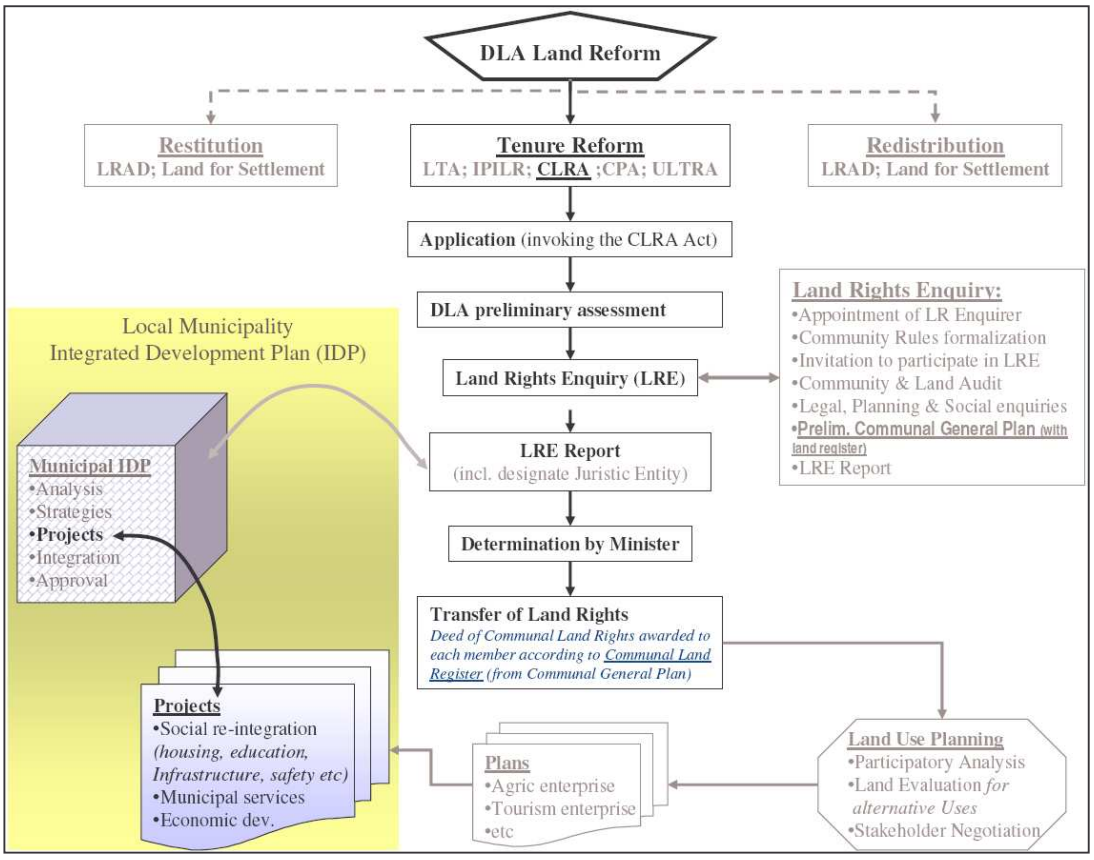


Figure 3. Procedures in a Land Tenure Reform project cycle (Source: Rugege, 2004 LIM lecture notes)

The Procedures for Act 119 of 1993 (LAND TITLES ADJUSTMENT ACT) as reflected in the Tenure Systems and Procedures (www.dla.gov.za) are as follows:

1. Request/ Application

Upon submission of the application, a DLA planner assists the applicant in filling in the application.

2. Categorisation of claim

An assessment is done to check whether applicant in question fits within a broader land reform project. This is done by qualifying the applicant in terms of the Act 119.

3. Preliminary investigation and Report

The application form is then sent to the Land Management Unit for a desktop study consisting of preliminary land information analysis. This includes verification of details such as property name, ownership, current and historical land use, sub-divisions etc. A report is then compiled detailing this information which is then presented to the Provincial Projects Approval Committee to release planning funds.

4. Designation Memorandum

A memorandum is then drafted requesting designation of the property in question and recommending the appointment of a commissioner. The commissioner is entitled to receive applications for the adjustment of titles and award claims in terms of the Act 119.

Upon approval of the designation memo, draft terms of reference for appointment of a commissioner are advertised and another memo recommending the appointment of the selected commissioner.

5. Designation of Land and gazette Notice

Upon approval, the Minister notifies Provincial Director of designation and this is published in the government Gazette Notice.

6. Appointment of Commissioner

After gazetting and development of clear terms of reference a Commissioner is appointed.

7. Commissioner calls for applicants

Upon assumption of duty, the commissioner would hold a briefing of applicants informing them on the process, requirements and possible timeframes.

8. List of applicants/ claimants compiled and verified

A list of claimants or applicants who have lodged a claim is verified in a community meeting representing all those interested or affected by the claim.

Upon acceptance by the community, the list is published in a newspaper.

9. Findings by Commissioner

After considering each application and objections, their merits and demerits, the commissioner would advise each applicant of his/her findings. The findings are then discussed and agreed to in a community meeting and a final decision made or revised.

10. Commissioner to furnish findings and relevant documents to the Director General of the DLA (DG) and the State Attorney.

11. The DG to cause designated land to be surveyed

Surveying of the designated land applies mainly if undivided shares are awarded and applicants have entered into written partition agreement.

12. Land Transfer to rightful owners and title registered

Upon receiving the Commissioner's instructions, the State Attorney prepares Deed of Transfer. Deeds are lodged and registered with the Deeds Office.

After transfer the DLA assists the community with unclaimed lots, overlapping rights and hand over title deeds.

3.4 The Generic Project Cycle: An alternative data collection mechanism

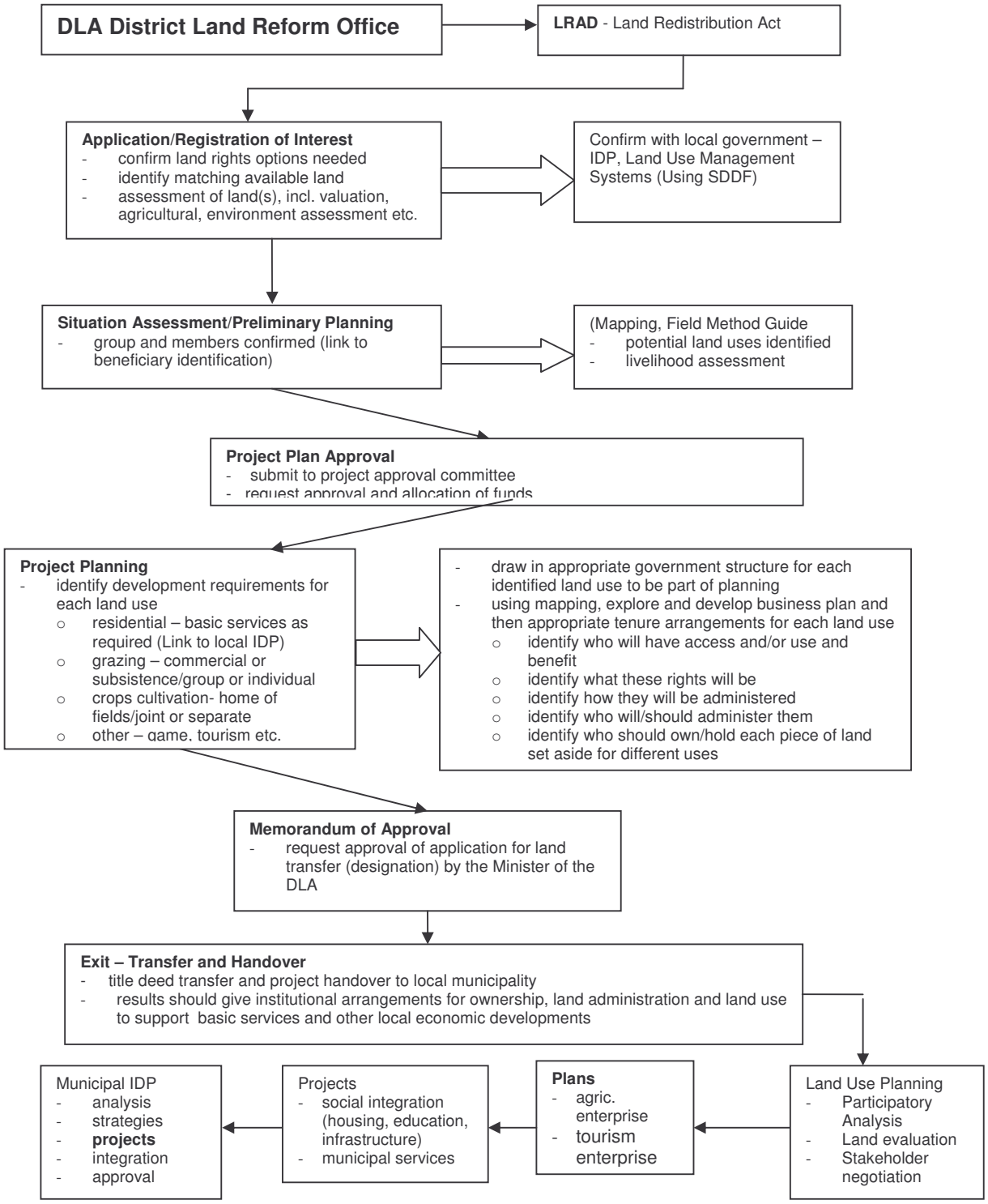


Figure 4: Procedures for the Generic Project Cycle (del Grande L, 2003)

As indicated in the Problem Description section of this paper (section 1.2), the methods that are currently used to collect Land Reform data and in planning projects using the DLA project cycles have been criticised as ineffective in ensuring sustainable Land Reform projects. These shortcomings are said to be particularly evident in the inability by the current method to properly integrate the disparate needs of the local community that need land into the Land Reform planning processes. It is proposed in this paper to use a generic project cycle (refer to figure 4) proposed by del Grande (2003) who claims that the generic project cycle would be able to provide an effective mechanism for problem analysis that would result in appropriate intervention as part of the comprehensive Land Reform project.

Underneath is the overview of the proposed steps in a Generic Land Reform project cycle as shown in figure 4 (del Grande, 2003):

1. Registration of Interest

Approval indicating acceptance of an application is given by the relevant receiving DLA official. This authorises that the application is submitted in an authorised form (Registration of Interest form) and that all the relevant information is supplied.

The application is then categorised according to the DLA products in which it fits in (i.e. either in restitution, redistribution or tenure reform). Prioritisation of projects within the different DLA programmes is done in terms of an internal criteria determined by the age of application, budgets, location, size or status of the applicants` tenure security.

2. Situation Assessment/Preliminary Planning

Mapping or Field method guide:

Figure 5 underneath indicates the “Mapping or Field Method Guide” that is one of the methods that is proposed to conduct a situation assessment of the area identified by the Land Reform applicants. According to del Grande (2003) mapping could be a visual participatory method whereby people can talk around, where they are asked to develop a map of their area. The sketch (figure 5) referred to as a community map also known as the PRA (Participatory Action Research) map, could be used to indicate common features on the area such as the roads, rivers, settlements, grazing and cultivated fields. Members of the community could be asked to take turns to draw this map using their knowledge of the area until a final common map is agreed upon.

This map could be used to enable the community to describe to an outsider how they live and also as a basis to ask probing questions about their land rights, various land uses, sharing and exchanging land and how these are administered and managed (del Grande, 2003).

With this mapping field method guide, maps and timelines are used as the starting point for people’s stories about land rights and administration and/or they could relate their history using the timeline method. One story may run across several indicators. The sample process and probe questions help unpack information in the field. Stories about recent cases are probably closer to current practice. Probe question would be slightly different when talking about future arrangements. The official does the interpretation steps to analyse the stories in terms of the indicators (del Grande, 2003).

Example of a Community/PRA Sketch

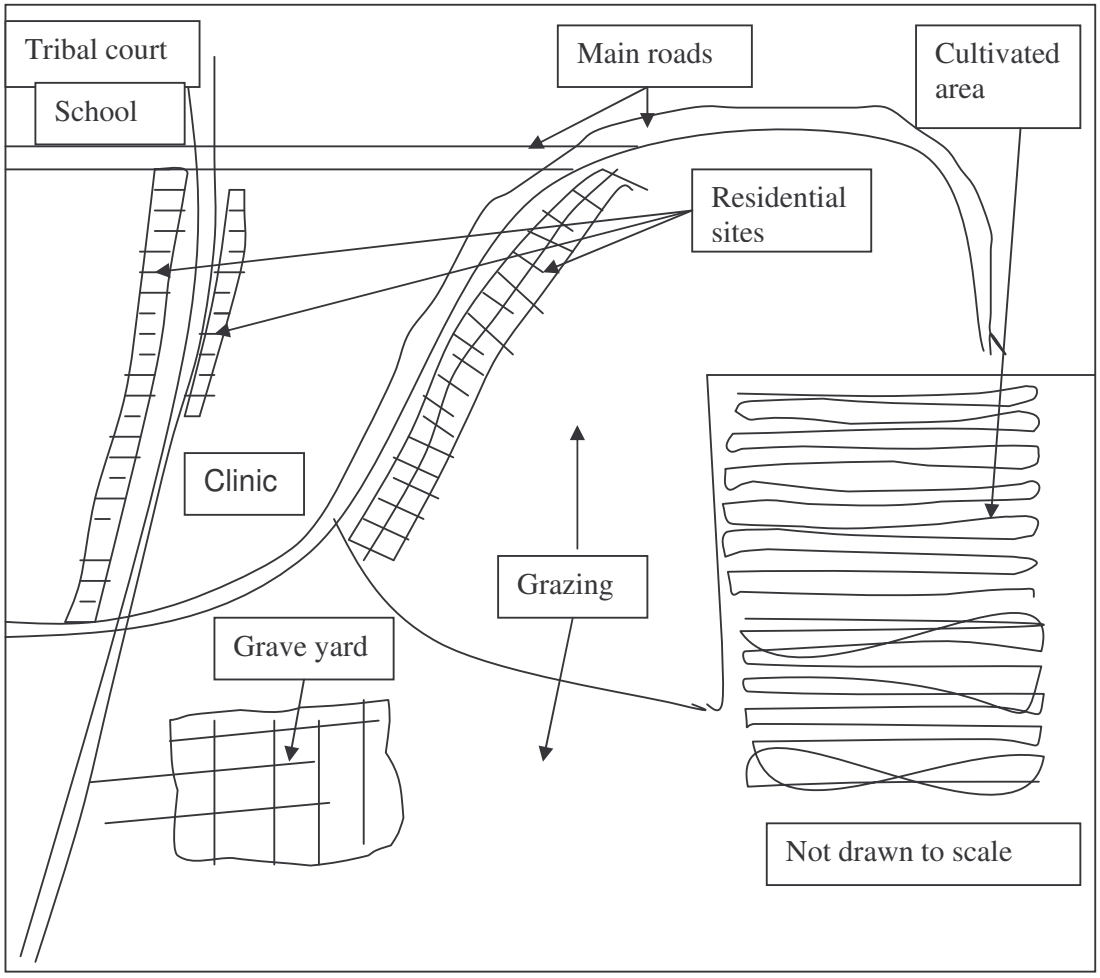


Figure 5. A generic PRA sketch indicating current land uses

3. Consultation of the local municipality:

During this stage comments are requested from the local or district municipality through joint meeting between the DLA and the municipality or through a correspondence in which a municipality is required to comment on the proposed Land Reform project. The municipality would comment on the

potential impact or compliance or otherwise of the proposed Land Reform project on the municipality IDP. Through this involvement the municipality could be able to influence the location of the land Reform project for example in terms of its Infrastructure Service Delivery plans or its Environmental Protection plans.

4. Project Plan Approval

Approval by the DLA projects approval committee as explained underneath would lead to acceptance of the project based on the following decisions:

The committee agrees with:

- the analysis of the land problem as identified by the DLA planner and or service providers.

- the proposed solution as described in the situational analysis section.

- the project plan for implementation of solutions as developed by the applicants through assistance of the DLA planner and or a service provider.

- financial implications as identified in the project plan.

Upon approval, the DLA would then allocate planning budget to finalise the project plan or to compile the detailed plan.

4. Project Plan

The activities described hereunder are carried out as part of the Project Plan or Business Planning phase:

- Surveying of internal and external boundaries of the area. These may include household, grazing fields or any other boundaries delineating exclusive rights held by individual or a group of individuals in the community. The output of surveying could consist of survey diagrams, maps, land use maps and site maps.

- Agricultural assessment reports provide in-depth information regarding land potential, land capability, grazing capability, natural resource potential and or its state of usage.

- The state of the local economy and potential economic opportunities are determined in the process of designing the economic development plans.

- Land administration rules governing the manner in which land and natural resources are accessed, managed, exchanged and shared are set.

- The constitution of the Communal Property Institution (CPI) or other land-holding entity is established to govern relations between the land and or natural resources and the people and among the people themselves.

- The members` register/beneficiary list contains all the individual or households that have the right to inhabit, use, or benefit from the proceeds of the land or the natural resources found on the land.

- Individual records are kept of each beneficiary or member in order to record any transaction, activity or occurrence that have an effect on the membership or beneficiary rights to the land.

- Infrastructure development plan is drafted after identifying the infrastructural needs and potential resources that are required to address those needs.

- Hand-over plans (for exit) or close out reports.

5. Memorandum of Approval

- A memorandum is drafted to the Minister of the DLA to request approval of change in land use and/or the land administration as the case may be.

- Upon the detailed land use acceptance by the Minister or his/her delegate, final plans are drafted and surveys conducted to prepare for implementation of the plan.

- Upon designation by the Minister, a capital grant is released to pay for land transfer and to purchase the required infrastructure.

6. Exit

After the completion of the planning process, transfer of land to the applicants is effected. The implementation of the development projects is left to a body that would hold the land after transfer such as the Communal Property Association (CPA) or a local or district municipality responsible for the area (del Grande, 2003).

3.5 Data Sources and Associated Constraints

3.5.1 Overview of the DLA Data Systems

The DLA is a major producer of spatial information and spatially related information. Information produced within the department (DLA) includes the cadastral databases, topographical maps in digital format as well as on paper, survey diagrams and the registered title deeds. Other spatially related

information that is generated within the department includes the Public Land Inventory and information pertaining to Land Reform projects (Gavin, 1997).

This section provides an overview of the various data sources based within the DLA that are available to the DLA planners and other users involved in Land Reform project planning and implementation. The analysis of the DLA data would be based on the data requirements for integrated spatial data including: standards, acquisition methods, storage, distribution, exchange and integration methods and policies. By this analysis it is also intended to show the role that could be played by the DLA as one of the key custodians of spatial data in SA, in developing an integrated spatial data system.

3.5.1.1 Chief Directorate: Cadastral Surveys – Surveyor General Office - Pretoria (SGO)

In the SGO website (www.dla.gov.za), the Core Functions of the SGO are described as:

- examination of diagrams and general plans;
- examination of sectional title plans;
- approval of diagrams, general and sectional title plans for registration in the deeds office;
- performing cadastral data processing to ensure consistency of numeric data on newly submitted documents and to capture alphanumeric information from approved documents into cadastral information system database;
- scanning all approved documents into electronic format to protect legal paper copies from damage and to provide information to the deeds office and the public;
- maintenance of spatial database of surveyed real rights used in macro planning environment;

- provision of cadastral mapping service;
- archiving and maintenance of all original diagrams, general and sectional title plans, survey records and beacon agreements; and
- maintenance of a current and dynamic cadastre by updating the various documents in respect of land

Pillay (2000) identified the projects that the SGO has embarked upon in furthering the stated objectives are as described below:

The SGO embarked on a process to store all its spatial data and to avail it in a digital format. This process resulted in a development of a system called a Cadastral Information System (CIS). The purpose of the CIS is to produce and maintain a continuous cadastral database for SA.

According to Pillay (2000), the CIS was developed from two key projects known as project Hope and project Miracle.

The project named HOPE was developed:

- To specify and design the system through capturing rural spatial data. This was done by digitising the noting plans (compilation sheets).
- To preserve the existing, original cadastral documents, the majority of which have been scanned through the Document Imaging System (DIS).

Another project named MIRACLE was undertaken:

- To capture all urban cadastre. Digital urban cadastre captured by local authorities, town planners, land surveyors, was also incorporated in this project to avoid duplication.
- To capture alphanumeric data which comprises of the parent land parcel data and historical data of the current parcel. This process captures information on sub-division, consolidation, servitudes, mineral rights etc. of the parent land parcel. The alphanumeric data is also used to link the Land Reform data contained in the Land base system

with the spatial data of the SG Office to create spatial view of Land Reform projects through the Link viewer program.

In their criticism of the projects under the CIS using the standards and use constraints as a criteria to measure the quality of the data, officials from the SPI-KZN unit (SPI – KZN interview: Annexure 4) observed the following:

CIS Standards:

- The data was rapidly captured thus contains many errors;
- The data contains no guarantees for accuracy and completeness; and
- The data is continuously being upgraded and referenced to a new and more accurate surveying.

Use Constraints:

- The user accepts liability for use;
- Land parcels and legislative boundaries have been digitised using general and noting plans. Thus the accuracy may vary from centimetres to several meters;
- Data can thus be used as a backdrop for planning purposes but cannot be used for engineering purposes;
- The cadastral data is not up to date;
- Existing cadastral data collected through the project Miracle, was captured through digitising and at different scales thus compromising the accuracy; and
- More up to date and accurate cadastral data is required for the IDP e.g. accurate property information is required in developing the Land-use Management System.

3.5.1.2 The Deeds Registry

In the Deeds Registry website (www.dla.gov.za), the Strategic Goals of the Deeds Registry as described below are:

- To ensure the maintenance of an efficient land registration system calculated to afford security of title through proper application and administration of common, statutory and case law, taking into account sound and efficient deeds registration principles and practices.
- To exercise control over the Deeds Registries in order to bring about and ensure uniform registration of deeds and documents by providing legal support and statutory registration policy.

Pillay (2000) described the following as services offered by the Deeds Registry:

- Registration of all transfers of properties, and any real rights in land.
- Maintenance of land registers.
- Provision of land registration information, and preservation of registration records for archival purposes.

Subscribers to the Deeds Enquiry System (Aktex) are able to electronically access registration information. The application provides an enquiry facility to enable the public to obtain deeds related information concerning property. Any member of the public can use the operational application subject to access fees.

A new system called a Deeds Web, has been put in place to web-enable the Deeds Registration System (DRS). This application enables the registration of deed document electronically. The Deeds Web provides an enquiry facility to enable the public to obtain deeds related information concerning property.

The infrastructure to web-enable the Deeds Registry also provides the backbone to the corporate data-warehouse as a whole, and will allow other branches (particularly Cadastral Surveys and the Surveys and Mapping) to leverage e-commerce opportunities. The advances in Internet technology allows unprecedented access to spatial and attribute data, which when

combined with property ownership and land value information, will give the State enormous spatial planning capacity (Pillay, 2000).

In order to speed up delivery of title deeds the Director General of the DLA has approved the establishment of a regional deeds registry in the Nelspruit area. The success of this project may influence the establishment of additional regional deeds registries in SA.

The following criticism of the Deeds Registry information systems were made by the officials from the SPI-KZN unit (SPI – KZN interview: Annexure 4):

Use Constraints:

- The current archives are paper and microfilm-based, which means that duplication is both expensive and time consuming and is limited to use only in its area of intended use, i.e. the archive cannot be used in more than one area after duplication.
- Inconsistency in naming and representing some important deeds features. Some of the data features e.g. farms or sites do not have the property extent or the extent is reflected in different units of measurement e.g. hectares, square kilometres, morgens, and dums.
- The data is based on a computer mainframe which makes retrieval cumbersome.
- The Deeds information contains user charges thus implying a limited access to a wide-range of the stakeholders. This may pose an impediment for the use of Deeds data in support of the IDP process.

3.5.1.3 Chief Directorate: Surveys & Mapping (CD: Surveys & Mapping)

The Strategic Goals of the CD: Surveys & Mapping as described in the CD: Surveys and Mapping website (www.dla.gov.za) are to:

- improve access to spatial information;
- establish client relationship management units to interact with people at local level;
- manage supplier vendor relationship;
- exploit Information Technology for efficiency gains in map and spatial information production
- maintain the national mapping programme;
- maintain the national control survey network; and
- maintain the national aerial photography programme.

The Core Functions are:

- To provide spatial information, including:
    - technical support for spatial information;
    - training;
    - maps; and
    - sell spatial information, images and maps

- To provide survey services, including to:
    - perform data capture;
    - gather Geo-referenced imagery;
    - collect photo and ancillary data;
    - determine differential positioning service;
    - maintain survey control beacons (monuments); and
    - display museum articles.

- To provide cartographic services to produce maps such as 1: 500 000 and 1: 50 000 Digital Topographical Data Sets.

According to Pillay (2000) the following standards of the CD: Surveys & Mapping data were observed:

- The 1: 50 000 original map information has been reduced to scale by cartographic generalisation from larger scale mapping.
- Upon conversion to digital form, 95% of all points are within 0, 25 mm of the position of the corresponding point on the input material and no point deviates by more than 0, 4 mm from the original position.
- At the 1: 50 000 scale, all well defined points are within 39, 5 m of the position on the ground.
- The currency of the data is the same as the published map sheet from which the data was captured.

The SPI-KZN unit (SPI-KZN: Annexure 4) observed the following use constraints with regards to the CD: Surveys and Mapping data:

- Accuracy of the data is appropriate for decision making in the planning environment but not for engineering purposes.
- Survey and Mapping mainly produces maps (1:50 000) which are not suitable for local level planning due to inaccuracies associated with using the large-scale maps. Currently most municipalities in KZN use 1:50 000 and 1:250 000 maps and data sets provided by the DTLG (KZN) for the IDP processes

3.5.1.4 Public Land Support Services (PLSS)

According to Pillay (2000) the directorate: PLSS has the responsibility to do the following tasks:

- To develop, implement and maintain a comprehensive inventory of all state and other public land in terms of section 39 of the Restitution of Land Rights Act, 1994.
- Locate public land on topo-cadastral maps.
- Conduct land use surveys/audits, on request and proactively to identify superfluous state land for land reform purposes.
- Render a cartographic drawing service.
- Develop and host an Internet-based Application Form that is used by the Inter-Departmental Provincial State Land Disposal Committees for disposal of state land. Clients can access the Inventory and maps data via this tool.

The following information is contained in the PLSS inventory (Pillay, 2000):

- The inventory has been developed from various datasets, obtained from major suppliers, such as the Chief SGO (cadastral and topographic data), the Registrar of Deeds, State Departments and the parastatals.
- Information on tribal areas.
- Certain additional data such as current and potential land-use is recorded in the inventory as specific land-use surveys are conducted.
- Data on vesting in terms of item 28(1) of Schedule 6 of the Constitution is also included.

In a discussion held with the NSIF officials (NSIF Interview: Annexure 2), the following were identified as use constraints to the PLSS data:

- The PLSS also contains useful digital information on various forms of state/public land and the ownership thereof but the access to external users is limited by a password that is currently only available to government officials dealing with the state land.

- The PLSS data which is reflected as available in the Link viewer has been removed due to considerations of the potential for invasions of the state land if the access to the information was not controlled.

3.5.1.5 Chief Directorate: Spatial Planning and Information

The NSIF is a unit in the CD: Spatial Planning and Information that is responsible for co-ordinating and managing all the spatial information activities of the DLA. In terms of the NSIF website (www.nsif.gov.za), the NSIF goals are:

- To ensure that the planning or development system is able to achieve critical national objectives.
- To provide spatial information support for critical policy areas such as poverty alleviation, job creation, security of tenure etc.

- The NSIF Core Functions are:
  - To provide support for planning systems.
  - To support national environmental planning.
  - To develop and maintain policy and legislative framework.

The NSIF currently acts as a data directory; however it has the vision to expand its scope to include the actual delivery of information.

According to the officials from the SPI-KZN unit (SPI – KZN: Annexure 4) and the NSIF officials (NSIF interview: Annexure 2), the following are the use constraints affecting the NSIF:

- The NSIF provides a good location for access to a variety of spatial data. This service however has not yet been used effectively by

government and the public particularly in the IDP process due to planners not being aware of its existence.

- Despite the efforts by the NSIF to promote itself, many government officials and the public are not aware of the services of the NSIF.
- There is a lack of willingness by some of the DLA components to part with their data when requested by the NSIF. This may be related to the notion of information being a source of power. Some managers regard parting with information at their disposal as parting with their power (NSIF Interview: Annexure 2). This also explains the lack of good working relations between the NSIF, Spatial Planning and the other DLA units such the Land Reform offices. Most Land Reform project managers are not aware of the importance or the role of spatial information management in enhancing the project management processes (SPI – KZN Interview: Annexure 4)

3.6 Overall Capacity of the DLA Spatial Data Systems/Programmes

This section is aimed at providing an analysis of the human resource and organisational capacity within the different components of the DLA in terms of its potential to support the integrated spatial data management. This overview is mainly based on the discussions and interviews held with some of the key participants in the Land Reform, other DLA components and those involved with the IDP processes in KwaZulu-Natal. Some aspects of the analysis are also based the literature review of the Land Reform and the IDP process.

3.6.1 Organisational Capacity

According to Mngwengwe (2003) there is generally a lack of appreciation and awareness of the importance of land or spatial information management in the planning and implementation of the Land Reform projects among DLA officials. The most significant factor that contributes to the limitations in the

handling of land management information within the DLA is the disjointed nature in which the different components of the DLA function. We, different units work in silos, each unit does not know what the other unit is doing or how should its tasks be performed in order to fit with the tasks performed by the other units (NSIF Interview: Annexure 2).

The most common and key land information management system used by the Land Reform project managers and planners is the Land base system. This system is said to be at most not functioning well and at worst unsuitable for the Land Reform information management needs (Mngwengwe et al, 2003, pers. comm.) The most common problems which have resulted in the malfunctioning of the Land base programme as mentioned underneath bear testimony to the detrimental effect of this disjointed approach to spatial information management. The most common problems mentioned are:

- The DLA district office based planners responsible for the management of the Land Reform projects and maintaining the Land base data do not fully appreciate the importance of entering the correct property information in the system especially the 21 digit code. This is partly due to the fact that they do not understand that in order for the Link viewer system to show the spatial location of the project area through a map it relies on accurate property information and the 21 digit code (SPI – KZN Interview: Annexure 4).

- Central to all the management deficiencies of the land information that is in possession of the DLA planners at the district offices is a lack of training and capacity building that is critical for efficient and effective data management. Although some of the key informants at the Vryheid Office indicated that they have attended a Map Awareness training courses run by the Surveys and Mapping Directorate, they said that they neither apply the knowledge learnt in these courses on their daily

> work environment nor are they provided with an opportunity to share this knowledge with their colleagues. This may be evidence of a lack of environment that encourages a culture of learning and knowledge sharing and application (Mngwengwe et al, 2003, pers. comm.).

The Land base system which is installed on the personal computers of every Land Reform project managers and other units in the DLA district office, is being redesigned due to operational problems of the previous versions. This redesign process is however being wholly carried out by the Information Technology component of the DLA which has little or no understanding of the operational requirements of the system. For the system to be effective, the redesign process should involve all the users of the system i.e. the SG Offices, Deeds Offices, Surveys and Mapping, NSIF, PLSS, and the Land Reform offices of the DLA (NSIF Interview: Annexure 2).

The beneficiary and farm or property data are contained in the Land base and the demographic, previous, current and proposed land use information is contained in the Land use Plans or Business Plans compiled by the consultants employed by the DLA. The DLA Planners or Project Managers are responsible for collecting and compiling this data. This data is then presented to the DLA in the form of designation memos on the basis of which a Land Reform Project is approved by the Minister (Mngwengwe et al, 2003, pers. comm.).

Upon completion of the planning process, the consultants normally hand in hard copy plans to the DLA and keep the digital/electronic copies with them excerpt the Land base data which is located within the DLA. This practise limits the ability of the DLA planners or other users to access this data for future purposes. It also results in high unnecessary costs to the government since this data often has to be generated afresh in future for implementation plan or for the IDP purposes. (SPI – KZN Interview: Annexure 4).

The other critical reason for inability to share spatial data within the DLA is the fact that the planning process is mainly outsourced due to capacity constraints within the DLA, thus leading to this process not being fully internalised within the DLA systems. The data management capacity of DLA project managers is not developed as the entire data collection and management for the planning process is managed and controlled by the consultants. Needless to say that the current situation further incapacitates the DLA officials with regards to in-depth planning and data management abilities thus leading to continued reliance on external consultants for planning purposes by the DLA (SPI – KZN Interview: Annexure 4).

3.6.2 The Land base System

The Land base system assists with the management and control of Land Claims and Land Reform projects. The Directorate Monitoring and Evaluation of the DLA, initiated the development of a Land base system as a tool for monitoring the progress of the Land Reform Programme, track changes and trends over time and to make recommendations to the policy components within the DLA in this regard. This system proved beneficial to the whole department and was developed into a departmental system being implemented in all the provincial DLA offices which have taken full responsibility to update and maintain the data within the system DLA (SPI – KZN Interview: Annexure 4).

The Data Capturing process for the Land base data is outlined as follows:

- A GIS – based system called the Link viewer has been developed upon the Land base system through which the physical locality of a Land Reform project can be queried as a feature on the map.
- The land information to link a project to its physical location is obtained from the designation and transfer documents from the office of the

Minister of the DLA, data capturing from the DLA Provincial Office files, the Surveyor General and the Deeds Offices.

- The linkage has been established by structuring the land information contained in the Land base to correspond with the "Property Key" held by the Surveyor General in its digital cadastre. Each property in the country has a unique key (21 digit code) that identifies its physical location in the cadastre (or on the ground).
- This linkage is made possible through a web based system called the "Link viewer".
- The Land base system also enables access to related Land Reform project information (i.e. community demographics, background, critical issues, project progress performance, and financial information).

The Standards mentioned hereunder were described by Pillay (2000):
The projection parameters: geo-spatial data set is referenced to that of the Cadastral Information System (CIS) of the SGO and topographic data set of the CD: Surveys and Mapping.
The DLA officials who are project planners and the so-called "super-users" are responsible for the input of the data thus responsible for the accuracy and maintenance of the Land base system.

According to the officials of the SPI-KZN unit, the under mentioned are the use constraints that affect the Land base data (SPI - KZN Interview: Annexure 4):

The Land base system, whose Link viewer function is currently not operational, is currently affected by numerous operational problems which render it ineffective as a land information management system due to the following shortcomings:

- Human error caused by incorrect capturing of land information especially the 21 digit code by DLA planners/users;
- Planners or users responsible for the input of information in the Land base cannot view any errors in the system as the datasets can only be extracted using the Oracle Discoverer Facility which the planners do not have access to;
- Computer manipulation errors arising from problems in the manipulation of the 21 digit code by the computer.
- Outdated SG Office cadastral information; and
- The Land base is expected to do function it was not originally designed for e.g. through linkage with the Link viewer the Land base is expected to be a broad-band system capable of performing the data management and spatial functions whereas it was designed for the operational functions only.

4. ANALYSIS OF SPATIAL DATA CONSTRAINTS IN LAND REFORM PLANNING:

Amantungwa Land Reform Project

4.1 Introduction

This chapter gives an overview into the manner in which the Amantungwa Land Reform project was planned by the DLA Vryheid District Office whilst concurrent planning was done including the same Amantungwa area by the Amajuba District Municipality (ADM) under whose jurisdiction the Amantungwa area falls. It will also be reflected in this chapter how the planning done by the ADM through its IDP process failed to take into consideration the Amantungwa project plan done earlier by the DLA which inevitably resulted in a duplication of planning, unnecessary delays of infrastructure and services to the Amantungwa community and a wastage of state resources. Using the Amantungwa project as a case study, this chapter seeks to indicate how the separate planning processes would impact on the future implementation hence sustainability of Land Reform project upon its transfer by the DLA to the Amantungwa community to implement development through the ADM.

As stated elsewhere in this thesis, the absence of a mechanism or framework to facilitate integration of the Land Reform planning with the IDP, due the fragmented planning processes ultimately results in duplication and wastage of resources. This thesis seeks to use the Amantungwa project to indicate the importance of ensuring that Land Reform planning is informed by the identified priorities, the level of services and infrastructure delivery, opportunities and limitations to land usage and the broader development strategies that affect the project area as identified in the ADM IDP. Although it is not the focus of this thesis, the contrary is also true that the IDP would also be enhanced by taking into consideration the Land Reform plans and priorities in areas under its jurisdiction. The successful accomplishment of this planning

exercise would be heavily dependent on the accessibility, transferability and reliability of the spatial data both within the DLA and the ADM IDP.

4.2 Background of the Amantungwa Land Reform Project

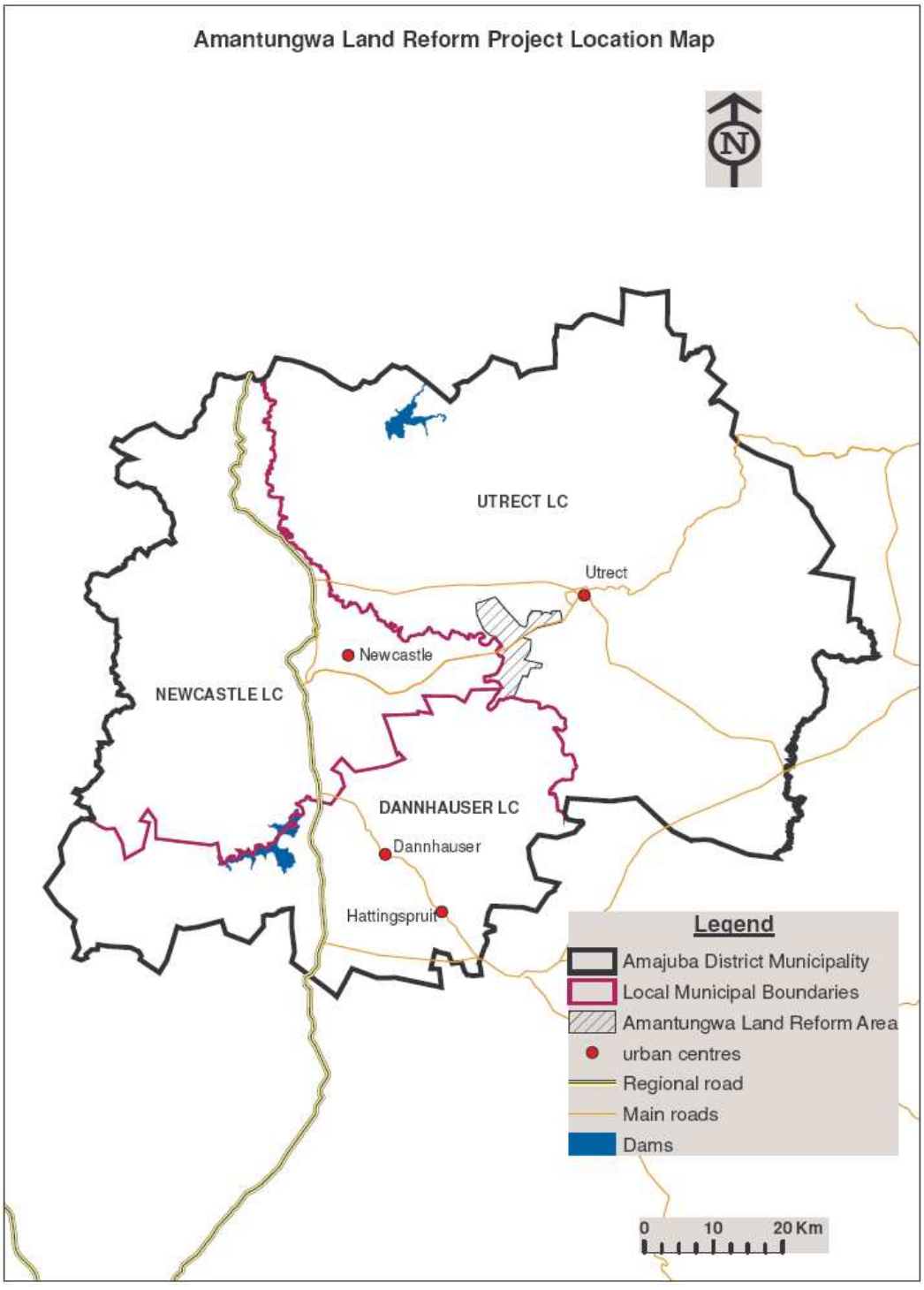
The Amantungwa Land Reform application was registered as a Land Redistribution project and included in the Redistribution Core Business Plan submitted to the RDP in November 1994 from the former Department of Regional and Land Affairs (Amantungwa Project Background: file no. KNA/3/6/7). This application emanated from the extensive land need within the Northern KwaZulu-Natal district comprising of Utrecht, Newcastle and Dannhauser areas due to the widespread labour tenancy overcrowding, overlapping and conflicting land rights, poor access to productive land and a high level of landlessness. The district also has a history of forced removals, farm evictions and conflicts over access to land between the black farm labourers and the white commercial farmers (Maseko Hlongwa and Associates, 2002).

In 1994 the government designated an area of approximately 5400 hectares for the settlement and limited agricultural use by the 600 members of the Amantungwa community. In view of the urgency of the land need, some households settled on the land before detailed planning for settlement and development of basic infrastructure was undertaken (Maseko Hlongwa and Associates, 2002). This practise was allowed by the DLA where extreme circumstances such as farm evictions of a particular applicant community dictated that settlement should occur prior to proper planning of the land (Mngwengwe et al, 2003, pers. comm.).

4.3 The Project Area

The Amantungwa Land Redistribution project is located within the ADM area in the KwaZulu-Natal province (Map A). It is approximately 5km from the small

town of Utrecht and 20km from Newcastle. It comprises of 11 subdivisions of the farms; Waterval 148, Vaalbank 154 and Berouw 179 which comprise of 5 474.8245 hectares in extent (Maseko Hlongwa and Associates, 2002).



Map A. showing the location Amantungwa Land Reform project area within the Amajuba District Municipality.

4.4 Amantungwa Current Land Use (Revised Land Use Plan: Maseko Hlongwa and Associates, 2002)

This section provides a brief overview of the Amantungwa Revised Land Use Plan as compiled by Maseko Hlongwa & Associates consultants (Maseko Hlongwa and Associates) in 2002 on behalf of the DLA Vryheid District office. This will serve to provide a contrast between the Land Reform Planning process and the IDP process for the Amantungwa area.

4.4.1 Settlement

Amantungwa area has four distinct settlement areas and each household is allocated approximately 2500 square meter site. The community resolved to maintain the existing settlement pattern but identified the need for the clear demarcation of sites; and additional sites to cater for population increases

4.4.2 Agriculture

4.4.2.1 Dry Land Crop Production

Land suitable for Dry Land Crop Production and Medium Scale Irrigated Crop Production has been identified. Most of the land is located on suitable and relatively high potential soils. The community will purchase tractors and other farm implements, which will be used for dry land crop production.

An area has been identified for a combination of subsistence livestock and crop production. Subsistence crop production will be undertaken within residential sites as it happens currently. In addition to the community gardens project initiated by the ADM, land suitable for irrigation and intensive production of vegetables has also been identified.

4.4.2.2 Livestock Farming

An area has been identified for Medium Scale Integrated Agriculture which is Intensive Beef and Fodder Production. Currently the community rear cattle, sheep and goats. Each household keep the cattle so that in times of distress

cattle could be sold to raise finance or to keep customs and rituals. The community members that keep cattle should be encouraged to commercialise their farming operations.

4.4.3 Community facilities

The Land Use Plan makes provision for the following community facilities:

- multi-purpose centre, which include a community hall, craft centre and other facilities;
- tribal court;
- secondary school; and
- clinic.

4.5 Planning Challenges

It is stated in the project file (KNA/3/6/7) that soon after the land was purchased, the planning process was initiated by the DLA; however the actual planning was not done due to an objection by some community members who were referred to as labour tenants (Amantungwa Project Background: file no. KNA/3/6/7).

In 1998, a consultancy firm Isikhungosethu Environmental Services (IES) was appointed to prepare a business plan for the development of the area. This was completed in 2000, but could not be implemented by the ADM due to problems associated with the identification of the bona fide members of the community. It was alleged by the ADM that the number of households settled on the land exceeded the number of households allocated grants by the DLA (Maseko Hlongwa and associates, 2002).

A verification of beneficiaries was then commissioned by the DLA through the appointment of Maseko Hlongwa and Associates. This verification revealed

that the number of households living in the project area exceeded 600 (number household for whom the land was designated) due to the influx of people evicted from the neighbouring farms and the time delays that resulted in population growth since the project initiation phase (Maseko Hlongwa and Associates, 2002). This difference in the number of legitimate households posed a serious challenge to the municipality in terms of planning and the provision of services and infrastructure.

It was also discovered at this stage that the business plan that was previously developed through the assistance of the Isikhungosethu consultants has become outdated, due to the delay between the project initiation and implementation phase. According to Maseko Hlongwa and Associates, some of the projects that were proposed in the initial business plan have already been implemented using funds from other sources obtained through the ADM and its predecessor, the Umzinyathi Regional Council. Among these, were the major link and access roads that have been developed with funding from the Department of Transport (KZN). Umzinyathi Regional Council also assisted the community to obtain water by installing boreholes. A major bulk water project was also implemented in 2000 to supply water to a number of rural communities in the ADM including the Amantungwa community (Maseko Hlongwa and Associates, 2002)'.

When DLA prepared to transfer the Amantungwa project to the ADM for implementation of the planned projects, it was discovered that these projects could not be implemented in their original form. In 2001 Maseko Hlongwa and Associates was appointed by the DLA to revise the Amantungwa Business Plan and ensure that it reflected the current needs of the community. Through this process, a list of Amantungwa beneficiaries was verified, and the business plan was redrafted to reflect the current development status of the area and to align it with the ADM IDP (Maseko Hlongwa and Associates interview: Annexure 3).

4.6 Spatial Data Requirements in the Amantungwa Planning Process (Maseko Hlongwa and Associates, 2002)

4.6.1 Access to Spatial Data

Table 1 indicates the planning activities that were conducted to produce the Amantungwa Land Use Plan as compiled by Maseko Hlongwa and Associates (2002). The table also indicates actual and/or potential sources of data that were used on each planning activity. In the case of potential data sources, most of the data was not available to be used in the Amantungwa Business Plan hence some of the challenges in the planning process as highlighted in section 4.5 and elaborated further in the sections hereunder. This section seeks to indicate the manner in which this data was collected and stored thus leading to its inaccessibility to other users and limiting the potential for integration of the DLA data with other forms of data.

Table 1. Amantungwa Planning Data Requirements

Concept	Activity	Potential/Actual Data Source
Development Strategy	• Identification of land • Identification of households/beneficiaries (demographic information including household income). • Basic needs assessment. – provide food security • Local economic development – job creation through commercial agriculture	• DLA Land base data and preliminary plans. • Beneficiary Verification through Revised Business Plan • Socio-economic Survey • DOA &EA BRG data

Development Principles	• Sustainable use of the environment • Integrated development	• Acocks Land cover data • ADM IDP
Proposed land use	• Demarcation of settlement sites • Re-adjustment of site sizes • Identification of additional sites	• DOTLG (KZN) Settlements data and village maps • DOH (KZN) Land suitability data
Agriculture	• Dry-land crop production • Livestock farming • Irrigated cropping	• DOA &EA BRG data and land suitability data • ACOCKS land cover data
Infrastructure and services	• Water provision – boreholes, bulk water scheme and reticulation • Roads - existing roads, road construction • Sanitation – existing and construction of pit latrines	• UMzinyathi Regional Council Borehole data • Dept. of Transport Roads data • DWAF sanitation data

As indicated in paragraph 3.6.1 above that upon completion of the Land Reform planning process, the consultants normally hand in hard copy Business Plans to the DLA office concerned and keep the digital/electronic copies. As noted earlier, this practise limits the ability of the DLA planners or other users to access this data for future planning or other purposes. The

impact of this problem was experienced by the writer in the process of collecting spatial data that was used in planning the Amantungwa project on behalf of the DLA for the purpose of this thesis. No electronic or digital format of the data used in the settlement plan was found in the DLA office where the main project file is kept. The consultants who did the Amantungwa Business Plan (Maseko Hlongwa and Associates) also did not have the digital copies of the data as they have subcontracted this work to GIS specialists who kept the digital copies of the data and in this case were difficult to be traced.

4.6.2 Transferability of the DLA Data

According to the planning officials at the ADM (ADM Interview: Annexure 1), the Amantungwa Land Reform planning data was not available to be integrated in the ADM IDP when the IDP was drafted. This was largely due to the fact that the required data was often not in a digital or electronic format that would enable it to be easily shared with others. This is attributed to the absence of an organisational and technical infrastructure to support the integration of spatial data among the relevant stakeholders involved in Land Reform planning and in the IDP (Interview with KZN-SPI unit: Annexure 4). This inadequacy prevails despite the fact that both the DLA policies and the municipal legislation as noted in sections 1.1 and 1.14, allows for the transfer of Land Reform projects into the municipalities responsible in the area for development implementation purposes. This responsibility cannot be effectively implemented without a framework or mechanism to ensure that spatial data held by both the DLA and the ADM is capable of being transferred and exchanged between both organisations and all other users (ADM interview: Annexure 1).

4.7 Amantungwa Planning through the ADM IDP

4.7.1 Projects Identified for the Amantungwa Area in the ADM IDP (2002)

To illustrate the point mentioned in 4.6.1 regarding the availability of the data for integrated planning, Table 2 underneath indicates that none of the projects identified for the Amantungwa area in the ADM IDP in 2002 were funded or to be funded by the DLA. This clearly indicates that the projects identified in the Amantungwa Land Reform Business Plan also drafted in 2002 were not taken into consideration in the ADM IDP.

Table 2. Amantungwa Projects in the ADM IDP

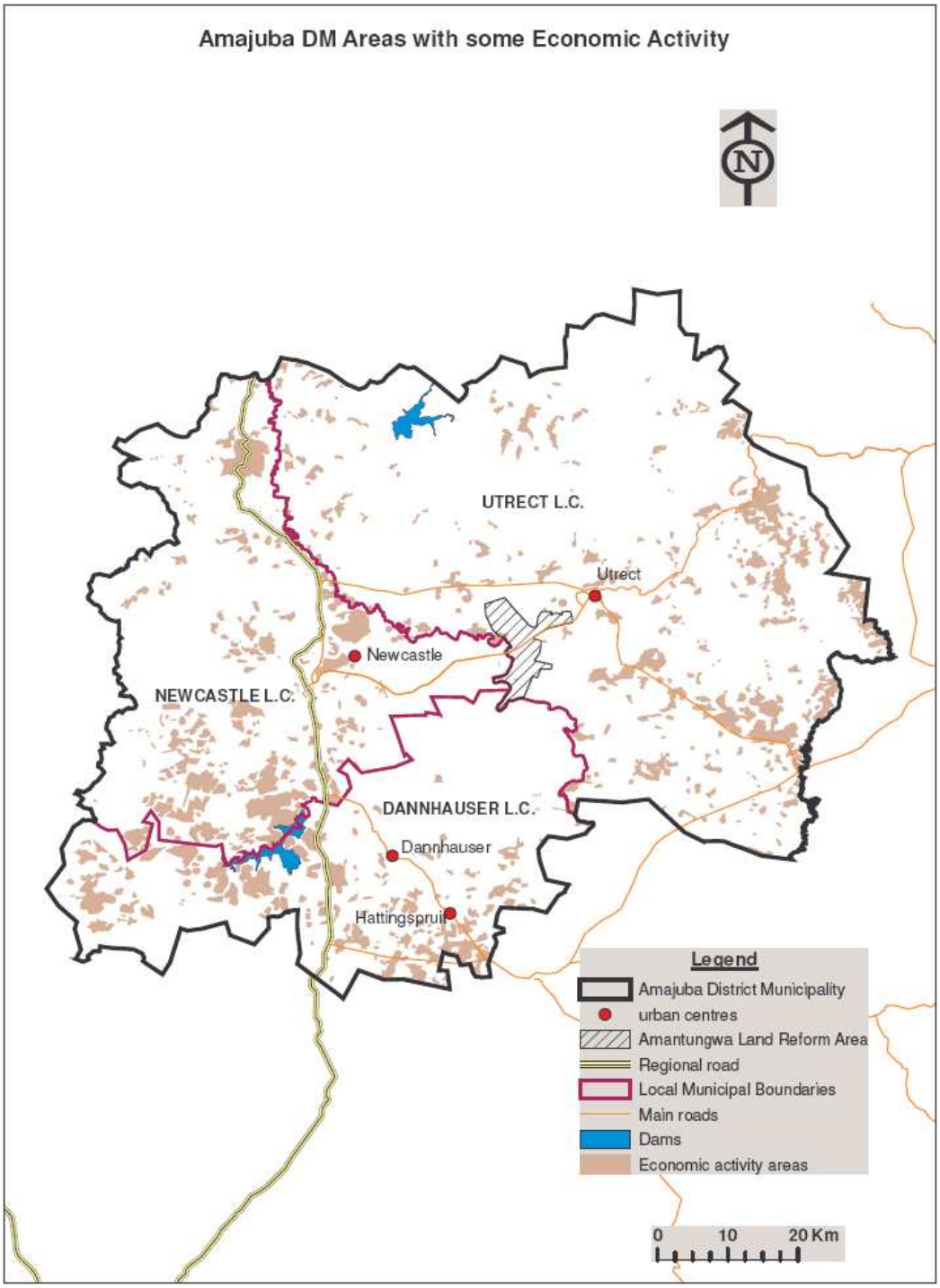
Project	**Description**	**Funding Agent**
Agriculture	Fencing Grazing Camps KZ253	CBPWP
Water	Starter Water KZ2532	DWAF
	Water Tanker Amajuba	UNKNOWN
	Amantungwa Bulk Water	CMIP
	School Sanitation KZ253	DWAF
	Water pipe construction to Vaalbank	CMIP
Sanitation	Household Sanitation – Amajuba School sanitation – Mxhakeni KZ253	DWAF
Roads	Roads and Storm water KZ253	DOT (KZN)
Social/Community Infrastructure	Amantungwa Cemetery Amantungwa bus and taxi rank Amantungwa shelters Multi-Purpose Halls KZ253	CBPWP

The Amantungwa case study indicates that proper planning was not undertaken prior to settlement on the land due to a number of factors as stated under the section 4.5 (Planning Challenges). This was also partly due to the fact that since Amantungwa project was a DLA project, the ADM through its predecessor (Umzinyathi Regional Council) was not directly involved in the initial project planning. This resulted in a number of infrastructure development projects being planned and implemented by the ADM in this area without involvement of the DLA. This then necessitated that the Amantungwa business plan previously compiled by the DLA, be revised prior to the beginning of the development implementation phase by the ADM upon transfer of the Amantungwa project to the latter (Interview with Maseko Hlongwa and associates: Annexure 3).

According to Maseko Hlongwa and Associates (2002), funding for the infrastructure projects such as roads and water implemented at Amantungwa was sourced from other government departments through the ADM and its predecessor the Umzinyathi District Council. This shows that whilst these projects were included in the district municipality's IDP (ADM IDP 2002), the DLA also continued to budget for them until their implementation stage was reached in 2003 where it was discovered by the DLA through the Amantungwa Business Plan revision that they have already been delivered.

4.7.2 Prioritising Amantungwa Project with the ADM

4.7.2.1 Prioritising for Service Delivery



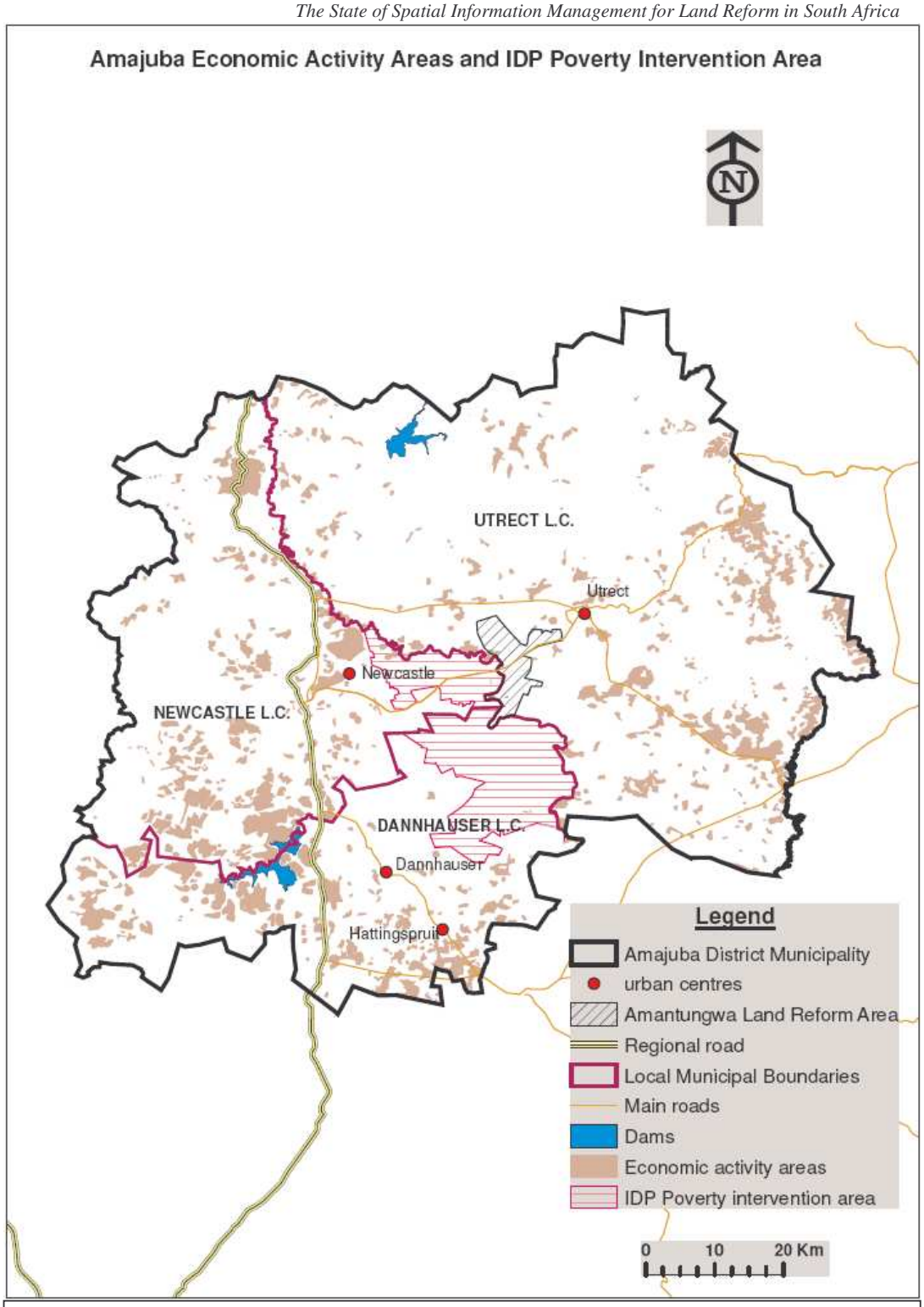
Map B. showing areas of some level of economic activity in the District Municipality. The map shows that the Amantungwa area has very little economic activity.

According to the ADM IDP, the Land Reform Programme was regarded as one of the Key Interventions that required prioritisation by the ADM. In regards to new projects, appropriate land needs to be identified within urban edges if possible if the developments are not associated with commercial agriculture, and near to markets and transport routes if associated with commercial agriculture (ADM IDP, 2005/06). Map C. indicates that the Amantungwa area had very little economic activity hence one of the areas under the ADM that should have been prioritized for infrastructure such as roads in order to stimulate economic activities in the area.

The prioritization of infrastructure projects for the Amantungwa area by the ADM however did not take into consideration that these projects were already identified as priorities in the Amantungwa Business Plan drafted by the DLA. The prioritization from the Land Reform point of view was more co-incidental that being informed by community needs and it also led to the duplication of efforts by government. Other areas of need which were not part of the DLA Business Plan could have been prioritized to improve the livelihoods of the Amantungwa community.

As key or special intervention areas in terms of the future development, provision of services and the potential link to sustainable small scale farming activities, the ADM IDP states that the interventions required in the Land Reform areas include:

- Proper planning prior to settlement
- Provision of basic services and infrastructure
- A basis for economic sustainability
- Preservation of agricultural land.



Map C. showing the ADM Key Interventions excluding the Amantungwa project area from the District Municipality IDP poverty intervention.

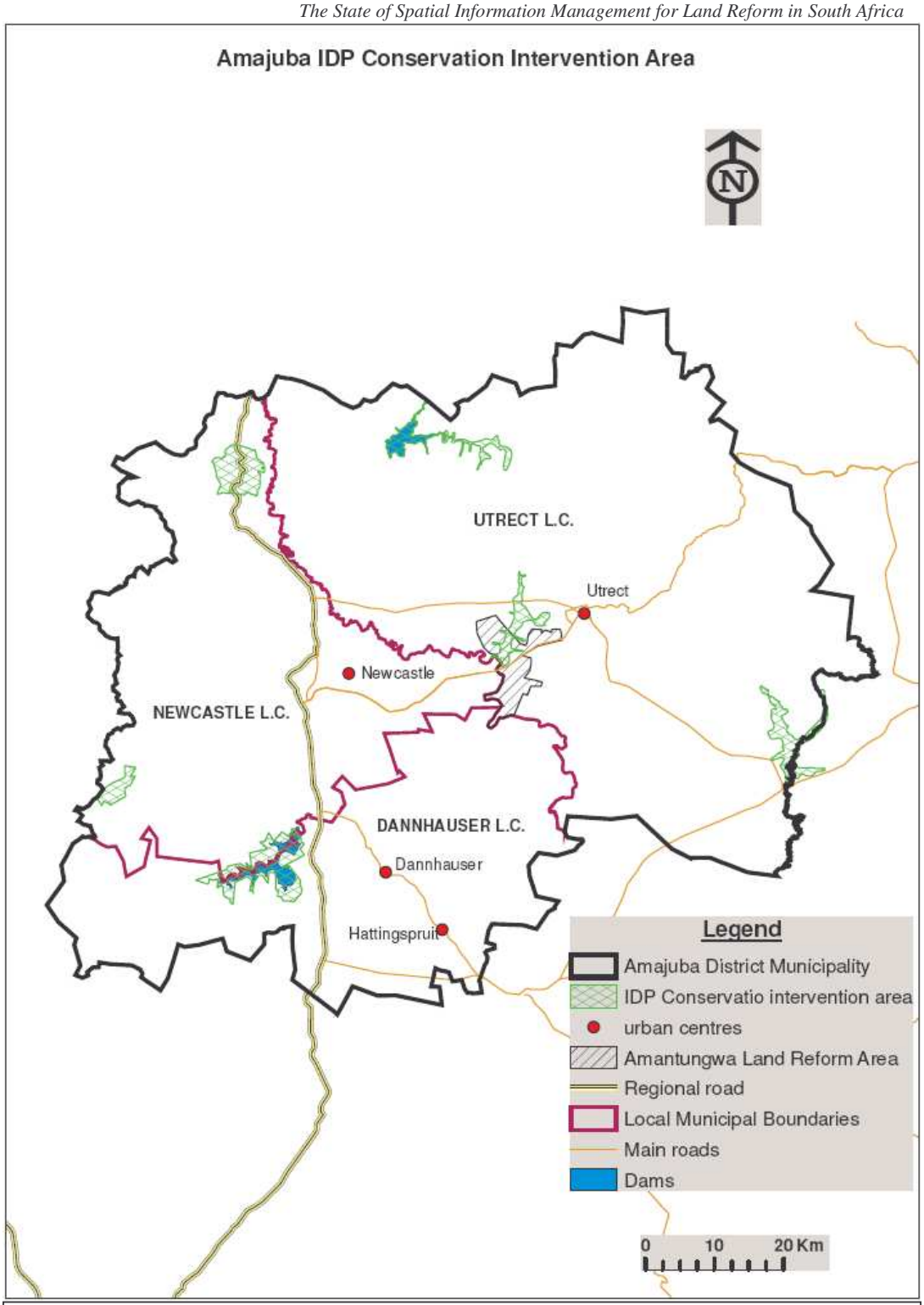
4.7.2.2 Prioritising for Poverty Alleviation

Poverty Relief is also regarded as another key intervention area for the Amajuba district (ADM IDP 2002). The Service Satellites and the Service Sub-satellites have been identified as Poverty Relief (area marked in red hatched lines in Map C). Key areas of intervention include:

- provision of infrastructural and social services
- support for Local Economic Development (LED) especially small scale agriculture and Small, Micro and Medium Enterprises (SMMEs); and
- giving priority in terms of development projects.

Amantungwa settlements (area marked in hatched light grey in Map C) are however excluded from the Poverty Relief areas which are directly adjacent to the Amantungwa area. This is quite peculiar since the income levels (which is used to determine the state of poverty per household) of the Amantungwa residents is expected to be similar to the ones of its neighboring communities in the areas marked for Poverty Relief. The families in the area marked for Poverty Relief is said to be equal to or below R9 600, 00 per household per annum [Spatial Development Framework (SDF): ADM IDP Review, 2005/06].

The exclusion of the Amantungwa area in the areas identified for Poverty Relief is also another indication that the disjointed planning between the DLA and the ADM was bound to result in ineffective and unsustainable planning.



Map D: showing the Amajuba IDP Conservation Intervention Area cutting through the Amantungwa Project Area

4.7.3 Location of the Amantungwa Area within an Environmental Conservation Area according to the ADM Spatial Framework (see Map D)

The location of the Amantungwa project like the other Land Reform projects in the ADM was determined through the Land Reform process through the Business Plan drafted by the DLA and not by spatial or environmental planning as reflected through the ADM IDP. According to the ADM IDP, certain parts of the Amantungwa settlement are not located in the most environmentally suitable area. This is due to the fact that the Amantungwa settlement is located in close proximity to the Boschoffsvlei (indicated in a dark green colour in Map D). The area around the Boschoffsvlei is one of the most environmentally sensitive locations in the ADM, consisting of a number of natural species like birds and insects that would be negatively affected by encroachment of a human settlement (SDF: ADM IDP Review, 2005/06).

According to ADM planning officials (Annexure 1), the location of other Land Reform projects such as the Groenvlei, Zaaihoek dam, Charlestown and Rondavel settlements indicate a common pattern which contrasts the ADM Spatial Framework. The Groenvlei project is located in close proximity to a major wetland close to the Groenvlei Dam; and the rest are located in an area where the topography creates a physical barrier between them and the rest of the district. This would create difficulties in terms of services and infrastructure provision to these areas.

5. SPATIAL DATA DISTRIBUTION FACILITY (SDDF) AS A SOLUTION TO SPATIAL INFORMATION CONSTRAINTS

5.1 Structure of the Spatial Data Distribution Facility (SDDF)

According to Gavin (1997) the core or base datasets are the widely used datasets that should receive priority treatment as far as correction and maintenance is concerned in the process of developing a national spatial data infrastructure. These core datasets also perform another valuable function namely, their use in spatially referencing derivative datasets which can greatly assist in the integration of data from various sources for further analysis (Gavin, 1997).

5.1.1 The SDDF Core/Base Datasets

The proposed SDDF (refer to figure 6) should have the following datasets as core or base datasets:

5.1.1.1 Land data

The identified datasets for Land Reform planning would be the DLA Land Reform data that is presently located in the Land base and in the DLA Land Reform Offices, Deeds Registry, SGO, PLSS, and the Surveys and Mapping data as described above in Spatial Data Sources and Constraints (section 3.5). The Land base as indicated in section 3.5 contains beneficiary demographic information and brief history, property details, progress of the project and the finances.

The Deeds data indicates past and present legal ownership of relevant property, size, bonds and other encumbrances registered on the property. The Surveys and Mapping data indicates all the property boundaries, sub-divisions and consolidation through digital and hard copy maps. This data is essential for investigating Land Reform applications and or land claims.

Other data essential for Land Reform Planning include:

5.1.1.2 Land Cover/ Land Use Maps

Land cover data such as the Acocks data is located in the CSIR. It indicates natural vegetation of the area and gives an indication of the potential land use e.g. grazing, cropping or settlement. Land use maps indicates the past and present uses of the land obtained through physical field research or through workshops where community describe the area and land uses using PRA methods. Land use maps are also useful in determining future or proposed land uses.

5.1.1.3 Bio-resource Unit (BRU) Maps

Bio-resource Groups (BRG) data is located with the DOAEA (KZN). It indicates areas where the soil type, terrain, altitude, climate and rainfall are reasonably alike to be grouped into a unit called the Bio-resource Unit. This data is essential in determining the agricultural potential of an area.

5.1.1.4 Municipal Services, Water Resources and Infrastructure Maps

Water supply data located in the various local and district municipalities and the DWAF. The data indicates the levels and needs of water supply in the specified area. Other infrastructural services data such as roads and bridges located in the DOT (KZN) and other relevant service providers such as Escom and Telkom indicate the level of infrastructure supply such as roads, electricity and other basic infrastructure as well as the needs for these services in a particular area.

5.1.1.5 Protected Species Maps

The Environmental and Protected Areas data is located with the DOAEA (KZN) and the National DEAT. This data indicates the environmentally sensitive areas that need to be protected. It is essential to influence decisions

on the present and future land use planning e.g. land suitable for agriculture or settlement.

5.1.1.6 IDP Report/Statistics

The IDP data located in the various local and district municipalities such as the ADM. It indicates the approved IDP Reports and statistics e.g. demographic, unemployment, poverty level etc. Every stakeholder active or interested in a particular municipal area would access this data for their planning or decision making purposes. The Land-use data located in the various local and district municipal IDPs in KwaZulu-Natal is also held by the DTLG (KZN);

5.2 Providing Data Access

The emphasis in the SDI Act is on establishing a system for realising access to spatial information. Thus, for example, all public sector organisations will be required to document spatial data holdings and provide specifications for the capturing of spatial and spatially related data in a format compatible with publication through the SDDF (SDI Act, 2003).

With the SDDF in place, it is indicated in figure 6 how the DLA Land Reform planner or project manager (spatial data user) would be able to access data from the various base datasets (e.g. land cover, topo-cadastral, or IDP data) located in the SDDF for Land Reform planning using the Generic Project Cycle described in section 3. In figure 6, the DLA project cycle is utilised to indicate how the data collected using the SDDF is to be integrated into the Land Reform planning process using GIS operations. These operations are also used to facilitate planning, stakeholder negotiation and enhance decision making to reach best possible land allocation options. Through the Land Reform project cycle, it is also indicated how the spatial data collected through the Land Reform planning process is integrated into the IDP process using GIS operations.

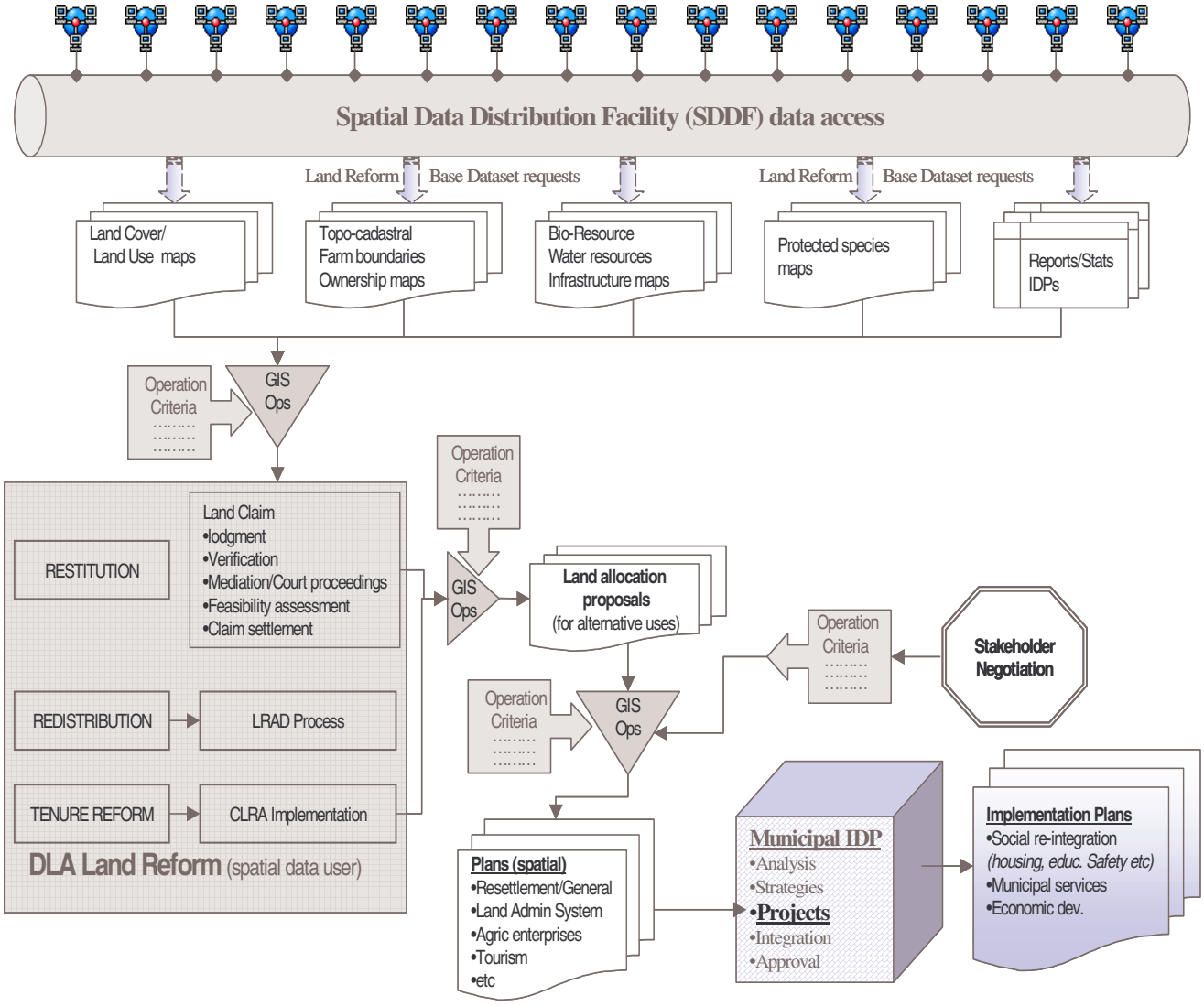


Figure 6. Proposed Spatial Data Infrastructure for Land Reform Planning (Source: Rugege, 2004 LIM Lecture notes)

The SDDF as indicated in figure 6 shows how the final spatial data outputs of Land Reform planning in the form of Resettlement, Land Administration, Agricultural Plans etc. are integrated into the IDP as projects that feed into the Municipal IDP Implementation Plans encompassing Social re-integration plans

for the Land Reform beneficiaries. These plans would then be used to implement housing, municipal services and infrastructure, economic development, poverty alleviation and HIV Aids projects in the community by the relevant municipality or its agents.

5.2.1 DLA: Land Reform Process (Proposed Generic Project Cycle)

The DLA has a strong need for a tool to manage its Land Reform projects. This includes the ability to register and track projects and to report on project progress. The existing systems in particular the Land base (refer to section 3.5) has proven ineffective in its present form in providing an information management tool to the DLA Land Reform planners and managers (del Grande, 2003).

The proposed SDDF as depicted in figure 6 indicates a flow diagram with base datasets and the process that a Land Reform application would follow from the planning to the implementation stage. The diagram also indicates the spatial data inputs, processing and outputs for each phase of the Land Reform project and the areas where Land Reform data should integrate with municipal IDP data. These processes of data inflows and outflows are further described from section 5.2.1.1 to 5.2.1.6 hereunder using the proposed Generic Project Cycle:

5.2.1.1 Registration of Interest

Upon receipt and registration of an application by the DLA office, it is assessed in terms of the applicable legislation whether it is a Restitution, Redistribution or Tenure Reform application. A file with a proper file name and number is then created to record all the details pertaining to the application (del Grande, 2003).

5.2.1.2 Situation Assessment/Preliminary Planning

The application is then prioritised and considered as a project with an allocated project manager who conducts a preliminary investigation on the application by investigating property details, past and present land uses, land claims, land rights and relations of the present occupants. In conducting this investigation, the planner will use the PRA methods of Mapping and Field Method Guide (del Grande, 2003) as described in section 3. Other activities conducted in this preliminary or situational assessment would include:

- Assisting the applicants to develop a map of the area indicating:
  - internal and external boundaries;
  - common local features such as roads, rivers, shops etc;
  - land use features such as settlements or huts, grazing land, fields etc.

- Relating of applicants` or community history through timeline methods in order to indicate;
  - how the community establishes and allocates land rights to its members;
  - previous and/or current land ownership rights and their management,
  - determination of previous and present property boundaries.
  - determining of previous and present land uses
  - assessment of community or informal land administration systems e.g. allocation of sites, transfer of ownership

5.2.1.3 Community/PRA Map

In order to be useful for planning and other purposes by other users outside the community concerned, the community sketch shown in figure 5. designed through PRA methods, needs to be spatially referenced to ensure the correct

measurement of the reflected features. This could be done by overlaying the sketch on an aerial photograph of the area or a topographical map and then conducting the necessary adjustments. The resulting map could then be included as part of the business plan that would be used to assess the project and enhance decision making by the DLA. The map would include features shown in the Amantungwa Land Use Plan (Maseko Hlongwa and Associates, 2002).

Once the map has been integrated into the SDDF using GIS, the topo-cadastral map of the project area and the Deeds information, it can be queried to indicate land ownership details of any particular land parcel in the project area. Other details such as the ownership history, bonds and other restriction on the title deed can also be viewed through the link. This would be made possible through the spatial features on the map that are linked to the land ownership data from the Deeds Registry which would now be linked to the SDDF in the proposed model (figure 6).

All the above-mentioned data would assist the DLA in deciding whether the application complies with its minimum requirements (e.g. the applicable legislation) and can therefore be approved as a project. The final product or output of this assessment would be the Preliminary Plan or Report that will be presented to the Project Approval Committee to decide on whether the project should be allocated funding for further investigation and planning activities.

5.2.1.4 Project Planning

5.2.1.4.1 Land Use Plan

Once the DLA planners have sorted out the land rights issues, a preliminary plan is drafted to indicate the proposed land-use and the applicant`(s) development vision of the acquired land. Using the Amantungwa Case Study as an example, this level of planning would involve the following:

- Establishing the location of the Amantungwa project area on a map in relation to the Amajuba District Municipality or even outside the district municipality area (see Map A). This location is obtained by viewing topographic, magisterial district, provincial or even the RSA map.

- The DLA planner would use the Land Cover and Land use data (Maseko Hlongwa and Associates, 2002) to establish the natural vegetation and the present land use of the area to assess its suitability for the proposed uses as identified by the Land Reform applicants through community PAR mapping (figure 5).

- Using the Bio-resource Grouping (BRG) data to assess land capability and suitability for the identified agricultural or other uses of the land as specified by the applicants. This would enable the community to decide on the most suitable land use option and possible projects for their area or for the DLA planner to advise the community on the best possible use e.g. portions suitable for grazing, dry land cropping, irrigated cropping and/or tourism.

- The DLA planner would also have to assess if the Land Reform project complies with the IDP of the local municipality. Using the IDP Reports and statistics available in the SDDF, the planner would be able to see if the proposed project is in line with the IDP priorities such as Poverty Eradication, Local Economic Development, and HIV/Aids Combating Strategies. The planner would also be able to determine if the proposed project complies with the approved Spatial Development Framework in terms of its location, proposed land uses environmental impacts etc.

The IDP data also contains the following crucial data that is required for Land use Planning:

- The level of basic infrastructure, water resources, and other services that the applicants should obtain from the municipality to sustain their livelihoods upon the transfer of land.
- Planned and/or budgeted projects for the provision of municipal services and infrastructure for the particular area in a given financial year e.g. roads, water, electricity etc.
- Opportunities and threats with regards to the exploitation of natural resources due to existence of protected species, wetlands and other conservation considerations.
- The opportunities and limitations to the proposed land uses due to the existing zoning measures and prohibited uses.

5.2.1.4.2 Infrastructure and Municipal Services

Using the spatial data located in the SDDF, all stakeholders involved or interested in a particular Land Reform project would be able to assess the current and/or proposed level of services and infrastructure for that area. This would then enable them to align their plans and budgets in accordance with the available current or planned development for the area.

The provision of infrastructure and municipal services by other government departments, municipalities and other service providers such as Escom and Telkom in a particular Land Reform area would be enhanced through easy access to the critical planning data located in the SDDF. Planning through the IDP by all stakeholders would be made efficient and less time consuming by the existence of a centrally accessible spatial data through the SDDF. Among the other advantages to the DLA and government as a whole would be the lessening of transactional costs of collecting the data from disparate sources such as the DLA Land base, Deeds Registry, SGO, PLSS, Surveys and

Mapping, and other external sources and transforming it into the form of data suitable for Land Reform planning.

5.2.1.5 Approval and Transfer (Memorandum of Approval)

The final allocation of land for alternative uses is to be determined using the information contained in the Land use Plans or Project Proposals that are drafted through facilitating negotiation with all the stakeholders involved in the Land Reform project. The alternatives could mean that the acquired land could be used either for settlement, agricultural production, tourism or any combination of these depending on the possibilities as shown by the Land use Plan. The DLA`s decision to approve the land allocation to the applicants is to a large extent dependent on the information contained in the proposed Land Use Plan or Business Plan. The decision making process leading to the final approval of the project by the DLA Minister would thus be greatly enhanced by availability of the SDDF.

Prior to making the decision on a project, DLA management (members of the Project Approval Committee) can always access the data through the SDDF to verify information contained in the Land Use Plans presented to them. The nature of questions that the approval committee could ask may include:

- location of the applicants in relation to their land need;
- location of the identified land;
- location or proximity to the urban centres or towns;
- viability of the proposed land uses, agricultural and/or other projects;
- project sustainability in terms of post – settlement support;
- compliance with the IDP; and
- current level of services or infrastructure.

The final output of this phase would be the establishment or confirmation of the land rights and ownership of the applicants represented through a title deed or a similar legal document. The legal land ownership rights can be represented spatially through any of the current spatial data systems within the DLA (i.e. Deeds web, Aktex, CIS or the e-Cadastre).

5.2.1.6 Exit (Transfer to the Local Municipality)

Upon the issuing of the title deed to the Land Reform beneficiaries, the DLA then transfers the funds to a local municipality or its agency for the implementation of the development projects as identified in the Land-use Plan or Business Plan.

The municipality would then compile a project implementation plan to implement the projects. To verify the level of services and infrastructure to accommodate the time difference between the project planning and implementation, the municipality would also access infrastructure and services data either in the IDP or with other government departments through the SDDF. This data would then be utilised to compile or update project implementation plans that would guide final project implementation.

6. RECOMMENDATIONS

6.1 Land Reform Data Integration into the Municipal IDP

The DLA`s policy is that the long term sustainability of Land Reform projects is to be ensured by the long-term involvement of municipalities. As shown on figure 6, upon transfer of the land to the Land Reform beneficiaries, the Land-use Plan approved by the Minister of the DLA would then be handed over to the municipality as a project for implementation of the proposed development projects using the DLA funding. With the SDDF in place, the municipality does not have to redo the planning process as the initial planning has already been done by the DLA and the project would have been already incorporated within the IDP prior to its final approval by the DLA (figure 6). Once the project is integrated into the IDP and approved by all the IDP stakeholders, implementation plans are drawn and the implementation of development projects commences.

In drafting an implementation plan for the transferred Land Reform project, the municipality would be able to access and utilise the spatial data contained in the SDDF regarding the project area. The municipality would have also ensured that the proposed project falls within its broader development objectives and strategies identified in the IDP during the incorporation of the project into the IDP. This is done to ensure that the Land Reform projects do contribute to job creation, poverty eradication, economic development, provision of basic infrastructure and environmental sustainability within the particular municipal area. This will ensure that upon the project implementation phase, the project is already part of the IDP and can thus be implemented without any delay and additional costs resulting from planning reviews and adjustments as was the case with the Amantungwa project.

6.2 Developing Common Standards

Some standardisation with regard to the capture of spatial data is necessary in order to ensure that new datasets can be integrated into existing information systems (Gavin, 1997). As a supplier of spatial information to both the public and the private sector, the DLA has a significant role to play in establishing and aligning standards for spatial data, which smoothes the way for the transfer of spatially related information between disparate information systems (Gavin, 1997). However, the DLA is not only a producer but also a consumer of spatial information. Land-related information is a vital source for performing Land Reform. For example, the location of a Land Redistribution project depends on many pieces of information, not only information directly pertaining to the land in question, but also information concerning infrastructure in the area. As such, DLA stands to gain directly from spatial data of better quality, covering wider areas and more diverse themes. This should be the outcome of a more co-ordinated approach to the development of Spatial Data Infrastructure (SDI) within the public service (Gavin, 1997).

The SDI Act, 2003 is intended to facilitate the development of common standards in the capturing, processing, maintenance and distribution of spatial data through the following provisions:

(2) The Minister (of the DLA) may determine standards and prescriptions to facilitate the sharing and integration of spatial information.

(3) No standard or prescription determined by the Minister shall take effect unless it has been published in the Gazette at least one month before the effective date specified in the notice.

(4) A data custodian and a vendor must adhere to the standards and prescription referred to in this section.

In terms of the SDI Act, public sector components will have to comply with national standards in collecting spatial information. The existence of common standards in the data contained in the SDDF would enable the DLA and the ADM to share whatever data that is required for both the Land Reform planning and the IDP. Other organisations such as the government departments and the parastatals that need to access this data to integrate in their databases for their own purposes, would be able to access this data without any constraints arising from quality related issues, differing formats and methods of acquisition and storage.

The SDI Act, by imploring all public sector organisations to comply with the standards prescribed for spatial data, will promote effective management and maintenance of spatial information. This would also ensure that the state organs invest the necessary resources to ensure that the data in their possession is acquired, processed, maintained, and distributed in the required quality and the prescribed formats. The DLA for instance would have to ensure that its planners that are responsible for data acquisition for planning and implementing Land Reform projects are well trained and capacitated to carry out their responsibilities. Secondly, the DLA would also ensure that sufficient information technology resources are invested to develop proper land management systems and tools that would improve or replace the malfunctioning current land information systems used in Land Reform such as the Land base system.

6.3 Developing Policy (Data Sharing and Acquisition)

The implementation of the SDI Act, 2003 using the SDDF will ensure the attainment of the objectives of the Spatial Data Infrastructure thus achieving an effective and efficient implementation of the Land Reform projects. This could be achieved in the following manner:

Ensuring co-operation by different organs of state in capturing Land Reform data. The DLA district office and the ADM could use similar PRA methods in identifying water needs or locating the settlements of the Amantungwa community. This could result in the drafting of a common water needs map or settlement map that would be comparable. Using the district-based Surveys and Mapping offices, the DLA could develop a map that would be used for its preliminary planning. The same map could also be used by ADM in integrating the Land Reform project in the IDP in preparation for the transfer of the Land Reform project to the ADM at a later stage.

To promote utilisation and sharing of spatial information in support of spatial planning, socio-economic development and related activities will require DLA officials and planners to view Land Reform project planning and implementation as part of broader spatial planning that is aimed at fulfilling the broader objectives such as poverty eradication, job creation, and economic development within the municipal area. This shift in the mindset of officials would make them more prepared to share information between the DLA and the municipality or other stakeholders involved in the IDP.

Elimination of duplication in the capturing of spatial information would also result from developing an integrated spatial information systems. By planning together with the ADM and sharing information, the DLA would know what the ADM is planning in its IDP and then align its Land-use plans for Land Reform projects accordingly. This will ensure that the DLA does not plan for the infrastructure projects e.g. roads, water and sanitation if the ADM has already included these in its IDP and the ADM would also be able to do the same. This will enable the DLA to save the money that would otherwise have been used to revise outdated plans as was the case in the Amantungwa project and rather allocate the money to other projects to improve the impact and pace of its Land Reform delivery programme.

6.4 Setting up Institutional Arrangements

According to Gavin (1997), all the measures to have integrated spatial data will be to no avail unless a culture of collaboration and co-operation is fostered within the geographic information community represented within both the public and the private sector. Gavin (1997) further argues that it is essential to ensure that the needs of all sectors and spheres of government are accommodated and it is hoped that this will be achieved through representation of all these components of the public service on a committee that will give direction to the development of the NSIF.

According to Dozie (2002), the under-mentioned principles are the key in an effective partnership for integrated spatial data:

- Partnership are the glue that holds everything together;
- Partnerships extend local capabilities in technology, skills, logistics, and data;
- All producers are assumed equal peers;
- Custodianship arrangements assigned to entities that are best able to maintain data set for community of users, usually entity that needs it for own use.

To facilitate the sharing of spatial information between the DLA and the local munipalities, the following arrangements according to Gavin (1997), are required:

- Unlimited access to each organisation's spatial information and data. Through the SDDF both the ADM and the DLA would have access to each other's data at any time and in any form required by each organisation.
- All stakeholders would, however have to comply with the SDDF standards requirements that apply to all the users and or vendors of spatial data kept within the SDDF (refer to Developing Standards in 5.2).

- A bi-lateral agreement between the users should be entered into to govern the acquisition, processing, maintenance, distribution and sharing of spatial data between the two organisations. In the case of the Land Reform data, such a bilateral agreement between the DLA and the ADM would be necessary to ensure that the process of Land Reform planning and implementation at local level is governed by the principles of co-operation, openness and sharing that are necessary to achieve effective integration of Land Reform data into the ADM IDP.

This co-operation and partnership between the DLA and the ADM would in return result in the sustainable Land Reform programme that is able to contribute to broader socio-economic development objectives of the municipality and the government as a whole such as job creation and economic growth.

7. REFERENCES:

Literature:

1. Barry M and Ruther H, 2001 “Data collection and management for informal settlements upgrade”, Presented in International Conference on Spatial Information Development, Nairobi Kenya.
2. Burrough P, Masser I., 1986, European Geographic Information Infrastructure: Opportunities and Pitfalls, London, UK.
3. Del Grande L, 2003, Delivering Land for Tenure Reform: Proposed Practical Guidelines, Legal Entity Assessment Project (LEAP), SA.
4. Dozie E, 2002, Open Access vs. Free Access in National Spatial Data Infrastructure (NSDI), Groot Retirement Seminar ITC Enschede, The Netherlands (Presented by Dozie E: United Nations Economic Commission for Africa).
5. Food and Agriculture Organisation (FAO) and United Nations Education Programme (UNEP), 1999, The Future of Our Land – Facing the Challenge, Rome.
6. Fourie C, 1994, Options for the cadastre in the new South Africa; Report to the South African Council of Professional and technical Surveyors, SA Council of Professional and Technical Surveyors, Johannesburg, SA.
7. Fourie C, van Gysen H, 1992, Land Management and Local Level Registries, SA.
8. Gavin E, 1997, Spatial Data as Infrastructure, Land info: Department of Land of Land Affairs, Volume 7 No. 3, 2000, SA.
9. Isikhungosethu Environmental Services, 2002, Brief history of Planning in South Africa and its evolution prior to 1994, as an entry point to considering the IDP, prepared for the Centre for Environment and Development (CEAD) – University of KwaZulu-Natal, SA.
10. Kandeh J, 2002, Geographic Information System On Invasive Alien Plant Species – International Institute for Geo-Information Science and Earth Observation (ITC) Masters Thesis.

11. Maseko Hlongwa and Associates, 2002, Amantungwa Business Plan Review Report, Project File in Department of Land Affairs Vryheid District Land Reform Office, KwaZulu-Natal Province, SA.
12. Nori C, 2003, Development oriented land administration in India – A case for national Land Information System (LIS), presented in Map Asia 2003 2nd Annual Asian Conference & Exhibition on GIS, Aerial Photography & Remote Sensing.
13. Ravindran A, Jaishanka J, 2003, GIS based information system for village level planning, presented in Map Asia 2003 2nd Annual Asian Conference & Exhibition on GIS, Aerial Photography & Remote Sensing.
14. Rugege D, 2004, Land Information Management Lecture Notes, University of KwaZulu-Natal, SA.
15. Spatial Data Infrastructure – Africa Newsletter, 2002, SDI News, Links, Papers, Presentations, Volume 1, Number 1.
16. Spatial Data Infrastructure – Africa Newsletter, 2003, SDI News, Links, Papers, Presentations, Volume 2, Number 1.
17. Spatial Data Infrastructure – Africa Newsletter, 2004, SDI Update from South Africa, Volume 3, Number 1.

Personal Communications:

1. Mngwengwe V, Khumalo W, Mpangane, Z, 2003, Personal Communications, Department of Land Affairs, Vryheid District Land Reform Office, P. O. Box 544, Vryheid, KwaZulu-Natal Province, SA.

Government Documents:

1. Amajuba PIMS Centre, 2004, The Revised Amajuba Spatial Development Framework (2005/6 IDP Review), Amajuba District Municipality, South Africa.
2. Department of Land Affairs, Amantungwa Project File: file no. KNA/3/6/7, 2004, Vryheid District Office, KwaZulu-Natal, SA.

3. Department of Land Affairs, Spatial Data Infrastructure Act 54, 2003, Government Gazette, RSA, Vol. 464, No. 25973, SA.
4. Department of Land affairs, White Paper on Land Policy of South Africa, 1996, SA.
5. Pillay P, 2000, Introducing DLA`s Land Information, Sub-committee of Land Information Systems Committee, Department of Land affairs, SA.
6. Department of Provincial and Local Government, Municipal Systems Act (Act 32 of 2000), 2000, SA.
7. Department of Provincial and Local Government, White Paper on Local Government, 1998, SA.

Websites:

1. Web site (Amajuba District Municipality), Amajuba District Municipality IDP Review, 2005/06, 28 March 2003 < www.idp.org.za >
2. Web site (Department of Land Affairs): Chief Directorate: Cadastral Surveys (Surveyor General Pretoria). Digital Urban and Rural cadastre. 09 March 2003 <http://www.nsif.org.za/Framework/csg_cdr_pta.htm>
3. Web site (Department of Land Affairs): Chief Directorate: Surveys and Mapping. 1:500 000 and 1:50 000 Digital Topographical Data Sets, March 2003 <http://www.nsif.org.za/sm_topo.htm>
4. Web site (Department of Land Affairs): Redistribution Support Systems, 05 February 2003 www.dla.gov.za
5. Web site (Department of Land Affairs): Tenure Support Systems, 05 February 2003 www.dla.gov.za
6. Article within a web site (UND) Fourie C and van Gysen H. Land Management and Local Level Registries, 15 March 2003 <WWW.und.ac.za/und/survey/clarrisa/public/argent/htm>
7. Web site (HSRC). An Integrated Approach for the Provision of Spatial Information to bring about Reconstruction and Development in SA. 15 March 2003 <http://wwwhsrc.ac.za/gis/thesiss/reconstruct/index.html>

8. Web site (National Spatial Information Framework). Geospatial Synergy. 16 March 2003 <http://www.nsif.org.za/metadata/value.html>

9. Article with a web site (GIS Development) Nori C, 2003, Development Oriented Land Administration in India. A Case for National LIS. 01 June 2003 <http://gisdevelopment.net/application/lis/overvview/lisrp0001.htm>

10. Article with a web site (GIS Development). Panaguiton L A, 1998, GIS-Assisted Pacellary Approach to Land Use Mapping for Local Government in the Philippines. 01 June 2003 <http://gisdevelopment.net/aars/acrs/1998/ps2023.shtml>

11. Article with a web site (GIS Development). Ravindran A, Jaishankar J, 2003, GIS based Information System for Village Level Planning. 01 June 2003 <http://gisdevelopment.net/application/lis/rural/lisr007.htm>

12. Web site (Department of Agriculture). SA–ISIS, 2000, Acocks Veld Types of South Africa (AGRIC001). Metadata provided by SA-ISIS 08 June 2003 <http://siftp.gov.za/node/isis2000/parsed/isis2000.AGRIC001.webentry.sgml.html>

13. Article in a web site (SDI Africa). SDI Africa - An Implementation Guide, The SDI Cook book, ver 1.1 (15/05/01) Ed: Nebert D.D. 10 June 2005 < htttp://geoinfo.uneca.org/sdiafrica>