



Earth Materials: The Foundation for Development

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United Nations
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International
Geoscience
Programme

Review of historical and present-day mineral demand and its connections to the economy and technology

UNESCO Lecture Series

Organised in collaboration with IUGS and iCRAG

Mineral Wealth and Social Justice

- Historical context – mineral extraction and human development
 - Early history of human and minerals
 - Explorers and the colonial project
 - Current trends
- Where do minerals come from?
 - Geographical
 - ASM vs LSM
- Why are minerals important?
 - Economic transformation: mineral-based industrialisation
 - Livelihoods: sustainable livelihoods approach
 - Development minerals
- Mining, Minerals, and the SDGs
 - Environment, Social and Governance criteria
 - Mapping SDGs to mining and ASM specifically
 - Stranded assets

Historical context - mineral extraction and human development

- Early history of human development and minerals
- Explorers and the colonial project
- Current trends
 - Optimal mining policy regimes
 - Responsible mineral supply chains

Early history of human development and minerals

Stone Age



Bronze Age



Iron Age



History of mining in southern and east Africa

Ancient mines



World's first underground mine at Lion Cavern, Swaziland; built by San people (20 000-43 000 BP years)



Engraved ochre from Blombos Cave was the first evidence of human art (75 000 BP years)

Iron, copper and tin smelting (c. AD 200)



Venda-type iron smelting furnace from 1888



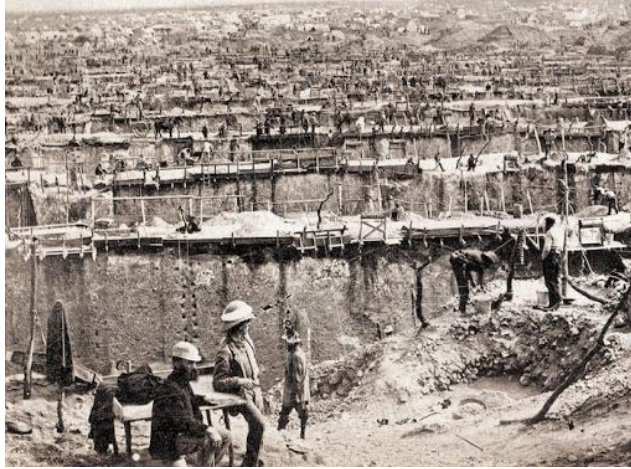
Traditional products, such as, hoes, arrow heads, and assegais produced until ~1950s



Gold artefact found at Mapungubwe (c. 1220-1270)

Explorers and the colonial project

- The quest for natural resources (minerals included)
 - Africa
 - Americas
 - Australia and the Far East (Oceania)

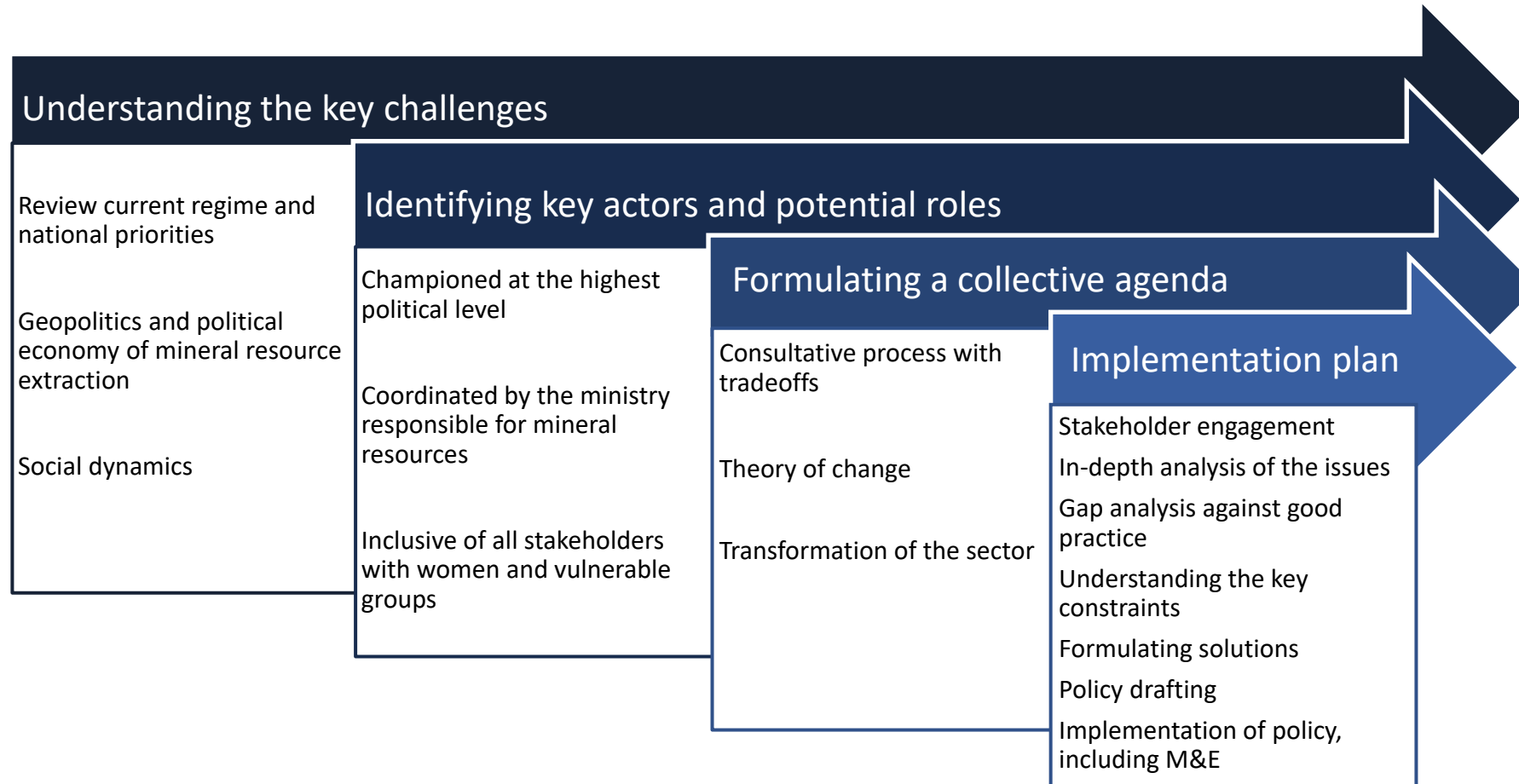


Current focus on optimal resource exploitation:

Key focus areas for mineral policy development

| | |
|---|--|
| Fiscal regime and revenue management | e.g. Whether fiscal regime is supporting, in revenue collection |
| Geological and mineral information systems | e.g. Whether the role of geology is understood by ordinary communities, with provisions for ongoing improvement of knowledge |
| Building human and institutional capacity | e.g. Whether the country has policies and strategies on capacity development that: Promote a knowledge-driven and internationally competitive minerals economy |
| Artisanal and small-scale mining | e.g. Whether there is an adequate policy framework for artisanal and small-scale mining (ASM), and whether it is optimally aligned with the country's development agenda |
| Mineral sector governance | e.g. Whether tax issues are managed properly as evident from having mechanisms and instruments in place to provide for fair sharing of benefits |
| Linkages, investment and diversification | e.g. Whether there are considerations for upstream or backward linkages evident in the existence of a local content policy |
| Environment and social issues | e.g. Whether there are policies and legislation in place to prevent and mitigate environmental and social impacts of mining |

Mineral policy development process



Responsible mineral supply chains

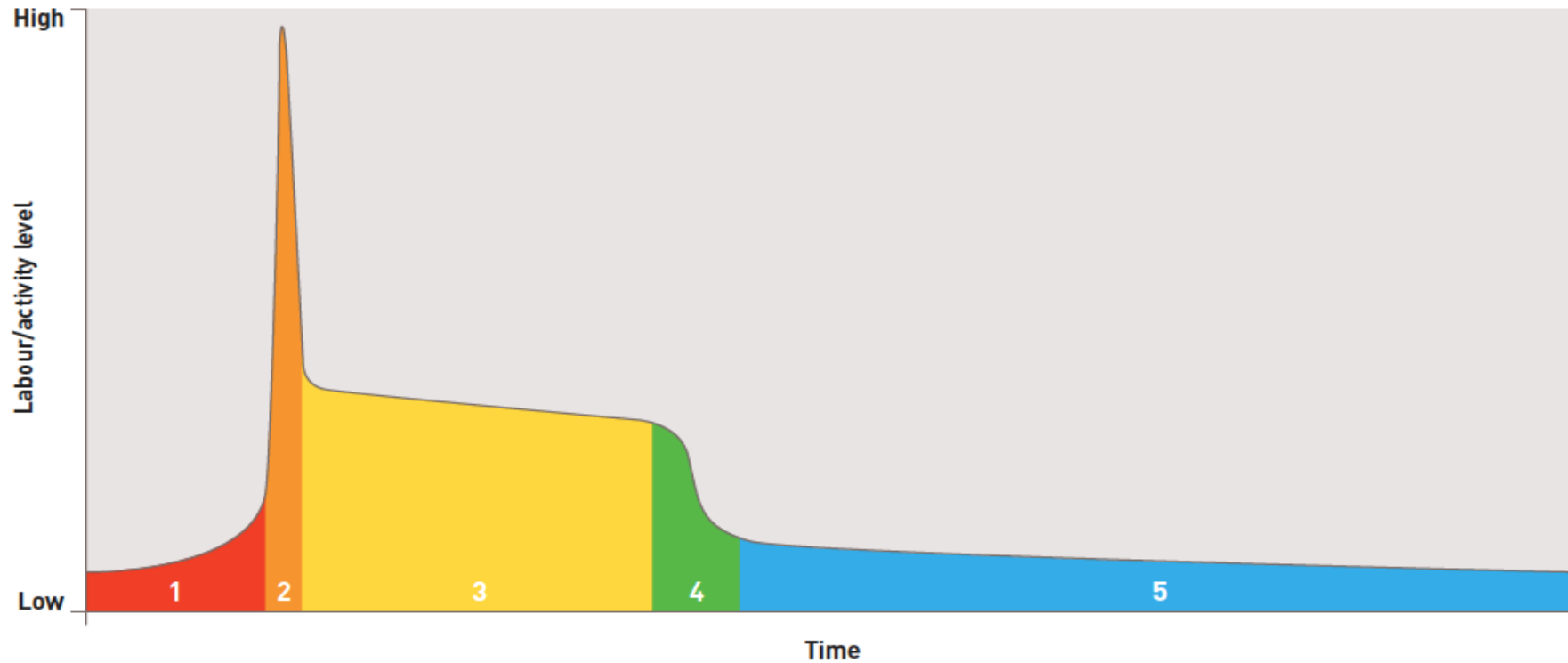


Where do the minerals come from?

- Mineral extraction process – mining lifecycle
- The different types and levels
- World production of key minerals (African examples)

Mining Lifecycle

- 1** Exploration
1–10 years
or more
- 2** Site design and
construction
1–5 years
- 3** Operation
2–100 years
- 4** Final closure and
decommissioning
1–5 years
- 5** Post-closure
A decade to perpetuity



ICMM, Mining's contribution to sustainable development (2012)

ASM vs LSM

| Features | ASM | LSM |
|--|---|---|
| Who are they? | Dominated by local people, the operations being largely informal | Dominated by multinational companies |
| What minerals do they mine? | Dominated by precious minerals, but also include base metals and development minerals | All mineral commodities |
| What are the drivers for their activities? | Needs for livelihoods | Profit, providing input into industries in developed economy industries |

Dynamics between ASM and LSM

- Conflict arising from competition for resources
- Need for coexistence models

ASM vs LSM

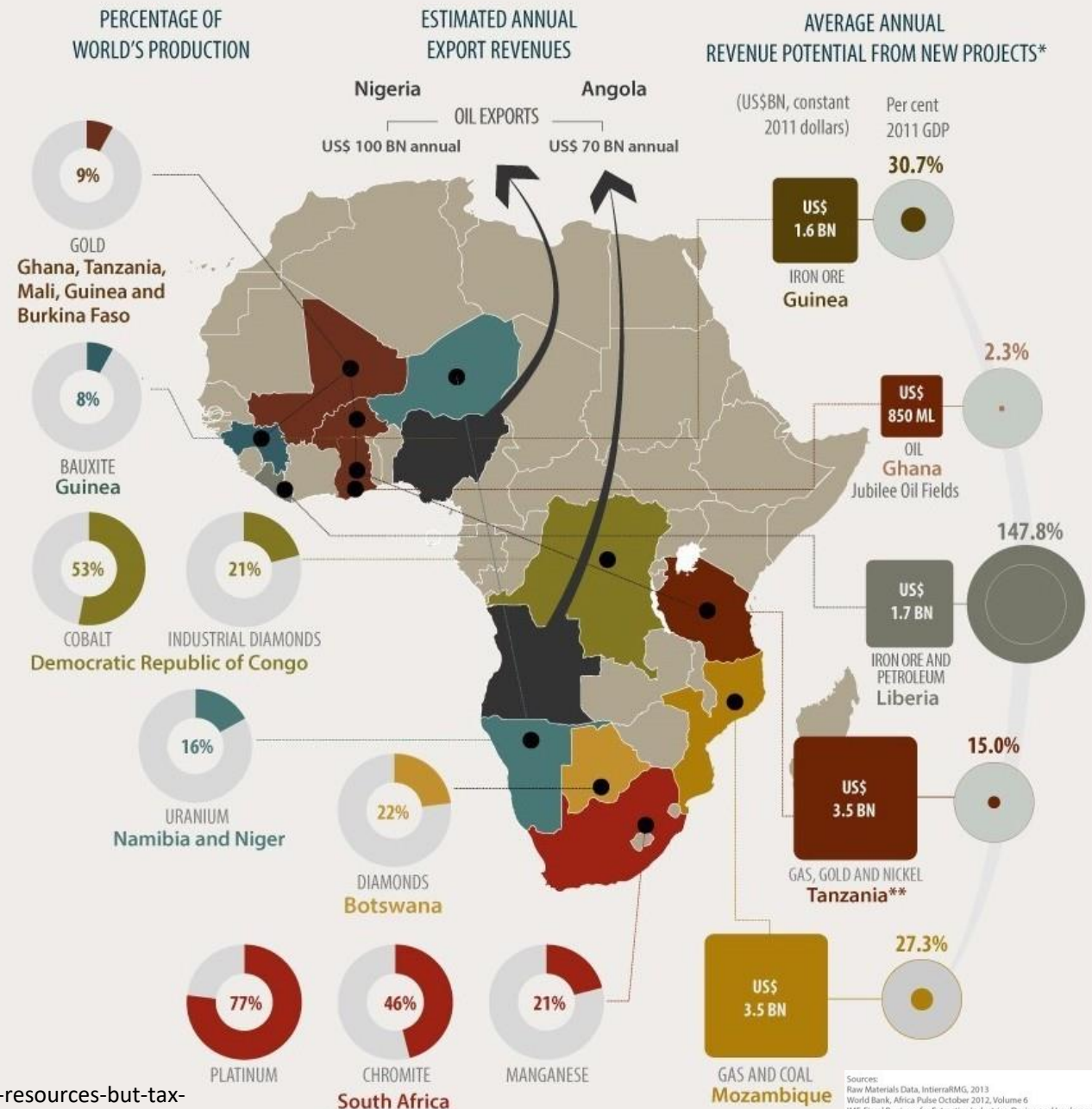
ASM



LSM



African contribution to global mineral wealth



<https://www.weforum.org/agenda/2016/05/africa-is-rich-in-resources-but-tax-havens-are-keeping-its-people-poor/>

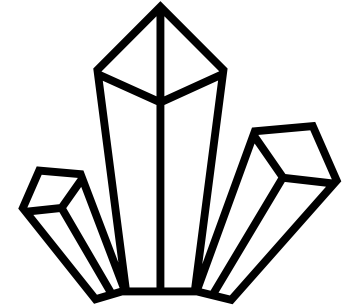
Why are minerals important?



ECONOMIC TRANSFORMATION:
MINERAL-BASED INDUSTRIALISATION

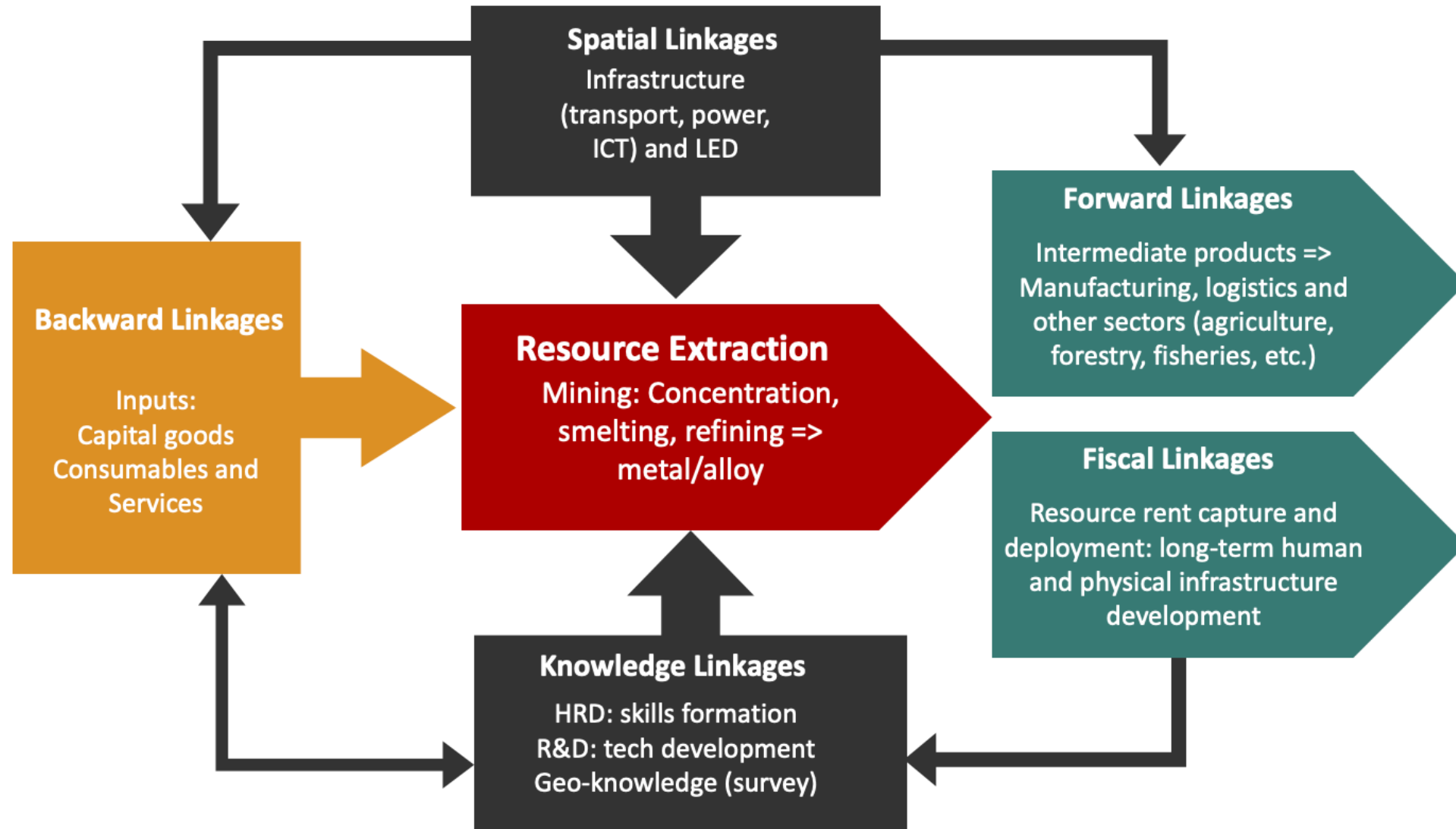


LIVELIHOODS: SUSTAINABLE LIVELIHOODS
APPROACH

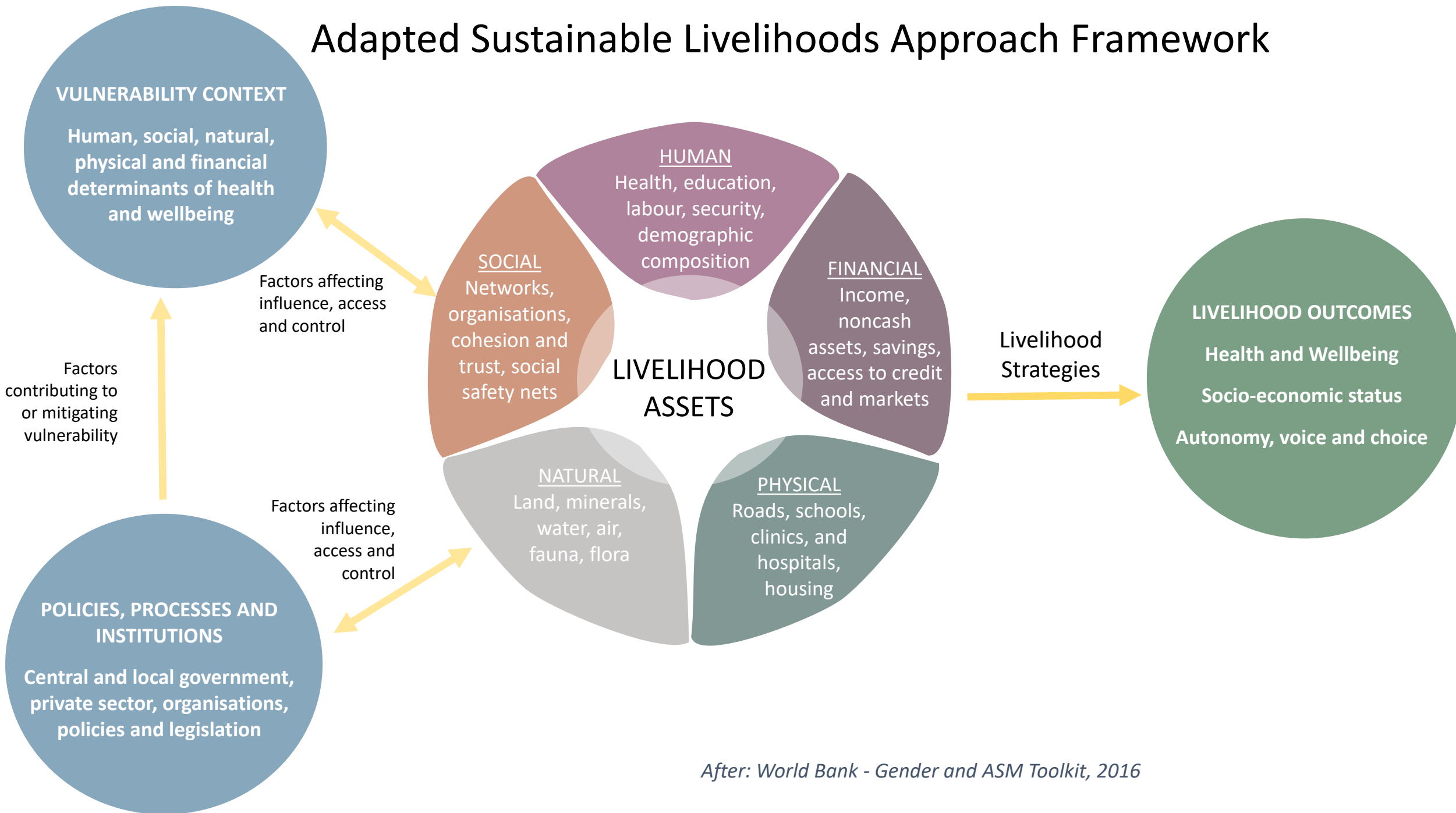


DEVELOPMENT MINERALS

Mineral based industrialisation: Resource Linkages



Adapted Sustainable Livelihoods Approach Framework

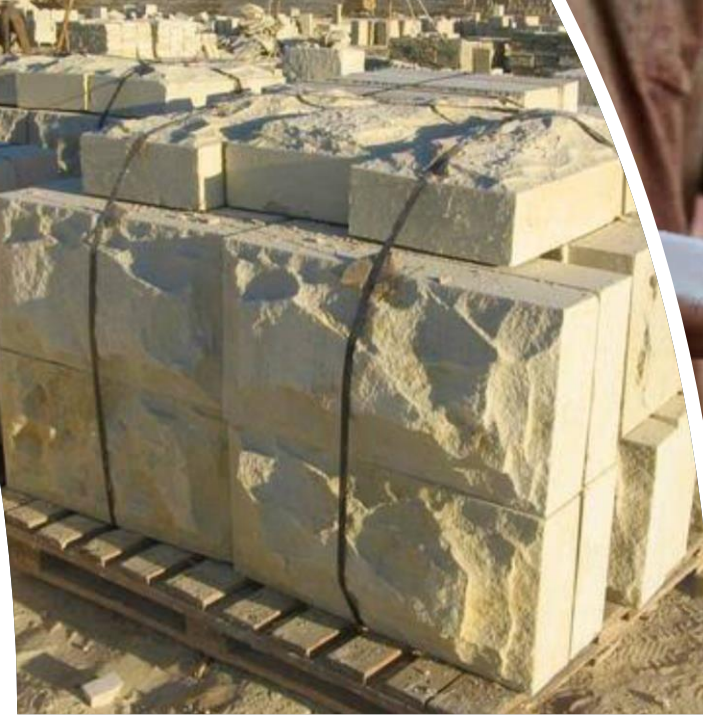


After: World Bank - Gender and ASM Toolkit, 2016

Development minerals

“Development minerals are minerals and materials that are mined, processed, manufactured, and used domestically in industries such as construction, manufacturing, and agriculture.”

“Development minerals are economically important close to the location where the commodity is. They include industrial minerals, construction materials, dimension stones and semi-precious stones.”



Mining, Minerals, and the Sustainable Development Goals (SDGs)

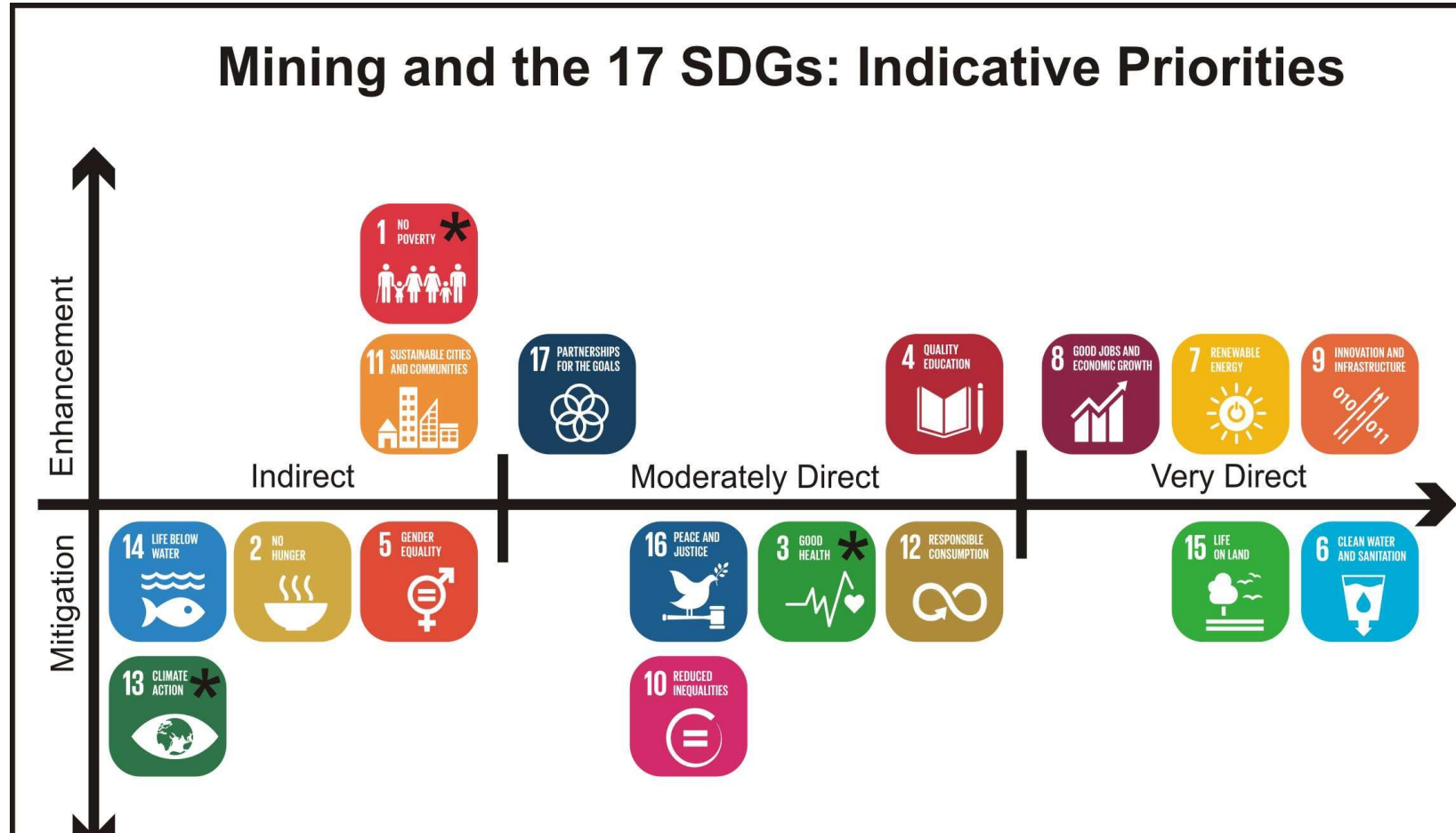
- Environmental, Social and Governance (ESG) Criteria
- Mapping mining to sustainable development goals (SDGs)
- Mapping ASM to SDGs

Environmental, Social and Governance Criteria

Environmental, social and governance (ESG) criteria are a set of standards for a company's operations that socially conscious actors use to ensure that economic activities, particularly those by investment, are implemented responsibly.



Mining and SDGs Mapping



ASM FORMALIZATION PROCESS

'INFORMAL'



'FORMAL'



Positive contributions to nearly all SDGs, but also **negative impacts**

Formalization **mitigates negative impacts** and **amplifies positive impacts** on the SDGs



IMPACTS

POSITIVE



NEGATIVE



POSITIVE & NEGATIVE



The future – value proposition

- Capacity building of mining economies regulatory capacity
- Community development agreements



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