

Analytical Hierarchy Process (AHP) for mineral potential modelling in the Collette Area, Upper West Region of Ghana.

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Introduction

This study applies the Analytical Hierarchy Process (AHP) to combine geological and geophysical data for gold prospectivity modelling in the data scarce Collette area.

Aim

To delineate potential zones of gold mineralization using AHP-based modelling.

Objectives

- To integrate geological and geophysical datasets and assign weights to evidential layers using AHP.
- To generate a mineral prospectivity map to identify high-potential exploration zones.

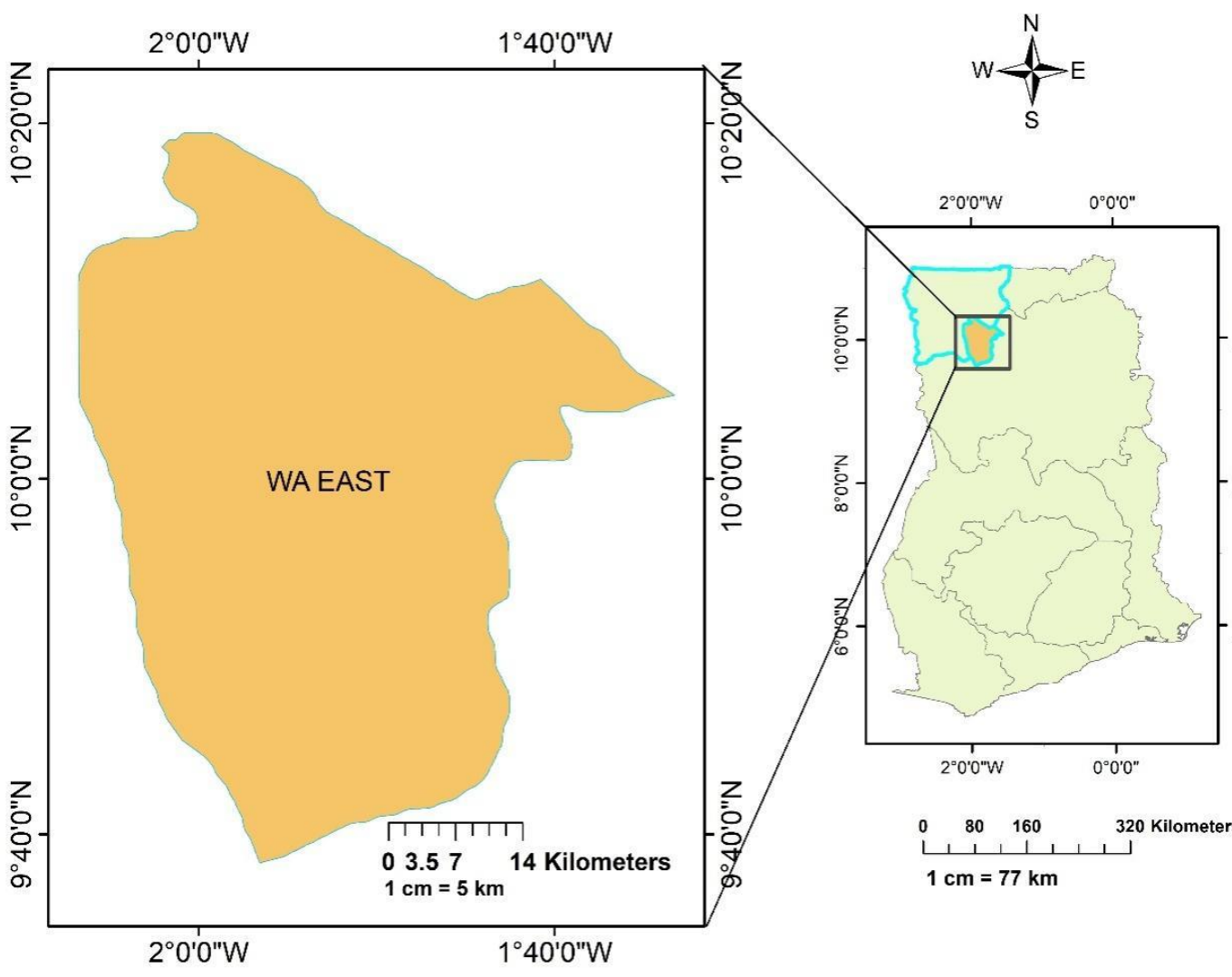


Fig 1: A map of the study area (Wa East district).

Method: AHP-Based Modelling

- Input of evidential layers →
- Pairwise Comparison →
- Normalization and Weighting →
- Integration of evidential layers →
- Prospectivity Map and Validation

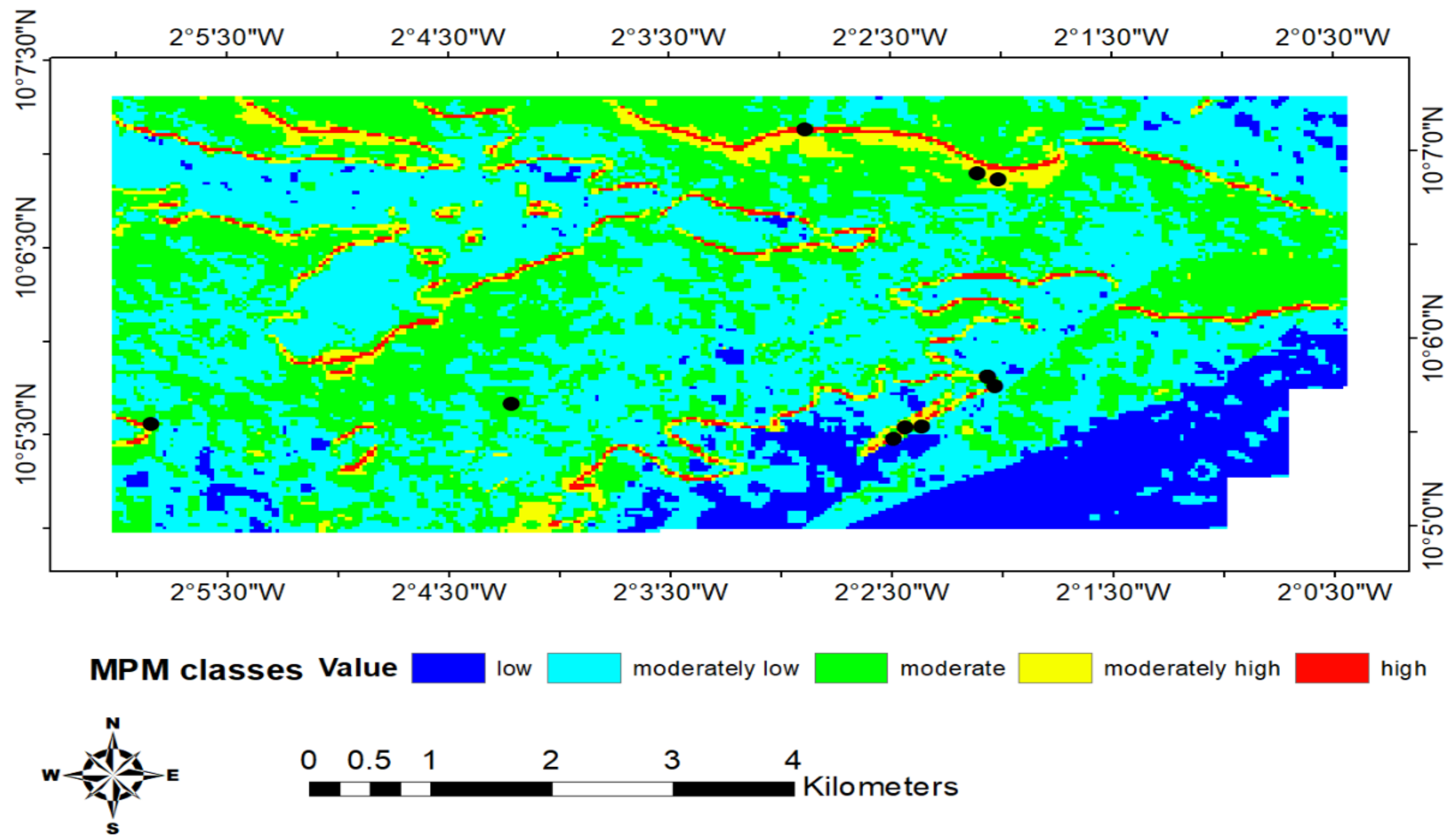


Fig. 2 :Final Mineral Prospectivity Map. 10 known gold occurrences fall within moderate–high prospectivity zones.

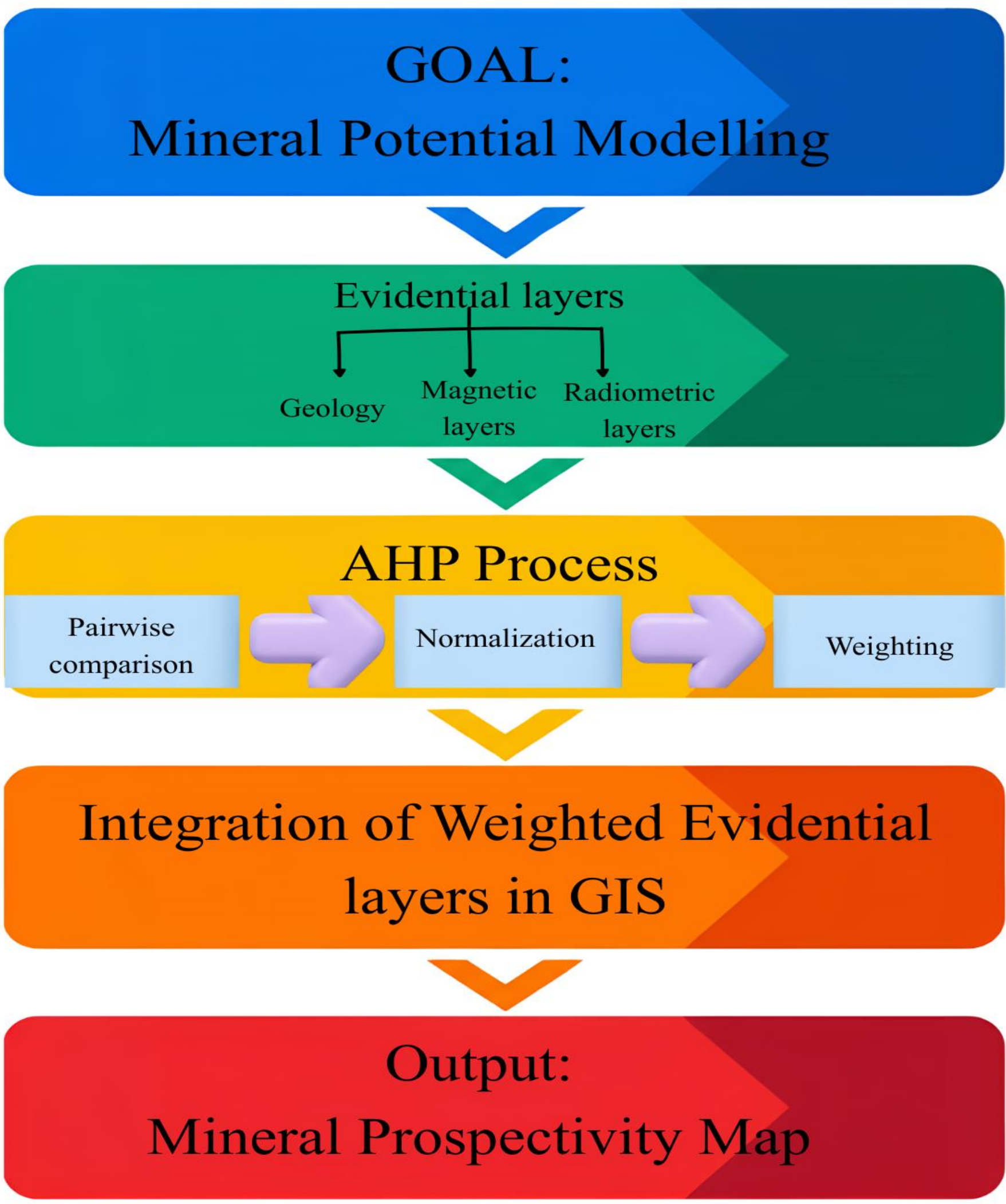


Fig 3: AHP Framework Diagram.

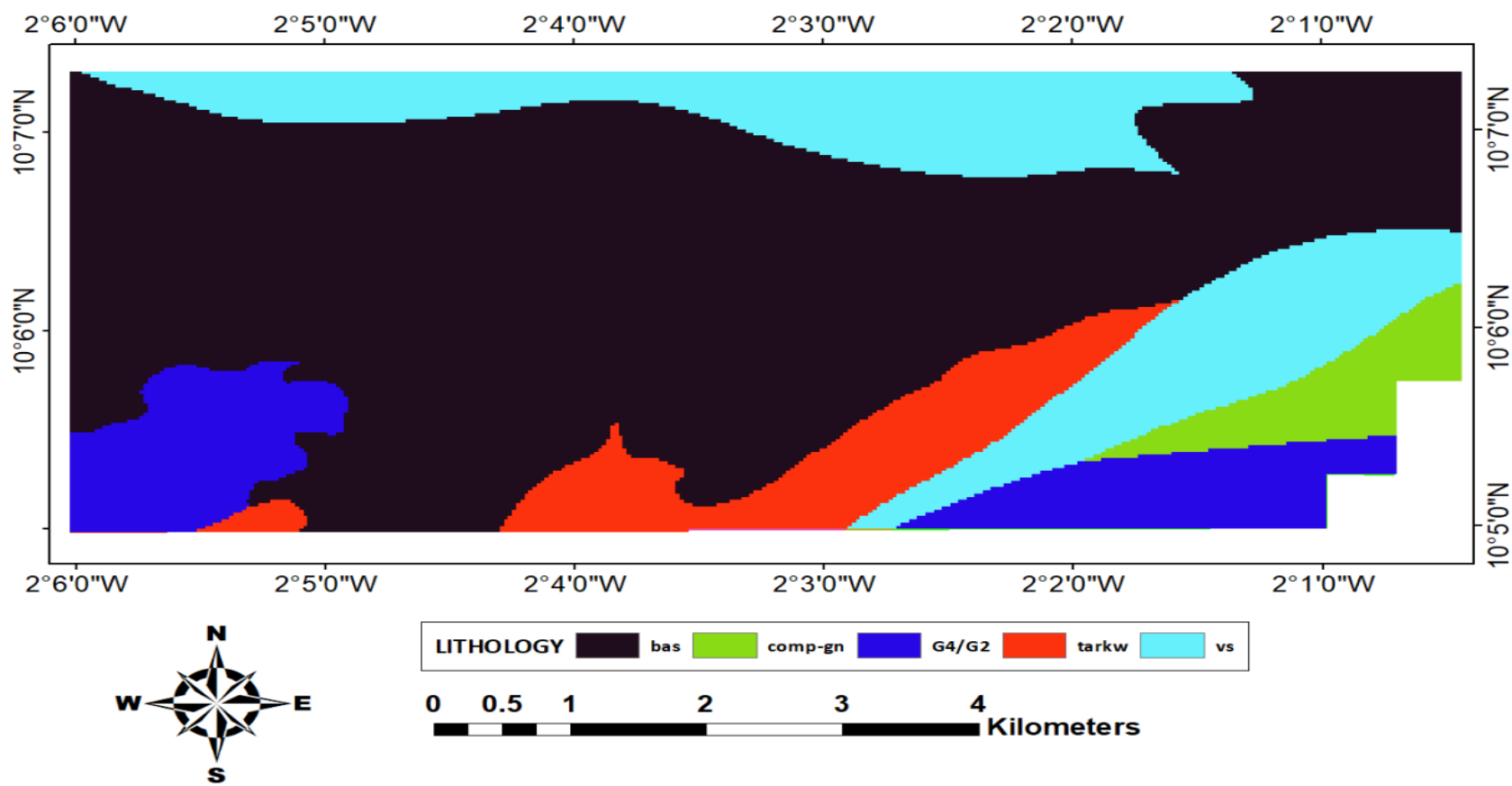


Fig 4: Geological map of Collette Area.

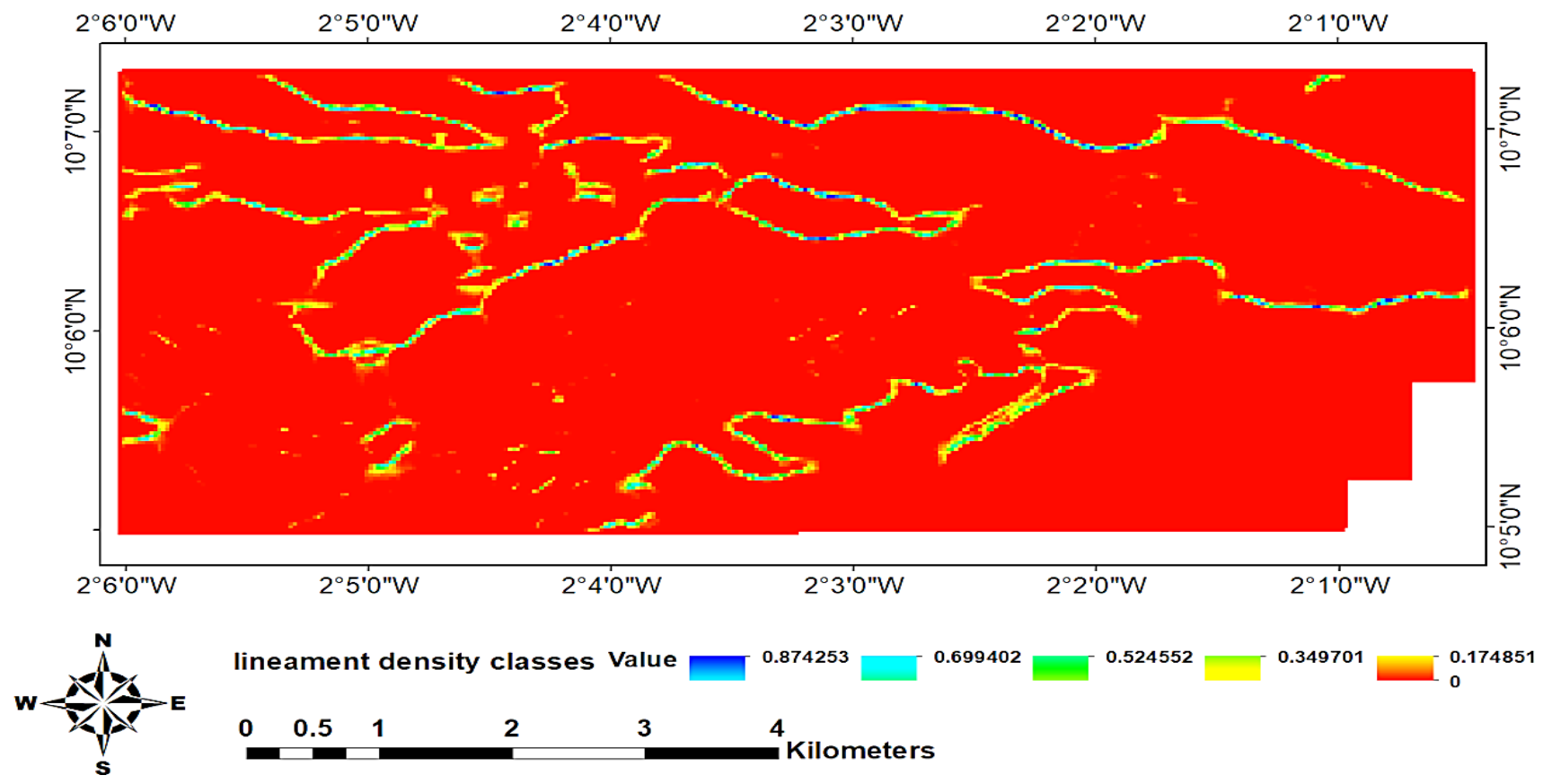


Fig 5: Lineament Density map of Collette Area.

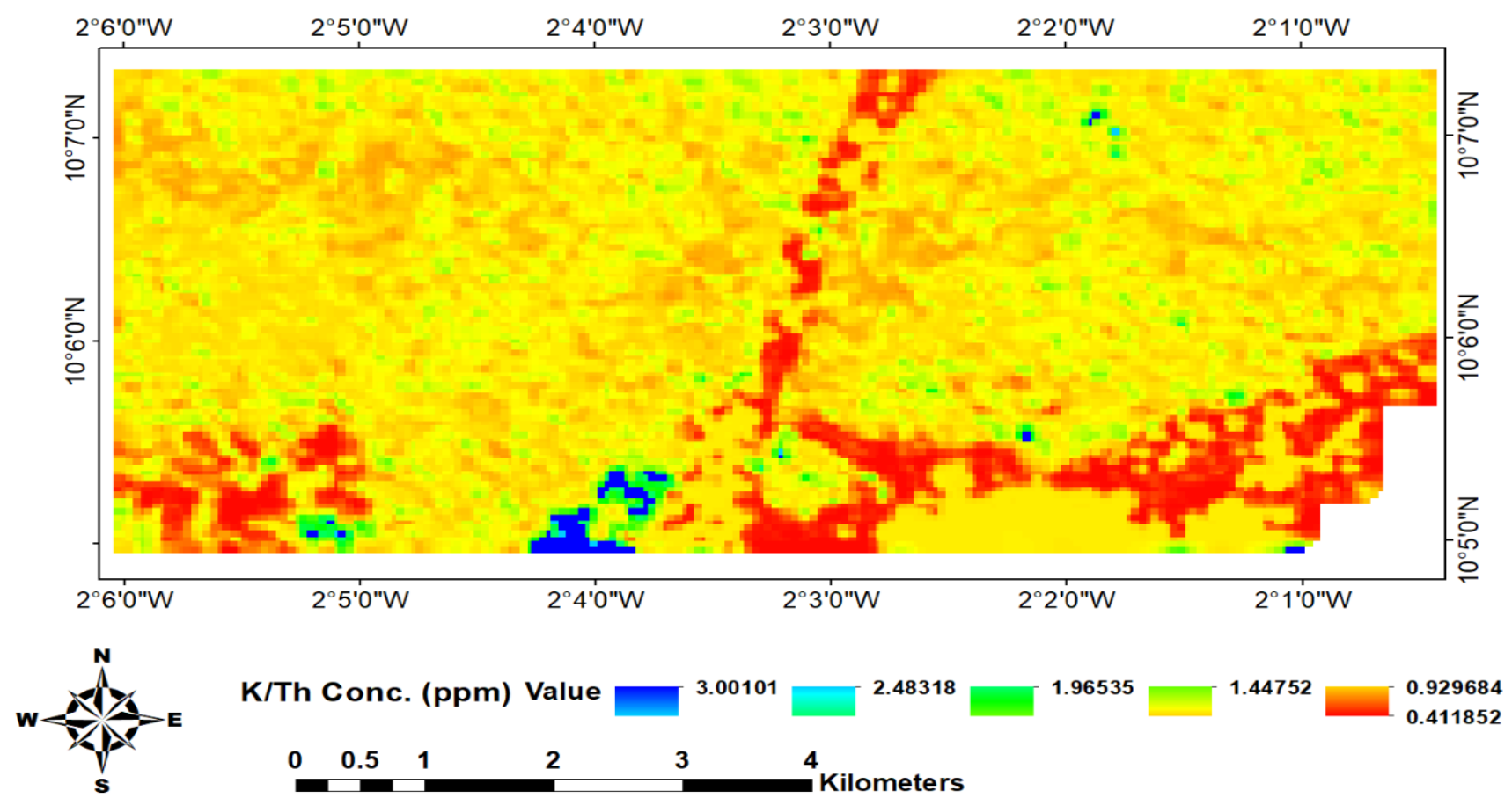


Fig 6: K/Th evidential layer for the Collette Area.

Results

High to moderate prospectivity zones align with structural trends and lithological contacts. The model successfully highlights favourable exploration targets.

Conclusion

The AHP-based approach effectively integrates multiple datasets to produce a reliable mineral potential map. The results can guide exploration and target prioritization in the Collette area.

Reference

Forson, E. D., & Amponsah, P. O. (2023b). Prediction of gold mineralization zones using spatial techniques and geophysical data: A case study of the Josephine prospecting licence, NW Ghana. *Heliyon*, 9(11).

