

## Mapping crime levels and court efficiency per magisterial district in South Africa

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### Abstract

South Africa is subdivided into provinces and each province is further subdivided into magisterial districts, the area of jurisdiction of a district court. South African courts have a three-tier structure namely: district, regional and high court. The Department of Justice and Constitutional Development (DoJ) is planning to right-size the courts to promote service delivery and manage the budget. This is a project within the Justice Footprint Project, which is a project commissioned by the DoJ and managed by a consortium led by the CSIR Crime Prevention Centre. As part of this project, the CSIR mapped the crime levels and court statistics per magisterial district to determine the effectiveness of the criminal courts, and to establish if each court has enough resources to deal with its volume of criminal cases.

To determine the crime levels per magisterial district, the police station precincts and magisterial boundaries were mapped and overlaid. This showed that in some instances the precincts and magisterial districts were not aligned with each other. For ease of analysis and to assign crime levels to magisterial districts, we assumed that the crime was distributed evenly over each precinct and the percentage of the precinct in each magisterial district was calculated. These portions were represented in a matrix whose cell values ranged between zero (0) [not present in a magisterial district] and one (1) [completely within a magisterial district].

Using statistical software, crime data from the South African Police Service (SAPS) were reclassified into the six major categories used by DoJ, and the crime levels per magisterial district were calculated, imported into a GIS and mapped per magisterial district.

By mapping crime categories such as sexual offences, it is possible to identify magisterial districts with high occurrences of these crimes, and hence districts that need courts specializing in sexual offences.

### 1. Background

South Africa is subdivided into provinces and each province is further subdivided into magisterial districts, *i.e.* the area of jurisdiction of a district court. The court structure in South Africa is a three-tier structure namely: district court, regional court and high court. Each layer is determined by the crime type it may prosecute and the severity of sentences given. The Department of Justice and Constitutional Development (DoJ) is currently planning to right-size the courts in terms of service delivery and budget. To determine the effectiveness of the criminal courts, it was necessary to map the crime levels and court statistics per magisterial district. Figure 1 shows the magisterial districts in South Africa. This was done to establish if a court has enough resources to deal with the number of criminal cases.

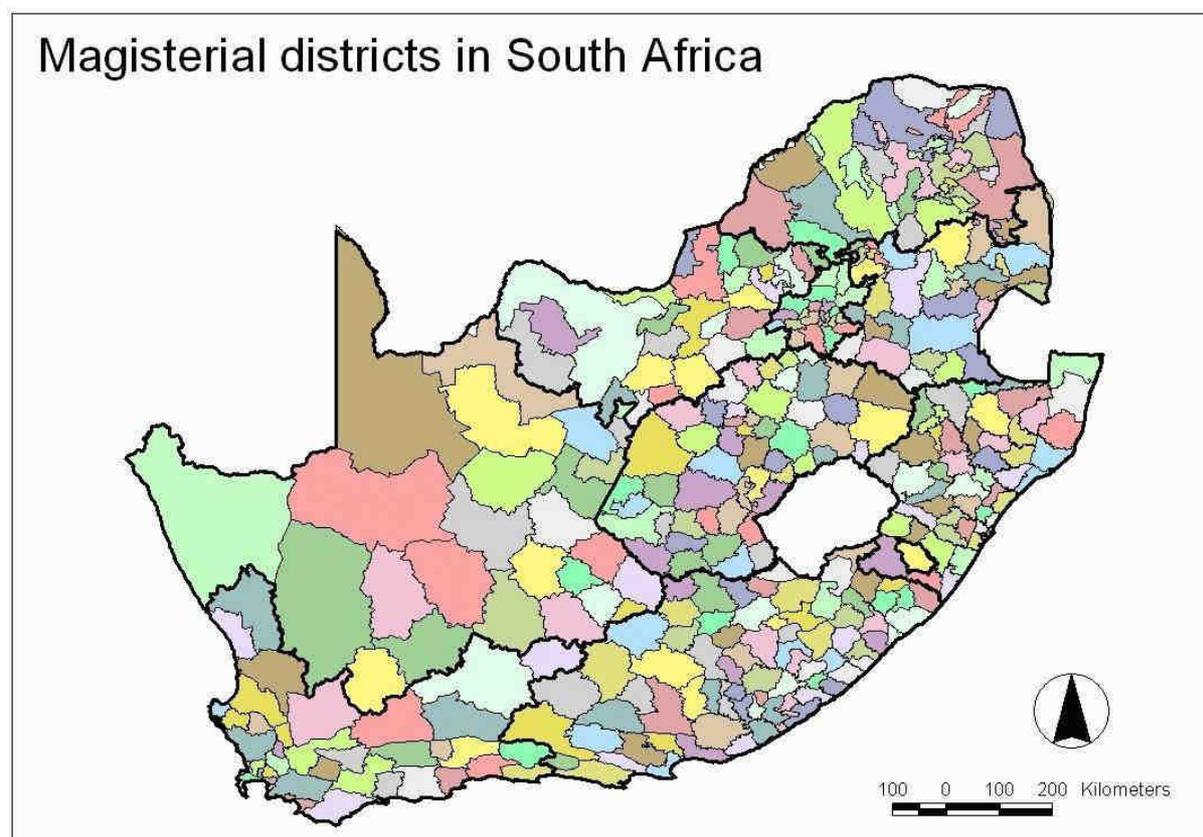


Figure 1: Magisterial districts in South Africa

## 2. The right-sizing of the South African Justice System

This project represents a sub-project of the Performance Enhancement Programme of the Office of the Chief Financial Officer of DoJ, through which a Right-sizing and Costing function will be created. This function will assume responsibility for the ongoing monitoring and management of resources within the Department in order to ensure that justice at a local level is dispensed effectively and efficiently, through the optimal use of available resources. In addition, this function will enable DoJ to allocate resources to the courts and other offices across the country on a needs basis with a view to ensuring efficiency of operations, as well as effectively catering for future requirements based on factual situation assessments and sound financial modelling.

The project will provide a framework, and the means, for the establishment of an appropriate "footprint" for justice in South Africa, which is designed, sized and resourced in accordance with prevailing demands placed on the Department, and which is able to respond to the changing demands imposed by both criminal and civil justice in the country.

### **3. Demand and Supply-side analysis**

To optimise the service delivery of the justice system, it is necessary to investigate the demand on, and supply of, services of the courts in South Africa.

#### Demand

Our analysis is focussing on determining the need for facilities of different types and serving different environments, using especially the following key data sets:

- Police station-level reported crime statistics on all types of crime: a comprehensive crime database is available at the CSIR, updated to the last official release of crime statistics from the South African Police Service (SAPS);
- Economic data (Gross Domestic Product per magisterial district);
- Incarcerated people in the country, by location, offence type, sentence, *etc.*; and
- Demographic information.

#### Supply

Our analysis was limited to classifying the data into categories and computing the statistics applying to these categories. Data required include:

- The human resource base within DoJ (both current and planned);
- Human resources available in services which impact justice service delivery, but which are not under the direct control of DoJ (such as the SAPS or other associated services);
- Number of cases by type; and
- Time spent on cases by type.

### **4. Development of a Geographical Information System for spatial analysis and visualization**

This activity entails the development of a geographical information system (GIS) to enable the spatial presentation and analysis of relevant data, both demand and supply-related. More specifically, the GIS is being used to:

- Display the location of relevant Departmental facilities with their associated attributes;
- Overlay boundaries, and demographic and environmental data;
- Overlay crime incidence data;
- Overlay police station locations, precinct boundaries and other police-related elements;
- Overlay Departmental records (number, type and status of cases, *etc.*);
- Overlay Department of Correctional Services data (numbers for each prison of incarcerated awaiting-trial prisoners, categorised by age and sex);
- Perform spatial analysis; and
- Report the results in a spatial format (*e.g.* display budget allocation).

The GIS can also be used as a management and decision support tool, utilising information from the demand and supply side, zero-based budgeting and financial modelling. The GIS can display the results of models to give a holistic overview of the results and to highlight areas of concern.

## 5. The conversion of crime incident data from police stations to magisterial districts and the mapping of court statistics

As part of the demand and supply analysis of the justice system, it was necessary to investigate the level of crime incidents [the demand] in each magisterial district. The methodology can be divided into four phases:

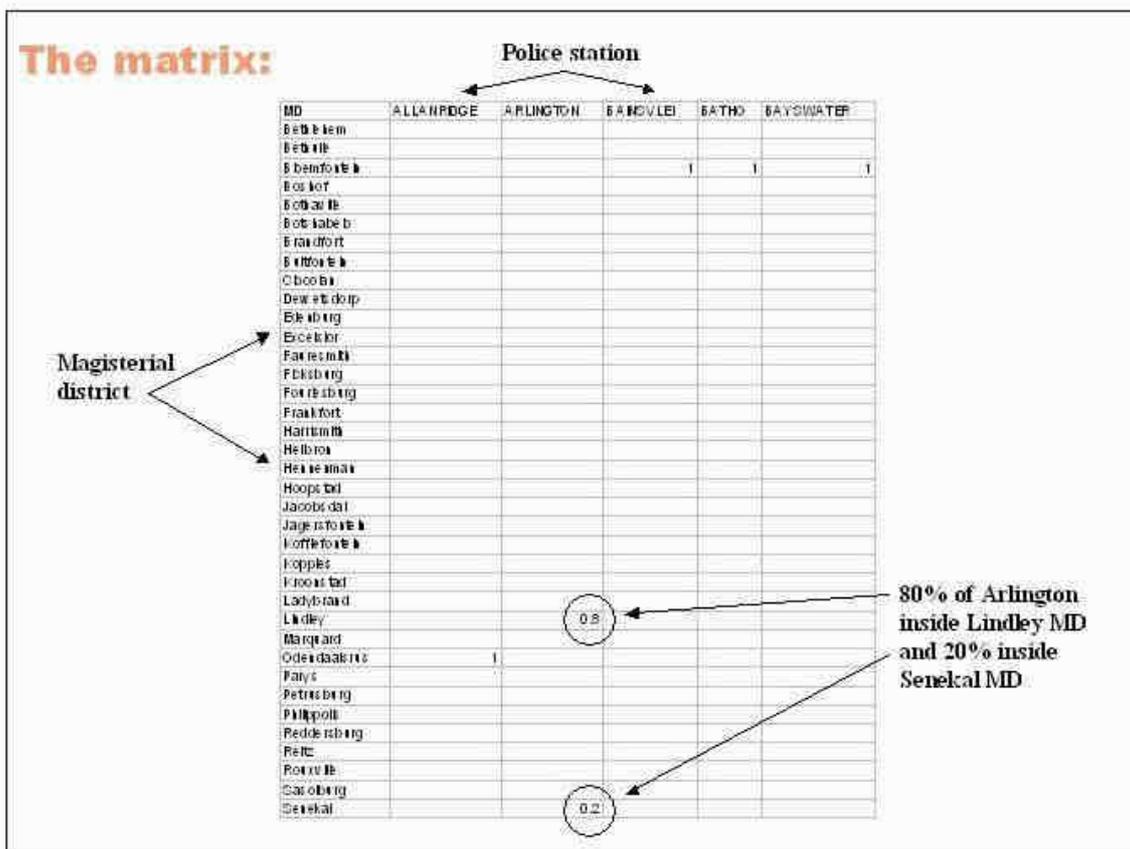
Phase 1: Mapping police station boundaries and overlaying them with magisterial boundaries

This was done to determine the matrix in Phase 2.

Phase 2: Developing a matrix to assign portions of police stations to magisterial districts

In common with many countries, South African government departments do not integrate their strategies, thus causing a lack of alignment between different administrative boundaries. This resulted in some of the police stations serving up to five magisterial districts simultaneously, depending on where the crime happens within the police station's area of jurisdiction – this could result in one investigating officer being required to appear at the same time on the same day in five different courts, tens of kilometres apart! For ease of analysis and to assign crime levels to magisterial districts, the assumption was made that the crime was distributed evenly over the police station area and the percentage of the police station area in each magisterial district was calculated. These portions were represented in a matrix whose cell values range between zero (0) [not present in a magisterial district] and one (1) [completely within a magisterial district]. This was done countrywide.

Table 1: The matrix



Phase 3: Converting crime data from police station to magisterial districts

The SAPS provided crime statistics for each police station per month, from January 1998 to December 2001. These statistics were provided for 37 crime categories for each station. Using SAS software, these were reclassified into six major categories as defined by DoJ (violent crime, sexual offence, crime against the state, property crime, dishonesty crime and other crime). Using the matrices and the crime data in SAS, the crime levels per magisterial district could be calculated. These results were imported into the GIS ArcView, relationally joined with the spatial data and mapped per magisterial district (Figure 2).

By mapping crime categories such as sexual offences, it is possible to determine magisterial districts with a high occurrence of these crimes with the aim to establish courts that specialize in sexual offences.

#### Phase 4: Mapping the court statistics

Court statistics such as the number of cases concluded, with or without evidence, the number of withdrawals, time spent on criminal cases (Figure 3), time spent on admission of guilt as well as the number of civil cases heard were also mapped as part of the project.

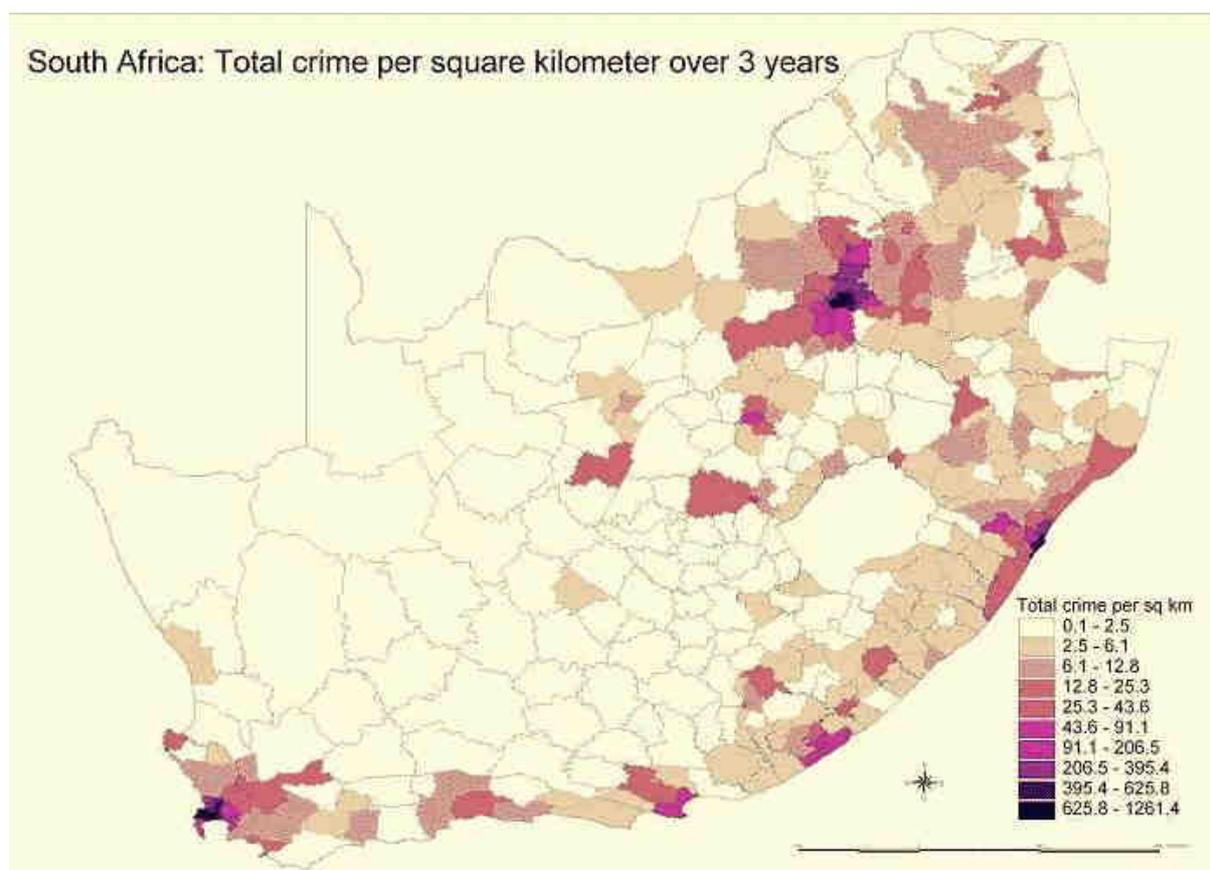


Figure 2: Total crime per square kilometre over 3 years for each magisterial district

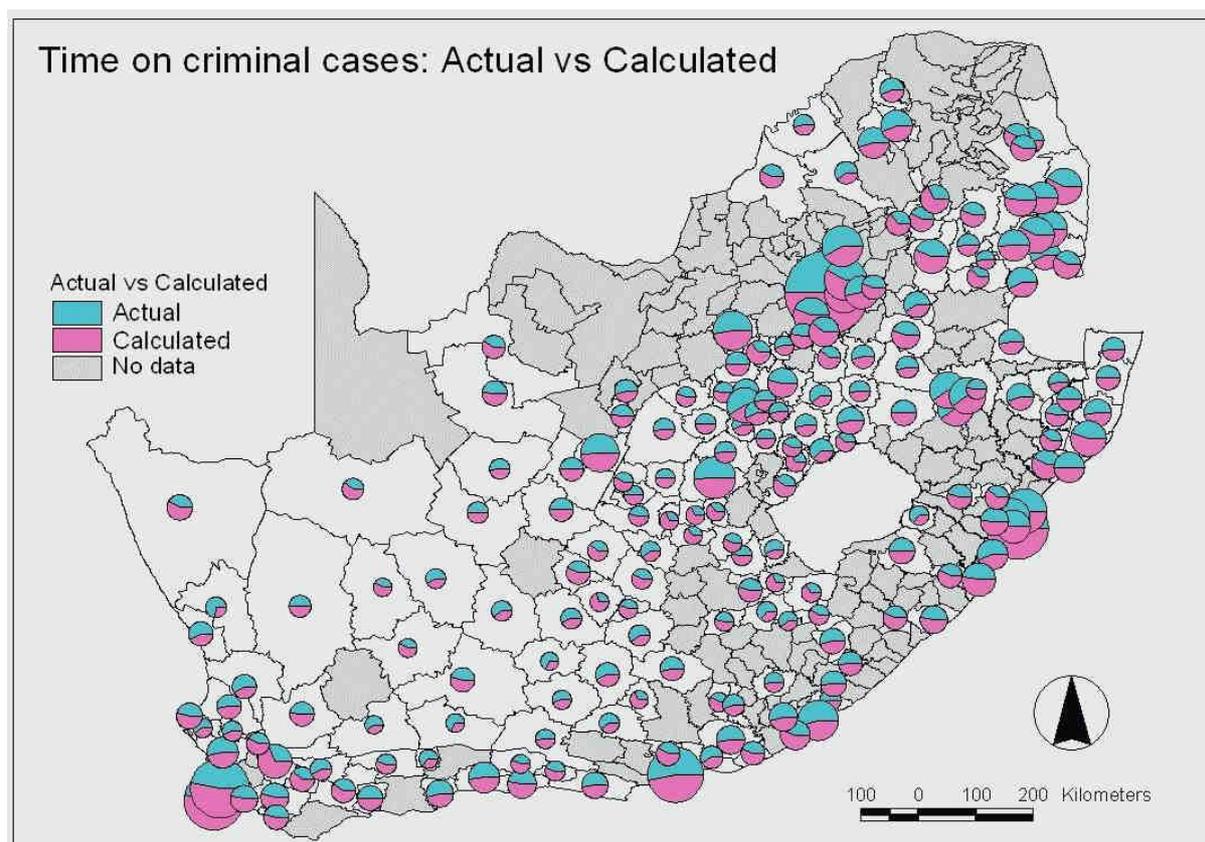


Figure 3: Predicted and actual time spent on criminal cases

Once the critical variables were established, that have an impact on the operations of the courts such as time spent on criminal cases (a reflection of crime levels), a model was developed to predict the time that should be spent by a court on criminal cases.

The model uses environmental factors such as crime levels per magisterial district to predict the time that should be spent on cases. A similar process was followed to establish the predicted time spent on civil and family court cases.

The results from the model and the actual time spent on criminal cases (court statistics) (see Figure 3) were used to perform a gap analysis. The gap analysis indicates which court spends more or less time as than predicted. The gap is defined as:

$$(\text{predicted} - \text{actual})/\text{predicted} * 100$$

Outliers are flagged and they will be visited to establish the reason for the large difference. Figure 4 shows the results of the gap analysis for time spent on criminal cases by each court.

Using all the above information, another model was developed to assign personnel to each court (the human resources needed to run the court effectively). The result from this model will be used as an input to a budgeting model to calculate the budget for each court. Figure 5 shows the personnel requirements for each court.

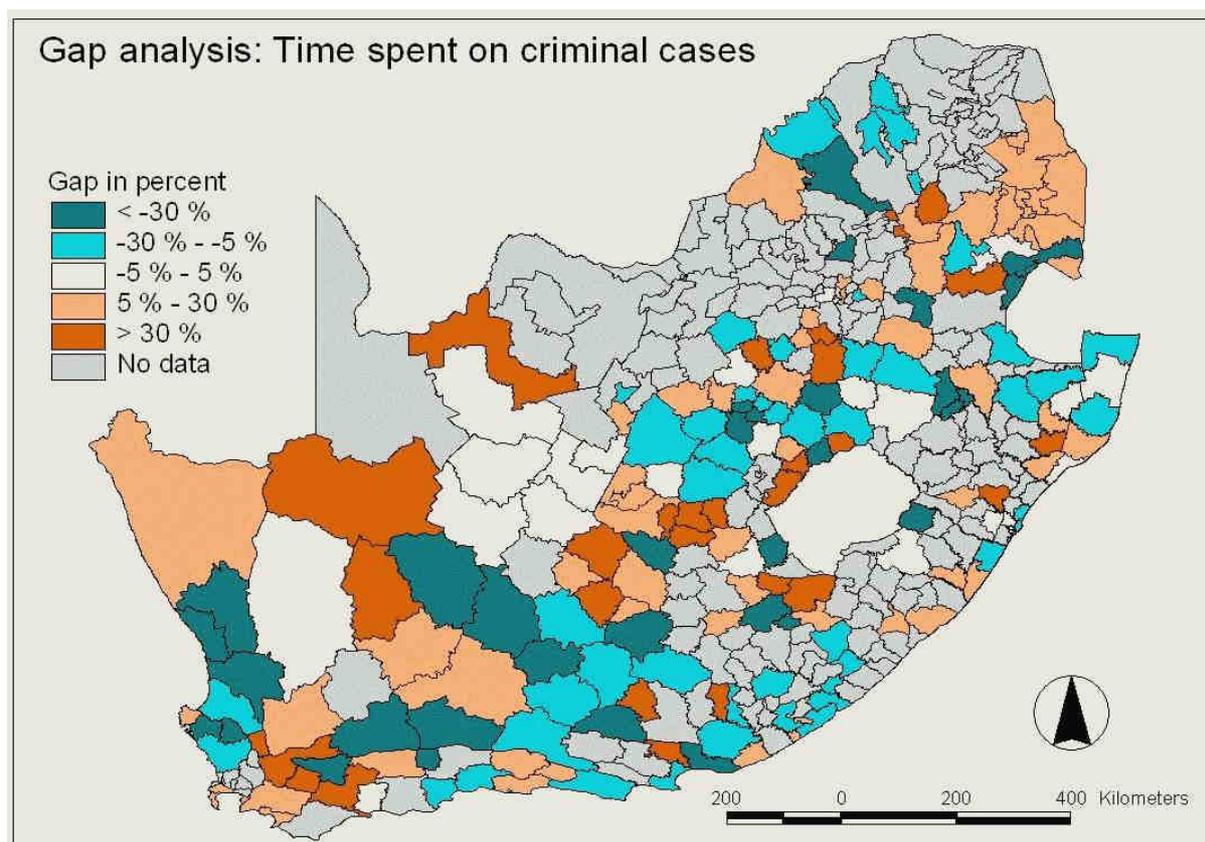


Figure 4: Gap analysis – Time spent on criminal cases

## 6. Conclusions

The established crime incident levels per magisterial district will be compared with other data from the magistrates' courts within the district, such as the number of cases heard, the time spent to finalise the case, conviction rates, withdrawal rates, personnel, etc. The aim is to establish whether the demand is too high on the existing court infrastructure or if a court is over-resourced, *i.e.* having low crime incidence levels in the magisterial district.

The project work reported on in this presentation was commissioned and funded by DoJ. We would also like to acknowledge the contributions of our colleagues at the CSIR, Ernst and Young, Business Against Crime, and the officials of DoJ who are working with us on the project.