THE CHALLENGE OF RESOURCING FUTURE GENERATIONS
AN AFRICAN PERSPECTIVE

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Outline

1. Minerals: blessing and curse
2. African Mining Vision
3. Current initiatives to build capacity
4. Challenges and opportunities
Production & known resources
(2004 Figures; Vast areas remain un-explored)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Production</th>
<th>Rank</th>
<th>Reserves</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGMs*</td>
<td>54%</td>
<td>1</td>
<td>60+%</td>
<td>1</td>
</tr>
<tr>
<td>Phosphate</td>
<td>27%</td>
<td>1</td>
<td>66%</td>
<td>1</td>
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<tr>
<td>Gold</td>
<td>20%</td>
<td>1</td>
<td>42%</td>
<td>1</td>
</tr>
<tr>
<td>Chromium</td>
<td>40%</td>
<td>1</td>
<td>44%</td>
<td>1</td>
</tr>
<tr>
<td>Manganese</td>
<td>28%</td>
<td>2</td>
<td>82%</td>
<td>1</td>
</tr>
<tr>
<td>Vanadium</td>
<td>51%</td>
<td>1</td>
<td>95%</td>
<td>1</td>
</tr>
<tr>
<td>Cobalt</td>
<td>18%</td>
<td>1</td>
<td>55+%</td>
<td>1</td>
</tr>
<tr>
<td>Diamonds</td>
<td>78%</td>
<td>1</td>
<td>88%</td>
<td>1</td>
</tr>
<tr>
<td>Aluminium</td>
<td>4%</td>
<td>7</td>
<td>45%</td>
<td>1</td>
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</tbody>
</table>

Also Ti (20%), U (20%), Fe (17%), Cu (13%), etc.

*PGMs: Platinum Group Minerals
Production & known reserves

Most oil and gas reserves concentrated in North Africa and Nigeria

Note: Size of circle indicates relative size of proved reserves, end of 2005

Source: BP Statistical Review of World Energy 2006
Minerals: blessing & curse

http://places.designobserver.com/slideshow.html?view=1618&entry=25008&slide=1
Minerals: blessing & curse

Minerals: blessings and curses
Water: the basis of life

http://www.lynseyaddario.com/#/horn-of-africa-drought/HORNOFAFRICADROUGHT004
Minerals: blessing & curse
Minerals: blessing & curse
Minerals: blessing & curse

RESOURCE EXPORTS
(Average 2005 – 2010)*

RESOURCE REVENUE
(Average 2005 – 2010)

- Oil exporters: Countries where net oil exports make up 30% or more of total exports

*Data for Côte d’Ivoire and Senegal exclude re-exports of refined oil products
Minerals: blessing & curse

Figure 6: NUMBER OF CHILDREN UNDER 18 BY UNICEF REGION

Figure 7: WEALTH/WELLBEING GAP

WEALTH
GNI PER CAPITA RANK 2011
(2005 PPPs)
Equatorial Guinea
Rwanda
Gabon
South Africa
Angola
Nigeria
Cameroon
Ghana
Tanzania
Zambia
Mali
Chad
Guinea
Sierra Leone
Central African Republic
Niger
Zambia
DR Congo

WELLBEING
HDI RANK 2011
HDI RANK CHANGE 2006-2011
Ranking positions

HDI: Human Development Index
GNI: Gross National Income
Countries are ranked from 1-187 with 1 being the richest or highest
Figure 9: LEFT BEHIND IN HUMAN DEVELOPMENT

Social indicators in resource-rich countries are lower than expected

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<tbody>
<tr>
<td>EQ.GUINEA</td>
<td>51</td>
<td>118</td>
<td>2.40</td>
<td>136</td>
<td>US$21,715</td>
</tr>
<tr>
<td>POLAND</td>
<td>76*</td>
<td>6</td>
<td>5</td>
<td>39</td>
<td>US$17,776</td>
</tr>
<tr>
<td>GABON</td>
<td>63</td>
<td>66</td>
<td>2.30</td>
<td>106</td>
<td>US$12,521</td>
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<tr>
<td>THAILAND</td>
<td>74</td>
<td>12</td>
<td>0.48</td>
<td>103</td>
<td>US$7,722</td>
</tr>
<tr>
<td>ANGOLA</td>
<td>51</td>
<td>158</td>
<td>2.18</td>
<td>148</td>
<td>US$4,812</td>
</tr>
<tr>
<td>VIETNAM</td>
<td>75*</td>
<td>22</td>
<td>0.58</td>
<td>128</td>
<td>US$2,970</td>
</tr>
<tr>
<td>NIGERIA</td>
<td>52</td>
<td>630</td>
<td>2.24</td>
<td>156</td>
<td>US$2,102</td>
</tr>
<tr>
<td>BANGLADESH</td>
<td>69</td>
<td>240</td>
<td>2.40</td>
<td>146</td>
<td>US$1,785</td>
</tr>
</tbody>
</table>

Minerals: blessing & curse

Percentage of World’s Production

- Gold
  - Ghana, Tanzania, Mali, Guinea and Burkina Faso
- Bauxite
  - Guinea
- Cobalt
  - Democratic Republic of Congo
- Uranium
  - Namibia and Niger
- Industrial Diamonds
  - Democratic Republic of Congo
- Diamonds
  - Botswana
- Platinum
  - South Africa
- Chrome
  - South Africa
- Manganese
  - South Africa

Estimated Annual Export Revenues

- Nigeria
  - US$ 100 BN annual
- Angola
  - US$ 70 BN annual

Average Annual Revenue Potential from New Projects*

- US$ 1.6 BN
  - Iron Ore
  - Guinea
- US$ 850 ML
  - Oil
  - Ghana Jubilee Oil Fields
- US$ 1.7 BN
  - Iron Ore and Petroleum
  - Liberia
- US$ 3.5 BN
  - Gas, Gold and Nickel
  - Tanzania**
- US$ 3.5 BN
  - Gas and Coal
  - Mozambique

Per cent 2011 GDP

- 30.7%
- 2.3%
- 147.8%
- 15.0%
- 27.3%

Sources:
Raw Materials Data, Interdatabase, 2013
World Bank, Africa Digest, October 2012, Volume 8
World Bank, Africa Digest, May 2011, Volume 7
**Data represent annual revenue at peak production
** Estimates are intended to show order of magnitude. Revenue projections are highly sensitive to assumptions about prices, phasing of production, and underlying production and capital costs.

Slide 16
At the December 2011, 2nd AU Conference of Ministers Responsible for Mineral Responsible Development a concrete Action Plan was agreed. This provides the roadmap for implementing the Africa Mining Vision in the future. Under the Action Plan, the pillars of the Vision will be implemented through nine programme clusters.

The International Study Group Report on Africa’s Mineral Regimes: Minerals and Africa’s Development supports the Africa Mining Vision. Published to coincide with December’s meeting of mining ministers, it will help inform policy decisions for the future. It is a key reference for guiding the implementation of the AMV.
1. Introduction

2. Africa’s minerals: history and search for direction

3. Global trends

4. Mining in Africa: managing the impacts

5. Artisanal and small-scale mining in Africa

6. Corporate social responsibility initiatives

7. Capture, management and sharing of mineral revenue

8. Optimizing mineral-based linkages

9. International trade and investment

10. Mineral management: the power of institutions

11. Regional and sub-regional strategies in mineral policy harmonization

12. Looking ahead: key challenges and policy messages
Building a sustainable future for Africa’s extractive industry: From vision to action

ACTION PLAN FOR IMPLEMENTING THE AMV

December 2011
AMV Action Plan: tenets

- Optimizing the knowledge and benefits of finite mineral resources
- Harnessing the potential of small-scale mining
- Fostering environmentally and socially responsible mining
- Building human and institutional capacity
- Developing a globally competitive African mineral industry
- Fostering a transparent and accountable mineral sector in which resource rents promote broad economic and social development
- Promoting good governance in which there is equity in the distribution of benefits
AMV Action Plan: clusters

1. Mining revenues and mineral rents management
2. Geological and mining information systems
3. Building human and institutional capacities
4. Artisanal and small scale mining
5. Mineral sector governance
6. Research and development
7. Environmental and social issues
8. Linkages and diversification
9. Mobilising mining and infrastructure investment
African Minerals Development Centre

If well managed, Africa’s mineral endowments can lift the continent out of poverty and catapult it to growth, development and prosperity for all – this is the ultimate purpose of the African Mining Vision, adopted by the African Union Assembly of Heads of State and Government.

About AMDC

Africa is well endowed with mineral resources and has a long history of mining, but has so far not reaped the developmental benefits from these resources. This is largely due to the weak integration of Africa’s mining sector into national economic and social activities.

READ MORE

Top Stories

Africans need to see the benefits of the extractive sector, Report Says
The OAGS consists of representatives from African countries including Algeria, Kenya, Ghana, Chad, Zambia, Tanzania, South Africa, Sierra Leone, Nigeria, Mozambique, Mali, Zimbabwe, Angola, and Uganda. South Africa was elected Secretariat of the organisation and Algeria is the current President of the OAGS.

Its mandate is to foster and sustain government-supported geosciences endeavours and excellence on the African continent, in the quest for socio-economic development and poverty alleviation, with special reference to mineral resource assessment, sustainable land use and development, hazard mitigation and environmental protection.

The specific aims of the organisation include, but are not limited to, creating regional- and continent-wide promotional maps and documents that inform decision-makers in government and industry on matters relating to the applied geosciences.

current projects of the oags

Select from the list below for more information:

Seismotectonic Map of Africa
Role of Geological Surveys in Africa
Role of Geological Surveys in Small-Scale Mining
African Geosites
African Input into the Geological Map of the World
Capacity-building initiatives

The Geological Society of Africa (GSAf) was established in 1973 to encourage geoscientific collaboration and cooperation across the continent.

Its main objectives are:

- to promote understanding of the earth sciences and improve standards of earth science education and research in Africa;
- to provide a forum for discussion and dissemination of information across national boundaries between scientists, associations and institutions engaged in African geology and earth resources;
- to promote the development and sustainable management of the continent’s earth resources, to advance its socio-economic development; and
- to improve natural hazards assessment and disaster mitigation.

The Journal of African Earth Sciences (JAES) is closely affiliated with the Geological Society of Africa (GSAf). The society will use its best efforts to promote the journal to its members and to the relevant scientific discipline, and will endeavour to stimulate the submission of papers of the highest professional standard. The Society shall make clear to members that members subscription (79 USD for 2013) will be for personal use only and may not be placed in institutional or university libraries. In our Memorandum of Agreement with Elsevier we have agreed that Elsevier will provide an annual prize of $500 USD for the best paper published by an African Researcher in the Journal from the preceding calendar year. The recipient of the prize will be chosen by the Editors of the journal. So, we encourage African Researchers to submit their research results for publication in JAES. The GSAf is planning to establish a publications committee among its members to support African Earth Scientists in their effort to prepare manuscripts of international standard.

Prof. Aberra Mogessie
Capacity-building initiatives

Observatory Network

- 51 stations
- 48 seismic stations
- 27 GPS/met stations
- 19 countries
- Continuous recording
- Data recovery 70-80%
- Data availability: IRIS and UNAVCO
- Data retrieval:
  - A few countries - real-time using cell modems
  - Elsewhere - monthly
Capacity-building initiatives

INTERNATIONAL FIELD SCHOOL

2012 Field School – Open pit project
The WAXI 3 Project proposal is now available. Please contact joe.cucuzza@amirainternational.com or mark.jessell@ird.fr for further information.

Welcome

The West African Exploration Initiative (WAXI) is an ambitious research and training program led by nine partner institutions, focussed on the mineral potential of the Leo-Man Craton. This Initiative, which commenced in November 2006, is principally funded by the international Mining Industry and the Australian Government (AusAID & ARC), via an AMIRA International consortium. AMIRA International is an industry association dedicated to supporting collaborative minerals industry research.

The overall aim of West Africa Exploration Initiative is to enhance the exploration potential of the Leo-Man Shield through an integrated program of research and data gathering into its 'anatomy', and to augment the capacity of local institutions to undertake this form of work. The capacity building activities are completely underwritten by AusAID (the Australian Agency for International Development). The capacity building activities are designed to enhance the capacity of individuals, teams, and institutions to participate in, and benefit from, exploration at the national level. The Initiative is highly relevant to the mining industry, and has the potential to make a major contribution to development through the generation of new mineral resources with economic potential.
Capacity-building initiatives
African Regional Implementation Workshop on Hazards and Disasters

An African Regional Implementation Workshop on Hazards and Disasters workshop was held at Dakar, Senegal from 26-27 September, 2012. The workshop was attended by leading hazards and disasters experts from the African and other regions of the globe. Representatives from regional hazards and disasters initiatives/organisations and some funding agencies were also in attendance.

This workshop focused on:

- Establishing research consortia that will design specific trans-disciplinary and trans-boundary projects to be implemented at regional level in collaboration with identified partners.
- Outlining a framework with envisaged work plans for the implementation of these projects, highlighting the key role players, time lines and milestones in the implementation.
- For each project, exploring and identify available funding/fundraising opportunities from within and outside the region, including submission within the 10-year research proposal that will be compiled at the end of the 18-month Sida-funded period.

The workshop ended with a strong resolve from all participants to work towards addressing the problems of natural and human-induced
Challenges & Opportunities

- Harness IUGS network and resources to build African Earth Science capacity and institutions
- Be sensitive to cultural, economic and political differences
- Colleges and Universities – expand current initiatives
  - Undergraduate (e.g. training for lecturers, e-learning materials)
  - Post-graduate training (e.g. co-supervision)
  - Research infrastructure and collaboration (e.g. share expensive instruments, host Africans for sabbaticals, spend a sabbatical in Africa, meaningfully include Africans in research projects)
Challenges & Opportunities

- Support for life-time learning
- Geological Surveys, Mining Ministries and Science Councils
- Practitioners employed by mining industry, consultants
- Make African data stored in northern institutions available to African geoscientists
- Harmonize and expand African geo-data sets
- Develop models of ore bodies and ore-forming systems applicable to Africa
- Promote local beneficiation
Challenges & Opportunities

Optimising future Mineral Opportunities in Africa

3 Types of Mineral Terrains

- **Unknown Mineral Assets**
  - Exploration Terrain
  - Exploration Licences
  - Prospective Resource Rent

- **Partially Known**
  - Geo-Reserve Terrain
  - Further geo-survey
  - Future exploration for future step-in rights

- **Known Mineral Assets**
  - Delineation Terrain
  - Rent share
  - Upstream/downstream investment
  - Infrastructure Development
  - HRD & R&D
  - Tech Transfer
  - Community Development
Investment in Geo-knowledge

- Investment into infrastructure should not only focus on physical infrastructure, but also knowledge infrastructure.

- Studies have indicated extremely high return to the state from investment in geo-survey (~1:10 investment to return ratio to the fiscus).

- The lower the geo-information base, the higher the risk, the lower the share of resource rents to the state.

- This compromises the longer term sustainability of the investment.
Paterson, Grant & Watson Limited (PGW), in collaboration with GETECH and ITC, compiled all the available airborne and marine magnetic surveys for the continent of Africa.

Data
• The known surveys number approximately 800 individual datasets, acquired largely for hydrocarbon and mineral exploration interest.
• Coverage is approximately 80% of the land and continental shelf area.
• Survey data from 1948 to 1992 and cover all 52 African nations.

For further information contact:
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Paterson, Grant & Watson Limited
Suite 1710, 155 University Avenue
Toronto, Ontario
Canada, M5H 3B7
Map 10.1
Potential Resource-based African Development Corridors

Challenges & Opportunities

35th International Geological Congress
Cape Town, South Africa - 2016

**Room 201**
17:30
Promotional Presentation