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Using GIS and aerial photography to detect the temporal effect of bush encroachment across the farms Kliprots, Elsinor, Nora and Sofiero in North West KwaZulu-Natal

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Background



Bush encroachment:

- **Widespread problem**
- **Indigenous species**

Outcome:

- **Change in land cover**
- **Lower carrying capacity- productivity and income**
- **Require change to burning regime/veld management**



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AIM



To quantify:

- the extent and historical effect of bush encroachment
- on the farms Kliprots, Elsinor, Nora and Sofiero
- between 1944 and 2014 using:
 - Aerial photography,
 - GIS techniques and
 - Resource surveys.



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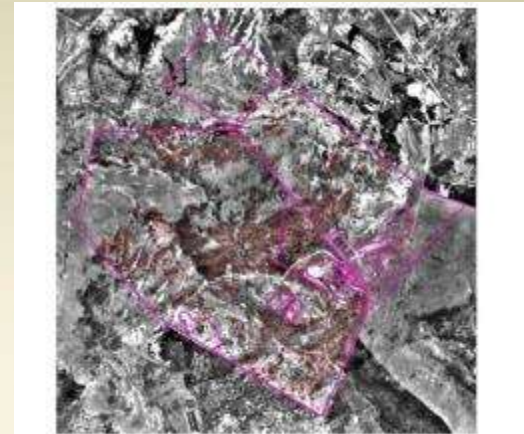
MATERIALS AND METHODS

- **Historical and contemporary data to compare bush encroachment dynamics over time.**
- **Aerial photographs from 1944, 1960, 1980, 2000 and 2014 (approximately 20 year intervals).**
- **GIS software was used to ortho-rectify the aerial photographs covering the study area, individual photographs were mosaiced into one image.**



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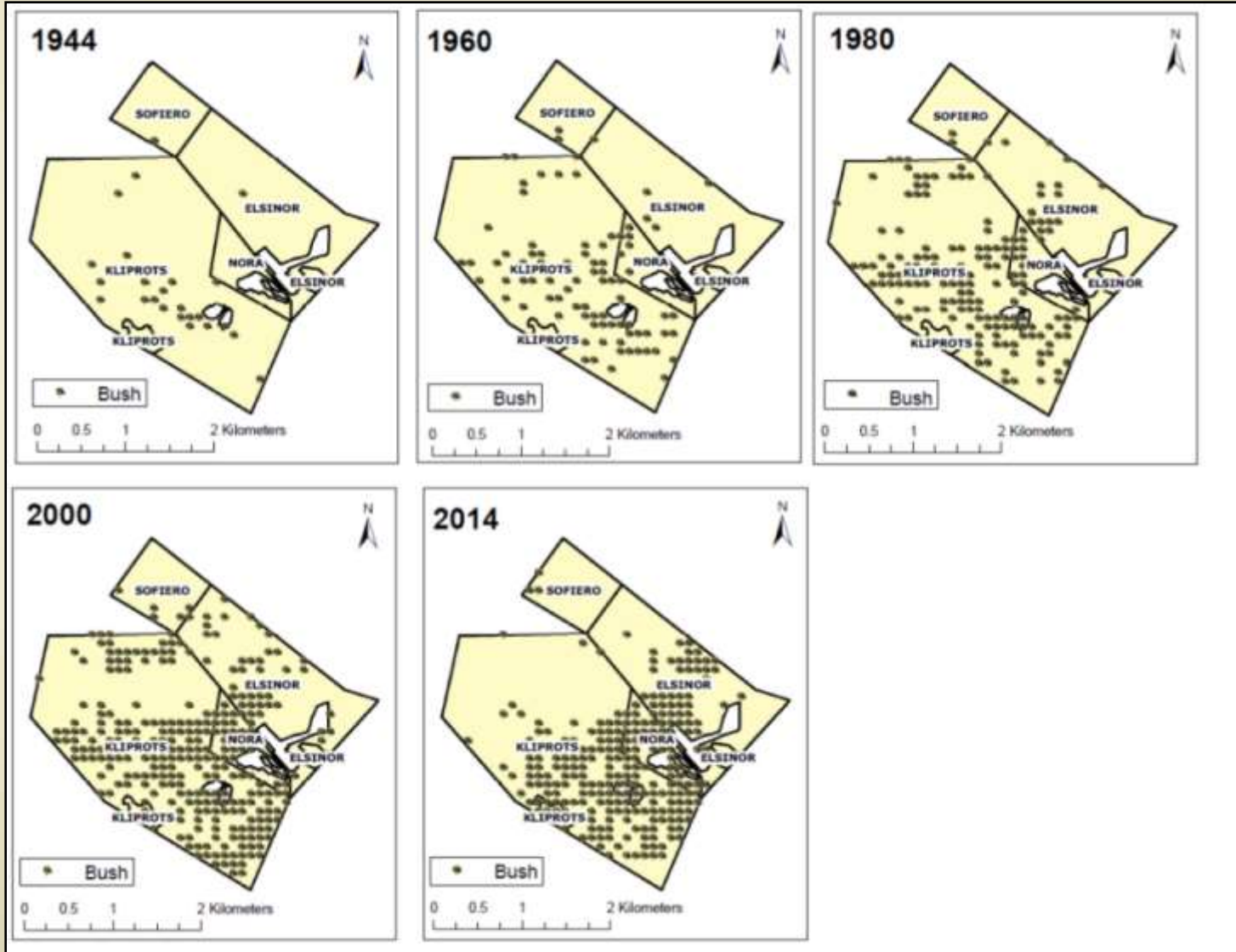


- A grid of points was generated over the image and manual interpretation used to assign each point to one of 4 land cover classes (Bush, Grass, Lands, Bare) on each of the aerial photographs from 1944 to 2014.
- Resource surveys were done on three representative sites that occurs on the farms: Cleared site, a natural un-encroached site and a bush encroached.



RESULTS

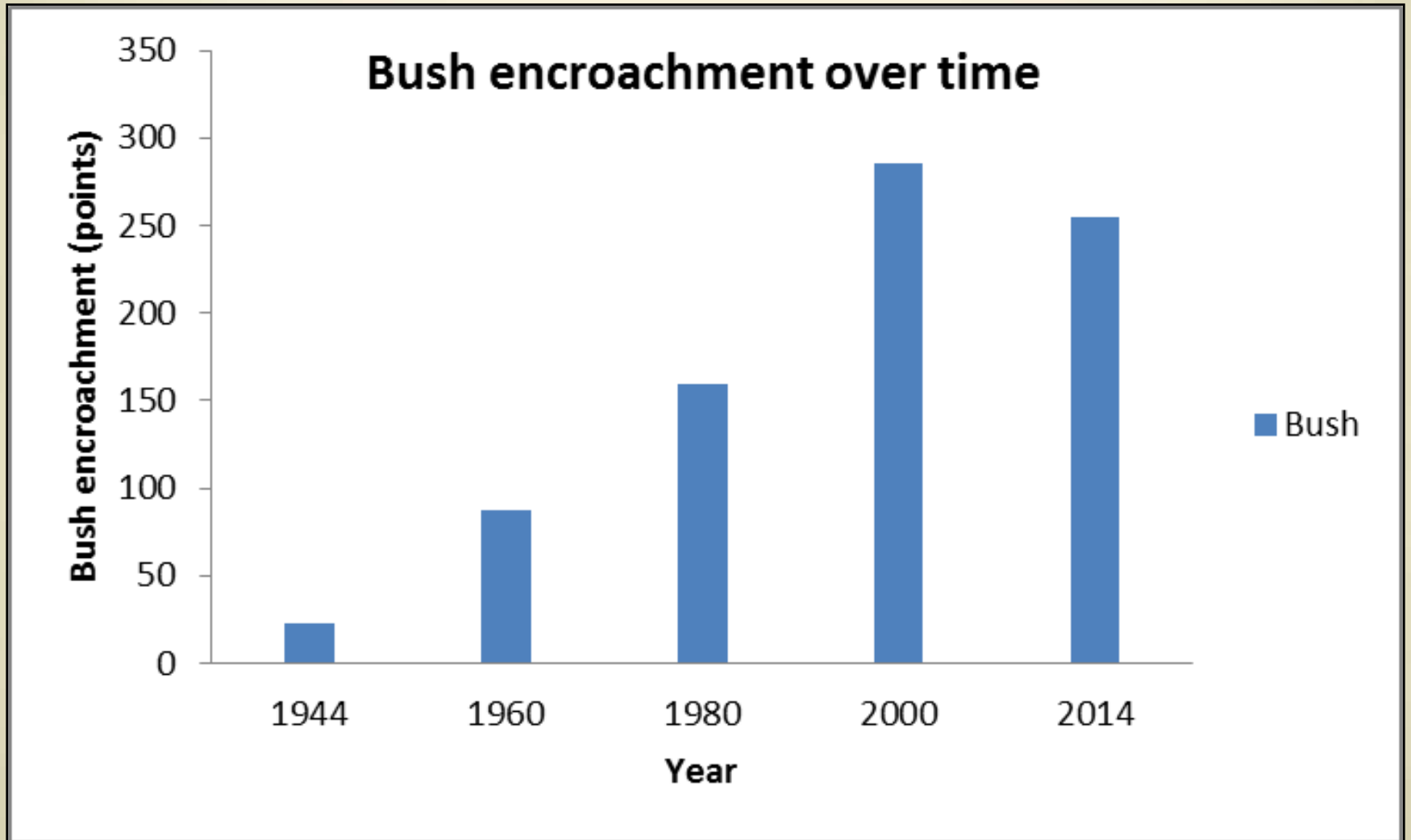
Land cover changes

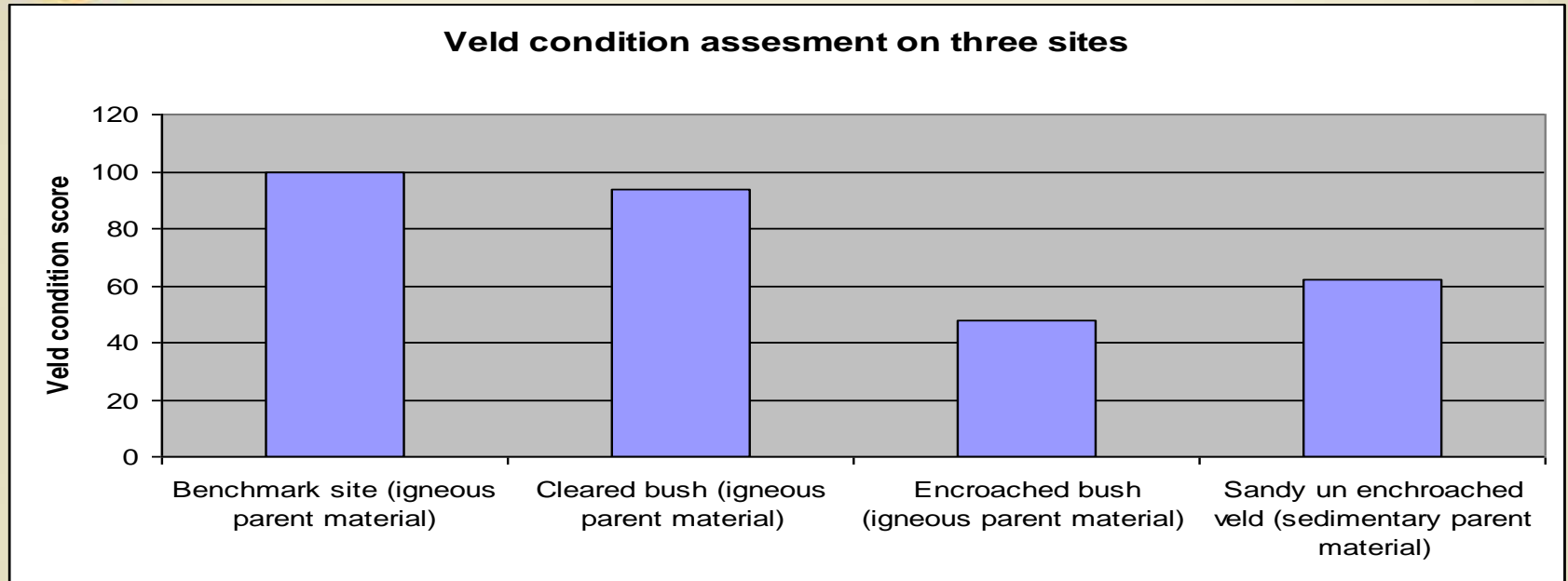




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***Cleared site:* Geology: Dolerite (igneous). Total topsoil cations: 36.54 cmol/L.**

***Un-encroached site:* Geology: Sandstone (sedimentary). Total topsoil cations: **2.12** cmol/L.**

***Severe encroached site:* Geology: Dolerite (igneous). Total topsoil cations : 21.69 cmol/L.**



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CONCLUSION

- **GIS techniques in combination with aerial photography allowed for bush encroachment to be detected on a temporal basis.**
- **Bush encroachment was found on the igneous soils - due to the higher total exchangeable cations.**
- **The reduction in bush from 2000 to 2014 was due to bush clearing on the farms. Clearing restored the veld close to benchmark level.**



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Thank you