

# **Biological Review of Draft Environmental Impact Statement Akyem Project, Ghana**

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## **SUMMARY**

This document is a review of the biological aspects of the April 2008 Draft Environmental Impact Statement (DEIS) of the proposed Akyem gold mine in Eastern Ghana. The DEIS is an inadequate assessment of existing biodiversity in the Akyem project area and is not an acceptable documentation of probable environmental impacts of the proposed mine. Information in the DEIS and additional sources indicates that the environmental and social impacts of the proposed mine would be severe.

The DEIS fails to:

- consider all feasible project alternatives that will minimize biodiversity impacts, including mining outside of forest areas or outside of the Forest Reserve;
- adopt a precautionary and ecosystem approach, including evaluation of ecosystem services;
- properly document the presence of species of conservation concern in the area;
- adequately and accurately assess the impacts of project plans on ecosystem functions, habitat and forest cover (including accurately estimating forest cover outside of forest reserves), and species of conservation concern;
- present adequate plans for managing, monitoring, and mitigating biodiversity threats;
- respect the principle that biodiversity offsets should only be proposed after project approval and should not consider as offsets areas that will need mitigation because of the project.

Based on the DEIS and other available information on ecosystems, biodiversity, and socioeconomics of the area, and the project plans, impacts would likely be severe. Impacts would include:

- construction of an open-pit mine within a Forest Reserve, destroying over a quarter (70 ha) of the remaining forest in the Reserve and threatening the integrity of the larger protected area network;
- destruction of approximately 140 ha of semi-deciduous tropical forest and associated ecosystem functions and services (recognized in the DEIS only as 74 ha in the ABFR and “3-5ha (estimated)” outside the Reserve, in contradiction with the DEIS vegetation map);
- destruction of at least 75% of all forest patches (~70 ha) between the nearest borders of the Ajenjua Bepo Forest Reserve and the Mamang River Forest Reserve (based on the DEIS vegetation map);
- destruction of known or presumed habitat of at least 15 Vulnerable and one Endangered species of plants (incorrectly recognized as only seven Vulnerable species in the DEIS);
- destruction of the habitat of several species of katydids that are new to science (not recognized in the DEIS);
- destruction of known or presumed habitat of at least two Endangered species, two Vulnerable species, and many Near Threatened species of vertebrates; and
- probable increased hunting and indirect habitat destruction of species of conservation concern, including in the Mamang River Forest Reserve, as per the DEIS.

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## **I. Highlights of Impacts Noted in the Draft Environmental Impact Statement (DEIS)**

- Loss of forest and other habitat
- Loss of integrity of forest reserve
- Direct threat to at least 7-8 Vulnerable tree species
- Direct threat to at least four Near Threatened and two Endangered mammal species
- Direct threat to at least one Near Threatened and one Vulnerable bird species
- Direct threat to one Vulnerable turtle species
- Increased bush meat harvest (p.D2-3).
- Resettlement of Yayaaso and other villages (242 households, or 1,331 people)
- Loss of farms and livelihoods (additional 1,443 households, or 7,937 people)
- Explosion noise and vibrations
- Dust
- Destruction or removal of 18 sacred/heritage sites in the Mining Area, including royal burial sites
- Damage to nine archeological sites that exist in the Mining Area
- Destruction of at least two springs/seeps and draw down of community wells because of mine de-watering (p.D7-6)
- Transportation of sodium cyanide, lime, hydrochloric acid, and other toxic reagents from the coast, threatening communities along the roads.

## **II. Inadequate Considerations in the DEIS**

### **General Comments**

The Executive Summary lists “primary issues” but not a concise list of “primary impacts.”

The DEIS does not consider an adequately comprehensive set of project alternatives. The DEIS does not consider, for instance, (a) mining only outside of the Forest Reserves (this would mean a smaller mine but a large part of the open pit is already outside of the Reserves), or (b) not conducting activities in areas with forest. Failure to consider these alternatives violates the principle of seeking alternative solutions that minimize biodiversity loss as expressed in the Convention on Biological Diversity, the International Association for Impact Assessment, the Ramsar Convention, and other policies.<sup>1</sup>

The DEIS does not adopt the precautionary principle in its evaluation of biodiversity occurrence in the area and the threat to biodiversity represented by the project. Failure to adopt the precautionary approach violates international best practice in EIA.<sup>2</sup>

Mining in a protected Forest Reserve would decrease respect for Forest Reserves locally and nationwide by entities that may threaten forests and could threaten the entire Ghanaian protected area network.

Section D1, Direct, Indirect and Cumulative Impact Analysis:Flora is missing from the DEIS copies provided. Instead it is replaced with a second copy of D2, Direct, Indirect and Cumulative Impact Analysis:Fauna. We requested but did not receive the correct Section D1.

The Closure and Decommissioning Plan is inadequately detailed for evaluation. It fails to describe activities that would “ensure that the ... Plan for the site maintains or improves biodiversity of the mine area” (p. 8-2) and it seems highly unlikely that this is possible given the probable biodiversity impacts.

The DEIS fails to adequately take into account seasonal changes in water availability when evaluating the impact of water drawn from the river and electricity demand by the mine.

The DEIS does not adequately consider the climate impacts of the project in terms of energy use, and greenhouse gas production (from energy use and forest destruction).

The conclusion that “the primary socioeconomic impacts associated with the Project would be positive...” does not seem to compare short-term economic benefits with the many negative socio-economic and environmental impacts (which have socioeconomic consequences on the short and long-term) noted in the DEIS.

## **Biodiversity Considerations**

### *--General Biodiversity Considerations*

Major impacts on biodiversity and destruction of tropical forest should not be listed under impacts and issues as “Protection of endangered species” (p.4-4).

The Assessment of Impacts does not describe particular impacts on all of the species of conservation concern, particularly for the vertebrate species (p.4-5,4-6,D2-1,D2-2; see Fauna Considerations below). A thorough such an assessment must be part of any project that will impact habitat of IUCN Red List species.

Species of conservation concern that occur in the Ajenjua Bepo Forest Reserve (ABFR) or in the general area but may not occur (assuming surveys were adequate, which they were not) in the direct mine footprint zone will be affected by the mine and this is not adequately recognized in the DEIS. Because of the reduction in forest cover (and related reduction of forest and wildlife resources) and the projected influx of people and demand for resources in the area, hunters, wood-cutters, and cultivators will most likely increase their activities in the forest and mixed forest-cultivation areas outside of the mine footprint zone.

The Assessment of Impacts fails to adequately note the probable changes in ecosystem functions and services that will occur because of the project. This is an important consideration and the ecosystem approach should be a focus of EIS's.<sup>3</sup> The habitat destruction caused by the project will harm functions that include, in addition to the production of non-timber forest products mentioned in text:

- soil surface stability and soil processes
- moderated seasonal water surface flow
- forest-mediated precipitation and microclimate
- pollination of natural vegetation and crops
- fruit and seed dispersal of natural vegetation
- carbon storage

The DEIS also does not note the loss of credit that destruction of the forest in the Forest Reserve would incur under planned forest protection financial incentives planned under the UN Framework Convention on Climate Change and the successor to the Kyoto Protocol.

Biodiversity offsets should not be proposed as part of a DEIS for a project that has not yet received approval (p. ES-17). In addition, the proposed offset area of Mamang River is itself likely to be impacted by the project and so is a candidate for mitigation but not offsetting.

Monitoring does not include vegetation in pre-construction phase according to the impact statement but should. Quantifying forest cover and quality and habitat suitability before the development is essential. It is striking that the DEIS authors appear to not perceive a need for biodiversity, conservation management, and native plant restoration studies under the Monitoring Programmes section (p.6-3). Monitoring of biodiversity threats is not presented in sufficient detail in that section.

The provisional Environmental Management Plan topics do not include a plan for mitigating biodiversity impacts and these are insufficiently described in the Mitigation section. Given the presence of species of conservation concern, operation within a protected area, and extensive forest destruction, this oversight is unacceptable.

The description of the Existing Environment does not adequately describe the biodiversity of the Mamang River Forest Reserve. This area would be impacted by the project, particularly by the tailings facility, which overlays a stream that crosses the Mamang River F.R., and tailings facility road and by increased

resource demand and decreased forest supply in the area. Impacts on the Mamang River Forest Reserve mention increased population adjacent to the Reserve (p. D2-3) but fail to mention increased access provided by roads. Roads are a major driver of biodiversity loss from deforestation (for cultivation and timber) and hunting and the DEIS fails to adequately account for these impacts.

The study fails to adequately analyze the importance of connectivity between reserves in the larger region. The Ajenjua Bepo Forest Reserve sits between five other Forest Reserves and serves as an important island of forest guaranteeing dispersal between the other reserves. Destroying a large portion (over a quarter of the Ajenjua Bepo Forest Reserve forest surface area) of Ajenjua Bepo, and almost all forest between Ajenjua Bepo and Mamang River, has the potential to greatly reduce movement of species between forest patches that may be necessary for some species.

The DEIS fails to discuss climate change impacts that may already be occurring or that are projected to occur, or quantify ongoing deforestation, and how those might be aggravated by impacts from the mining.

#### --Forest Cover and Flora Considerations

The DEIS does not adequately discuss the proportion of forest remaining in Ajenjua Bepo that will be destroyed by the open pit (tables indicate it would be 74 of 255ha, or 30%). Instead, the DEIS states that the open pit will occupy 13% of the total Reserve (p.4-4); digitization of the map in the DEIS suggests that 13% is a slight underestimate and it fails to highlight the greater impact on forest area in the Reserve.

The report does not state methods used for vegetation cover analysis and the maps fail to include coordinate systems and information on projections used. These deficiencies make it difficult to assess and verify forest cover and other impacts spatially.

The DEIS greatly underestimates surface area of forest patches between the Ajenjua Bepo Forest Reserve and the Mamang River Forest Reserves that would be destroyed by the mine. Table 3-3 lists forest cover outside of the Forest Reserves as being only “3-5ha (estimated).” Digitizing the forest patches in the operation area between the Reserves on the Vegetation Cover Type Map in the DEIS suggests that the area of forest outside of Reserves that will be destroyed is approximately 70 ha, or approximately 75% of all forest patches remaining between the two Reserves.

The DEIS fails to highlight the value of the remaining forest patches between the Ajenjua Bepo Forest Reserve and the Mamang River Forest Reserve. These could be important for movement between the Forest Reserves for birds, bats, and some terrestrial mammals. It is unacceptable for the DEIS to state that “wildlife movement... has not been evaluated” but conclude that “obligate forest species would not likely leave the security of existing forest patches of forest to cross the matrix of habitats altered by agricultural, residential and industrial developments” (p.D2-2). The study also fails to highlight its own finding that even Vulnerable tree species persist in the forest-agricultural matrix (in “fallow areas and cocoa plantations;” p.3-11) that will be destroyed.

The DEIS fails to provide a list of plant species detected in the Ajenjua Bepo Forest Reserve and in the impact area and to name and explain the significance of the Black Star and Gold Star plant species, although it may be just lacking in our version that does not have Annex D1 (requested). The IUCN status of only the Scarlet Star species is reported even though the Black Star species *Berlinia occidentalis* is Vulnerable according to the IUCN.

Three, not one Gold Star listed species are present in the Ajenjua Bepo Forest Reserve according to one survey.<sup>4</sup> Two of these species, *Cussonia bancoensis* and *Placodiscus boya*, are both Vulnerable according to the IUCN.<sup>5</sup> The third, *Cola boxiana*, is Endangered.<sup>6</sup>

The DEIS fails to list five additional Scarlet Star tree species found in the Reserve: *Entandrophragma cylindricum*, *E. utile*, *Khaya anthotheca*, *K. ivorensis*, and *Nauclea diderrichii*; all of these are Vulnerable according to the IUCN.<sup>7</sup> The total number of Scarlet Star, Vulnerable species for the Reserve is therefore

13 and not the seven reported (p. 3-6, 3-8, 3-11). This is a serious misrepresentation of the occurrence of plants of conservation concern in the Reserve.

The Assessment of Impacts and Mitigation Measures sections fail to note the likelihood of expansion of invasive plant species noted in the Existing Environment and Monitoring (E-3) sections.

#### --Fauna Considerations

Survey effort is not quantified or even described in the DEIS for terrestrial species. Species occurrence data are based on multiple non-peer-reviewed studies that are not publicly available. The completeness of the surveys cannot be evaluated and the data can only be presumed incomplete in the absence of complete information on survey effort, including species accumulation curves. Preliminary reports from at least one survey indicate that survey effort was insufficient to represent the vertebrate assemblage adequately. For several taxa at most only one survey station was located in the part of the Ajenjua Bepo Forest Reserve that would be destroyed by the open pit.<sup>8</sup>

It is unclear from the DEIS if surface aquatic sampling, especially for fish and invertebrates, was conducted in project area streams or only on the larger or more distant rivers and waterways. Although such river survey sites may serve as a good baseline for changes that may occur to downstream points if mining occurs, it will not indicate the resources that would definitely be lost to the mining and this missing information is unacceptable. Concluding that the waterways are generally polluted falsely implies that water quality would not be lost to mining, and streams in the project limits may be of higher water quality than that of the larger waterways.

The cyanide management procedures do not eliminate the possibility that wildlife could come into contact with cyanide at the tailings pond.

Terrestrial invertebrates are inadequately represented in the Existing Environment and Assessment of Impacts sections, especially given the presence of several insect species (katydids) that are new to science.<sup>9</sup> Given the discovery of new species of katydids in the ABRF, failure to mention the potential destruction of the type localities and only known habitats of these species is alarming.

The statement that “Several rare and forest interior species of butterflies were identified in the ABRF however none are identified as having conservation concern” (p. 3-10) is misleading since species that are rare are necessarily of conservation concern.

Several details of the DEIS indicate inaccuracies or lack of biological expertise: amphibians are listed under the Reptiles title in the Existing Environment section (p.3-9 and 3-13); some species are listed under outdated genera names, and there are numerous errors made in listing of scientific names.

The status of several vertebrate species as species of conservation concern is ignored in the DEIS. The tree frog *Leptopelis occidentalis* is Near Threatened but not recognized as such in the DEIS.<sup>10</sup> The Brown-cheeked Hornbill (*Bycanistes cylindricus*), the Copper-tailed Glossy Starling (*Lamprotornis cupreocauda*), and the Gray Parrot (*Psittacus erithacus*) are Near Threatened but not recognized as such in the DEIS.<sup>11</sup> The Gray Parrot is also listed on Appendix II of CITES and not recognized as such in the DEIS.<sup>12</sup> These important omissions are unacceptable.

The DEIS fails to acknowledge the presence of the Copper-tailed Glossy Starling (*Lamprotornis cupreocauda*, Near Threatened) in the Ajenjua Bepo Forest Reserve (not just in the study area as indicated in the DEIS), as indicated in a published study of Ghanaian birds.<sup>13</sup>

The DEIS fails to note that the conservation status for most of the reptiles found in the area has apparently not been evaluated by the IUCN. These species could be potential Red List species but simply have not yet been evaluated.

The “Large Mammals” paragraph of the Ajenjua Bepo Existing Environment section (p. 3-9) fails to discuss the reported (Table C1-1 and C1-2) presence of the Endangered *Cercopithecus diana* in the Ajenjua Bepo Forest Reserve.

The statement that “No species of small mammals reported for the ABFR [or Study Area] are of conservation concern based on IUCN, CITES, or GWC criteria” (pp.3-10 and 3-14) is misleading because anomalures, or “flying squirrels,” and bats are generally considered small mammals and the DEIS includes the presence of Pel’s flying squirrel, *Anomalurus pelii*, at Ajenjua Bepo and Mamang River and other areas and it along with several of the bat species are of conservation concern according to their IUCN listing.

The paragraph on bats under the Ajenjua Bepo Existing Environment (p.3-10) fails to note the presence of the Endangered bat *Scotoonycteris ophiodon* in the Reserve (p.C1-7).

The statement that “No species [of bird] ranked by IUCN as of conservation concern have been identified in areas of the ABFR proposed for mine development”(pp. 3-10) is misleading. Survey effort in that section of the ABFR is unknown and could have been insufficient. In addition, several species of conservation concern occur in the ABFR and in nearby areas. The Copper-tailed Glossy Starling (*Lamprotornis cupreocauda*, Near Threatened) occurred in the Ajenjua Bepo Forest as late as 2000<sup>14</sup> and the Gray Parrot (*Psittacus erithacus*), recognized in the DEIS as occurring in the Ajenjua Bepo Forest Reserve, is Near Threatened. Several bird species of IUCN-ranked conservation concern (Green-tailed Bristlebill, *Bleda eximius*; Rufous-winged Illadopsis, *Illadopsis rufescens*; and Brown-cheeked Hornbill, *Bycanistes cylindricus*) also occur near the ABFR, as recognized in the DEIS. All of these species (a) most likely also use the forests of Ajenjua Bepo, including the area planned to become a mine, given their proximity and avian dispersal capabilities, and (b) would be affected by forest destruction in the ABFR and between the Reserves and by indirect impacts on Mamang River Forest Reserve.

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<sup>1</sup> Sixth Conference of the Parties to the Convention on Biological Diversity. 2002. Decision VI/7 and Guidelines for Incorporating Biodiversity-related Issues into Environmental Impact Assessment Legislation and/or Process and its Strategic Environmental Assessment.  
International Association for Impact Assessment. 2005. Biodiversity in Impact Assessment. Special Publication Series No. 3. [www.iaia.org/modx/assets/files/SP3.pdf](http://www.iaia.org/modx/assets/files/SP3.pdf)  
Ramsar Convention Secretariat. 2007. Impact assessment. Ramsar handbooks for the wise use of wetlands. 3<sup>rd</sup> Edition, vol. 13. Ramsar Convention Secretariat, Gland, Switzerland. 2007.  
US Council on Environmental Quality. 1993. Incorporating Biodiversity Considerations into Environmental Impact Analysis under the National Environmental Policy Act. Executive Office of the President, Washington, DC, USA.

<sup>2</sup> Sixth Conference of the Parties to the Convention on Biological Diversity. 2002. Decision VI/7 and Guidelines for Incorporating Biodiversity-related Issues into Environmental Impact Assessment Legislation and/or Process and its Strategic Environmental Assessment.  
International Association for Impact Assessment. 2005. Biodiversity in Impact Assessment. Special Publication Series No. 3. [www.iaia.org/modx/assets/files/SP3.pdf](http://www.iaia.org/modx/assets/files/SP3.pdf)  
Precautionary Principle. (<http://www.pprinciple.net/index.html>)  
Ramsar Convention Secretariat. 2007. Impact assessment. Ramsar handbooks for the wise use of wetlands. 3<sup>rd</sup> Edition, vol. 13. Ramsar Convention Secretariat, Gland, Switzerland. 2007.  
Canadian Environmental Assessment Agency. 1996. A Guide on Biodiversity and Environmental Assessment. Biodiversity Convention Office, Hull, Québec.

<sup>3</sup> Slootweg, R. & Kolhoff, A. 2003. A generic approach to integrate biodiversity considerations in screening and scoping in EIA. Environmental Impact Assessment Review 23:657-681.  
Sixth Conference of the Parties to the Convention on Biological Diversity. 2002. Decision VI/7 and Guidelines for Incorporating Biodiversity-related Issues into Environmental Impact Assessment Legislation and/or Process and its Strategic Environmental Assessment.  
Ramsar Convention Secretariat. 2007. Impact assessment. Ramsar handbooks for the wise use of wetlands. 3<sup>rd</sup> Edition, vol. 13. Ramsar Convention Secretariat, Gland, Switzerland. 2007.  
International Association for Impact Assessment. 2005. Biodiversity in Impact Assessment. Special Publication Series No. 3. [www.iaia.org/modx/assets/files/SP3.pdf](http://www.iaia.org/modx/assets/files/SP3.pdf)  
Canadian Environmental Assessment Agency. 1996. A Guide on Biodiversity and Environmental Assessment. Biodiversity Convention Office, Hull, Québec.

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US Council on Environmental Quality. 1993. Incorporating Biodiversity Considerations into Environmental Impact Analysis under the National Environmental Policy Act. Executive Office of the President, Washington, DC, USA.

<sup>4</sup> Conservation International – Ghana; Rapid Assessment Program. Unpublished Report. Preliminary report; Ajenjua Bepo & Mamang River Forest Reserves; RAP Survey; Ghana, West Africa; 24 August-4 September 2006.

<sup>5</sup> Conservation International – Ghana; Rapid Assessment Program. Unpublished Report. Preliminary report; Ajenjua Bepo & Mamang River Forest Reserves; RAP Survey; Ghana, West Africa; 24 August-4 September 2006.  
IUCN 2007. 2007 IUCN Red List of Threatened Species. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

<sup>6</sup> Conservation International. 2005. Biodiversity Assessment of Newmont’s Gold Mining Site at Agyenua Forest Reserve. As indicated on [http://newmontghana.com/index.php?Itemid=1&id=18&option=com\\_content&task=view](http://newmontghana.com/index.php?Itemid=1&id=18&option=com_content&task=view)  
Conservation International – Ghana; Rapid Assessment Program. Unpublished Report. Preliminary report; Ajenjua Bepo & Mamang River Forest Reserves; RAP Survey; Ghana, West Africa; 24 August-4 September 2006.

<sup>7</sup> Conservation International – Ghana; Rapid Assessment Program. Unpublished Report. Preliminary report; Ajenjua Bepo & Mamang River Forest Reserves; RAP Survey; Ghana, West Africa; 24 August-4 September 2006.  
IUCN 2007. 2007 IUCN Red List of Threatened Species. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

<sup>8</sup> Conservation International – Ghana; Rapid Assessment Program. Unpublished Report. Preliminary report; Ajenjua Bepo & Mamang River Forest Reserves; RAP Survey; Ghana, West Africa; 24 August-4 September 2006.

<sup>9</sup> Conservation International – Ghana; Rapid Assessment Program. Unpublished Report. Preliminary report; Ajenjua Bepo & Mamang River Forest Reserves; RAP Survey; Ghana, West Africa; 24 August-4 September 2006.

<sup>10</sup> IUCN 2007. 2007 IUCN Red List of Threatened Species. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

<sup>11</sup> IUCN 2007. 2007 IUCN Red List of Threatened Species. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

<sup>12</sup> <http://www.cites.org/eng/app/appendices.shtml>

<sup>13</sup> Beier, P., Van Drielen, M., & Kankam, B.O. 2002. Avifaunal collapse in West African forest fragments. *Conservation Biology* 16:1097-1111. Appendix: Species detected in each management unit. Accessed May 2008 at <http://oak.ucc.nau.edu/pb1/vitae/ghanabirds.htm>

<sup>14</sup> Beier, P., Van Drielen, M., & Kankam, B.O. 2002. Avifaunal collapse in West African forest fragments. *Conservation Biology* 16:1097-1111. Appendix: Species detected in each management unit. Accessed May 2008 at <http://oak.ucc.nau.edu/pb1/vitae/ghanabirds.htm>