TOWARDS A RURAL LAND USE PLANNING FRAMEWORK FOR THE AGULHAS PLAIN, SOUTH AFRICA

Michael Wallace
Western Cape Department of Agriculture,
Private Bag X01, Elsenburg, 7607, South Africa
Email: mikew@elsenburg.com

Abstract

The Agulhas Plain lies at the southern-most tip of Africa and falls within the Cape Floral Kingdom. It covers an area of approximately 2 160 km2 of coastal lowlands and low hills. This exceptionally species-rich area has been severely fragmented by alien plant infestation, agriculture and urban development. In order to guide conservation efforts whilst addressing the socio-economic needs in the area, a process of rural area-wide planning has commenced in the region. This is carried out by the Landcare division of the Department of Agriculture in partnership with conservation authorities, farmers, local government and communities. Agritourism is identified as a high- potential industry in this region. In order to guide decision-making, an intensive data-collection exercise has commenced, whereby land use on the Plain is being mapped at 1:10 000 scale and relevant information is collated in a Geographic Information System (GIS). This paper will examine the role which GIS, spatial data and associated technologies play in the project – and specifically how the information generated is made relevant and accessible to regional planners and indeed all role players.

Key words: Geographic Information System, rural development, spatial planning, rural planning, agritourism.

Introduction

There is currently an urgent requirement for more detailed rural data in the Western Cape region of South Africa and particularly in the Agulhas Plain region due to the following issues:

1. This exceptionally species-rich area has been severely fragmented by alien plant infestation, agriculture and urban development. Bioregional conservation projects such as C.A.P.E (Cape Action for People and the Environment), which are multisectoral programmes that provide a collaborative conservation action (Driver *et al*, 2004).
2. The decentralisation of rural management authority from province to local municipalities. Each municipality is required to produce a Spatial Development Framework which informs development planners across a wide range of affiliations and levels of government.
3. The redressing of former inequalities in land ownership.
4. LandCare: LandCare Areawide Planning is a comprehensive problem solving process that integrates social, economic and ecological concerns over defined geographical areas. This process strives to sustain and improve environmental health through a natural resource management approach that integrates locally driven initiatives (Steyn, 2003).
5. Conservation Stewardship programmes amongst private and communal landowners which involves increasing the capacity of provincial conservation agencies to work outside of formally protected areas (Driver *et al*, 2004).
6. Working For Water programmes of the Department of Water Affairs and Forestry (controlling invasive alien species).
7. The development and promotion of new industries to boost local economies – for example agritourism.

All of these require a well planned base data set from which to draw regional spatial statistics, examine the *status quo* in terms of land use and to form the base for monitoring, planning and reporting.

Inevitably each agency has its own set of data requirements on which to base such decisions. It is generally acknowledged that most of the existing data is at too small a scale to be used effectively in local planning. In the Western Cape a project was initiated by Landcare to map the land use *status quo* at a scale of 1:10 000. Fundamental to the success of planning at this scale was the acquisition of a set of digital colour orthophotos provided by DWAF to be used as a base dataset. New high-resolution satellite images provide a viable alternative for areas where aerial photography is not available.

Process

Status Quo Mapping

The fundamental "*status quo*" categories for rural planning support are (H. Germishuys, personal communication):

1. *Intensive* agriculture: these are areas which are ploughed or cultivated.
2. Areas where natural vegetation remains, also referred to as *extensive* agricultural areas. These may consist of pristine natural vegetation and may be utilised for grazing.
3. *Waterways*, including riparian vegetation.

Fundamental planning goals may differ in different areas according to regional priorities, but this first step is required as a reference point. Each category may then be subdivided according to the needs of each agency or region. Because of the multi-agency nature of the GIS work, it is vitally important that *common standards* are established and adhered to, to prevent duplication of effort and to facilitate the overlay and analysis of disparate datasets within the GIS framework.

The Landcare data capture methodology was initially carried out as follows.

1. The digital orthophoto is printed (at 1:10 000) and laminated.
2. Cadastral boundaries are overlaid on the map.
3. The Landcare officer demarcates areas in the above categories using coloured marker pens.
4. The maps are brought into the GIS office for digitizing.

It became evident that very stringent specifications must be included in contracts for the capture such data to ensure that data is captured topologically correctly. Step 3 was problematic in that each field worker delineated riparian areas slightly differently depending on their own interpretation.

Subsequent steps may require field verification and farm visits to add details on a farm scale, such as

1. Current land use (i.e. wheat, vineyards, fruit orchard type)
2. Future development plans
3. Priority conservation areas and endangered species.

These data then need to be made available to other agencies to add their specialist input.

It has recently been acknowledged that due to the increasingly high demand for land use data and the enormity of the task of mapping at the required scale, that this process will be fast-tracked through a tender process to capture agricultural land use data at a 1:10000 scale for the whole province.

Agritourism is recognised as the ideal activity to capitalize on the expected growth in tourism numbers in the Western Cape (Nowers, 2006). Some of its advantages are:

- It stimulates entrepreneurship, creates and broaden job opportunities for farm families and surrounding rural communities;
- Agritourism combats the depopulation of rural areas;
- It creates direct connections with consumer patterns in terms of value-added products of origin which can be purchased direct from the farm – it also influences consumer preferences and may develop export markets;
- It improves the image of agriculture and enlightens visitors on agricultural related issues – particularly important in the Agulhas region, being a biodiversity "hot-spot";
- It is an established industry that has a sustainable demand. It however needs to be continuously co-ordinated and stimulated if it is to develop to its full potential. Farm accommodation had in 1996 a two percent share in the local tourism market and in the Western Cape alone some ten percent of foreign tourists make use of farm accommodation.

A survey was undertaken in the region to map and analyse data from all agriculturally related tourist activities in the region and the data. This data can then be analysed spatially in the GIS, for example in conjunction with demographic data, tourism routes etc.

Field Data Capture Technologies

A number of methodologies were investigated to facilitate the capture of digital data in the field. PDAs and tablet PCs with integrated or blue-tooth GPS units and GPS units with GIS software all provide potential solutions. The size of screen on the tablet PC together with "mobile GIS" and "digital ink" technology make this an attractive solution. Sketches and notes created on a Tablet PC are geographically referenced and can be saved as (georeferenced) map graphics or as annotation in the geodatabase. However, it is preferable to purchase a ruggedized tablet with a bright screen to cope with field conditions which entails a substantial financial outlay. The obvious implication of introducing this technology is that field officers will be required to have a reasonable level of GIS skill.

Information Flow and Data Warehousing

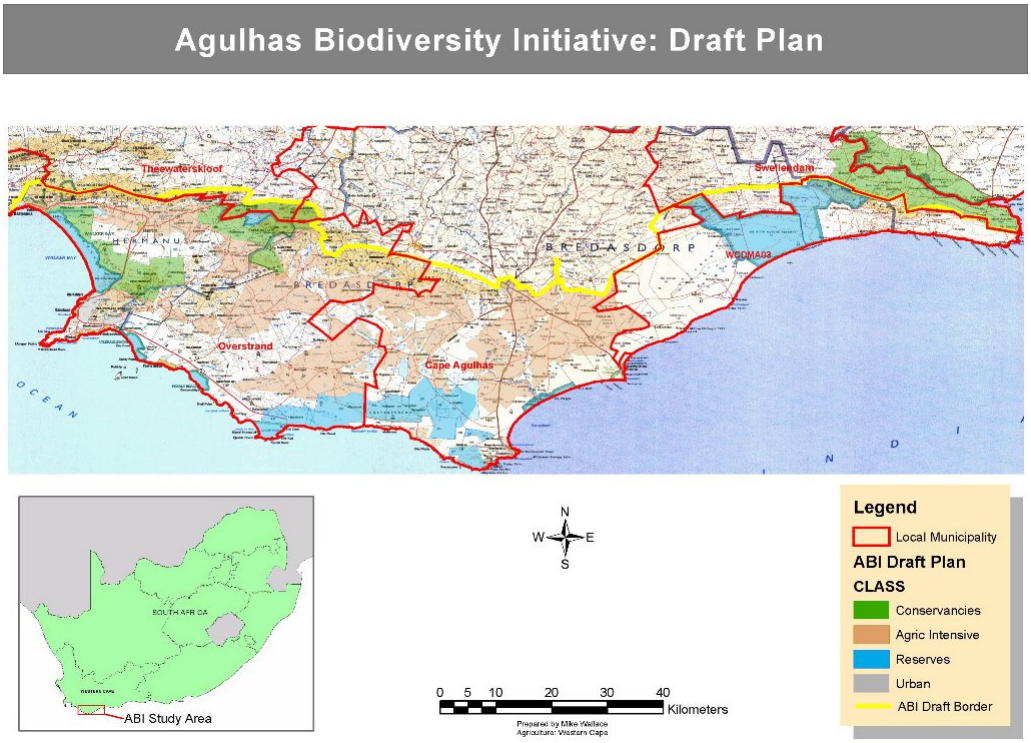
GIS data centralization in some form is essential in order for integrated planning and decision-making to occur as envisaged. This provides a number of challenges in the multi-agency context. Issues of data sharing, custodianship, updating of data and data access can become stumbling blocks in the context of multi-agency involvement. The ideal of a central data warehouse for all relevant spatial information in a region is extremely difficult to achieve in practice in the SA context. At present much of the success in this regard revolves around interpersonal relationships and "networking" amongst the various GIS role players and end users. Some data warehousing is currently provided through the SA National Biodiversity Institute's web portal: http://bgis.sanbi.org/ but the integration of biodiversity, agricultural, economic and administrative spatial data within one portal is still required. A model such as that developed by DEFRA in the UK (http://www.magic.gov.uk/projectsummary.htm) to provide a 'one-stop shop' for rural and countryside information is being proposed for local development.

The Agulhas Biodiversity Initiative (ABI) and GIS

ABI is a project under the C.A.P.E banner. The Agulhas plain is a hotspot of threatened biodiversity, and as such has been the focus of a number of specialised studies. Most of the ABI study domain has been subjected to a detailed botanical survey, where the resulting GIS data has been key to planning and development in the region. The botanical survey (Cole, *et al,* 2000) was captured at a 1:10 000 scale, providing a useful reference for initial fine scale planning in the region, whilst the "*status quo*" mapping

discussed previously is currently almost completed. Some 70% of this region is covered by colour digital orthophotography as shown in figure 5.

Figure 5: The ABI Project Area.



For areas where digital 1:10 000 orthophotography is lacking, the use of Quickbird (pan-sharpened) imagery has been investigated as a viable alternative. The Department of Agriculture has also recently acquired a full set of SPOT® imagery, which provides a full coverage of the area at 2.5 m resolution.

Using the Cole *et al* data (2000) and subsequent manipulations of this data by Holness (2003) the GIS provided a useful reporting tool. Spatial statistics regarding various conservation indicators could be extracted from these data to monitor and plan progress in achieving conservation targets according to the ABI planning, monitoring and evaluation framework (Logframe).

Conclusion

Through the projects discussed above, a number of stumbling blocks were identified which have slowed the GIS spatial data gathering process. A number of needs have been identified which would result in improved data capture and information flow. Some of the key needs identified are:

1. A farm boundary database with farmer/ownership details. Although the (GIS) cadastral data is available from the Surveyor General, it does not indicate actual farming units.
2. A co-ordinated effort by various government organisations to periodically capture and update a series of 1:10 000 colour digital orthophotos (or high resolution satellite imagery) to be used as base data for fine scale planning.
3. Efficient integration of and access to planning data from all spheres of involvement. An excellent example of how this could potentially be done can be examined at the website www.magic.gov.uk.
4. Improved band width for on-line data access.

5. Stringent and carefully considered specifications and standards need to be included in contracts to ensure good quality GIS products are obtained from data capture agencies.
6. Common standards and data dictionaries to ensure a consistent frame of reference.

In a world where specialization is the order of the day, in agriculture, diversification is the key towards reaching sustainable agricultural goals. In the midst of changing climatic patterns, adverse weather phenomena, and inter- and intra-regional competition for markets and resources, farmers and planners increasingly need to identify value-adding possibilities to increase the sustainable level of farm profit. The optimal utilization of scarce natural resources also dictates the wise use of these resources. Agriculture in the Agulhas region has a wide range of resources which are not suitable for traditional farming practices and which provide the entrepreneur with access to various opportunities to use these resources in such a manner that it is sustainable on the one hand, whilst adding value to the net farm income.

GIS is well established as an indispensable tool for such spatial planning, resource management and reporting. The challenge for the future is to improve accessibility and promote co-ordination of effort amongst all users in a multi-agency planning context. Regarding responsible and sustainable land use management - even the best spatial data, maps and guidelines do not lead to effective action unless they are "mainstreamed" (Driver *et al*, 2003). In other words they must be readily available to all land owners and land-use decision makers and incorporated into policies and actions from a regional to national level. The effective and integrated implementation of regional, multi-agency GIS should play a significant role in supporting this objective.

References

Cole, N.S., Lombard, A.T., Cowling, R.M., Euston-Brown, D., Richardson, D.M., and Heijnis, C.E., 2000. Framework for a conservation plan for the Agulhas Plain, Cape Floristic Region, South Africa. Institute for Plant Conservation, University of Cape Town

Driver, A., Cowling, R.M., and Maze, K., 2003. Planning for Living Landscapes: Perspectives and Lessons from South Africa. Botanical Society of South Africa. Cape Town, South Africa.

Driver, A., Maze, K., Lombard, A.T., Nel, J., Rouget, M., Turpie, J.K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K. & Strauss, T. 2004. South African National Spatial Biodiversity Assessment 2004: Summary Report. Pretoria: South African National Biodiversity Institute

Nowers, R.J., 2006. A Perspective on Agritourism with specific reference to the Garden Route in South Africa, Agriprobe, Elsenburg, Western Cape, South Africa.

Steyn, F., 2003. LandCare Areawide Planning, Resource Conservation, Department of Agriculture: Western Cape: South Africa.