CHAPTER 2

Study area

2.1 KRUGER NATIONAL PARK AT A GLANCE

The present research has been carried out in a central region of the Kruger National Park, South Africa (Fig. 2.1). The Park is situated in the *lowveld* of north-eastern South Africa covering an area of about 2 million ha. It stretches 350 km from north to south and has an average width of 60 km. The park is bordered on the west mainly by high-density communal areas and by private and provincial game reserves. Geologically, Kruger is split down its long axis with the western parts characterized by granite substrate and the more eastern parts underlain by basalt (Fig. 2.2; see Mabunda et al. 2003). The park straddles two climatic transitional zones: the tropical and subtropical north and the temperate south. Summer temperatures regularly exceed 35°C and winter temperatures are moderate. Rain falls mostly from October to March with a dry season that occurs mainly between April and September. The long-term average annual rainfall for the whole park is 530 mm. Rainfall cycles of 15-20 years are recognizable. Kruger is drained by five perennial rivers that flow from west to east through the park and into Mozambique and a large number of seasonal rivers of varying sizes. The vegetation in all but the wettest part of Kruger is classified as subarid to arid wooded savanna (see Mabunda et al. 2003). Vegetation structure varies from open plains with low shrubs and a sparse tree canopy to close gallery forest along certain rivers. The savannas of Kruger are split between the two main ecological types, broad-leaved savannas occupy approximately 75% of Kruger, 50% of which are mopane (*Colophospermum mopane*) and 25% are made up by fine-leaved savanna (Venter et al. 2003). The response of the vegetation and animal population to the template presented by the geology (which is reflected by the soils), and changes caused by the ecosystem drivers such as rainfall and fire, have led to a complex patch mosaic. The abiotic template heterogeneity at different spatial and temporal scales supports an impressive array of species. So far, the following species have been identified: 147 mammals, 505 birds, 119 reptiles, 49 fishes, 34 amphibians, 1,980 plants and many thousands of invertebrates.

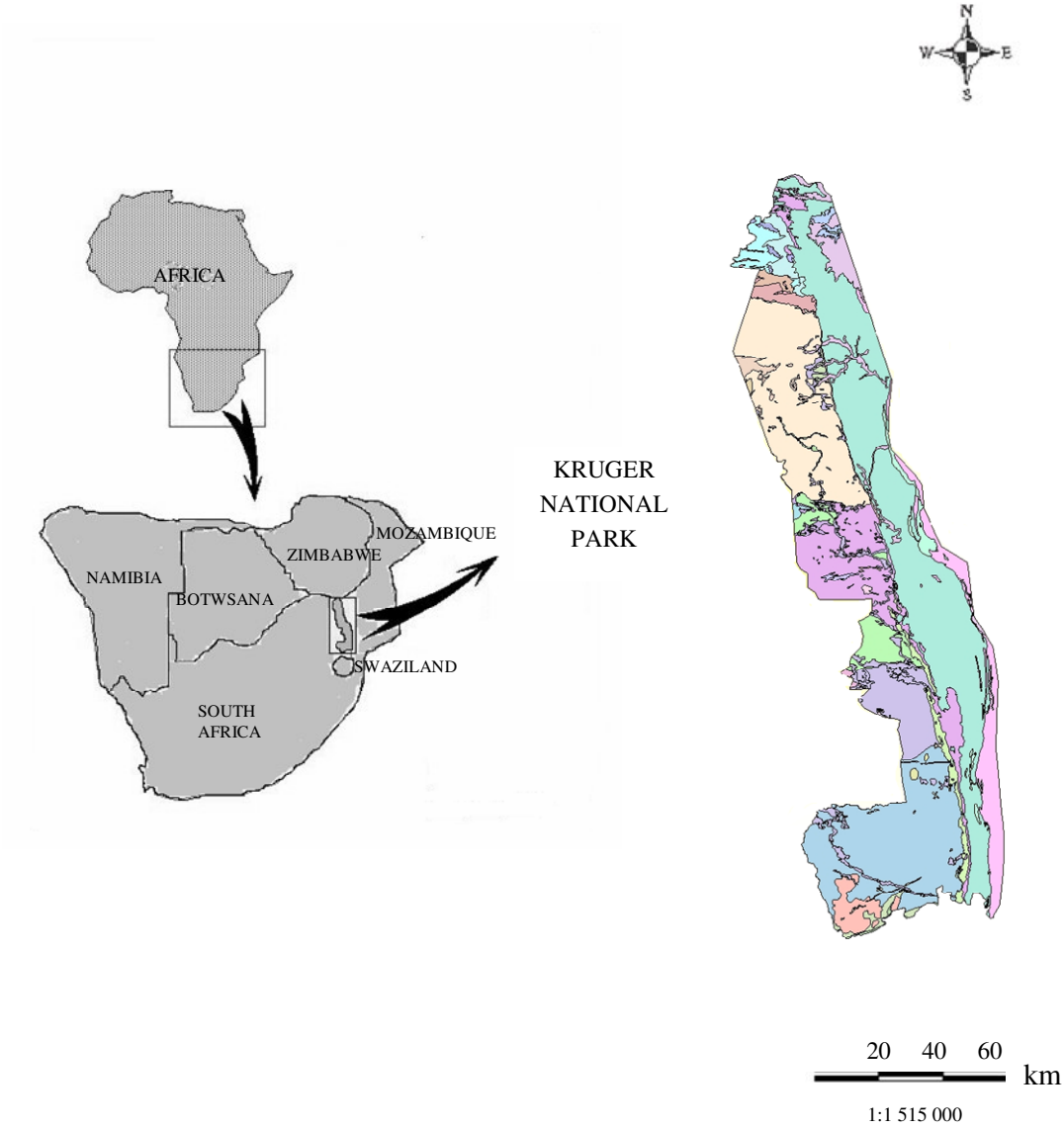
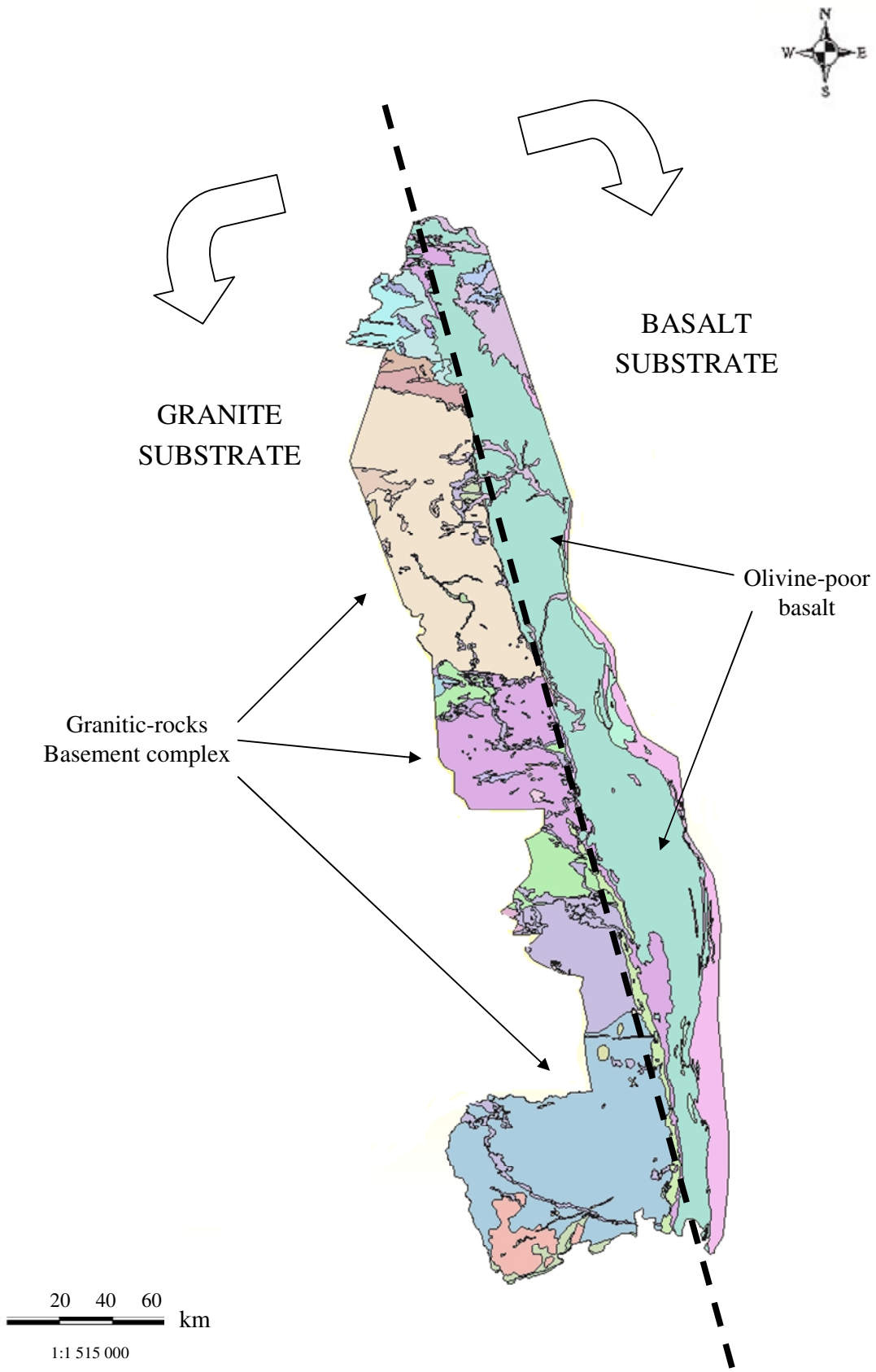


Fig. 2.1. Kruger National Park in relation to Africa.



2.2. Main geological features of the Kruger National Park.

2.2. STUDY AREA: THE TSHOKWANE SECTION OF THE KRUGER PARK

The study was conducted in a central-eastern region of the Kruger National Park (Fig. 2.3), based at the Tshokwane ranger station (24° 47´ S, 31° 52´ E). The experiments were carried out in the Satara land system on basaltic soil, which consists mainly of fine-leaved tree savanna or bushveld, dominated by *Acacia nigrescens*, *Sclerocarya birrea* and *Dichrostachys cinerea* (Fig. 2.3; Venter et al. 2003). The soil is general high in clay and nutrients and dominated by *Acacia* trees that enhance nitrogen availability and therefore attract herbivores. Along the basalt catena there is an increase in pH and most of the exchangeable cations, in a downslope direction (see Venter et al. 2003). Rainfall regime averages 560 mm per annum, with 80% of the precipitation concentrated in the wet season from October to March. Distance from surface water is a powerful determinant of the distribution of herbivore biomass and density, which determines strong browsing-grazing gradients departing from permanent and/or seasonally waterholes (see Redfern et al. 2003).

2.3 SITE DESCRIPTION AND RESEARCH ASSUMPTIONS

Large concentrations of game occur in the Satara land system (Owen-Smith and Ogutu 2003). The ungulate browsing guild is mainly composed by giraffe (*Giraffa camelopardis*), kudu (*Tragelaphus strepsiceros*), steenbok (*Raphicerus campestris*), and the mixed feeders impala (*Aepyceros melampus*), and elephant (*Loxodonta africana*). Former studies on the Kruger browsing guild started in the 1970s (Owen-Smith 1979; du Toit and Owen-Smith 1989; du Toit et al. 1990; Owen-Smith 1990) and monitoring data from Kruger indicate that large mammalian density has been consistently high in the Tshokwane section of the Park. Hence we can assume the woody vegetation has been experiencing consistently high browsing pressure for decades and presumably for centuries (see du Toit 2003). The giraffe density is estimated at 2.52 animals per km² (du Toit 1988), and the kudu density at 2.46 animals per Km² (Owen-Smith 1990), impala are very common and in general elephants and large herbivore densities high in this central part of the Kruger on basalt substrate. Soil nutrient pool was tested in previous studies (du Toit et al. 1990; du Toit 2003), which indicated relatively high concentration of N, P and cations. Field experiments on individual trees were performed on *Acacia nigrescens* trees, which represent the staple food source for large mammalian browsers. The leaves are double pinnately compound and differ from those of many *Acacia* species since are not fine-leaved but have 4 – 6 leaflets relatively large with oblique (lopsided) bases.

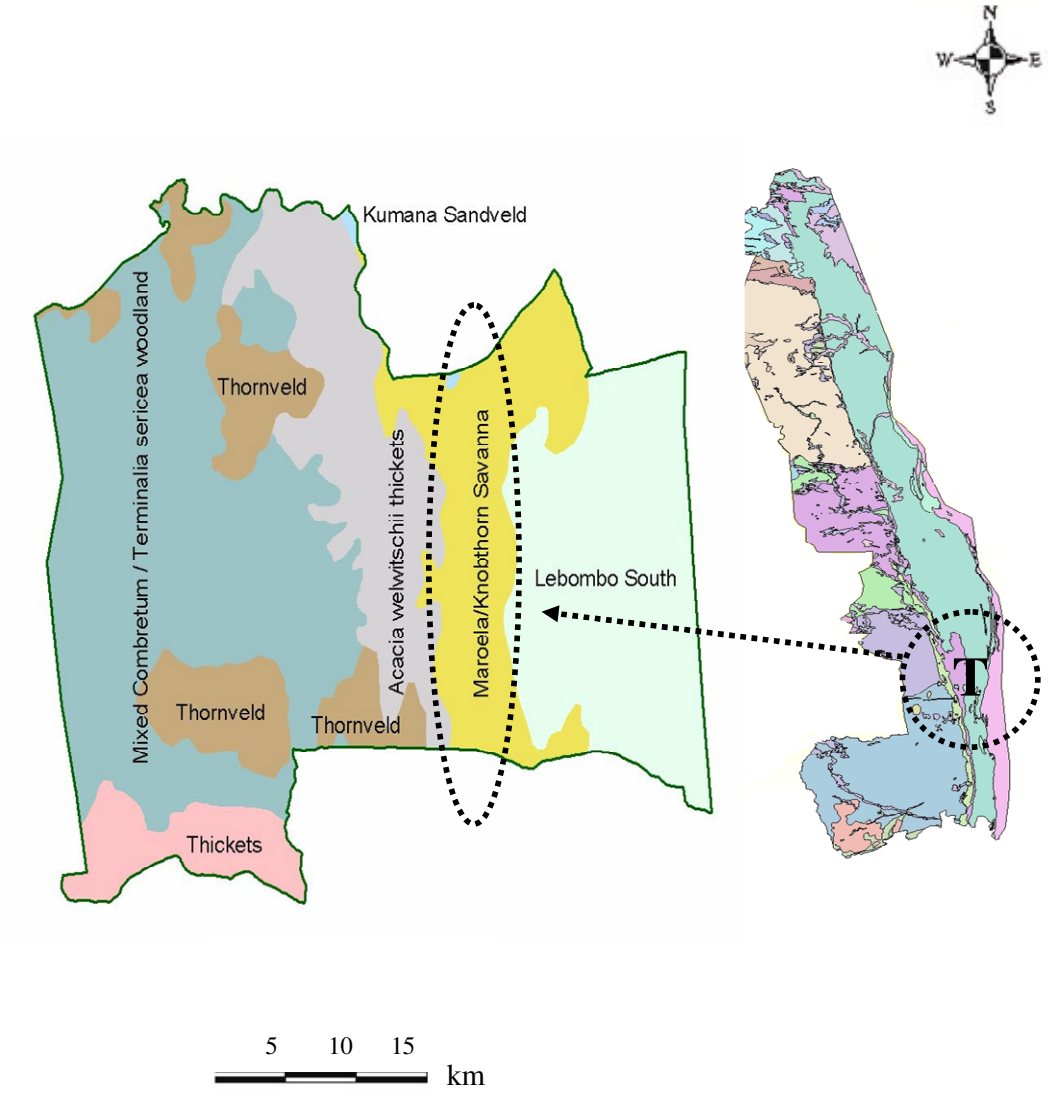


Fig. 2.3. Vegetation types of the Tshokwane section (T) of the Kruger National Park Experiments were carried out in the Maroela (*Sclerocarya birrea*)-Knobthorn (*Acacia nigrescens*) savanna.

Branches bring paired of prickles whose tips are oriented from the canopy surface in, offering resistance to pruning and leaf stripping by ungulate browsers. The study sites were chosen to minimize environmental variation across them. First, all study sites were on basalt soil at the top of the catenary drainage sequence. Second, the entire study area covered ~ 230 km² and so rainfall differences were assumed to be negligible. Third, fire events hadn't been recorded for 13 years in all the study sites. Finally, I assumed the impact of ungulate herbivores on vegetation has been stable for decades or presumably for centuries (du Toit 2003). I therefore addressed browsing effects on structure and composition of a woody plant community exposed to an intact indigenous browsing guild in an ecosystem in which large herbivores move freely in response to seasonal variation in resource availability.

2.4 REFERENCES

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