

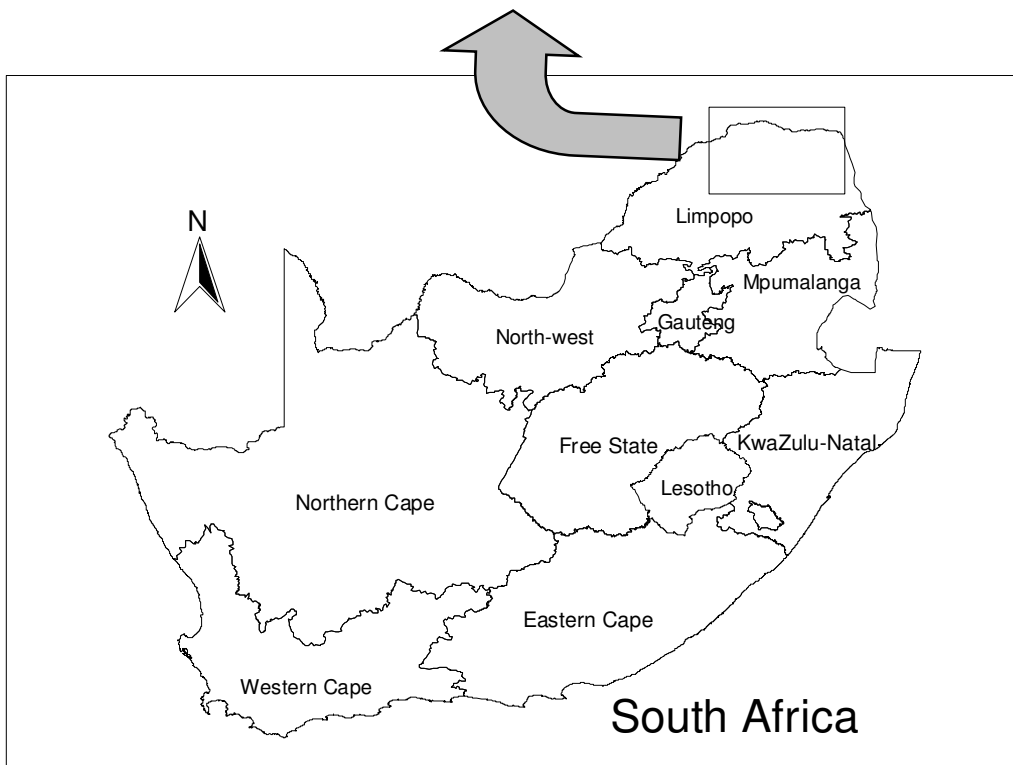
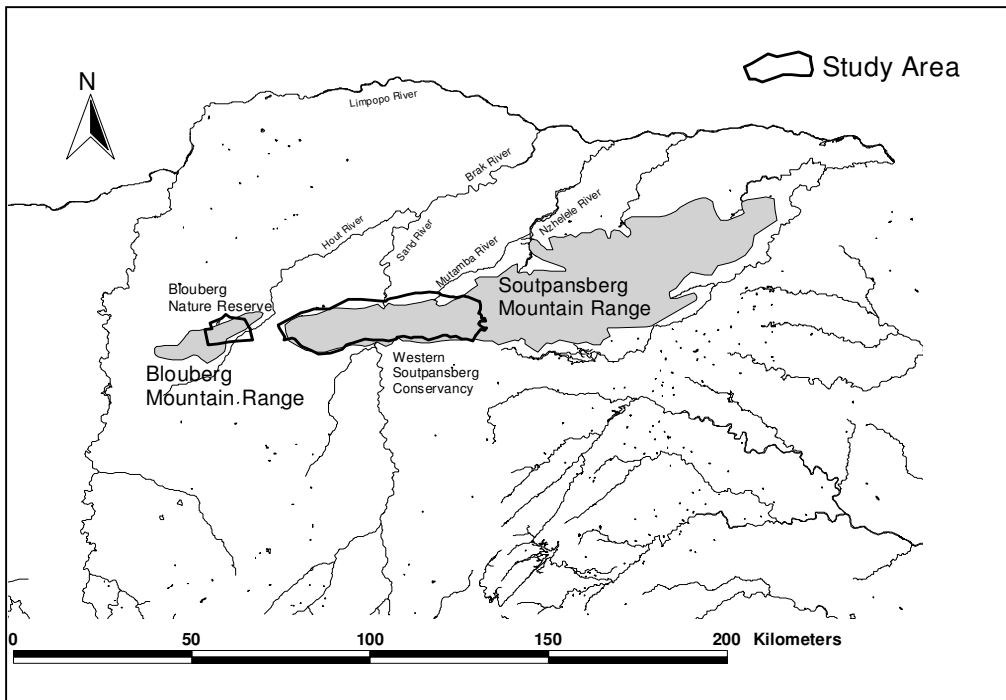
## CHAPTER 2

### STUDY AREA

#### **Location**

The BNR (7000 ha) and SC (100 000 ha) are located in the arid northern regions of the Limpopo Province of South Africa (Figure 1). For the purpose of this study, the SC is defined as a section of the Soutpansberg Mountain Range contained by four provincial and national roads. The eastern boundary (E29°55') is the N1 from Makhado in the south to Wyllies Poort in the north. The northern boundary (S 22°52') is the R523 road from Wyllies Poort in the east to Kalkheuwel in the west. The western boundary (E29°15') is the R521 road from Kalkheuwel in the north to Vivo in the south. The southern boundary (S23°12') is the R522 road from Vivo in the west to Makhado in the east. From east to west it spans approximately 70 km and from north to south approximately 25 km at it's widest.

The BNR lies approximately 40 km to the west, situated along the north-eastern section of the Blouberg Mountain.



**Figure 1.** The location of the Blouberg Nature Reserve and Soutpansberg Conservancy within South Africa.

## **Topography**

The SC and BNR are part of the Blouberg–Soutpansberg Mountain Range, with its ENE–WSW orientation (Figure 2). Although the Blouberg and Soutpansberg belong to the same geological formation they are referred to as separate entities. Successive faulting along the Tshamuvhudzi, Kranspoort, Nakab and Zoutpan strike-faults, followed by the northwards tilting of the area, created these quartzite mountains within the surrounding Limpopo Plain. This gave the Blouberg–Soutpansberg Mountain Range a wedge-shaped appearance with steep southern slopes and moderate northern slopes. The ridges are highest at the western extremity of this range, gradually descending until it finally plunges beneath the Karoo Supergroup along the northern reaches of the Lebombo Mountains near the north-eastern border of the Limpopo Province. The SC's altitude ranges from 750 m above sea level at Waterpoort to 1 748 m at Lejuma. The BNR's altitude ranges from 850 m above sea level in the east to 1 400 m in the west. The highest peak of the Blouberg lies further to the west, reaching 2 051 m above sea level (Bumby 2000). The surrounding plains are approximately 850 m above sea level.

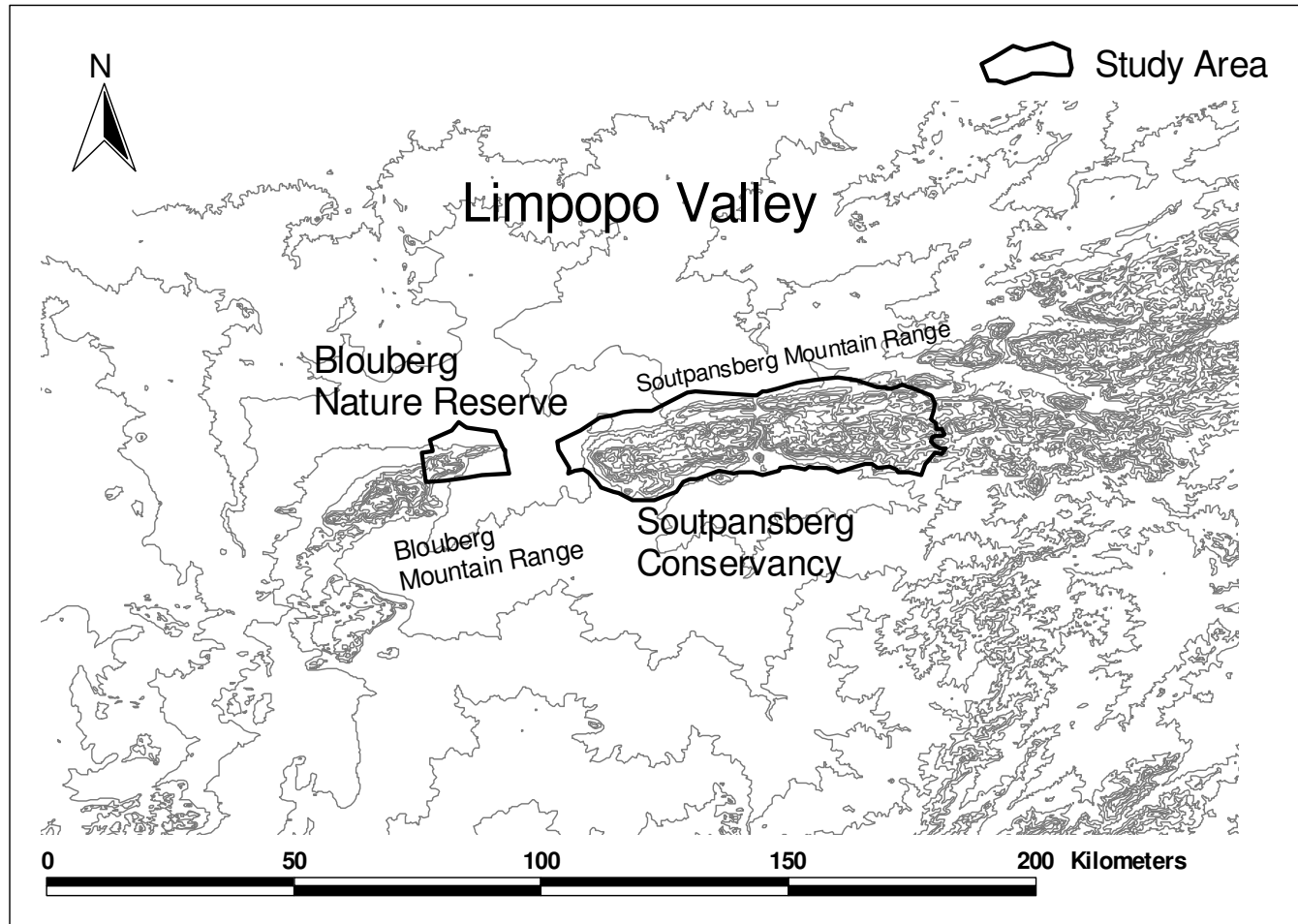


Figure 2 Topography of the Soutpansberg-Blouberg Area

## **Geology and soils**

The Soutpansberg basin was formed approximately 1 800 million years ago as an east-west trending asymmetrical rift along the Palala Shear Belt (Brandl 2002). This belt formed due to a collision between the Kaapvaal craton from the south and the Limpopo Belt from the north (Bumby 2000). Layering of the most prominent geology started with the deposition of basaltic lavas, followed by the settling of various sediments over an extended period of time (Barker 1979). The Soutpansberg rocks initially formed a flat featureless landscape. Approximately 150 millions years ago, the area block-faulted and uniformly tilted to the north (Barker 1979). Numerous north-south extensional faults truncate the Soutpansberg strata. Recent erosion (last 60 million years) formed the landscape as we see it today (Brandl 2003). The pink resistant quartzite was instrumental in shaping the present morphology. The Soutpansberg rocks rest on gneisses of the Limpopo Belt and Bandelierkop Complex. Sedimentary rocks of the Karoo Supergroup cover the Soutpansberg outcrops along its eastern and northern margins. Many diabase dykes and sills occur throughout the Soutpansberg. These dykes are of volcanic origin and often intruded along fault planes (Brandl 2003).

The Soutpansberg Group represents a volcano-sedimentary succession, which is subdivided into seven formations (Brandl 1999). Only the Wyllies Poort and Sibasa Geological Formations are prominently represented within the study area. The geology of the SC and BNR is dominated by pink, erosion resistant quartzite, and sandstone with minor pebble washes of the Wyllies Poort Geological Formation of the Soutpansberg Group. Other less prominent rock types include shale, conglomerate, basalt and diabase intrusions of the Wyllies Poort and Sibasa Geological Formations. The rocks of the study area do not contain large amounts of minerals that are of economic value.

Soils derived from the quartzite and sandstone are generally shallow, gravely, skeletal and well drained, with low nutrient content and acidic characteristics. Soils derived from the basalt and diabase dykes are fine textured, clayey, well weathered and generally deep. These poorly drained soils are prone to erosion along the higher rainfall southern slopes. Soils derived from the Aeolian Kalahari sands are fine-grained deep sands. Large areas along the northern sloped contain no soil, consisting

only of the exposed underlying mother material. Peat soils occur along the cooler high lying wetlands of the SC. The deeper soils and saprolite matrix within the mistbelt act as sponge areas, which slowly release water to feed mountain streams over prolonged periods.

### **Climate**

The SC and BNR fall within the summer rainfall zone of southern Africa. A climate diagram (Figure 3) depicts typical rainfall patterns and temperature gradients within the study area.

Temperatures vary dramatically according to topography and seasonal conditions. The summer months are warm, with temperatures ranging from 16–40°C. Winter temperatures are mild, ranging from 12–22°C. Minimum winter temperatures seldom drop below freezing point.

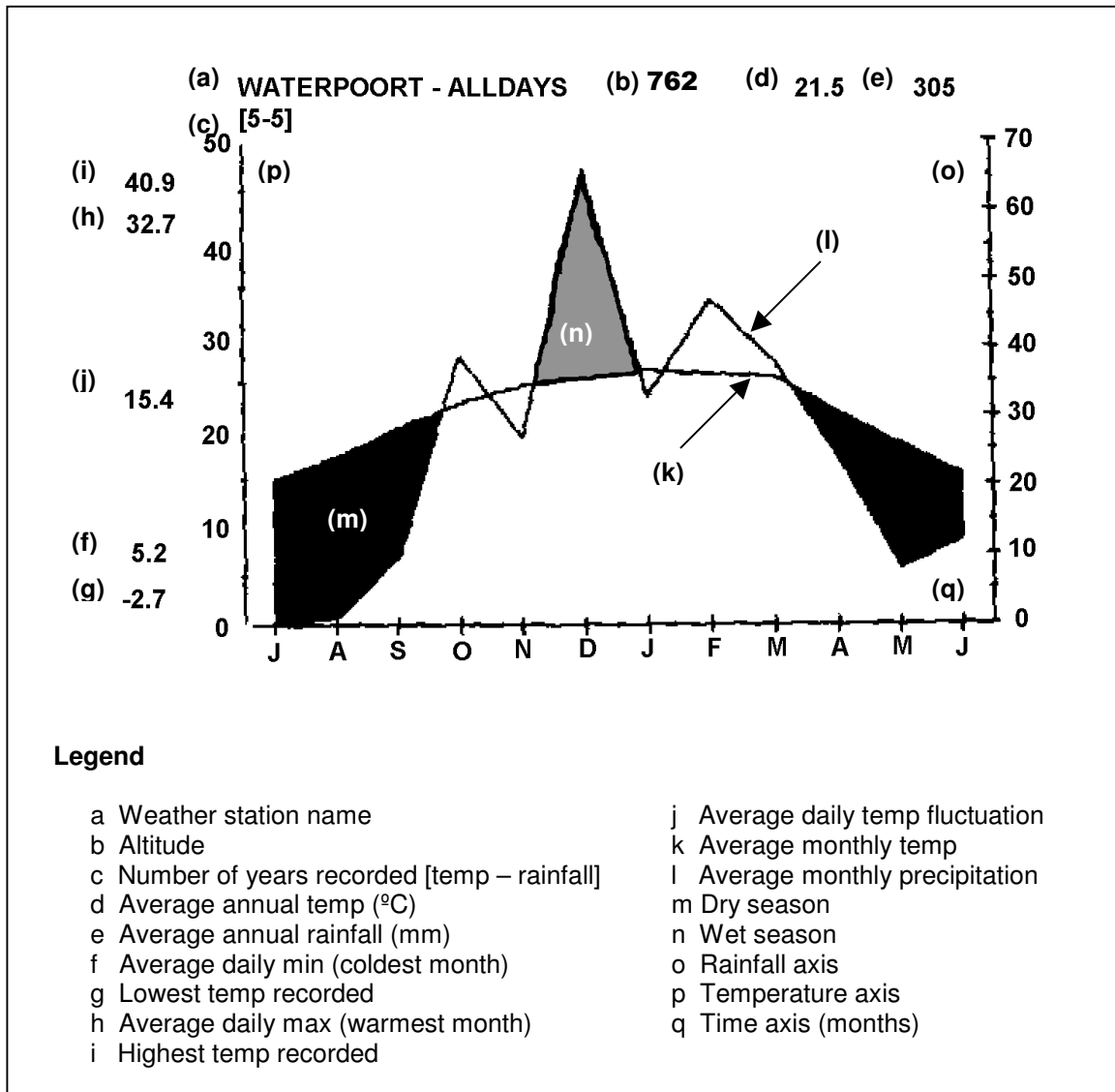
Due to the east-west orientation of the Soutpansberg, it experiences orographic rainfall. This phenomenon is due to moisture-laden air from the Indian Ocean, driven by the prevailing south-easterly winds onto the southern scarp of the Soutpansberg (Kabanda 2003). The north-south orientated Wolkeberg further blocks the westerly movement of the atmospheric moisture, forcing it into the wedge created by the two mountains in the vicinity of Entabeni. Large amounts of rain are discharged onto these southern slopes of the Soutpansberg and eastern slopes of the Wolkberg. Entabeni receives an annual rainfall of 1 874 mm. Orographic mist along this southern slope may increase annual precipitation to 3 233 mm (Hahn 2002, Olivier *et al.* 2002). This creates a rain-shadow effect along the western slopes of the Wolkberg and the northern slopes of the Soutpansberg. With the SC and BNR located north-west of the Soutpansberg–Wolkberg junction, a double rain-shadow effect is experienced along the northern slopes of the study area. Waterpoort, located north of the Soutpansberg, receives only 367 mm rain annually.

Due to the extreme topographic diversity and altitude changes over short distances within the study area, climate (especially rainfall and mist precipitation) varies dramatically (Kabanda 2003). The amount of orographic rain associated with the southern ridges varies considerably in accordance with the changing landscape. The

venturi effect caused by certain narrow gorges when mist is forced through them by orographic, anabatic and catabatic winds can lead to abnormally high localised rainfall (Matthews 1991; Hahn 2002). The areas just below the escarpment crest, where atmospheric moisture can be trapped most effectively against the south-facing escarpment, generally yield the highest precipitation (Matthews 1991).

The diversity of rainfall in the study area can be seen by the long-term average rainfall recorded for three farms, namely Ventersdorp, Hanglip and Schyffontein with annual rainfall of 585 mm, 774 mm and 835 mm respectively (South African Weather Bureau). Apart from the spatial variation in rainfall, the area reveals a high temporal variation in recorded rainfall (Geldenhuis & Murray 1993). Mean annual rainfall for Makhado fluctuated between 571 mm for the period 1965–1971 and 1 027 mm for the period 1979–1988 (South African Weather Bureau). In addition to these rainfall figures, the amount of precipitation as a result of mist can be substantial (Schutte 1971). In the higher lying areas of the KwaZulu-Natal Drakensberg, for example, the orographic fog contribution at 1 800 m altitude is an additional 403 mm per annum, which amounts to one third of the mean annual precipitation (Matthews 1991). As with many mountainous areas, the daily weather of the higher altitude crests and summits of the Soutpansberg is very unpredictable, fluctuating between extremes within a matter of hours.

The higher lying crests and ridges within the mistbelt are exposed to strong winds (Kabanda 2003). During the summer months, these winds carry moisture in from the Indian Ocean, creating a seasonal mistbelt, which gives rise to an abundance of rock- and bark-lichens and bryophytes. The combination of frequent orographic rain and mist during the summer months leaves the available soil drenched and sometimes flooded for extended periods. During the prolonged dry season, the prevailing winds are dry, causing dehydration and desiccation of the soils and vegetation (Hahn 2002). These extreme and fluctuating environmental conditions have led to specialization among the plants and may explain the relatively high level of endemism within this region (Hahn 2002).



**Figure 3.** Climate diagram for the Alldays / Waterpoort area.



## **Soutpansberg Centre of Biological Diversity**

The following section is a repetition of some of the information conveyed in the introductory chapter of this manuscript. This duplication of information under the heading of Study Area was deemed appropriate due to the relevance of the statistics on the biological diversity for the area. Its inclusion aims to reemphasize the conservation importance of the Soutpansberg Centre of Biological Diversity.

The Soutpansberg–Blouberg region has been recognized as a Centre of Endemism by Van Wyk and Smith (2001). However, little ecological knowledge of the area exists (Anderson 2001, Berger *et al.* 2003). Some floristic surveys conducted by Hahn (1994; 1996; 1997; 1999; 2002), Stirton (1982), Obermeyer *et al.* (1937) and Van Wyk (1984; 1996) indicated that the Soutpansberg Centre of Endemism is exceptionally diverse and species rich for its size (Van Wyk & Smith 2001). The conservation value of this centre lies in its unique ability to house a wide variety of floristic elements from the surrounding floristic regions (Hahn 2002). The region is an outstanding centre of plant diversity, with approximately 2 500–3 000 recorded vascular plant taxa (Hahn 1997). The region boasts with 41% of all plant genera and 68% of all known plant families of the flora of southern Africa. Altogether 595 specific and infra-specific trees and shrubs are known from the Soutpansberg, amounting to one third of all the known tree species in the entire southern Africa region (Hahn 1994; 1997; 2003). This constitutes one of the highest tree counts in southern Africa (Hahn 1997). The Kruger National Park, which covers an area of two million hectares, contains approximately 380 tree species (Van Wyk 1994), whereas 321 tree species have been recorded by Hahn (2002) in an area of only 2 000 hectares within the SC. Trees and shrubs encompass approximately 24% of the vascular plants of the Soutpansberg and play an important role in the species composition, vegetation structure and relative dominance within the different plant communities.

More than 500 bird species have been recorded throughout the Soutpansberg mountain range, amounting to approximately 56% of the recorded species for the entire southern Africa (Harrison *et al.* 1997; Hockey *et al.* 2005). The Soutpansberg and its surroundings contain some unique reptile habitats, and house seven endemic species (Branch 1988). A total of 46 spider families, 110 genera and 130 species have been recorded in the SC on the single farm Lejuma (<50 km<sup>2</sup>), which constitutes 70%

of the families, 26% of the genera and 5% of the species recorded for South Africa (Foord *et al.* 2002; 2003). The high biological diversity of the Soutpansberg and Blouberg can possibly be attributed to the fact that the mountain range acts as a refuge in times of environmental flux (Hahn 2003).

In the light of the high diversity recorded for the Blouberg–Soutpansberg expanse, it is proposed that the region be given the status of the Soutpansberg Centre of Biological Diversity (SCBD) in addition to its recognised status as the Soutpansberg Centre of Plant Endemism. There are current efforts to create a biosphere reserve in this area, which will include the SC and BNR (Hahn *in prep.*).