DIGITAL TRANSFORMATION ENABLING SUSTAINABLE DEVELOPMENT MANDATES

Digital Transformation of Mining Industry - Driving Energy Transition and Sustainable Resource Development (Adoption of Geospatial Technology and Earth Observation)

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BGI Background

Where is Botswana?

Institutional Background

BGI – In the Structure of Government Ministry

BGI Mandate

BGI Strategic Focus

BGI Areas of Impact

How BGI Enhances Prospectivity

Data Coverage Showing Improvements of Prospectivity in Botswana

Technology Towards Advancing Prospectivity

Pre-competitive Data on Mineral Prospects

Latest updates (2022) of National Geological Interpretations and Updates

Industrial Minerals

Data Access Platforms

Digital Transformation Using Geospatial Technology and Earth

Observation

Conclusions
• Botswana is located in the Southern part of Africa.
• Is part of SADC (Southern African Development Community).
Botswana Geoscience Institute (BGI) is a public corporation constituted under the Botswana Geoscience Institute Act, 2014

- Wholly owned by the Government of Botswana. (Parastatal.)
- Resulted from GoB decision to restructure Department of Geological Survey (DGS).
- GoB realised the need to improve efficiencies in carrying out geoscience research.
- Ensure best practices in geoscience research.
- Geological Survey was formed in 1948 while survey practice in Botswana began in 1943.
- It later focused on exploration for various minerals in Botswana.
MAIN ROLE OF BGI

- Undertake research in field of geosciences and provide specialized geoscientific services
- Promote search for and exploration of any mineral in Botswana
- Custodian of geoscience information
- Advisory body in geosciences and geohazards
**BGI MANDATE**

- Geoscience Research
- Geological Mapping

- Mineral Resource Assessments / Exploration

- Geoscience policy advice

- Key Operational Services - Laboratory Services

- Geohazards monitoring
- Seismicity monitoring & Assessment
- Geotechnical assessments

- Geoscience data and information management (Critical geoscience datasets)

- Key Operational Services - Drilling Services
Vision
To be a Renowned Geoscience Centre.

Mission
We create economic value through advancing, promoting and disseminating geoscientific knowledge for the benefit of Botswana and our global partners.

Values
• We are reliable custodians of Geoscience information.
• We are innovative in creating and promoting market-oriented products and services.
• We are professional in all or interactions.
• We act with integrity, transparency and accountability.
• Kgetsi ya tsie e kgonwa ke go tshwaraganelwa. We stand together.
Botswana Geoscience Institute

**BGI AREAS OF IMPACT**

**Making Botswana a preferred destination for mineral exploration**
- Geological and mineral occurrence grassroots investigations
- Geological mapping
- Data Analysis based on availability and accessibility of geoscience information
- Advise prospects/investors and Government on mineral potential or even up to bankable feasibility if possible

**Safer communities and livelihoods**
- Geotechnical investigations
- Seismological monitoring
- Assessment of geohazards on critical infrastructure
- Natural hazards mapping and modelling

**To Have an informed Nation**
- Promote public understanding of geoscience
- Demonstrate the importance of geoscience to resource and environmental issues
- Provision of information on natural capital accounting: for development
Enhancing Prospectivity in Botswana

- Technology
- Innovation
- Improving Pre-competition Data
  - Geophysics
  - Geochemistry
  - Geology
  - Mineral Occurrences
  - Reports and Maps
  - Core Sheds
  - Exploration Reports
- Governance and Polices

www.bgi.org.bw
Data Coverage Showing Improvement of Prospectivity in Botswana

- The government of Botswana’s continue to invest in mineral exploration in country,
- Provision for enabling policies and the environment
- Enhanced prospectivity through technology advancement, availing baseline data online
- Streamlined processes (prospecting application, baseline data, instruments)
- By 2022, Botswana has invested in production of:
  - 1: 500 000 geological and mineral potential maps
  - 1: 1 000 000 Geological Map 1997
  - 1: 1 000 000 Geological Map 2022
Notes:

- Thirty-five (35) priority areas for mineral prospecting - total surface area approx. 40,622 km²
- Twelve (12) high potential - known mines and deposits, and extensions that are highly prospective, - total surface area of 10,817 km²
- Twenty-three (23) medium potential occurrences and metal based deposits - total surface area of 29,805 km²
- Tabulation of resource estimates, where available, to provide the framework/basis for determining the mineral prospects
- Improved understanding of Geology and Hydrogeology
Geophysical Data – Magnetics:
• Compilation of 35 airborne magnetic surveys

Technology Towards Prospectivity in Botswana

Technology (Example):
• Using geoscientific data such (Gravity and Magnetic data) to conduct statistical methods.
• The use 3D Magnetic inversion to show the geological interpretation underground.
• The use Geosoft to show magnetic vector distribution.
• Through Cluster analysis zones the area to indicate geology and possible prospectivity within the zones.
• The data can still be used for further analysis, project still ongoing.

Ground gravity data coverage
“Approximately 25% of Botswana land area... is where all of the current mines in Botswana have been discovered. The unexposed 75%, covered by sands, are potential untapped mineral prospects that can drive mineral investment.”

— His Excellency the President of the Republic of Botswana

Dr. Mokgwetse E.K. Maile at the African Mining Indaba Conference of 2022, Cape Town.
1.3% CU
3% Pb – Zn
3.5 g/t Ag

Stratabound Cu – Ag Koemacau,

Cu, Ni and A (Phoenix/Selkirk and Mupane Mines)

Ni/Cu (BCL)

(PGM) Molopo Farms Complex (Bushveld Igneous Complex Analogue)
Pre-competition Data – Geological Mapping Coverage

Notes:
- Botswana widely covered in geological mapping
- Data as far back as 1950s during Departmental of Geological Survey establishment

- 106 760km² Airborne Electromagnetics (20% of Botswana Covered with Airborne Electromagnetic Surveys)
- 25% High Resolution (250 line spacing) Coverage of Radiometric – Eastern Botswana
- 25 000 Gravity Stations
Major Pre-Karoo tectonic terranes and mafic complexes of Southern and Eastern Botswana

REE in Gaborone Granite Complex (Semarle synite)

(Strata Bound Manganese Deposits in Transvaal Group)
INDUSTRIAL MINERALS OF BOTSWANA
WITH OUTLINE GEOLOGY

INDUSTRIAL MINERALS
- Clay Quarry
- Aggregate Quarry
- Recommended Quarry Sites
- Aggregates Occurrence
- River Sand Quarry
- Gravel Barrow Pit
- Clay Occurrence

TOPOGRAPHIC LEGEND
- Major Towns/Villages
- Village
- Main road
- Rivers
- National boundary
- Districts

LITHOLOGICAL LEGEND
- Kalahari beds
- Karoo basalts
- Karoo sediments
- Damara Supergroup
- Ghanzi and Kgwebe Formation
- Kanye Volcanic Group
- Gaborone type granite
- "Schist belts"
- Gneisses and granites
Hydrogeological Map Update

Pre-Kalahari water quality

Kalahari aquifer productivity

www.bgi.org.bw
DATA ACCESS PLATFORMS
Geoscience Data and Information Portals

- **Geoscience Publications and Reports Portal**
  Geoscience Information and Collection Management
  The Botswana Geoscience Institute (BGI) Library holds collections of geoscience data that is accessible to staff and the public...

- **Botswana Geological Portal**
  Multidisciplinary Geoscience data and Information
  A platform that provides an intuitive web map interface for multidisciplinary geoscience data search, discovery, and access for internal and external stakeholders...

- **Exploration and Water Boreholes Portal (BOREHIVE)**
  Borehole Portal - Borehive
  As mandated by the Botswana Geoscience Institute Act, BGI exists to undertake research in the field of geosciences and provide specialised geoscientific services...

- **Mining Cadastre System (MCS)**
  Your gateway to all mining tenure services in Botswana
  Botswana’s Mining Cadastre Portal provides an electronic platform for all stakeholders in the mineral sector to engage directly with the Botswana Ministry of Mines and Energy (MMIE)...
This project was initiated as part of the Government Reset-agenda under Priority 3 which is Digitalization, focusing on combining the delivery of government priorities to place the country to compete at a global scale.

The goal was to improve development of Mines in the Country through provision of mineral occurrence data.

The mining sector is one of Botswana’s biggest export earners and a key focus for government production, while simultaneously delivering a positive economic impact for its citizens.

The government of Botswana committed National Development Plan (NDP 11) to facilitate digitalization in the country through implementation of the Mining Cadastre System.

Mining Cadastre was launched in October 2022.
Mineral Development for Growth

**Policy and Regime**
- Attractive Mining Regime
- Enabling Institutional Framework

**Improve Perception**

**Mining Cadastre**
- Increase confidence of International Investors
- Provide security of Tenure

**Integration of Sector**
Minerals in Botswana (especially those in demand):

- REE (rare earth minerals i.e. lithium)
- Metals: Copper, silver, nickel, graphite
- Coal
- Manganese
- Gold etc.

Why invest in mining?

- Mining time period can be from 25 years to 100 years operation of operation.
- Return on Investment (RoI) is highly possible.
- Minerals are in high demand

How to apply for prospecting and mining licenses?

- Have Company name in place to start the application process.
- Click on the link below:
  https://portal.miningcadastre.gov.bw/page/landing
- Access application process online”

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MINING CADASTER

- Mining Cadastre is accessible at: https://portal.miningcadastre.gov.bw/page/landing

NIGIS

- BGI Data within NIGIS is accessed from Geoscience Portal, (Geology, Geophysics, etc). Accessible at www.geos.bgi.org.bw
- Reports, publications at www.library.org.bw
- Borehole reports at www.borehive.org.bw
I. **LIBWIN portal**: provides geological collections and publications among others and aggregate data for research or business intelligence purposes repository for consultants, geoscientific, prospecting licenses and mineral resources reports, annotated bibliographies, bulletins, district memoirs, records of the geological survey, seismological series, multimedia, books, journals. Accessible at [www.library.bgi.org.bw](http://www.library.bgi.org.bw)

II. The **BoreHive portal** provides for search, discovery, and an interactive dynamic map display pinpointing location on data and information. The information covers water and exploration boreholes, critical information like borehole location, coordinates, depth, water strike, yield and relative borehole logs. Accessible at [www.bh.bgi.org.bw](http://www.bh.bgi.org.bw)
Each license can be viewed by the public showing:
the license number,
Who have been issued the license,
license expiry date etc
The system secures mineral rights, recording the geographical location, ownership and time validity of mining rights, assuring compliance with the payment of fees and/or other requirements to keep a concession valid.

Handles all the processes related to exploration and mining activities thereby enhancing efficiency and improve turnaround times.

BGI have provided platforms to store and allow data extraction. Geoscience portal, Landfolio are build on GIS platform to allow data mining of both vector and raster data.

Provides Mineral Rights Security
Mining Cadaster allows Data Mining of relinquished PL reports
Improves geoscience research

Improves retrieval of reports, maps etc
Allows quality checks and approval of data and information
Mobile Payment

- BGI will use USSD provision in creating e-Commerce platform.
- USSD allows users to use a smartphone or data/internet connection to use mobile banking through i.e *754# code

Online Payment

- Online Gateway will provide a shopping cart for purchases of BGI products and services, placed on BGI websites.

Customer dials *174#, and selects the menu to pay.

Customer selects the report and add items on the shopping cart and pays online.
Botswana richly endowed in economic minerals and an inherent value exists in the strategic mineral commodities;

Opportunity to attract technological excellence in mineral-related industries including mines, to support side-stream and downstream value addition.


Botswana as the destination for mining – Investment Attractiveness Index and Policy Perception Index rated approximately 70% (Fraser Ranking, 2021);

BGI is focusing on enhancing, promoting, diversifying to improve Botswana’s Mineral prospectivity and beneficiation drive;

Inherent exhaustibility of mineral resources makes their benefit timeline finite and requires planning in advance for resource decline and exhaustion = Integrated Mineral Resource Development Plan; and

We are using Geospatial technology and Earth Observations to enable a shared approach on how Mineral Resource Development can contribute to broad–based development.
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