

**AGRICULTURAL ASSESSMENT OF THE**

**uMNGENI MUNICIPALITY**

**PREPARED BY:**

**RURAL DEVELOPMENT SERVICES**

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## **AGRICULTURAL ASSESSMENT**

### **1. INTRODUCTION**

The purpose of this study is to assist the officials and councillors of the Umngeni Municipality (KZ222) and their Consultants, Udidi, in planning the development of the area by:

- a) Providing a description and an assessment of the agricultural resources of the area included within the municipality.
- b) Identifying within the municipality areas of high, moderate and marginal agricultural potential.
- c) Describing present agricultural land use within the study area.
- d) Identifying potentials and opportunities for agricultural expansion and development.
- e) Considering possible development strategies and projects. It is stressed however that this is not an in-depth study but rather a desk-top study aimed only at obtaining a general overview of the area supported by very limited field observations. It relies heavily on a detailed topographic analysis of the 1:50 000 map sheets of the area supported by only reconnaissance field observations and other available sources of information.

### **2. AGRICULTURAL ENVIRONMENT AND RESOURCES.**

The agricultural resources of any area are determined by its climate, topography, soils, vegetation and water resources. This discussion is therefore concerned mainly with these characteristics, although it starts with a brief review of the physiography (or major relief features) of the area and its geology, since these factors usually exert major influences on the agriculturally important elements of climate and soils respectively.

#### **2.1 Physiography and geology**

The study area is located on three major physiographic units or relief features which Turner (1972) has called:

- The Natal Midlands, which occur as rolling country at altitudes from about 1 200m to 1 700m.
- The Howick Benchland of undulating country at an altitude of about 1000 - 1200m.
- The Greytown - Pietermaritzburg Benchland at altitudes of some 700 - 800m.

These three major steps in altitude are accompanied by substantial changes in climate as will be discussed in more detail in the next section. They also result in broken topography along their edges, especially along the Pietermaritzburg scarp which separates the two benchlands.

The geology of the area is of the Karroo system of sedimentary rocks with different layers of rock being exposed at varying altitudes as follows:

- In the west, on the higher ground to the west of about Fort Nottingham predominantly sandstones of the Tarkastad formation.
- In the centre of the middle altitude range, predominantly mudstones and sandstone of the Estcourt formation.
- In the east, predominantly shales of the Volksrust and Pietermaritzburg formations.

This broad pattern of sedimentary rocks has however been extensively altered by intrusions of dolerite, including large sills of dolerite in the Fort Nottingham, Curry's Post, Karkloof and Howick areas.

## 2.2 Climate

There are 10 official meteorological stations in the municipality recording a range of climatic data (rainfall, temperatures, wind, humidity, evaporation etc.) and several others which record only rainfall. The comprehensive climatic stations are at Cedara and Claridge and on farms in the Dargle, Howick, Loteni, Nottingham Road, Fort Nottingham, Lidgetton and Karkloof areas so that the Municipality is well covered.

From an agricultural point of view rainfall is the most important element. The amount tends to be closely related to altitude as shown below by average annual rainfall for a number of stations in or close to the study area:

<u>Rainfall Station</u>	<u>Altitude (m)</u>	<u>Mean Annual Precipitation (mm)</u>
Ukulinga (Pmb)	775	733
Bishopstowe (Pmb)	838	889
Cedara	1 067	869

Lidgetton	1 204	1 086
Karkloof	1 219	1 337
Loteni	1 600	1 366

In addition to altitude aspect has a major bearing on rainfall. This is because moist air enters the area from the south-east so that south-easterly slopes tend to be wetter than north westerly ones. The records for Karkloof (on a wet southerly slope) and Ukulinga on a dry westerly one illustrate this point.

The records indicate that except for a few rain-shadow localities near Pietermaritzburg, the municipality as a whole has a mean annual rainfall of over 800mm with the higher parts receiving over 1 000mm. This is an agriculturally important attribute as experience throughout the province has shown that it is only in areas receiving an average rainfall of at least 800mm per annum that intensive dryland cropping is economically viable.

With the exception of a few rain shadow localities near Albert Falls dam the whole Municipality thus meets the most important requirements for a good agricultural climate.

Other agriculturally important elements of climate with the study area are temperatures and the occurrence of frost, hail, snow and mist.

Temperatures are closely related to altitude as illustrated below for 3 stations in or near the area:

Recording Station	Altitude (m)	Mean max. temp (deg C)	Mean min. temp (deg C)
Bishopstowe	838	23,9	11,2
Cedara	1 067	22,5	9,9
Nottingham Road	1 438	21,3	6,1

It can be seen from these figures that minimum temperatures vary more than maxima (almost twice as much). This trend is also reflected in the occurrence of frost where the following data apply:

Recording Station	Average date of first frost	Average date of last frost	Average number of frost days
Pietermaritzburg	8/7	17/7	9
Cedara	23/6	25/7	32

Nottingham Rd	2/5	14/9	72
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At the higher altitudes the frost are also more severe than at the lower altitudes.

Snow is also much more common at the higher altitudes above about 1 200m and especially at the very high altitudes of over 1 500m near the Drakensberg, while the risk of hail also increases with proximity to the mountains.

The whole area is also characterised by much mist (as implied by the name mistbelt). This is an important source of moisture during dry times which has a particularly beneficial effect on pastures.

Considering the area as a whole it may be said that it has a very good agricultural climate but with the proviso that the higher lying parts are cold and frosty in winter and prone to hailstorms in summer.

### 2.3 Vegetation

According to Acocks (1975) the natural vegetation of the area is that described for the following of his Veld Types:

- Highland Sourveld which occurs in the higher parts of the municipality to the west of Nottingham Road. This is a dense, tough grassland veld type with a high carrying capacity in summer but which becomes fibrous and unpalatable in winter.
- Mistbelt Ngongoni veld which occurs to the east of Nottingham Road and around Cedara. Acocks considers this veld type to have originally been Podocarpus (Yellow wood forest) in its natural state. The veld is now largely dominated by the unpalatable grass species *Aristida junciformis* (Ngongoni grass).
- Southern Tall Grassveld which is found around Howick. This is a grassland veld type with scattered thorn trees.
- Valley Bushveld which occurs in the Umgeni Valley near Albert Falls dam and which is bushveld rather than grassveld.

The Department of Agriculture has mapped the area in terms of Bio-resource groups which are broadly similar to Acocks' units but which are specifically related to veld management requirements and grazing capacities. The main Bio-resource groups occurring in the municipality and their grazing capacities are:

- Moist Highland Sourveld which has an average grazing capacity of 2,5 ha per Animal Unit (AU)\*
- Moist Midlands Mistbelt with an average grazing capacity of 2,5

ha per AU.

- Moist Tall Grassveld with an average grazing capacity of 2,5 - 3,0 ha per AU depending on topography and aspect.
- Coast Hinterland Thornveld with an average grazing capacity of 3,0 - 3,5 ha per AU.

A set of veld management practices such as length of grazing season, length of grazing cycle, rest periods and burning dates (where permitted) are given by the Department of Agriculture for each Bio-resource Group.

It is important to note that the Mistbelt and even the lower parts of the Highland sourveld were thought by Acocks to have been forested. It is not therefore surprising that much of this land is now under gum, wattle and pine plantations. It is also important to note that there are now also large areas of planted pastures, notably of Kikuyu grass in the area.

## 2.4 Soils

There is no comprehensive soil survey covering the uMgeni Municipality such as the Tugela Basin.

Survey which, covers most of Municipality 223 to the north. The Department of Agriculture nevertheless has a large amount of soils information on the area as contained in the Bioresource descriptions of the area. From these and from field observations it may be said that the great majority of soils in the area are those described by van der Eyk at (1969) in their Tugela Basin Soil Survey under the heading of Soils of the Highland and Mistbelt Areas.

The soils of the Highlands and Mistbelt areas are soils which have formed under a comparatively high rainfall so that, except on steep slopes where there is rapid erosion, weathering of the underlying rock is at an advanced stage. As a result the soils tend to be deep, strongly leached, friable and rapidly permeable without any well-developed structure. They are mainly fine-grained loamy or clayey soils and include both red and yellow brown soils which, in terms of the South African Binomial system of classification (Mac Vicar et al, 1977) are placed in the following soil forms and series.

<u>Color of subsoil</u>	<u>Soil form</u>	<u>Dominant soil series</u>
Red	Hutton	Hutton, Farningham, Balmoral
Yellow brown	Clovelly	Oatsdale, Balgowan
Yellow brown over red	Griffin	Cleveland, Griffin, Farmhill

\* An Animal Unit (AU) is defined as the grazing equivalent of 450 kg steer which consumes 10 kg of dry matter a day.

These are the normal mature upland soils on gentler slopes. On steeper slopes immature shallow soils tend to occur. These are often of the Glenrosa or Mispah forms, while in bottomlands waterlogged and gleyed soils of the Katspruit form predominate.

The upland soils in this group are, however, well-drained, permeable and very stable under cultivation. They have generally excellent physical characteristics with a favourable moisture regime and a low erosion hazard. Also, although they have a low natural nutrient status, due to leaching, they are highly productive if correctly fertilized (and limed where excessively acid).

In the lower-lying parts of the Municipality around the Midmar and Albert Falls dams some of the soils known as Soils of the Interior Basins occur. These include both non-calcareous red soils of the Hutton and Shortlands forms and plinthic soils, i.e. soils with a subsoil horizon of ferro-manganese concretions or incipient concretions. These plinthic horizons indicate a fluctuating sub-surface water table and in some cases may be poorly drained. Many of the alluvial soils are also poorly drained.

There are also places where the soils, even on the flatter slopes, tend to be shallow or stony e.g. on the ridge to the north of Curry's Post.

These few exceptions do not however detract from the fact that most of the soils on the flatter land throughout the Municipality are high potential agricultural soils.

## **2.5 Land Capability**

The provisional land resources is based on the land capability classification system for agriculture in South Africa as compiled by the Task Team appointed by the Multilateral Technical Committee for Agriculture and Environmental Affairs (MTC/AGEN, 1991).

### **2.5.1 Review of the MTC/AGEN system**

This system provides for eight land and soil capability classes based on soil and landscapes factors for the soil capability classification combined with a climatic rating for the land capability assessment. Risk of erosion and sustainability of land use are the main criteria underlying the system.

Class 1 is the best land. It is confined to prime arable land with a low risk of erosion. Class II is still very good arable land but with a

slightly higher risk of erosion. Classes III and IV have increasing limitations due to an increasing risk of erosion but are still regarded as arable land, though only marginally so in the case of Class IV. Classes V - VII are non-arable with increasingly severe limitations for agricultural use while Class VIII is regarded as being unsuitable for any form of agriculture.

The main soil and terrain characteristics which determine the soil capability class are soil depth, texture, internal drainage, erodibility and mechanical limitations, which are combined with the terrain factors of slope (which has a major and direct bearing on erodibility) and flood hazard. Once these characteristics have been assessed so as to derive the soil capability class, a climatic assessment is incorporated so as to derive the land capability class.

Rainfall is usually the over-riding climatic consideration since, in South Africa, drought is usually the most serious climatic hazard, but risk of hail or severe frosts are also taken into account in assessing the climate in terms of one of the six climatic ratings provided in the classification system. The climatic factor is then combined with the soil capability rating to arrive at the overall land capability assessment. This is done by taking the lower of the two values. For example, if the Soil Capability Class is II and climatic rating is C3 then the Land Capability Class will be III. If, on the other hand, the climate is C2, the Land Capability Class will remain as Class II.

### **2.5.2 Application of the system to the Umgeni Municipality**

In the absence of a soil survey of the area or aerial photography which facilitates the mapping of stony land and poorly drained areas, it has been necessary in applying the system to the Umgeni Municipality to confine it to the following procedure:

- a) Carry out a slope analysis of the area using the 1:50,000 map sheets and the following slope brackets:
  - 0 - 8% - Land which in terms of slope is potentially in Land Classes I and II.
  - 8 - 15% - Land which in terms of slope is potentially in Land Classes III and IV.
  - 15 - 30% - Land which in terms of slope is potentially in Land Class VII.
  - Over 30% - Land which in terms of slope is in Land Class VII.

- b) Carry out a field reconnaissance of main areas of potentially arable land to assess dominant soil types and characteristics.
- c) Establish broad land capability units according to the following grouping of provisional land classes:
  - Unit A: Land Classes I & II which is potentially High potential land.
  - Unit B: Land which is potentially in III & IV: Moderately high potential land.
  - Unit C: Land Classes V & VI: Moderately low potential land.
  - Unit D: Land Class VII: Marginal agricultural land and wetlands.

These are the mapping units shown on Map 3b.

## **2.6 Water Resources:**

The Umgeni Municipality is very well watered with many perennial rivers and streams and a large number of farm dams as well as the two major impoundments: Midmar and Albert Falls dams. There are also a large number of perennial springs and a number of important wetland.

The main rivers are:

- the Mooi river which drains the north-western part of the Municipality.
- the Mgeni river with its major tributaries : the Lions and Karkloof rivers and a number of smaller ones.

It is important to note that most of the municipality drains into the Mgeni river and thus falls under the Mgeni Integrated Catchment Management Plan. According to Puttick (1997) this plan seeks to devise strategies for making best use of available water within the Mgeni Catchment Area. To this end it seeks to:

- Limit further afforestation and sugar cane production.
- Limit the further development of farm dams and irrigation.

From an agricultural, and especially irrigation, point of view the surface water resources are therefore finite, rather limited and likely to become

more limited and more expensive in the future. The major wetlands within the area are important as water storage sponges and for water purification.

In addition to the surface water resources discussed above there are also the sub-surface or ground water resources which supply a considerable number of boreholes in the area. This resource which has not been quantified is likely to become more important for agriculture as ground water resources become less available.

## **2.7 Overall assessment**

In assessing the overall agricultural potential of the area the main criteria to be considered are:

- the suitability of the climate for agriculture.
- the suitability of the main soil types for cropping.
- the amount of arable land i.e. land suitable for crop production.
- the amount of irrigable land.
- the suitability and carrying capacity of the vegetation for livestock.
- the scope for intensification of agricultural production.

These are the main physical criteria. In addition to these will be economic consideration, notably markets, and infrastructural factors.

Dealing first with the physical factors it will be evident from preceding sections that the Umngeni Municipality has:

2.7.1 A favourable agricultural climate with a high and comparatively reliable rainfall as the over-riding determinant of agricultural potential in South Africa. Its main climatic constraints are its moisture deficit during the period May - September, its slightly restrictive frost and temperature constraints during winter, and the risk of hail in summer.

2.7.2 Generally very good agricultural soils with a high proportion of deep, well-drained, red soils of the Hutton form with their excellent physical properties. The main limitations from the soil point of view are:

- the risk of erosion on the steeper land due to the generally hilly topography.
- the need for additions of lime and fertilizer to rectify soil acidity and low nutrient status as a result of leaching under the generally high rainfall.

- 2.7.3 A substantial irrigation resource although future expansion is now unlikely due to expanding urban requirements for water.
- 2.7.4 A major potential for forestry although this again will have to be curtailed due to the demands by forestry on water supplies.
- 2.7.5 A high potential for livestock production off its Highland Sourveld and Moist Midlands Mistbelt veld types where the latter has not been badly invaded by unpalatable Ngononi grass, and especially off its potential for high yielding pastures particularly Kikuyu grass.
- 2.7.6 As a result of these characteristics especially its high rainfall and good soils it will be evident that the area has a high potential for intensification i.e. of raising its productive potentials. These areas should wherever possible be reserved for agriculture.

Finally, regarding economic criteria, the area is well located in regard to markets for horticultural produce, timber, wattle bark, dairy produce, beef, pork products and poultry.

It is also well served by infrastructure in the form of road and rail facilities and electricity, and has the rapidly growing market associated with the Midlands Meander. It is also on the doorstep of Pietermaritzburg as a major agricultural and general service centre.

The main enterprises for which the area is suitable include:

- maize, soyabeans, dry beans, potatoes and lupins as annual field crops.
- sugar cane in the lower, warmer parts of the area.
- timber production.
- vegetables where irrigation is possible, with cabbage, tomatoes and carrots as the main crops.
- orchard crops, notably avocado
- pasture and fodder crops
- intensive livestock enterprises.

### **3. PRESENT LAND USE**

There are at present three main patterns of agricultural land use:

- Intensive single enterprise operations like poultry (broiler) production.
- Intensive mixed farming.
- Extensive mixed farming.
- Timber production.

Intensive mixed farming is the main form of land use. It includes farms, which combine dairy farming, poultry production, horse breeding, pork production and intensive beef production, with varying amounts of cropping. The main crops are maize, potatoes and soyas. Pasture production is also a feature of most of these farms with Kikuyu and rye grass as the main summer and winter pastures respectively.

**Eragrostis curvula** is also widely grown as a hay crop.

Because intensive mixed farming is normally associated with cropping it is normally carried out in areas gentler relief where there is at least a reasonable amount of arable land.

In areas of more rugged relief more extensive forms of agriculture, especially beef farming, are the main form of land use, with only very limited cropping. The South- Western part of the area, along the boundary with Impendle, is typical of this form of land use.

The third main form of land use is timber production. This is most evident in the eastern part of the municipality between Howick and Karkloof and around De Magtenburg, where there are several large plantations. Smaller concentrations of timber plantations also occur in many other parts of the municipality.

Farming standards and standards of resource conservation are generally high throughout the municipality.

#### **4. POTENTIALS AND OPPORTUNITIES FOR EXPANSION AND DEVELOPMENT.**

The opportunities for agricultural expansion and development depend on three main sets of potentials.

- a) the physical resources provided by areas of high agricultural potential i.e. areas with a favourable climate, gentle topography, good soils, adequate water supplies etc.
- b) the scope for developing new and promising enterprises.
- c) the creation of new, or the expansion of existing economically viable markets in order to absorb any increased production.

In applying these concepts to the uMgeni Municipality the following observations are considered to be relevant.

##### **4.1 Physical potentials**

The municipality includes at least five areas of exceptional potential. These, as shown on Map 1, are:

- In the Elands river valley near Fort Nottingham.
- the areas to the north west and north east of Nottingham Road.
- the Kusane river valley to the north and east of Curry's Post.
- the Karkloof valley in the north-east part of the municipality.
- the Hilton College - Cedara - Mt Ashley area.

In all of these areas there are major concentrations of good soils on gentle slopes with favourable agricultural climates and substantial irrigation resources. There is still much potential for further intensification in all of these cases and for intensification in many smaller areas of high potential land throughout the municipality.

#### **4.2 The development of new enterprises**

There would seem to be considerable scope for developing the potential for deciduous fruits and nuts in parts of the municipality along the lines of the peach, cherry, apple and pear orchards as found near Ficksburg in the eastern Free State. If these fruits can be grown successfully, the Midlands Meander would provide an excellent starter market for the produce.

#### **4.3 Creation or expansion of markets**

Marketing limitations have long been a problem with most agricultural enterprises. Some enterprising farmers in the municipality have, however, very successfully exploited the opportunities offered by the Midlands Meander, and there are undoubtedly other opportunities in this regard.

### **5. POSSIBLE DEVELOPMENT STRATEGIES AND PROJECTS**

When considering possible development strategies and projects for the area it is necessary to draw a distinction between those development activities which come directly under the municipality such as the provision of infrastructure and urban services and those which are controlled and owned by the municipality's individual residents or "burghers". Thus, in this case, since practically all agricultural productions is being undertaken by individual commercial farmers operating on free hold land, there is only limited scope for involvement by the Municipality.

In such circumstances the role of the Municipal authorities becomes one of facilitating development and production by the individual farmers rather than attempting to become directly involved. In other words its role becomes one of providing and maintaining infrastructure such as roads and, where appropriate, marketing facilities.

Technical forms of assistance and guidance to the farming community fall under the aegis of the Department of Agriculture and other technical agencies. It is therefore those agencies which would need to assist with most of the suggestions made in the previous section, e.g. the development of deciduous fruits and selected nut crops in the area. Even though the agricultural role of the Municipal authorities may be somewhat limited it is nevertheless recommended that a meeting be held between the Municipality and the local farmers associations at which the farmers could discuss their infrastructural problems in detail. It would also provide an opportunity for the farmers to raise other problems they are experiencing e.g. theft and other forms of crime. Although these matters are also outside the normal role of the municipality the local authority, by using its good offices with the law enforcement agencies, may be able to assist the farmers.

## REFERENCES

Acoccks JPH (1975) Veld Types of South Africa

Mark Puttick & Associates (1997) Strategic Analysis: North Eastern Districts Umgeni Valley to Bishopstowe.

Midgely DC, Pittman WV, Middleton BJ (1994) Surface water resources of South Africa. Vol VI.

Multilateral Technical Committee for Agriculture and Environmental Affairs (1991) A system of soil and land capability classification for Agriculture in South Africa.

Phillips J (1973) The agricultural and related development of the Tugela basin and its influent surrounds.

Scotney DM, Smith JMB & Mann QV An agricultural strategy for the north-eastern districts of Pietermaritzburg.

Van der Eyk JJ, Mac Vicar CN, de Villiers JM (1969) Soils of the Tugela Basin.