GIS as a Tool For Mineral Exploration

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SGL 413: PROJECT IN GEOLOGY

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OUTLINE

- Introduction
- How GIS Works
- Case Study
- Conclusion and Discussion
- Recommendations
INTRODUCTION

- Kenya has a rich reserve of various minerals and natural resources.
- Only a small amount of minerals have been discovered in selected parts of Kenya. There is a need to further explore our rich country in order to maximise on its potential.
- Mineral exploration is the best way of discovering minerals on earth and as such it’s very crucial to make it as quick and efficient as possible.
- Among the ways of doing this is use Geographical Information Systems (GIS) to assist in interpretation and manipulation of various multi-disciplinary geoscientific data and information that is available to a geologist.
**Intro: Objectives**

- To create awareness on GIS and its importance in mineral exploration in Kenya.
- To find out how GIS has been used in various parts of the world and correlate it to Kenya.
**Intro: What is GIS**

- GIS is a system that integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.
WHY IS A GIS NEEDED IN KENYA

- Geospatial data are poorly maintained
- Maps and statistics are out of date
- Data and information are inaccurate
- Geographic data are inconsistent
- There is no data sharing
- There is no data retrieval service
INTRO: REQUIREMENT FOR GIS

- Software eg. ArcGIS Desktop 10
- Hardware – Computer,
- People – User
- Data – raster / vector data
Intro: Benefits of a GIS

- Cheap and efficient
- Better decision making
- Improved communication
- Better geographic information recordkeeping
CASE STUDY

- GIS was used to classify geological units in S.E Rajasthan to discriminate the lithology and structures found and delineate the associated zones for mineral exploration
- Study done by Suneel K Joshi and R. Annadurai
The study area extends between – Latitude - 24°40’ - 25° 37’ N and Longitude - 74° 50’ - 75° 40’ E. The covering area is 7549.45 km².
CASE STUDY : MATERIALS

- **Spatial Data and Non-spatial data:** Topographic sheet (scale 1:50,000 and 1:2,50,000) and remote sensing data – IRS LISS III, SRTM data, thematic mapper (TM), enhanced thematic mapper (ETM+), geological maps and district resources maps

- **Software:** ArcGIS 9.2, ERDAS IMAGINE, ILWIS, AutoCAD Map.
CASE STUDY: METHODOLOGY

- Mosaicking was the first step for Landsat ETM+ data and topographical data. The mosaic image was subset the area of interest by using vector AOI that was created on the map of S-E Rajasthan.

- Geological, geomorphological, lineament, ferrous mineral, iron oxide, clay minerals and mineral composition map or thematic layers were prepared. Then, weightages map of all layers for overlay analysis were prepared.
CASE STUDY: RESULTS AND DISCUSSION
CASE STUDY: RESULTS AND DISCUSSION (CONT’D)
CASE STUDY: RESULTS AND DISCUSSION (CONT’D)

[Maps showing clay minerals and ferrous minerals with legends indicating poor, moderate, and good conditions]
CASE STUDY: RESULTS AND DISCUSSION (CONT’D)
The overall results indicated that a considerable amount of area has moderate iron oxide but poor ferrous and clay mineral contents.

- Mineral occurrences controlled by faults (Jahazpur Thrust and Great Boundary Thrust)

The techniques employed in the present study may be extended to prepare the mineral potential map in other potential areas for mineral exploration programme.
DISCUSSION

- Various geo data sets can be fed into a GIS to create a potential map and this will help in decision making.
- Various geological data exists in Kenya but the problem is access to this data and approaches to integrate the available data.
- If Kenya embraced the right technology, exploration productivity and prospecting capabilities would be greatly improved.
CONCLUSION

- GIS is an information system to input retrieve process analyse and visualize geographically referenced data or geospatial data in order to support decision making for planning and management.
- It has various components: software, hardware, people and data.
- It works by capturing data from various sources and feeding them into the GIS to a recognizable and format so that they can be manipulated to display different information.
RECOMMENDATION

- Kenya mining companies should begin to find ways of integrating GIS into all its mineral exploration programs for a better success rate and at reduced cost.
- GIS should be encouraged and taught in earth related courses in Kenya especially in mineral exploration.
RECOMMENDATIONS
THANK YOU FOR YOUR ATTENTION