

Using spatial analysis as an approach to rural development

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Comprehensive Rural Development Programme (CRDP) projects are showing that it is possible to assist rural communities on the road to independent growth by providing essential planning services enabled by spatial analysis.

To set the scene it is important to know that there are many changes to government other than names in the new administration. In 2009 the Department of Land Affairs was transformed to the Department of Rural Development and Land Reform. The exciting change affected many well known Chief Directorates such as Deeds and the Surveyor General. The relatively new Chief Directorate Spatial Planning and Information was tasked with the responsibility of initiating the now well known Comprehensive Rural Development Programme (CRDP) through a methodology informed largely by spatial analysis through the combination of town and regional planning and GIS principles. The focus was aimed at establishing the status quo of an identified area. This in turn would inform the interventions required and not only by specifically the Department of Rural Development and Land Reform but by all departments with a mandate to care for our rural communities.

The methodology in short is designed around three spatial components which are the built environment, socio-economic indicators as well as the bio-physical attributes of the chosen area. The tragedy is that all of these are supposed to be easily available both to the community and to the planning professionals, and are regarded by most urban communities as a given and a right. Further to this we also conduct research by interviews with all involved to ensure that we not only focus on the empirical data but also on the emotional side where people are tied to land through heritage and ancestry.



Fig. 1: Riemvasmaak in the Northern Cape is situated where the 20° longitude line meets up with the Orange River on the border with Namibia.

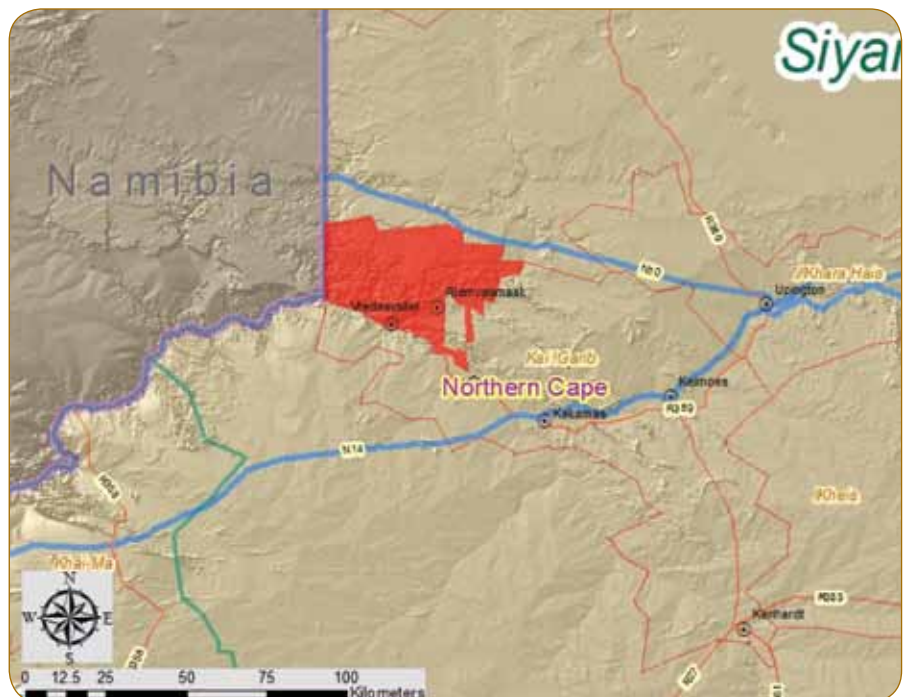


Fig. 2: The focus area (indicated in red) includes two settlement Riemvasmaak, or Mission as it is referred to, and Vredesvallei which lies on the banks of the Orange River.

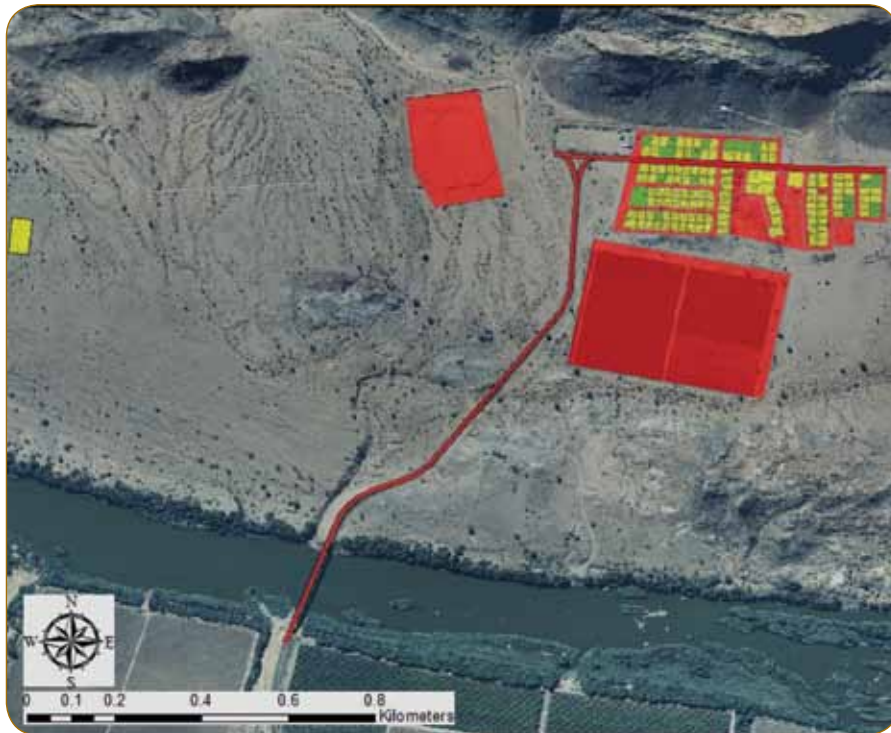


Fig. 3: Aerial photography and DTM data were used to analyse the status quo of Vredesvallei.



Fig. 4: Mission developed next to a mission station which is located in the light pink area on the map.

Background

To better explain how GIS is used to ensure responsible spatial planning I will use one of our implementation sites which received national publicity. The area of Riemvasmaak in the Northern Cape is situated where

the 20° longitude line meets up with the Orange River on the border with Namibia. Riemvasmaak is one of those places which when looked at on photographs might scare the urban city dweller with its vast almost emptiness. The secret however lies in

the people of the area and once you have met them, this harsh piece of South Africa is defined and becomes surreal (see Fig. 1).

We started off in Riemvasmaak by compiling geology, soils, climate, rainfall, topography, vegetation and floodplains maps of the area. It was evident from the start that all resources are very scarce and considerable effort should be taken to protect all. The average daytime summer temperatures range between 18 and 43°C and in winter between 20 and 30°C. The nighttime temperatures drop to 0°C in mid winter. The average rainfall per year is 75 mm which severely limits the cultivation of crops in the interior sections. The areas along the river consist of suitable agricultural land for produce like grapes. The focus area includes two settlements Riemvasmaak, or Mission as it is referred to, and Vredesvallei which lies on the banks of the Orange River (see Fig. 2). The two areas differ vastly in that the one can draw water from the river and the other is reliant on boreholes which dry up during summer months. The challenges were all addressed in the intervention projects.

Spatial analysis of the settlements

The first order of business was to evaluate the settlements. Vredesvallei was developed as an addition to the original Mission settlement and is situated next to the Orange River (see Fig. 3). It was possible to utilise excellent aerial photography provided to the team by NGI (for those who are still not sure, the old Surveys and Mapping). Together with DTM data, this provided for an indispensable component in analysing the status quo of the area. This area is able to focus on crop cultivation by utilising water from the river. They have 10 Ha of grapes which are tended by the inhabitants of the settlement itself. They are also very fortunate to have access to Kakamas via a tarred road and bridge which was constructed for this sole purpose. A primary school and municipal offices are in place and the newly built sports facilities are a product of the intervention projects.

Mission is the original settlement and as referred to by its name was developed next to a mission station that has been there since the early 1900s. It is located in the light pink area on the map (see Fig. 4). It also houses the primary school. Mission is unlucky in that it is not linked with a tar road to Kakamas which is about 60 km away via gravel road. The road between Mission and Vredesvallei is very mountainous and virtually impossible to be upgraded due to the terrain. From this land use analysis further planning was done to focus on upgrading the living conditions to an acceptable standard.

The remoteness of Mission makes its inhabitants especially vulnerable as in most cases they do not have the financial means to get to facilities like clinics, secondary schools and shops. A basic time distance analysis shows that they are extremely isolated in terms of travelling by foot from any of the facilities (see Fig. 5). Each of the rings including the omitted rings represents a walking distance of one hour. It would thus be impossible to attend secondary school for most of the inhabitants as they simply cannot afford taxi fare. The result of this is that most secondary-ready pupils simply do not attend school and this will perpetuate the poverty cycle. What makes this a further challenge is that the community has a negative perception of boarding school which in turn negatively impacts the teenage component of the population that should be attending school.

This challenge to transportation also impacts on access to a clinic in case of an emergency or even police services. The crime statistics as a result of the remoteness of the Mission community also increased as indicated by the research done. This has also been addressed by the CRDP interventions and a brand new clinic has been constructed to cater for the needs of the community. The South African Police Service is currently busy with plans to construct a police station at Mission as well.

Further analysis indicated flood lines, 50 year (red) and 100 year (blue) at Mission, which almost seemed to be an impossibility in the harsh Northern Cape climate. This is the reality

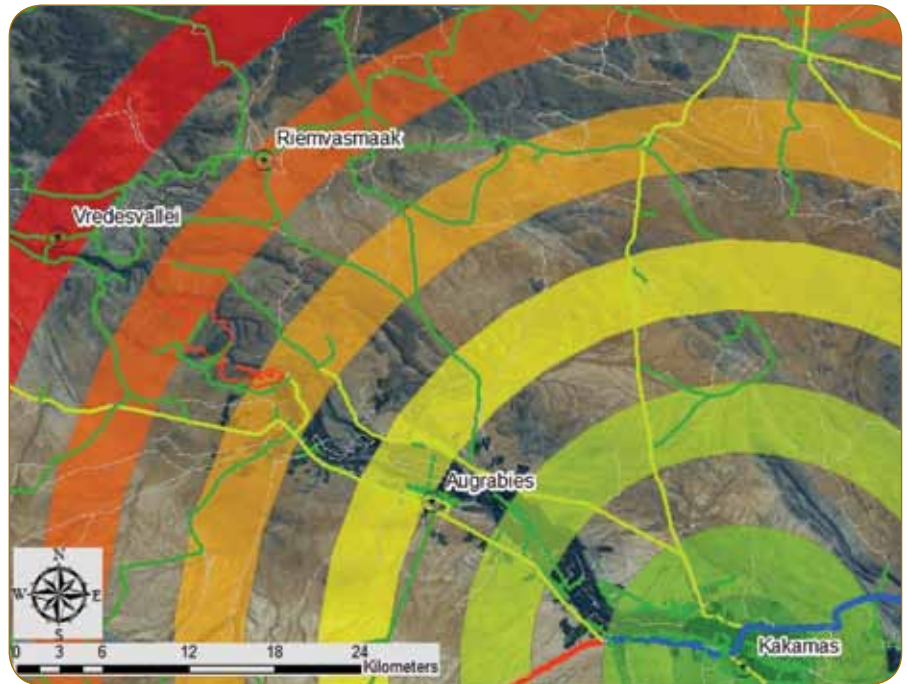


Fig. 5: A basic time distance analysis with the rings representing a walking distance of one hour.

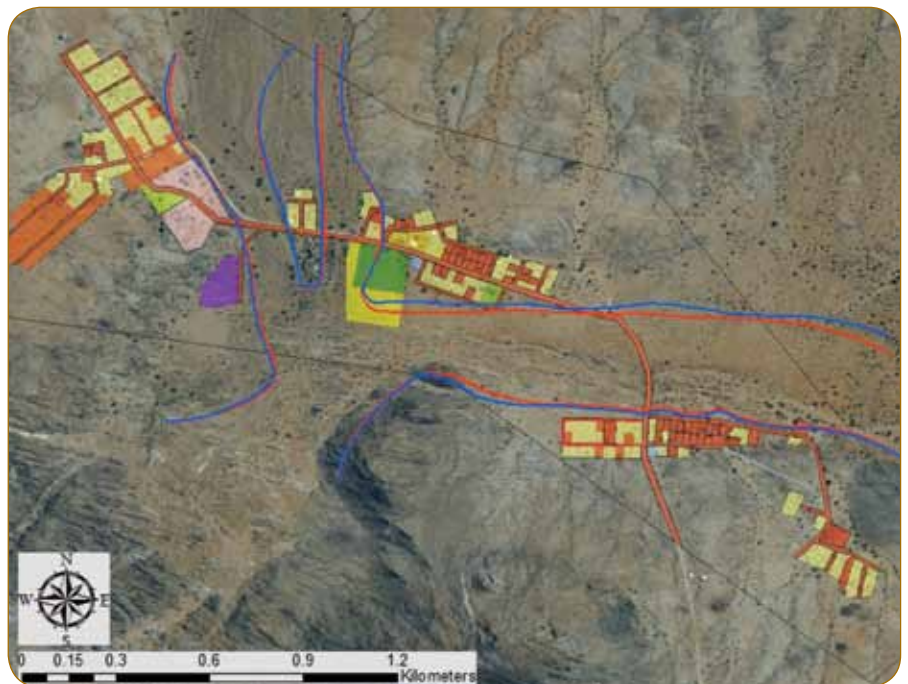


Fig. 6: Flood lines at Mission with the 50-year floodline in red and the 100-year floodline indicated in blue.

though and careful planning had to be done to ensure the settlement is not impacted in the unlikely event of a flood in the Molopo River, a non-perennial river running down from the Kgalagadi Transfrontier Park.

The Mission primarily focuses on livestock farming. In collaboration

with the Northern Cape Provincial Department of Agriculture and Rural Development a grazing analysis was done. They surveyed the extent of the farms to draw up a sustainable farming plan for the community. This included boreholes to enable live stock watering facilities in the more remote areas. One of the bigger

challenges is an estimated 1500 donkeys roaming the areas which are depleting the edible vegetation. Due to the terrain it is almost impossible to capture the donkeys which have adapted to surviving in the area. Live stock facilities were provided to the community to ensure that their livestock can be treated by veterinary services on a regular basis. The facility will also be utilised by the community to sell their livestock and will enable loading of the animals.

The Riemvasmaak Project is in the final stages and the settlements both have formal town planning layouts to assist with future developments by guiding the municipalities.

This same method is being utilised on a great number of sites throughout South Africa. Each of these CRDP sites has its own challenges in terms of the natural systems that exist in the area. Although the analysis carried out at this site is not

comparable to that when making use of satellite monitoring, the window provided through the utilisation of GIS at all of these sites provides a holistic approach which ensures sector departments do not plan in silos resulting in water reticulation systems with no water sources for example. Challenges on most projects are the collection of data to enable the spatial analysis. While most natural systems data are easily obtained from the Department of Water Affairs or Environmental Affairs the challenges that need to be overcome are still the built systems like sewer, water and electricity layouts.

Access to ICT systems is in most cases not available and due to the fierce competition between suppliers, it is virtually impossible to obtain data on the existing infrastructure. In most cases we resorted to plotting these with differential GPS.

We also are in the process of refining the spatial analysis through

the acquisition of additional ESRI extension licensing. Amongst others we have discovered that the analysis of network systems is virtually non-existent in most departments. A typical example would be to determine how far away residents are from amenities like schools, clinics and or hospitals by using the road network. This will enable the planning to be done on a bigger geographic area to determine access to larger order amenities like shopping centres and similar services. Riemvasmaak, like other CRDP projects, has proven that through an integrated agrarian approach it is possible to assist communities on the road to independent growth by providing the essential planning services enabled by spatial analysis.

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