GMDC – DISCOVERY TO DELIVERY THROUGH INNOVATIVE TECHNOLOGY

D.U. VYAS
GM (Geo. & Tech.)

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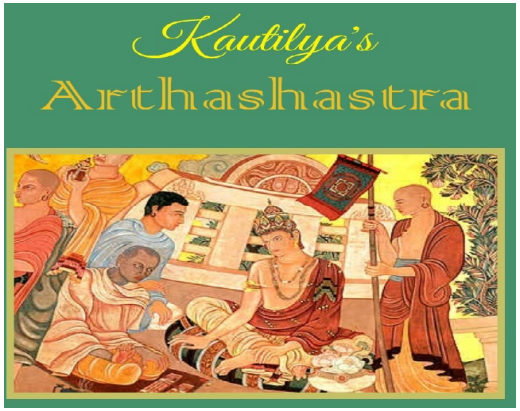
‘Profit earned from mine should again be reinvested
in the mine to earn further profit.’
- Kautilya’s Arthashastra (2:28, 12:3, p.169)



आचार्यात् पादमादते पादं शिष्यः स्वमेधया ।
पादं सब्रह्मचारिभ्यः पादं कालक्रमेण च ॥

A student learns a quarter from teacher, a quarter from own intelligence, a quarter from fellow students, and the rest in course of time..

PREAMBLE :

Minerals

- Valuable natural resources and finite and non-renewable
- Vital basic material for any industry

Indian Mining

- Mining activities dates 6000 years back
- with the adoption of conventional technology mineral hunt was flourished
- With the advent of newer investigation, technologies, a thorough and detailed mineral research pursuit and as a result of many new resources are added in the list
- However, adoption of newer modern technologies for this noble resources warrants dynamic approach and efforts to still pursuit mineral investigation to properly assess the resources includes onshore and offshore both which would help in the promotion of site specific modern mineral based industries in the country.

GEOSPATIAL TECHNOLOGY IN EXPLORATION & MINING

Pre-mining Stage:
Topographical Survey
Mineral Exploration
Land use/cover Pattern
Potential Ground Water studies

Syn-mining Stage :
Excavation Measurement
Operator Independent Mine Management System

Post-mining Stage :
Land reclamation and mine closure monitoring
Erosion and siltation assessment from mining areas


Mineral Concessi on
Conservation of minerals
Sustainable utilization + economic growth
Import substitution, value addition and export
Improvement in the life of associated people
Development of mineral- short, medium and long-term demand and supply
Development of mineral-mineral specific strategy
Elements Of National Mineral Policy
National Mineral Policy - 2008

Gujarat State Mineral Policy-2003

- Mineral is finite and non-renewable natural resources.
- Rational approach for the development of mineral resources is required.
- So, for beneficial utilization of mineral resources in accordance with environment protection, mines safety and mineral conservation. Optimum utilization of mineral, minimum waste and maximum mineral revenue generation through value addition are important aspects considered in the policy
- **Govt. has declared its Mineral Policy – 2003 with main objects like .**
  - To build a global competitiveness in all aspects
  - to infuse transparency at all levels of operation
  - To enhance efficiency by adopting e-governance

Exploration

Mining

Beneficiation

Solar Energy

250 MW Power Plant

150 MW Wind Energy

GMDC – CARING FOR EXPLORATION DISCOVERY TO DELIVERY

- The growing global energy need, rapid infrastructure development and environmental concerns have renewed the focus on better utilization and responsible exploration of natural resources.

- GMDC is in line of better utilizing the resources of Gujarat through innovative technology, exploration and establishing reserves for mining and value addition of mineral resources to the industry. This has led to an increase adoption of advanced tool and technologies

Exploration

Evaluation

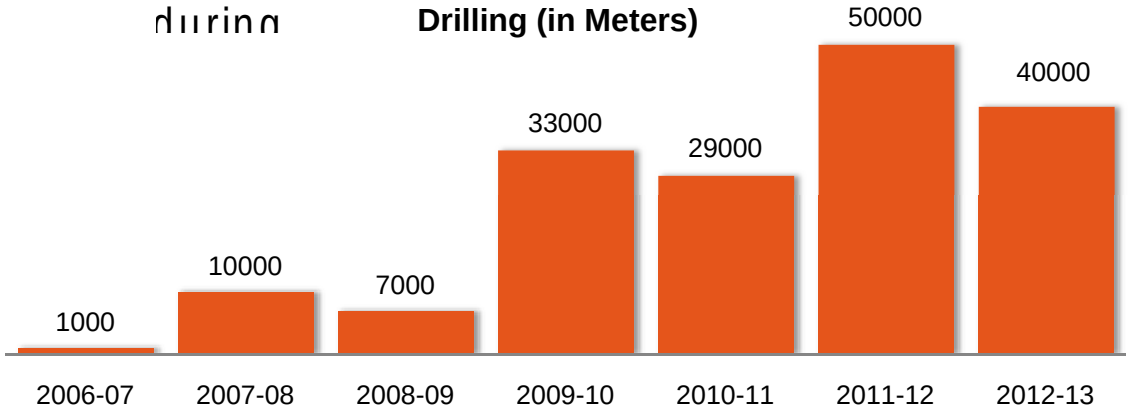
Mining

CARING FOR EXPLORATION

GMDC EXPLORATION

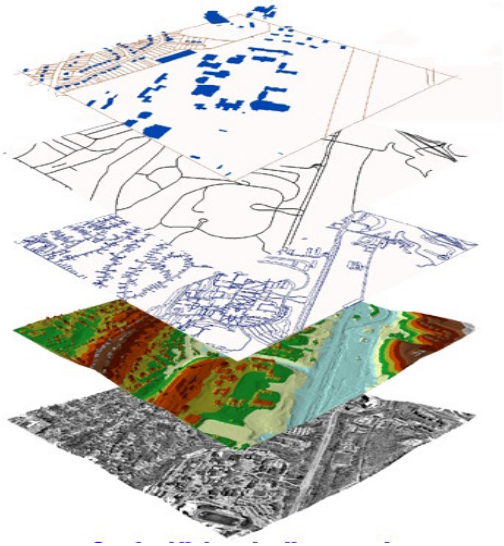
BROWN FIELD EXPLORATION	• WITHIN MLS • NEAR LEASEHOLD AREA
GREEN FIELD EXPLORATION	• NEW AREAS • OLD WORKING AREAS

- Two pronged approach for conventional mineral exploration .
- Brown field exploration i.e. in mine , near mine and area where mineral endowment is there.
- Our rates are competitive
- Planning for 15 crores for mineral exploration during



- Green field exploration in unexplored and incompleted area . GMDC is planning for the same in bauxite, lignite etc. .

INTRODUCTION - RS AND GIS TECHNOLOGY



Geographical Information Systems (GIS) are a new and blossoming concept, and continue to grow in complexity and utility thanks in large part to the proceeding and continual development of Remote Sensing. Remote Sensing plays a large role in the enhancement of any GIS, and in most cases, allows data to become much more relatable and useful for anyone. A GIS receives much of the data for its built-in layers from Remote Sensing platforms such as satellites, radars and airplanes. Passive sensors contribute to imagery and data for land cover mapping, change detection, snow monitoring, thermal changes and terrain modeling. Active sensors contribute heavily to data for extremely accurate terrain models known as Digital Elevation Models (DEMs). These large quantities of data can be geo-referenced and integrated into one large GIS, allowing a user to access a powerful amount of information at one time with relative ease. And as remote sensing technology continues to increase in resolution and power, the data base will enlarge and increase the potential power of users of a Geographic Information System.

USE OF RS AND GIS TECHNOLOGY IN MINERAL RESOURCES IDENTIFICATION IN GMDC

- Mineral Investigation Project start with regional level studies to help identify and prioritize target area for undertaking detailed exploration, survey and drilling. Such studies are an essential pre-requisite to develop detailed exploration plan for cost optimization and reduction of business risk which includes ;

  - Field and satellite based geological and structural mapping, land use and land cover mapping
  - Hyper spectral and aerial hyper spectral data analysis
  - Identification of mineral prospecting zone
  - Field checks and Resource estimation

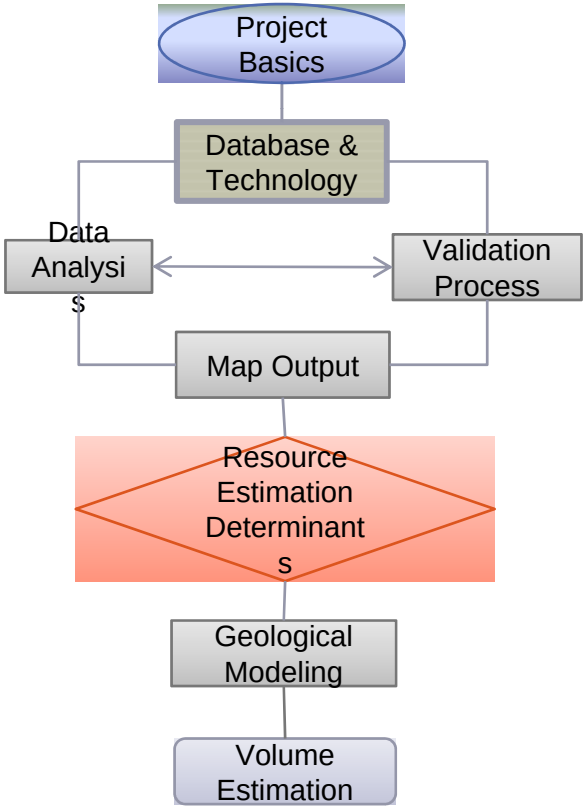
✍SUCCESS STORIES

- **Manganese resource estimations**
  - Shivrajpur, Dist. Panchmahal, Gujarat State
  - Pani, Dist. Baroda, Gujarat State
  - Salapada, Dist. Dahod, Gujarat State

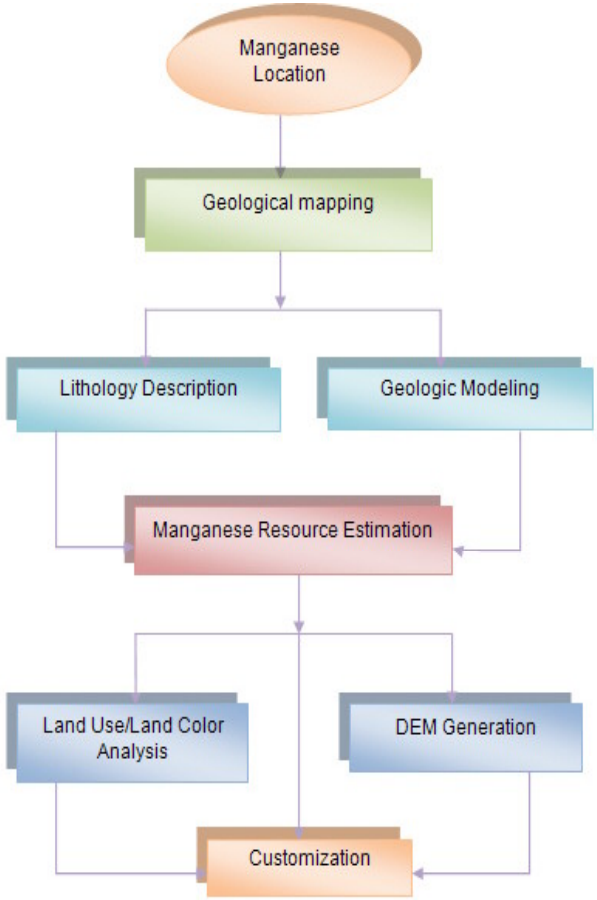
- **Bauxite resource estimations**
  - Kalyanpur Tal. of Dwarka Dist., Gujarat State
  - Part of Khambhaliya Tal. Of Jamnagar Dist., Gujarat State

Manganese Resource Estimations

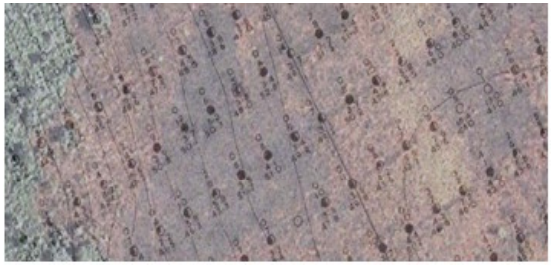
Project Approach



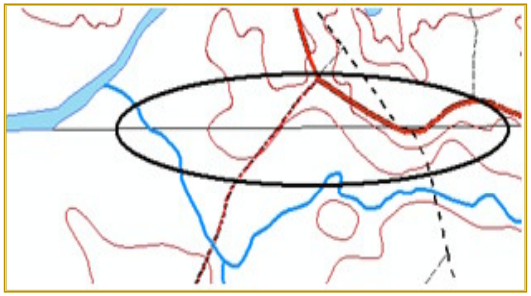
Analytical framework



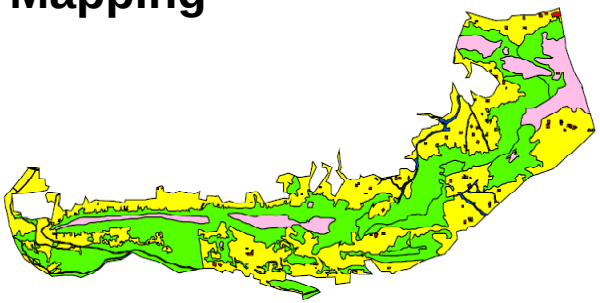
Geo-referencing



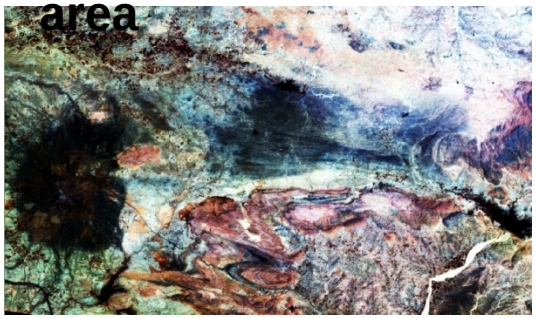
Mosaicking



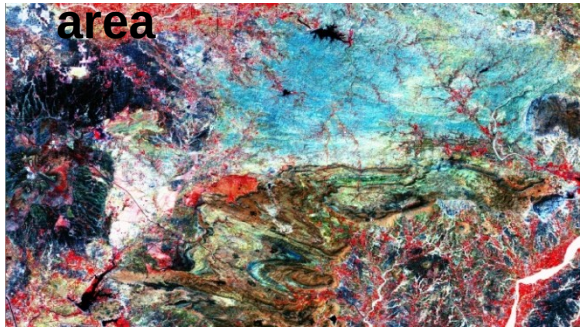
Land Use/ Land Cover Mapping



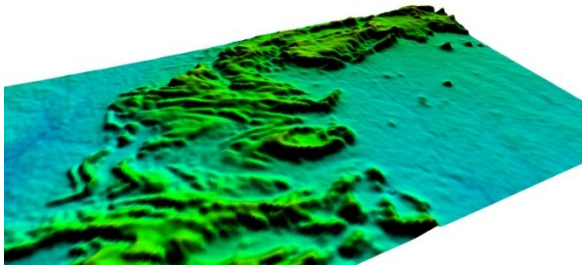
SWIR Aster satellite data of Shivrajpur, Pani and Bhabhar / Jari area



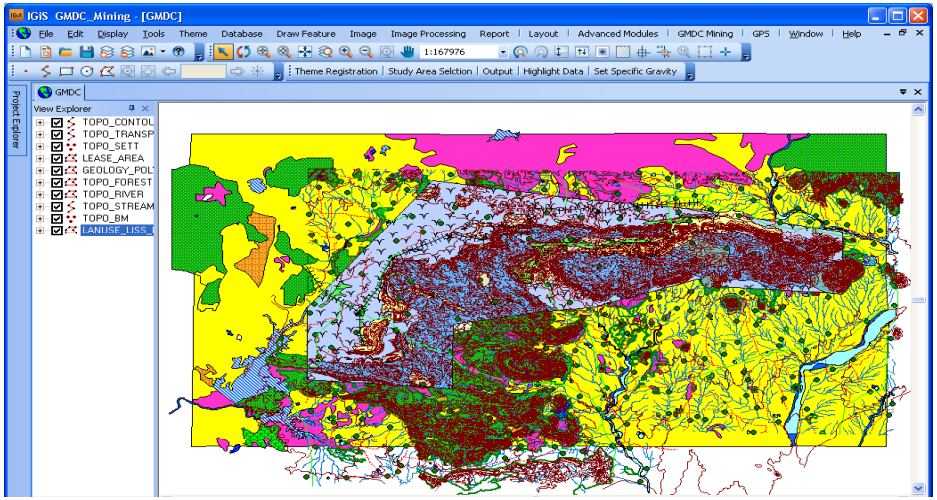
VNIR Aster satellite data of Shivrajpur, Pani and Bhabhar / Jari area



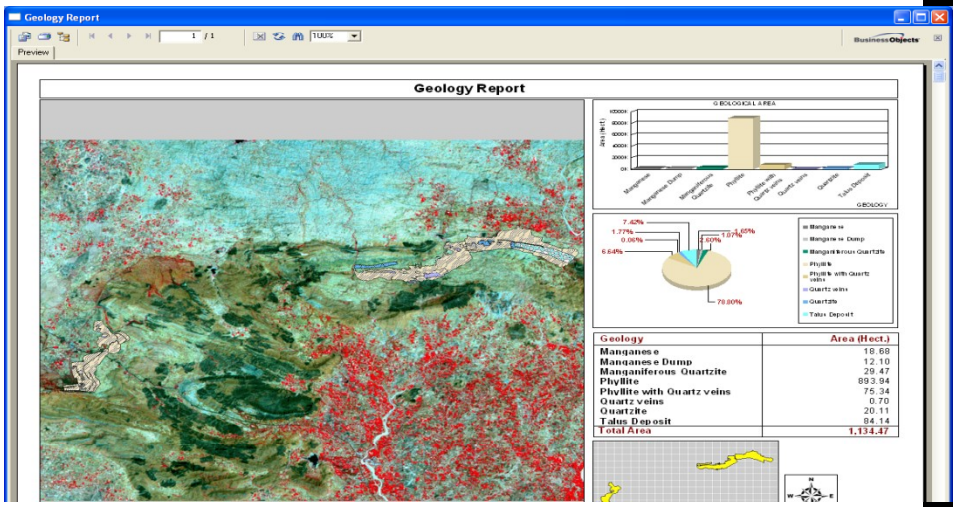
Digital Elevation Model`



Output of Study Area Selection Process

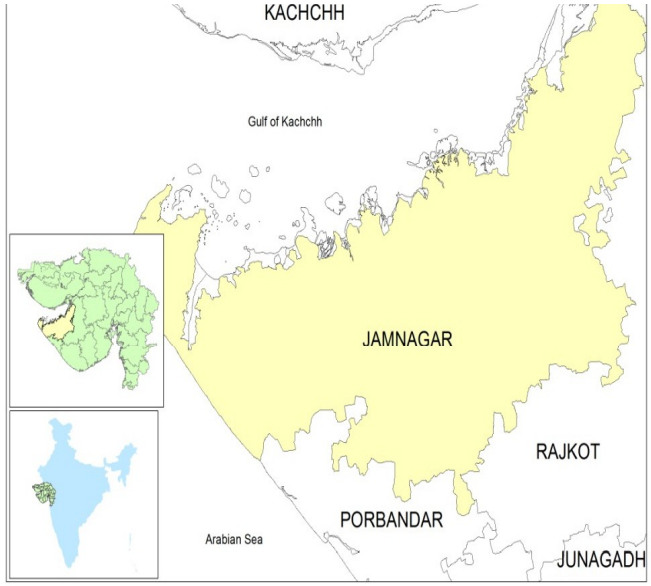


Report showing total geological area



The study of manganese resource estimation by identifying rock type containing manganese ore using deep and strike measurements leading to volume estimation. Thus, it was established an estimated resource of 4.4 million tonnes of manganese over Shivrajpur – Pani – Bhabhar – Zari areas of Baroda and Panchmahal districts of Gujarat. Further, the same technology was also applied to manganese bearing areas of Dahod dist. of Gujarat which has identified few thin veinlets of manganese bearing rock.

Bauxite resource estimations



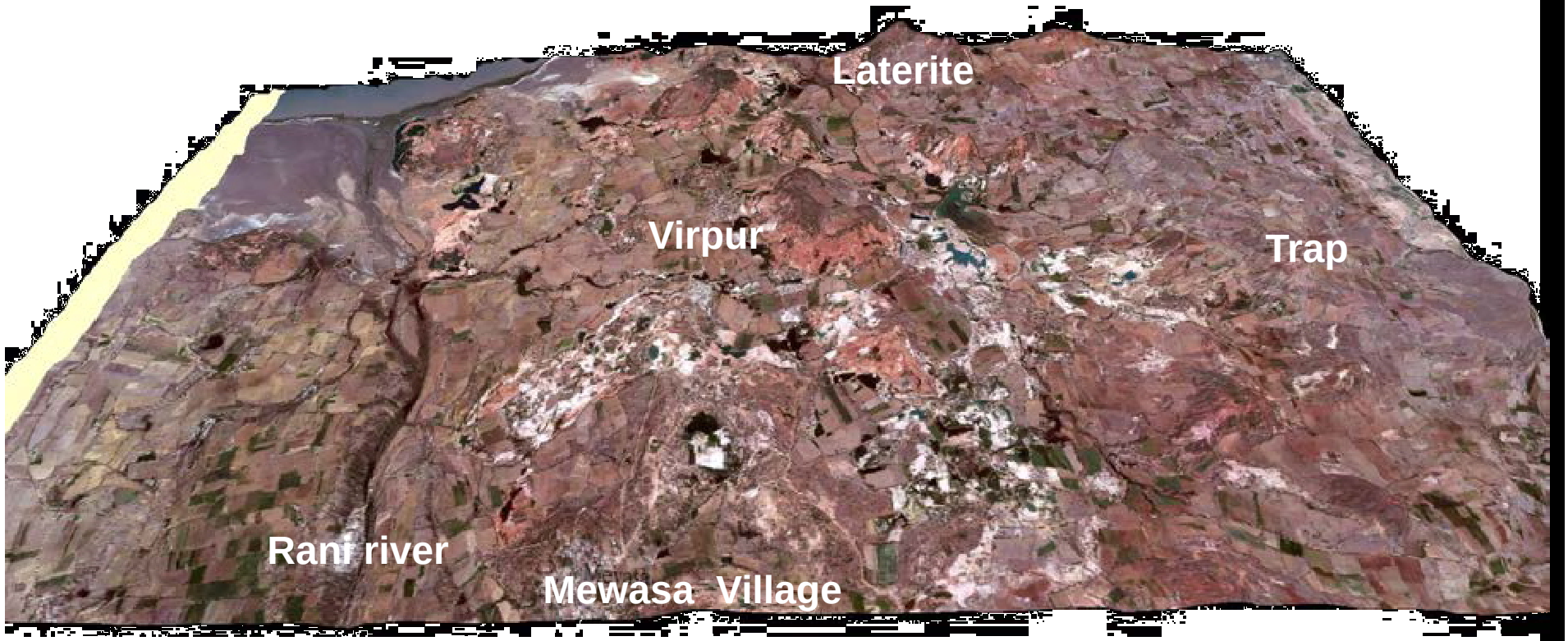
Geographic Information System

Arc GIS software of ESRI was used for GIS work. Georeferencing of Satellite data, digitization of landuse/landcover, cadastral boundaries, geological units has been carried out using Arc GIS.

Map layouts were generated using the GIS software on desired scale.

- Satellite Image Map ,
- Base Map (Road, Rail, Village location)
- Cadastrial Map
- Elevation Map (DEM and contour map)
- Drainage Map
- Landuse/Landcover Map
- Geology Map
- Borehole location and Reserve
- Calculation

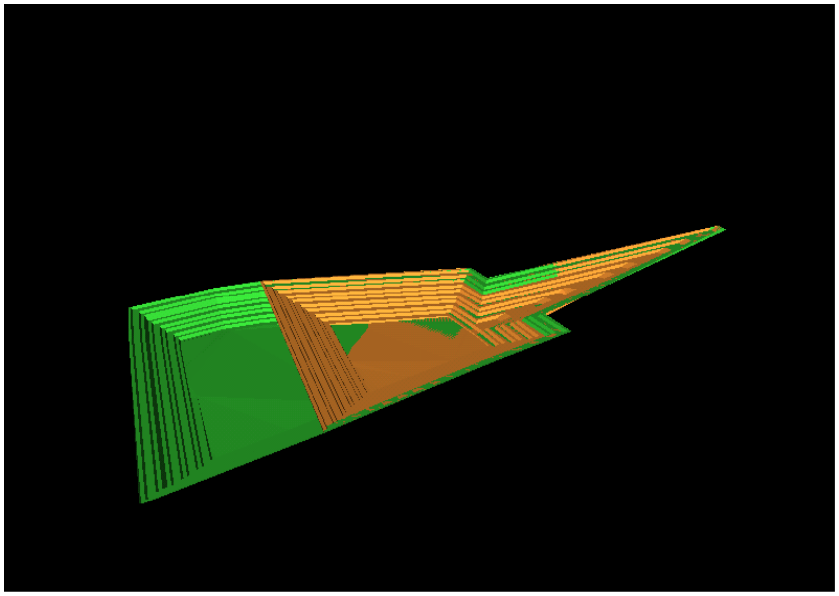
3Dimensional view of Satellite Image overlay on Digital Elevation Model. (North on top) in Kalyanpur taluka of Jamngar / Dwarka districts.



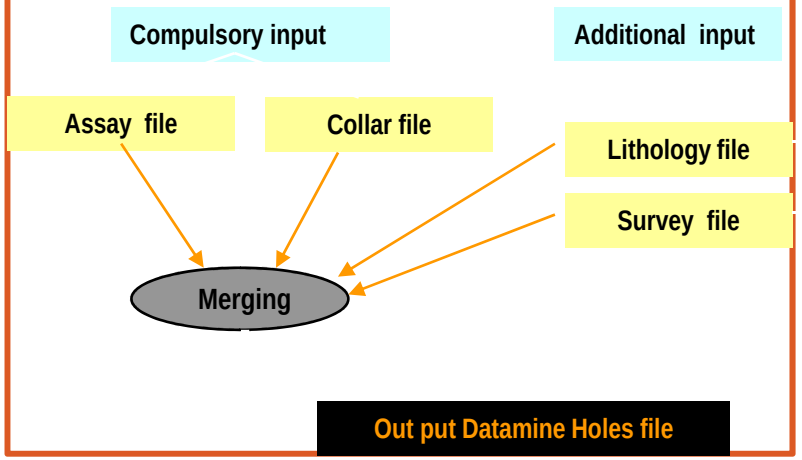
Total Reserves of all grade Bauxite is about 28.49 Million Tonnes and that of Limestone is 0.1 Million Tonnes covering an area of about 70 sq. Km. of bauxite bearing area of Jamnagar / Dwarka districts.

3-D modeling of ore deposits through Datamine software

- DATA INPUT
- DATA VALIDATION
- IMPORT OF DATA INTO DATAMINE
- MERGING OF FILES (HOLES 3D PROCESS)
- CORRELATION OF MINERALISED ZONE
- BLOCK MODELLING
- VOLUME & RESERVES CACLULATION
- ESTIMATION OF GRADE
- MINE PIT DESIGING
- OUT PUT OF PLANS & SECTIONS



- HOLES 3D PROCESS [Merging process]



Conclusion :

SIGNIFICANT SUCCESS IN GMDCS BROWN FIELD EXPLORATIONS

GMDC IS ALSO EMPHASISED UPON NEW INNOVATIVE TECHNOLOGY IN GREENFIELD EXPLORATION

The newer and modern investigation technologies has proved as blessings to the mineral investigators, mine owners and mineral based industries which will have a vital role in the development of the country.

LET US UTILISE THE EARTH PERFECTLY

Thanks..