

CHAPTER II

THE STUDY AREA

The salt production activities which form the focus of this study centre around the Baleni geothermal spring. In this Chapter, I describe the natural landscapes in which Baleni is situated, and within which prehistoric salt production took place.

The Study Area

The name Baleni refers to a mineral hot spring located at S23°25'07.50", E30°54'54.36" and 380m above sea level. The Baleni research area covers the entire area around the salt spring up to a radius of 1,5km measured from the spring's centre. The spring is located approximately 20km south-east from the town of Giyani, and falls within the borders of the Giyani Municipal District (Figure 1). Situated in the Limpopo Province, the district is bordered in the east by the Kruger National Park, in the south by the Groot Letaba River and in the north by the Shingwidzi River. This area forms part of the South African Lowveld (Figure 2) - the area geographically defined as the low-lying areas east of the South African escarpment and west of the Lebombo Mountains on the Mozambique border (Onderstal 1984: 17).



Figure 1: The location of Baleni within the Giyani Municipal District, as well as adjacent municipal areas and major rivers.

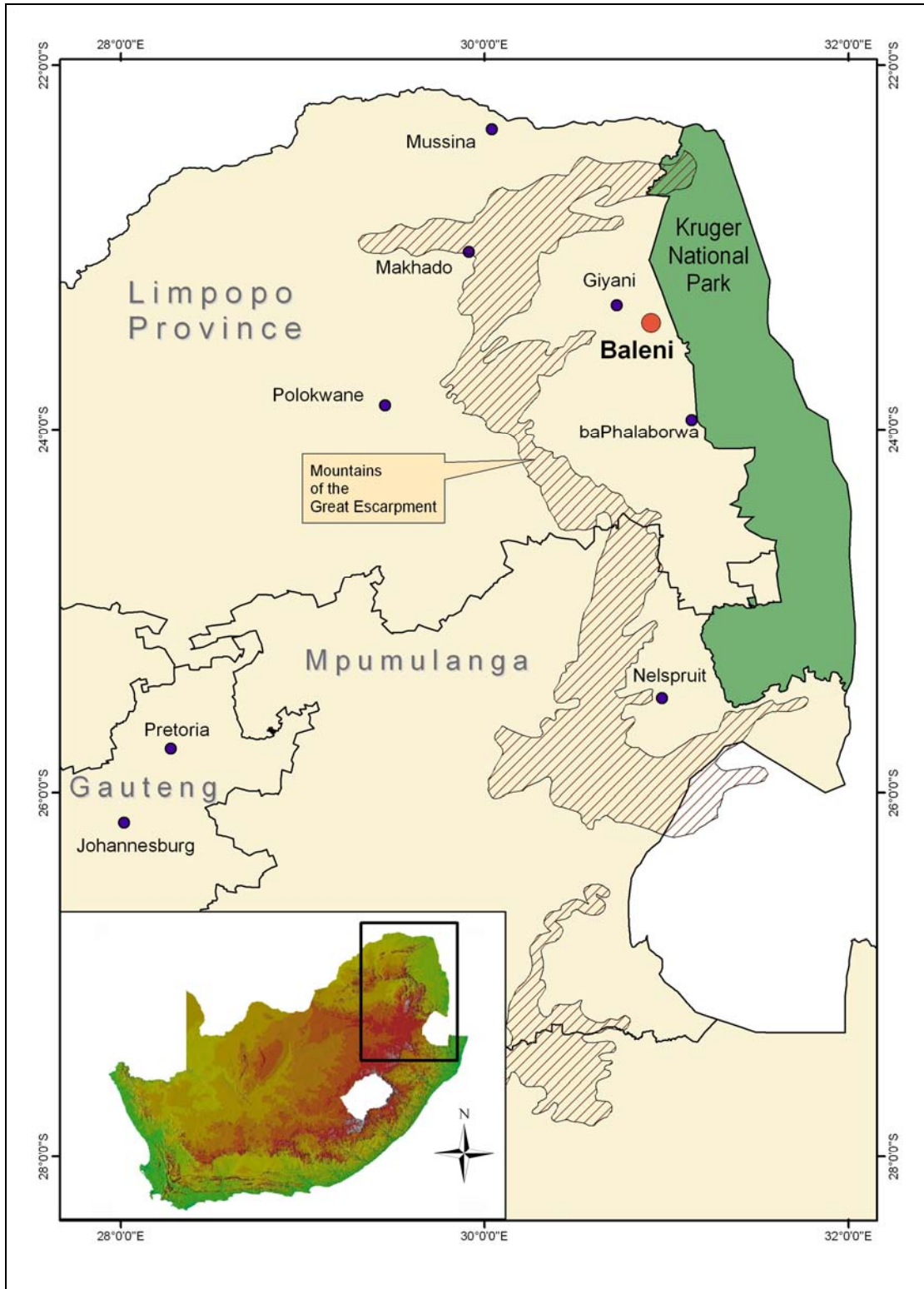


Figure 2: Baleni in regional context

Biome

Baleni is situated within the Savannah Biome, which is characterized by grassy ground cover and an upper layer of trees and shrubs. The grass layer in savannah areas is mostly dominated by C4 –type grasses (Van Rooyen and Bredenkamp 1996: 20).

Climate and Rainfall

The Lowveld is primarily a summer rainfall area. The average precipitation for the Giyani district is 600mm per annum, mostly in the form of thunderstorms. On average 90% of the annual rainfall occurs during the period between October and March. Summer temperatures for the Giyani District vary between 18°C to 43°C while winter temperatures range between 8°C to 23°C (Hartman and Kriel 1991).

Topography, Geology and Soils

The average elevation of the northern Lowveld ranges between 600m in the west and 300m in the east. The gentle undulating landscape is broken at places by conspicuous ridges and hills like the Murchinson Range, Mangombe Hills, and the Black Hills which rise up to 400m above the surrounding landscape. In the east where the Lowveld meets the escarpment, the landscape rises sharply to an altitude of almost 2 000m (Brandl 1987: 3).

The landscape around Baleni is set on archaean gneiss from the Goudplaats Gneiss formation. The gneiss varies in colour between light and dark grey (Brandl 1987: 3-6). The rocks are generally poorly exposed with outcrops limited to river channels. In the vicinity of Baleni, the gneiss is medium grained and well-foliated (Brandl 1987: 3; Kent 1986: 145). Small schist lenses and thin pegmatite in bands and segregations have also been observed in the area. The gneiss is cut by many mafic dykes of a north-east tending direction (Kent 1986: 144). The predominant soils are medium and coarse freely drained sandy loams, usually of a reddish-yellow to red colour with a high alkaline content.

Fauna and Flora

The predominant vegetation type at Baleni is Mopane Bushveld. It is characterized by fairly dense growth of *Colophospermum mopane* (mopane), and mixtures of *C. mopane* and *Combretum apiculatum* (Red Bushwillow) and is also associated with Knob Thorn (*Acacia nigrescens*),

Comiphora spp. and *Combretum imberde* (Van Rooyen and Bredenkamp 1996). Areas of Mixed Lowveld Bushveld also occur approximately 1km south of the spring where the elevation rises slightly. Here the vegetation is mostly dominated by Red Bushwillow (*C. apiculatum*), Silver cluster leaf (*Terminalia siricea*), and Knob Thorn (*A. nigrescens*) with concentrated pockets of Sicklebush *Dichrostachys cinerea*. Dense clusters of Magic Guarri (*Enclea divinorum*) occur on the brackish floodplain area around the eastern and northern edges of the saltpan. The area along the Klein Letaba River is typical riverside forest with large examples of Common Cluster Fig (*Ficus sycomores*) and Tamboti (*Spirostachys africana*). In areas along the river, pockets of Mopane Forest also occur. The predominant grass types in the area are all *Digitaria* species.

At present, the Baleni area is devoid of game. Due to the close proximity of Baleni to the Kruger National Park (its western border being approximately 15km to the east of Baleni), and seeing as the Mopane veldt around Baleni extends into the Park, present-day game profiles from Kruger can be used to give an indication of past profiles for Baleni. At present, Mopane Bushveld in the Kruger Park supports herds of buffalo, waterbuck, zebra, giraffe, impala, white rhinoceros, eland and sable antelope as well as very large herds of elephant (Gertenbach 1983: 50, 52, 60).

The Baleni Thermal Spring

The eastern edge of the swamp is situated about 150m from the bank of the Klein Letaba River. The spring flows into a reed covered swamp or pan which is roughly oval in shape, about 415m in length and 150m wide. The swamp drains into the Klein Letaba River by means of a small stream on its eastern edge. At present, the Baleni fountain is the most reliable source of water in the area. Although the water is brackish, cattle from the surrounding area come to the spring to drink during dry spells. In wetter periods other sources of water are preferred.

During the dry season, a white salt crust is formed along the edge of the swamp when the waterline of the swamp recedes. This crust is collected by present-day salt workers at Baleni to produce salt. These processes will be discussed in greater detail in Chapter IV.

South-east from the main spring, there are a number of much smaller springs that flow out into open depressions. These depressions are mostly dry but become swampy in the rainy

season. A saline crust also forms in these depressions, however, it is not as concentrated as that around the main spring.



Figure 3: Looking east over the reed covered swamp into which the main spring at Baleni flows. The spring itself is located approximately 15m inward from the waters' edge.

Origins of the thermal water

Kent (1986: 4-5), after analyzing air photographs and LANDSAT images, believe that the thermal water at Baleni rises to the surface through a geological fault. Though no faults pass directly through it, the spring is likely part of a fracture that is connected to a prominent east-west tending fault, situated 900m south of the pan. This fault, with its shear-zone and associated fractures, believed to form the main aquifer that feeds the spring. Although it is difficult to determine the hydro chemistry of the spring's water, Kent (1986: 150-152) believes that the high temperatures are due to resurgences of ground water that descends to depths of at least 1000m. At this depth the water takes up heat from the earths' crust and then returns to the surface at a high enough speed so that much of this heat is retained.

Chemical analysis of the spring's water indicates that its mineral content exceeds 1g/l, which means that, in addition to being a hot spring, Baleni can also be classified as a mineral spring (Kent 1986: 150). Tests showed that the water is slightly acidic, being saline, with the predominant constituent being NaCl (Table 1). Kent (1986: 152), argues that the water which flows forth at the spring acquires its mineral content in deep aquifers. These aquifers are probably made up out of trapped oceanic water of an unknown age (source of the Na and Cl), recent recharge (accounting for Ca, Mg and HCO in the water) and dynamic underflow (Na and HCO). Reaction between the country rocks and the thermal water is believed to be an additional source of Na, Ca, Mg and other trace elements.

Table 1: Mineral content of the Baleni spring (Kent 1947: 72)

NaCl	1270 mgm p/l
CaSO⁴	218 mgm p/l
CaCO³	30 mgm p/l
MgCO³	Trace



Figure 4: Reeds behind the cows indicate the location of a minor spring located in an open depression.

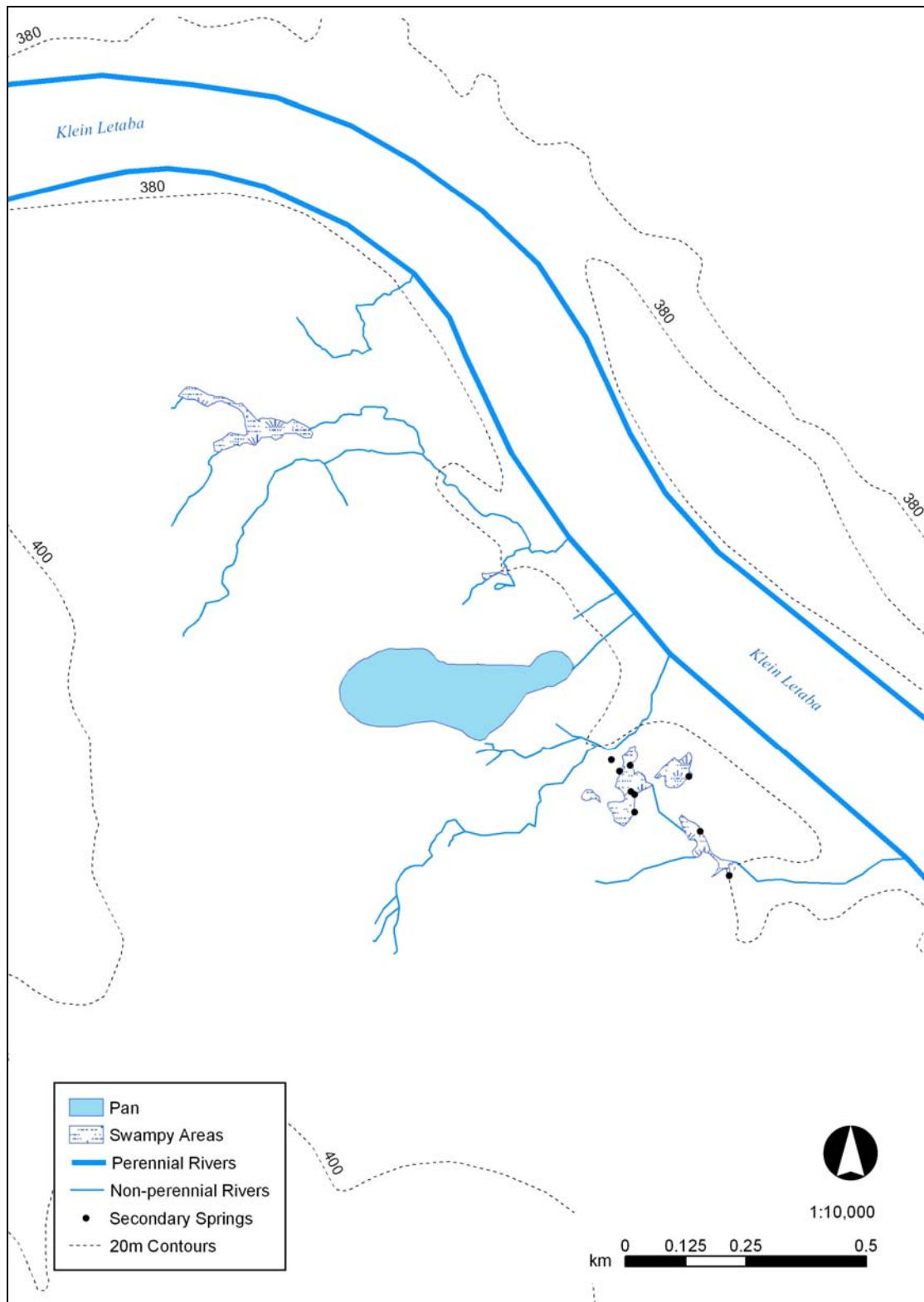


Figure 5: The Baleni spring and associated features

Other Hydrological Features

The main hydrological feature in the area is the Klein Letaba River. Approximately 30km downstream, it drains into the Letaba River, which eventually flows into the Olifants River, the main drainage line of the northern Lowveld. The Nsama, a prominent tributary of the Klein Letaba, flows into the latter approximately 8km downriver from Baleni. At present the Klein Letaba only experiences ephemeral flows. This, however, was not the case in the past, since the catchment area has been dramatically modified by human activity (Moon and Heritage 2001: 52-54).



Figure 6: Salt crust formed in basin of non-perennial river near the salt spring.

At Baleni, there are several non-perennial streams around the swamp that all drain into the Klein Letaba. In several places these streams have formed deep dongas or erosion gullies. One large gully, on the south-eastern side of the swamp, has eroded into a deep channel with vertical banks, over four meters deep in places. In several places these small perennial rivers

display a tendency to expand horizontally to form open areas, which become swamp-like in the rainy season. When dry, a white salt crust forms on the surface of these open areas. This crust is probably a result of the surrounding saline soils being leached by the streams.



Figure 7: Vertical erosion of stream banks south-east of the swamp, here measured at 4m.

Implications for Agro-Pastoral Communities of the Iron Age

Although Mopane Bushveld has a low carrying capacity, mopane leaves are nutritional, and provide relatively good fodder for cattle. Bonsma (1976: 8) states that cattle can be successfully raised, provided the animals are adapted to the hot climate and are able to stand the dry conditions. Grazing in Mopane Bushveld should, however, be controlled and well managed to prevent overgrazing and degradation of the veldt (Bonsma 1976: 8-11). Since the indigenous African cattle species are heat tolerant, cattle raising during the Iron Age would not have been a problem in the study area. Evidence of cattle raising in the area during Iron Age periods, is provided by archaeozoological research in the Kruger National Park (Plug 1988). The presence of domesticated animals during the Iron Age would, however, be constrained by animal diseases endemic to the area. The most important of these were nagana, carried by the tse-tse fly (*Glossina* spp.), malignant catarrhal fever (MCF), foot-and-mouth disease, as well as various tick-borne diseases. These diseases are endemic, and thus non-lethal, to wild animals, but the same cannot be said for domesticated fauna (Fuller 1923; Plug 1988). Although indigenous cattle breeds do have a high tolerance against some of the tick-borne diseases, they have none for nagana. Ovicaprines are more tolerant to nagana, and less sensitive to grazing conditions than cattle. A preference for these species probably existed in areas where cattle keeping was limited by environmental factors (Plug 1988: 315-316).

The staple diet of EIA communities in southern Africa was cereal crops. Seeing as the predominant soil types of the area are relatively low in nutrients and the surrounding clays are poor water retainers, the area is relatively unsuitable for agriculture. EIA communities in the Kruger National Park are all located along the banks of large rivers where deep alluvial soils occur and limited agriculture can take place (Plug 1988: 307).

Conclusion

The Baleni area would have been a suitable area for EIA communities to settle. Although game would have been plentiful in the region, herding and agriculture could only have been practiced on a limited scale at Baleni during the Iron Age. Ecological factors that would limit the success of these systems would be erratic rainfall, wet/dry cycles, the presence of diseases affecting domestic stock, and the low carrying capacity of the veldt.

The most important aspect of the study area, in relation to the research, is the presence of the Baleni saline spring and the pan into which it flows. The pan's mineral rich waters, with its high NaCl content, allowed Iron Age communities to extract salt. However, the spring and associated pan are not the only available sources of salt at Baleni. Precipitated salt also forms in the dry beds of some of the small rivulets that drain into the Klein Letaba River.

Both of these could have been exploited as sources of salt by prehistoric communities. Unprocessed salt could therefore have been obtained from a variety of different sources at Baleni. This point serves as a good introduction to the next chapter which will review Africanist research on the various sources and methods utilised in traditional salt production.