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Mining and the Environment in West Africa

African Center for Economic Transformation (ACET) Policy Brief

Globalization and demand from major markets are driving growing interest for resource extraction in Africa. This includes demand for infrastructure materials and metals used in information and communications technologies. Technological advances are also making resource extraction in previously inaccessible parts of remote areas easier. Consequently, Africa is seen as a growth region, accounting for 10% of today's mine production and 15% of investments in the project pipeline. Yet access to new areas and the search for new resources bring new risks, as recent experience with shale gas fracking illustrates. The introduction of new mines and technologies highlights the importance of applying recognized principles such as precaution, prevention, and "Free, Prior and Informed Consent". These principles remain relevant as extractive majors and small-scale operators seek new frontiers in Africa.

Major Impacts

The environmental effects of mining are influenced by factors such as the type of minerals extracted, the geological structures involved, technologies used, extraction techniques, scale of extraction, as well as the location of projects. Direct and indirect impacts on the environment follow. *Direct impacts* are those caused by activities such as prospecting, exploration, site development, ore extraction, smelting, refining, and transportation. *Indirect impacts* are caused, for example, through infrastructure for mining supplies such as energy, related services such as roads and railways, as well as human settlements.

Major environmental challenges for the mining industry have been captured by the *Breaking New Ground* (2002) report, produced by the two-year, multi-stakeholder Mining, Minerals and Sustainable Development (MMSD) process in the early 2000s. Taking stock of progress a decade later, the International Institute for Environment and Development (IIED) has found that the key environmental issues identified remain unresolved. The industry also has new pressures related to climate change and resource nationalism.

Recognized by the International Council on Mining and Metals (ICMM), the industry today continues to face environmental challenges related to the application of Environmental Impact Assessments, energy use, water use, land use, mine wastes, metals in the environment, as well as mine closure and mine legacies. Present throughout these are the issues of climate change, chemicals, biodiversity, and ecosystem services. These issues have become part of risk management in large companies.

The proper use and credibility of *Environmental Impact Assessments (EIAs)* in mining development remains an area of concern. The EIA provides the basis for site level Environmental Management and Protection (EMP) and related thematic plans such as Biodiversity Management Plans (BMPs). Yet questions remain about the quality of EIAs and their follow-up as projects are initiated and further environmental management procedures of varying quality introduced. Mandatory for most large-scale projects worldwide, the implementation of EIAs is often poor. It often leaves the burden of protection to international conservation NGOs, as national authorities are divided over the relative gains involved.

Complications in conducting EIAs include the lack of clear technical standards and local data availability. An examination of Guinea, Liberia, and Sierra Leone by the World Bank has also questioned whether Environmental and Social Impact Assessments (ESIAs) and related Management Plan requirements are followed effectively and if any enforcement occurs after mining licenses are granted.

Energy use and related greenhouse gas (GHG) emissions have critical implications for the industry. In addition to the energy intensive nature of the primary production of mineral commodities such as aluminum and steel, declines in the quality of ores also have energy cost implications imposed by the physical realities of local geology. Furthermore, use of refrigeration and air conditioning equipment in mining is an additional source of GHG emissions.

The extractive industry in Africa is the 2nd biggest user of *water*, following the agricultural industry. In rural areas it competes for the use of surface and groundwater with local populations dependent on agriculture. Mining impact on the water environment relates to mining operations, seepage of contaminated water from mine residue deposits, the de-watering of active mining operations, as well as the flooding of closed mine voids and discharge of untreated mine water. At stake therefore is water consumption at both the extraction and processing phases, and water quality put at risk due to toxic waste disposal. One of the most serious impacts is acid drainage.

Mining requires significant volumes of water. Gold, platinum, diamonds, nickel, and copper are associated with the highest water consumption. As ore grades decline, each unit of production results in greater quantities of waste and higher water consumption. Worryingly, the World Resources Institute (WRI) has estimated that nearly 30% of active mines worldwide are located within stressed river basins.

Pertaining *land use* by mining companies, habitat destruction is a key environmental impact. Recent expansion in biofuel development has strengthened the interest among oil & gas companies in practical methodologies for land use accounting, among others to assess the impacts of land use change. Mining is invariably associated with deforestation, soil erosion, land degradation and ecosystem disruption. Surface mine facilities and dumps impact land through site facilities including mine surface excavations, processing plants, storage sheds, dumps and dams, water and sewage treatment plants, refuse disposal sites, power line access ways, access roads and railways.

Mine waste involves large volumes of removed overburden, waste rock, tailings (residual slurry) and heap leach spent ore. Decisions on the location of waste disposal facilities require knowledge about local ecosystems as well as social and economic realities. Storage facilities such as tailings dams contain residual chemicals and elevated levels of metals. Seepage can therefore result in severe contamination of ground and surface water. In the 1970s – 1990s, tailings storage facility failures accounted for three-quarters of major mining-related environmental incidents. The failure of tailings dams can have disastrous consequences. The risk of such disasters requires having “Awareness and Preparedness for Emergencies at a Local Level” (APELL) programs, involving local communities.

Mine waste raises the issues of cyanide and acid drainage. Reagent used to extract minerals – cyanide in the case of gold or silver, and sulphuric acid in the case of copper or uranium – can escape from waste heaps and cause severe damage. While in some areas mining waste can be disposed of at sea, this remains controversial. Experience has illustrated how this can cause severe losses for coral reefs and fishing industries. Disposal in rivers, often done by small-scale and artisanal miners, has resulted in equally damaging consequences for local ecosystems and communities downstream.

With respect to *metals in the environment*, a number of metals are of environmental concern because of their potential chemical toxicity. Of special worry is arsenic as a by-product of copper production and the effects of mercury on artisanal and small-scale gold miners. In 2013 governments agreed on the Minamata Convention on Mercury. It foresees that nations with artisanal and small-scale gold mining (ASGM) operations will draw up plans to reduce the use of mercury. The UN recognizes that meeting standards such as eliminating mercury use is a key step in realizing ASGM development opportunities.

Of all industries, ASGM represents the single largest demand for mercury in the world and is the largest source of mercury pollution to air and water. In Ghana,

host of the 2nd largest gold deposits in Africa, unmonitored releases of mercury - used in the gold-amalgamation process - have caused numerous environmental problems. Cases have been found of severe pollution of the environment through the release of heavy metals from mining operations into streams that provide drinking water downstream.

Relevant International Environmental Conventions and Forums

A range of international agreements apply when considering the impact of the extractive industries in Africa, notably conventions related to biodiversity, land, water, chemicals, waste, and air pollution. Of special interest are forums and agreements where the extractive industries and specific impacts, pollutants or wastes related to extraction are listed. These include the UN Convention on Biological Diversity (CBD), World Heritage Convention, IUCN World Conservation Congress Resolution 2.82 on “Biological diversity of protected areas and negative impacts of mining”, Minamata Convention on Mercury, Africa Convention on the Conservation of Nature and Natural Resources (African Union), and the ECOWAS Council of Ministers Directive on the Harmonization of Guiding Principles and Policies in the Mining Sector for its member countries (2009). The toxic impact of chemical and pollutant releases also underlines the need for appropriate provision for the *closure of mines*, sites that may have a lifetime of up to a hundred years. It is agreed in industry good practice today that closure objectives must be considered from the inception of mining projects. The mine closure plan in a project life cycle should include physical rehabilitation and socio-economic stability, ensuring that local environmental resources are not subject to physical and chemical deterioration.

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Mining in Ecological and Market Context

The Economics of Ecosystems and Biodiversity (TEEB) process has sharpened the focus on “*biodiversity and ecosystem services*” and a more holistic, strategic approach by major extractive industry companies. It takes the industry beyond philanthropic support for conservation to more strategic projects that are linked with core business and the longer-term supply of key resources. Experience with oil & gas operations and related pollution off the coast West Africa has shown the value of Regional Marine Managed Areas (RMMAs) and the ecosystems approach. The Network of Marine Protected Areas in West Africa has had success in ensuring fisheries, tourism, and oil & gas development do not adversely affect marine ecosystems.

Of special concern is the presence of operations on or close to valuable and protected areas, aware that some extraction operations can eliminate entire ecosystems and all their endemic species. Defining areas for protection, the conservation community has classified priority areas based on approaches such as “hotspots” and “eco-regions”. Protected areas (IUCN Management Categories I-IV) and UNESCO World Heritage Sites have been defined as areas to be avoided at all costs.

Recognizing the industry's ecological impact, many large companies have undertaken Biodiversity Action Plans in recent years. The multi-stakeholder Business and Biodiversity Offsets Programme (BBOP) has produced a standard on biodiversity offsetting. Biodiversity offsets are one of a number of environmental stewardship approaches, part of environmental mitigation measures under the *mitigation hierarchy*. The latter requires that impacts are first of all to be avoided, then minimized, remediated, and any further residual impacts offset. Many governments have introduced regulation that provides for offsetting. The IFC Performance Standards – financial lending requirements applied in project lending by banks – has new stipulations with reference to ecosystem services and offsetting.

Debates on mining and sustainable development have evolved to focus on two key themes: (i) small business development – specifically *artisanal and small-scale mining (ASM)*, and (ii) new *industry clustering approaches* that have a global commerce and local economic planning dimension.

Mining employment tends to be highest in smaller enterprises, ones financially the weakest and with least capacity to deal with complex challenges. ASM is characterized by low incomes, unsafe working conditions, serious environmental impacts, and exposure to hazardous materials. The IIED has reported that sustainability in ASM has hardly advanced over the past decade, whereas its numbers have grown dramatically. Conservative estimates in 2012 suggested there were 20 million artisanal miners worldwide. Up to 8 million people are directly employed in ASM in Africa. Artisanal miners mine high-value minerals such as gold and diamonds. Artisanal gold and diamond mining account for over 75% of national mining production in the Democratic Republic of Congo and Sierra Leone. Governments are challenged to provide a relevant legal framework, open the way to formalization, and establish basic standards of operation.

Focused on more integrated local economic development, in addition to the value of mining and metals in the global supply of critical materials and products, new cluster approaches explore innovative opportunities at the mining site level. It raises the prospect of an alternative business model – similar to industrial ecology – in which mining is clustered with fellow manufacturing and agricultural industries to support local economic development in a more integrated manner. This foresees a model that evolves from a core business centered around a core competence, to a clustering of activities that exploits all available local resources, generating multiple benefits for the mines, industrial partners, local communities as well as the environment. Examples include the development of ‘growth corridors’ by Mozambique and Liberia. This linkage agenda is part of the Africa Mining Vision.

Case Example: Arcelor Mittal in Liberia

Good practice for the extractive industries can relate to various impacts, in particular involving the policy and management areas highlighted by the UN in its *Environmental Guidelines for Mining Operations* (1998): regulatory frameworks; environmental impact assessments (EIAs); environmental management systems and conservation programs; environmental monitoring programs; environmental auditing; and enforcement. More complex are response programs that look beyond the mining site to address interactions with local ecosystems and economies. The case of ArcelorMittal Liberia is illustrative, addressing local biodiversity, ecosystems and developmental challenges. ArcelorMittal started new iron ore mining operations in Liberia at the end of 2011. Liberia has one of the richest seams of iron ore in Africa. However, some of the most accessible seams of ore are in the remote Nimba mountain range, which is one of the few remaining West African wet-zone forests, and home to many unique species and ecosystems.

In response, the company has initiated an extensive ecological study to build a solid basis for decision-making. This involved assembling a large team of specialists and partners from Liberia and neighboring countries, including the Liberian Forestry Development Authority as well as the NGOs Conservation International and Fauna and Flora International. Its stakeholder group has helped ArcelorMittal design an offset program to compensate for land lost to mining. The result was a commitment by ArcelorMittal to an annual budget of at least half a million USD per year during its four-year mining start-up phase, to be dedicated entirely to a biodiversity conservation program. Recently, ArcelorMittal established with its partners the Rural Integrated Center for Community Empowerment project, helping local farmers to introduce conservation farming and combat deforestation.

Suggested Policy Options

International reports¹ have made the following recommendations for improving the impact of the mining industry in West Africa, including action areas for governments, societal organizations and industry:

Pursue sustainable cluster development approaches: Governments –ministries of development and planning in particular– are encouraged to pursue an industry cluster and corridor development approach that advances sustainable use of natural resources.

Formalize artisanal and small-scale mining (ASM) enterprises: Formalization is a critical step towards organization and advancement of recognized environment, health, and safety standards.

Modernize and improve enforcement of relevant laws and regulations: Governments need to ensure that appropriate environmental regimes for mining are in place. This includes revised mining legislation and alignment of relevant requirements in resource extraction and environmental laws².

Strengthen interdepartmental collaboration: Avoiding contradictory policy directions and application of regulatory requirements is critical. Interdepartmental alignment is required from early planning and approval stage to eventual development and closure stages.

Ensure environmental impact assessments (EIAs) meet international standards and are appropriately applied: Governmental bodies need to ensure that EIAs that meet international standards are conducted effectively. This

includes ensuring that relevant professional skills are available for their completion.

Respect and conserve protected areas: This includes the protection of nature reserves, wilderness areas, national parks, natural monuments, and habitat or species management areas as defined by the IUCN, and staying out of agreed “no-go areas”.

Expand public participation and education on resource extraction and natural resources: Educational programs build an environmentally aware and informed public, ensuring public consultations are constructive and help to define win-win solutions. Meaningful public participation includes stakeholder engagement in impact assessments and responsible production initiatives.

Facilitate participation of local project developers in green market mechanisms: This includes international schemes such as Reducing Emissions from Deforestation and Forest Degradation (REDD+). These schemes facilitate payment for the use of ecosystem services.

Promote a supportive role by a responsible financial sector: Banks and insurers should be encouraged to employ good practice indicators. This also applies to export credit agencies and multi-lateral development banks.

Support and recognize the development of corporate social responsibility (CSR) programs by extractive industry companies: This includes good practices in the development of stewardship approaches and implementation of appropriate health, safety, and emergency preparedness initiatives.

Biodiversity Convention (CBD) Akwe-Kon Guidelines: www.cbd.int

Institute for Environment and Development: www.iied.org

Business & Biodiversity Offset Program: <http://bbop.forest-trends.org>

International Mine Water Association: www.imwa.info/index.php

Conservation International: www.conservation.org

Post Mining Alliance: www.postmining.org/index.php

Equator Principles: www.equator-principles.com

The Natural Resource Charter: <http://naturalresourcecharter.org>

Responsible Mining: www.frameworkforresponsiblemining.org

Integrated Biodiversity Assessment Tool: www.ibatforbusiness.org

UNEP: www.unep.org/resourceefficiency/Business

World Bank - Oil, Gas and Mining Unit: <http://web.worldbank.org>

Intergov Forum on Mining and SD: www.globaldialogue.info/intro_e.htm

World Conservation Union - IUCN: www.iucn.org International Council on Mining & Metals: www.icmm.com

World Resources Institute: www.wri.org

International Finance Corporation Standards: www1.ifc.org/wps

World Wildlife Fund: www.panda.org

¹Compare recommendations in UNECA. 2011. *Minerals and Africa's Development*:

The International Study Group Report on Africa's Mineral Regimes. Addis Ababa: United Nations Economic Commission for Africa.

²For improved enforcement, sufficient resources should be allocated to enforce environmental requirements. This includes use of autonomous bodies (e.g. councils, boards, associated with environmental authorities).