Artisanal Mining in Sudan - Opportunities, Challenges and Impacts

By

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Republic of Sudan
Ministry of Minerals

ARTISANAL MINING IN SUDAN-
OPPORTUNITIES, CHALLENGES AND IMPACTS

Mohamed Suliman Ibrahim
OUTLINES

- Artisanal mining activities in Sudan: history, geographical distribution
- Gold production
- Current challenges facing artisanal mining sub-sector
- Impact of artisanal gold production on the socio-economic life in Sudan
- Contribution of artisanal scale mining to job creation and growth
- Interventions and way forward
Historically, Sudan experienced at least 5 major episodes of mining boom:

- **3000-1500 BC**: The ancient gold, iron ore and copper mining activities in Nubia in northern and central Sudan
- **Around 10th Century**: Nuba, Beja, Arab and other tribes produced substantial gold in the Red Sea hills, Nubian desert, south Blue Nile, and Nuba mountains
- **19th Century**: The Ottoman Empire gold quest in Sudan
- **1900-1953**: The colonial gold mining in the Red Sea Hills, northeastern Sudan
- **2005 - present**: The recent gold mining boom in all Sudan
Figure 1: Geographical distribution of artisanal scale gold mining activities
Definition of Artisanal Scale Mining (ASM)

- Minerals Wealth Development & Mining Act (2015), section 4 Article 14e defines Traditional mining (artisanal scale mining) as an activity practised utilizing local traditional means within the specified area.

- Other definitions cited elsewhere: labour intensive, use simple tools, poverty-driven activity, of migratory nature.

- Artisanal scale mining is a gold-focused activity in Sudan.

- Limited artisanal activities on chromite, limestone, and salt.
FACTS & STATISTICS

- Over 1 million miners participate in gold mining and extraction
- About 4 million dependents directly benefit from the activities
- Activities cover 14 of the 18 Sudanese states
- Artisanal gold mining accounts for ~85% of the total gold extracted (2010-present)
- Total gold produced for the period 2010-2015Q3 reaches ~280 metric tons
## Table 1: Operating Exploration and Mining Companies- 2015

<table>
<thead>
<tr>
<th>Agreement Type</th>
<th>Exploration</th>
<th>Piloting</th>
<th>Producing</th>
<th>General Prospecting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large scale</td>
<td>160</td>
<td>2</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Small scale</td>
<td>190</td>
<td>-</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Tailings Processing</td>
<td>(34)</td>
<td>6</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td>370</td>
</tr>
</tbody>
</table>

*Source: Ministry of Minerals Report- 2015*
Figure 2: Mining Concessions Map - 2015

Legend
- Working Company Block
- Under Negotiation Block
- State Block
- China Block
- Russia
- Free Block
- Cu Block
- Iron Block
- Agrominerals Block
- Uranium
  - Capital
  - International Bound.
  - State Boundary
  - Railway

Projects Planning Administration - Oct. 2015
Table 2: Artisanal gold Production Licenses/Permits

<table>
<thead>
<tr>
<th>Type of licensing</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold mining</td>
<td>318</td>
<td>700</td>
</tr>
<tr>
<td>processing</td>
<td>741</td>
<td>4464</td>
</tr>
<tr>
<td>services</td>
<td>100,000</td>
<td>na</td>
</tr>
</tbody>
</table>


Table 3: Gold Production in Sudan 2012-2015

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015 Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>5,800</td>
<td>9,720</td>
<td>11,000</td>
<td></td>
</tr>
<tr>
<td>Artisanal</td>
<td>41,200</td>
<td>63,655</td>
<td>50,500</td>
<td></td>
</tr>
<tr>
<td>Total /Kg</td>
<td>50,000 (46,133 export)</td>
<td>47,000</td>
<td>73,375</td>
<td>61,500</td>
</tr>
</tbody>
</table>

Sources: Ministry of Minerals Reports 2012-2015, Central Bank of Sudan Annual Reports
Challenges Facing Artisanal Scale Mining (ASM) Sub-sector in Sudan

Challenges are categorized into:

- Legal and organizational
- Socio-economic
- Environmental protection
Organization of the Artisanal Gold Mining in Sudan

Policy

• Overall policy of the Ministry of Minerals is to boost the minerals production and productivity, diversify production of mineral commodities, promote investment, add value to minerals

• Policy also caters for organizing artisanal mining and extraction sub-sector, increase production, ensure safety and health of the miners, protect the environment, combat smuggling, maintain positive LSM-ASM interactions

• Central bank of Sudan policy on gold pricing, trade, exports, access to credit
The Law

- Legalization of the mining sector is governed by the Mineral Wealth Development& Mining Act 2015 and regulations

- For artisanal scale mining the law provides for the definition of the sub-sector, licensing requirements, the environment, and coordination with local mining councils in the States

- The Regulation of Traditional Gold Mining (2012) sets conditions for practising artisanal mining such as registration, safeguarding the environment, stick to specified area of operation, sell gold produced to the bank of Sudan sale points
Other relevant laws

- Labour Act (1997)
- Child Act (2010)
- Environmental Protection Act (2001)
- Environmental Health Act (2009)

Sudan Committed to international conventions relevant to ASM sub-sector:

- Minimata Convention on Mercury,
- Basel Convention on Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal (1989),
- ILO Convention of Worst Forms of Child Labor (1999),
- Rotterdam Convention on environmental concerns,
- Bamako Convention on the environment
Mechanisms of Organization

- A joint Federal-State coordination body to remove any jurisdictional overlapping that jeopardize organizational efforts (Table 4)

- A permanent committee headed by the State Minister of Minerals to manage and solve problems associated with artisanal mining activities in the country

- Organizational intervention campaign bodies to regularly visit the States for supervising and registering active miners, service providers and dealers, provide IDs, practicing licenses, collect royalties on produced gold

- Local authority bodies responsible for camp/processing centres administration
Table 4: Joint ASM organizational Councils -2015

<table>
<thead>
<tr>
<th>Council Level</th>
<th>Planned</th>
<th>Actual</th>
<th>Pending</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fed-State JV</td>
<td>12</td>
<td>12</td>
<td></td>
<td>4 campaigns -85% of sub-sector organized</td>
</tr>
<tr>
<td>Locality</td>
<td>42</td>
<td>32</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Processing Centre</td>
<td>55</td>
<td>45</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>109</strong></td>
<td><strong>89</strong></td>
<td><strong>20</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Ministry of Minerals Reports 2014, 2015*
Table 5: Artisanal gold mining and extraction legalization -2015 Q3 (3rd campaign)

<table>
<thead>
<tr>
<th>State</th>
<th>License</th>
<th>Contract</th>
<th>Miner ID</th>
<th>Mine site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>44</td>
<td>218</td>
<td>1674</td>
<td>11</td>
</tr>
<tr>
<td>River Nile</td>
<td>-</td>
<td>343</td>
<td>1740</td>
<td>9+</td>
</tr>
<tr>
<td>N. Kordfan</td>
<td>-</td>
<td>3</td>
<td>37</td>
<td>7+</td>
</tr>
<tr>
<td>W. Kordfan</td>
<td>3</td>
<td>-</td>
<td>146</td>
<td>30</td>
</tr>
<tr>
<td>S. Kordfan</td>
<td>-</td>
<td>16</td>
<td>76</td>
<td>20+</td>
</tr>
<tr>
<td>N. Darfur</td>
<td>15</td>
<td>23</td>
<td>135</td>
<td>24</td>
</tr>
<tr>
<td>S. Darfur</td>
<td>-</td>
<td>1</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>W. Darfur</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3+</td>
</tr>
<tr>
<td>Red Sea</td>
<td>-</td>
<td>2</td>
<td>462</td>
<td>30+</td>
</tr>
<tr>
<td>Kassala</td>
<td>-</td>
<td>2</td>
<td>45</td>
<td>19</td>
</tr>
<tr>
<td>Gedarif</td>
<td>1</td>
<td>2</td>
<td>162</td>
<td>6</td>
</tr>
<tr>
<td>Blue Nile</td>
<td>4</td>
<td>-</td>
<td>115</td>
<td>5+</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>641</strong></td>
<td><strong>4464</strong></td>
<td><strong>221</strong></td>
</tr>
</tbody>
</table>

*Source: Ministry of Minerals Campaign Report 2014*
Recent Studies point to a number of indicators attributed to the impact of gold produced on the national macro-economy:

- Boosted GDP and economic growth
- Enhanced balance of trade through exports
- Increased employment opportunities
1- The Economic Indicators

- Total gold production escalates with the advent of artisanal gold activities

- Artisanal gold mining operations currently contributing ~85% of the total national production

- 12 to 15% of production comes from large- and small-scale mining and tailings CIL processing operations

- Prior to 2008, production solely came from the Sudanese-French JV Ariab Mining Co. (6 MT in 2005)
Figure 3: Gold production in Sudan, 2002-2014

- In 2014 Sudan ranked 3rd in gold production among African countries
- Gold exports make an average of 33% of total national exports for the period 2012-2014

2- Contribution of total gold production to growth/GDP
- Table 6 below summarizes contribution of mining and quarrying in GDP

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP growth%</td>
<td>5.9</td>
<td>5.2</td>
<td>1.9</td>
<td>1.4</td>
<td>3.6</td>
<td>na</td>
</tr>
<tr>
<td>Gold mining growth rate %</td>
<td>0.3</td>
<td>9.3</td>
<td>66.7</td>
<td>215</td>
<td>14</td>
<td>na</td>
</tr>
<tr>
<td>Contrib. m&amp;Q in GDP %</td>
<td>0.2</td>
<td>0.3</td>
<td>0.2</td>
<td><strong>1.5</strong></td>
<td>2.3</td>
<td><strong>2.5</strong></td>
</tr>
</tbody>
</table>

Figure 4: Gold exports as % of total exports (2005-present)

Source: Central Bank of Sudan. Data on 2015 incomplete

*2012 total gold export proceeds US$2.2 billions
3- Contribution of artisanal gold mining activities to employment

▪ A one million individuals involved in artisanal-small scale gold mining and extraction

▪ Another 4 million of family dependents benefit from mined gold revenues

▪ The total ASM activity-dependents (5 millions) translate to ~14% of the total population

▪ Over 30 types of occupations are practised within the ASM gold mining and processing centres

▪ Open opportunities
Table 7: General statistics on different types of platforms that contribute to job creation in the ASM sub-sector

<table>
<thead>
<tr>
<th>State</th>
<th>sites</th>
<th>pits</th>
<th>machinery</th>
<th>mills</th>
<th>washing centre</th>
<th>amalgm. centre</th>
<th>other facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>47</td>
<td>6140</td>
<td>107</td>
<td>268</td>
<td>62</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>R.Nile</td>
<td>23</td>
<td>90</td>
<td>270</td>
<td>35</td>
<td>60</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Nkordfan</td>
<td>19</td>
<td>7562</td>
<td>-</td>
<td>436</td>
<td>503</td>
<td>191</td>
<td></td>
</tr>
<tr>
<td>SKordfan</td>
<td>34</td>
<td>na</td>
<td>27</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>WKordfan</td>
<td>20</td>
<td>6343</td>
<td>7</td>
<td>150</td>
<td>200</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>NDarfur</td>
<td>9</td>
<td>13000</td>
<td>100</td>
<td>700</td>
<td>1000</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>SDarfur</td>
<td>3</td>
<td>1278</td>
<td>-</td>
<td>81</td>
<td>224</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>WDarfur</td>
<td>5</td>
<td>150</td>
<td>-</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Red Sea</td>
<td>24</td>
<td>441</td>
<td>254</td>
<td>350</td>
<td>408</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Kassala</td>
<td>8</td>
<td>285</td>
<td>1</td>
<td>15</td>
<td>100</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Gedarif</td>
<td>18</td>
<td>2247</td>
<td>71</td>
<td>150</td>
<td>117</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Blue Nile</td>
<td>11</td>
<td>200</td>
<td>-</td>
<td>33</td>
<td>na</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>221</td>
<td>37736</td>
<td>837</td>
<td>2218</td>
<td>2674+</td>
<td>822</td>
<td></td>
</tr>
</tbody>
</table>
4- Social Impact Indicators of Artisanal Gold Mining Activities

- Recent surveys indicate that majority of the miners sample are young (below 45) - constitutes ~93% of the community
- Child labour is diminishing (<1%) - in some sites children under 15 and women are visible minorities
- Participating artisanal gold miners dwell in 2 types of settlements:
  - Mining camps located around pits - transient
  - In or around processing centres established at out-skirts of towns - semi-permanent
- Processing centres (suq) provide over 30 type services ranging from gold extraction techniques to food, health care, entertainment …
- Low level hygiene, occupational health problems and different ailments reported (??%)
- Security and crime cases among the miners communities generally low - vary from vice encounters to serious offenses. Theft, cheating, and drug abuse make >90% of cases
- ASM mining sites provide social melting platform - neutralize political tension
5- Micro-economic Impacts of Artisanal Gold Mining and Extraction

- Surveys of artisanal gold mining community depict the majority have previous occupations and a source of income.
- The study shows that only 7.5% of sampled were previously unemployed (Figure 5).
- Average daily wages of farming labour increased from SDG32 (2011) to SDG80 (2013). Hike could be attributed to migration of workforce from traditional agriculture sector to artisanal mining sub-sector.
- Consequences of sectorial migration: less land cultivated, lower crop yield, shortages, less exports.
- Gold sales proceed-sharing is dominant labor relation set up among facility owners and hand labor.
- Earnings from artisanal gold production jobs vary. 48% of miners make SDG1000-2000/month (US$100-200). Survey indicates 4% only earn over SDG3000/month.
Figure 5: Artisanal gold miners previous income source

Source: GEO Services Int. Co Report on Artisanal Mining Impacts prepared for Ministry of Finance 2015
Contribution of Artisanal gold production to Revenues

- No business tax is imposed on the artisanal gold extracted
- An annual 10% royalty is collected from gold sale proceed per license/contract
- States levy local taxes and fees per type of operation or service
- Local economies boost indicators: boom towns – high cash flow- stimulate trade- better life quality- lower poverty rates- savings investment

Gold Smuggling

- Hard to find statistics
- Indicators-
- Hard currency demands
- Gold trade policies
Environmental Impacts of Artisanal Gold Mining

- ASM often has serious environmental impacts—physical, chemical and organic pollution of waters, damage to landscape, deforestation, wildlife disturbance, poor hygiene, health hazards, mercury release into the environment.
- Direct negative impacts on the miners—occupational health hazards—exposure to dangerous substances—exposure to dust and gases.

**Mercury**

- Field observation indicate that ASM gold is extracted from ore through amalgamation ($\text{Hg}^0 - \text{Au}^0$/amalgam)
- Gold extracted through burning off mercury. Hg vapour released in the atmosphere and ultimately into the environment.
- Released Hg poses serious health issues—vapour inhalation or consumption of contaminated water, animal and crop products contamination.
- Research and development work carried out on Hg use provide two options:
  - reduced and safer use of mercury, or
  - elimination of mercury from ASM gold extraction process.
ASM Intervention and On Going Tackles

- Maintain supportive policy
- **Organization** of ASM sub-sector- legal titles- licensing- IDs, -partnership- large-Artisanal scale (LSM-ASM) co-existence
- **Technical support**- Intermediate technology transfer supply
- **Capacity building**- training on best operational practises-
- **Awareness raising**- health- hygiene -environmental protection- behaviour change
- **Incorporation in the national economic cycle**: trade- micro-credit access- job creation- rural development plans- taxation- social plans
- **Establish capacities** for both monitoring and law enforcement
Artisanal Gold Mining Contributes ~85% of current national gold production.
ASM contributes livelihood to rural Sudan
Thank you!