

MINING SECTOR DEVELOPMENT IN WEST AFRICA

AND ITS IMPACT ON CONSERVATION



IUCN-West and Central African Protected Areas Programme

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AND ITS IMPACT ON CONSERVATION

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The "études du Papaco" (Papaco Studies) series offers documented analyses which aim to stimulate reflection and debate on the conservation of biodiversity in West and Central Africa.

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SUMMARY

Be it for ore extraction, transformation or transport, the extractive industries at all levels damage the environment. The degree to which they do so depends partly on the substance being mined and partly on the existing natural environment. The damage can include land clearance, loss of farming land, dust, chemical pollution and noise. The extractive industries also cause populations to migrate, whether it be local communities displaced from the mining site or people who flock to it to try to benefit from the direct or indirect economic effects. This human pressure also has an impact on wildlife but particularly plant life (timber felling to clear fields and for firewood).

Since the 1990s, the mining sector in West Africa has grown considerably, spurred on by attractive national mining policies on the one hand and high private sector investment from abroad on the other. This growth, encouraged and facilitated by international institutions, has led to the opening of a significant number of mines and oil fields and carries significant weight in GNP figures and export earnings.

The mining and oil laws passed between 1990 and 2003 focused on both the fiscal aspects (mining fees, contracts to ensure a share in oil production etc.) and on the management of mining licences (rules of attribution, preventing overlap of mining licences for a given substance). The environmental aspects were more or less ignored, leaving mining companies to comply with “good practice”. The mining sector as a whole was governed solely by the Ministry of Mines.

Since the 2000s, environmental laws have gradually developed, along with a realisation of the need to carry out Environmental Impact Assessments (EIA) for large industrial projects and to establish “environmental permits” prior to granting industrial mining licences.

In almost all West African countries, this has led to the setting up of inter-ministerial commissions responsible for examining mining licence applications and for overseeing impact studies: the Ministry of Mines is therefore no longer the only stakeholder and licences are granted jointly with the ministries of the Environment, Agriculture, Budget etc.

Unfortunately, EIAs are not systematically required for quarries which can cause environmental damage comparable to that caused by mines. While the broad outline of what an EIA should contain is usually specified by law, there are no specific guidelines for mining sector-specific EIAs or those where protected areas are involved. Furthermore, with a lack of mining environmental specialists, whether in the ministries responsible for the environment or for mines, the EIAs are seen by mining licence applicants more as an administrative formality than real studies, apart from a few large companies with sound environmental ethics.

These recent environmental laws encompass earlier regulations regarding forests and wildlife, which remain the essential laws governing how protected areas are managed. The original documentation for many of these protected areas dates from colonial times and has not been updated in line with regulatory developments.

The general finding of this study is that, overall, mining licences respect protected areas when the latter are clearly identified and mining pressures, if they exist, are mainly located on the periphery of these protected areas which rarely have a “buffer zone”. At the same time, all West African countries are trying to regulate and limit artisanal and small scale mining (for gold and diamonds) but such

activities are still carried out illegally in areas where mining is prohibited, in particular in protected areas.

The situation for the oil industry is even more worrying: blocks set aside for oil exploration pay no heed to protected areas. Although oil production today is mainly off-shore (which causes severe pollution particularly in the Gulf of Niger), future operations could be on-shore (Mali, Niger), polluting land ecosystems.

Recent structural changes in extractive industry operation attempt to give more consideration to the environment in general and to protected wildlife and plant life in particular. However, two major adjustments are required:

- The official status of protected areas, which were often created during the colonial period and have not kept up with regulatory changes, must be updated. This should also include a thorough evaluation of biodiversity in these areas: it is all the more difficult to protect conservation areas from the impact of industrial projects in that some of them have long since lost any flora or fauna worth conserving.
- Environmental impact studies for the extractive industries must be reinforced by making them compulsory for all activities (mines, quarries and oil fields) and by setting up an independent technical body with the required expertise to objectively assess these impact studies.

Collaboration between the government and mining companies can have a positive effect on the environment and biodiversity conservation provided that strategic land development plans are drawn up and that the government has the human and financial resources necessary to fulfil their regulatory role over mines and the environment.

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Glossary

1. Deposit: this is a concentration of minerals or metals that is high enough for mining to be economically viable. Viability depends on many economic and political factors; therefore an ore deposit can be viable one day and not the next. In this study, all economically viable or sub-economically viable concentrations are referred to as deposits.
2. Eviction: action to evict someone who does not have the legal right to be there.
3. Extractive industries: encompasses all industries that extract liquid or solid mineral resources, apart from water. This includes oil and natural gas, metals such as gold, silver, copper etc., fuels (uranium, coal, lignite), agricultural substances (phosphates) and construction and industrial materials (sand, gravel, solid or crushed rock, dimension stone etc.)
4. Mining District: an area whose boundaries are usually geologically defined in which there are many occurrences and/or deposits of a given substance. This does not mean that other deposits will be found, but the probability of finding new mineralisation is higher than outside these districts.
5. Mineral occurrence: this is the indication of the presence of mineralisation, that is to say a higher than normal concentration of one or more minerals or chemical elements. Occurrences are usually revealed during geological surveys or mineral resource inventories. A mineral occurrence in itself has no economic value.
6. Mining licence: any permit or authorisation to prospect or mine mineral resources (in some countries the term “mining licence” is reserved strictly for mining, and does not include prospection and exploration).
7. Prospect: “prospective” mining area, that is to say one where there is a high probability of finding a deposit.
8. Protected Areas: protected areas are areas of national land that are governed by certain specific rules, for instance all activity may be forbidden, hunting may be totally or partially prohibited, it may be forbidden to remove plants etc. The decision to “protect” an area is taken at national level (by-law or similar). Some of these areas can be recognised on an international level (UNESCO heritage for humanity, Important Bird areas – IBAs etc.). Details are given in Appendix I.
9. West Africa: for this study, West Africa consists in the 17 following countries: Mauritania, Cape Verde, Senegal, Gambia, Mali, Burkina Faso, Niger, Chad, Guinea-Bissau, Guinea, Liberia, Sierra Leone, Côte d’Ivoire, Ghana, Togo, Benin and Nigeria.

Acronyms

- a. **ASM:** Artisanal and small scale mining
- b. **CBD:** Convention on Biological Diversity
- c. **CEPF:** Critical Ecosystems Partnership Fund
- d. **CI:** Conservation International
- e. **ECOWAS:** Economic Community of West African States
- f. **EIA:** Environmental Impact assessment
- g. **EITI:** Extractive Industries Transparency Initiative
- h. **EMP:** Environmental Management Plan
- i. **EoH** (Enhance our Heritage Toolkit): for world heritage sites
- j. **GEF:** Global Environment Fund
- k. **GIS:** Geographical Information System
- l. **GPG:** Good Practice Guidance
- m. **IBA:** Important Bird Area
- n. **ICMM:** International Council on Mining & Metals
- o. **ICS:** Industries Chimiques du Sénégal (Chemical industries of Senegal)
- p. **IPA:** Important Plant Area
- q. **IUCN** International Union for the Conservation of Nature
- r. **METT** (Management Effectiveness Tracking Tool): IUCN methodology for individual protected areas
- s. **NGO:** Non-Governmental Organisation
- t. **OFINAP:** Office National des Aires Protégées (National bureau for protected areas)
- u. **PAPACO:** Programme Aires Protégées Afrique Centrale et Occidentale (West and Central Africa Protected Areas programme)
- v. **RAPPAM** (Rapid Assessment and Prioritization of Protected Areas Management): IUCN methodology for monitoring protected area management on a national scale
- w. **SNIM:** Société Nationale de l'Industrie Minérale (Mauritanian national mining industry company)
- x. **WAEMU:** West African Economic and Monetary Union
- y. **WDPA:** World Database on Protected Areas
- z. **WRI:** World Resources Institute
- aa. **WWF:** World Wide Foundation for nature

Foreword

The International Union for Conservation of Nature (IUCN) is an association whose mission is to influence, encourage and assist societies to conserve the integrity and diversity of nature and ensure that any use of natural resources is equitable and ecologically sustainable.

In West Africa the main, if not the only, industrial activity liable to have an impact on protected areas is the extractive industry in the widest sense of the term. Indeed, in order to fulfil their ecological role, protected areas are usually located at a good distance from agglomerations and therefore far from industrial zones. Only mines, due to local geological characteristics, are likely to be set up in the vicinity of protected areas.

In light of the sector's current development, due in particular to the very high price of many metals, it was considered important to take stock of the regulatory situation and to compile the data required to make an accurate assessment of the issues involved (cf. TORs appended).

The study commissioned by the IUCN does not take sides, either for mining or for protected areas ("mines destroy the environment" versus "protected areas hinder industrial development") but aims to examine synergies and divergences, whether on a regulatory level or in practice, in order to propose "win-win" solutions or ideas for improvement.

There are several angles from which the interaction between the extractive industries sector and that of nature conservation can be viewed:

- The actual impact of mining (whether within or outside protected areas): these impacts are known and have been studied and covered in international reports (US-EPA, ICMM, etc.). This study will focus on the main points concerning the industries that exist in the sub-region.
- The environmental management of these impacts: good practice guidelines abound in the extractive industries sector and EIAs have become a matter of course when requesting a mining licence. The emphasis will be placed on the implementation of these EIAs and different good practices, depending on the type of extractive industry.
- Spatial proximity of extractive industries and protected areas for nature conservation: the regulatory approach (what activities may or may not be carried out in the different protected areas, buffer zones, compliance) and the mapping approach based on the data gathered.

Methodology

This study required a great quantity of environmental and mining data, both regulatory and technical, to be gathered and analysed. Regulatory information is quite often available either directly on ministry internet sites, or from the ministries themselves. Mining data is more difficult to find and field trips were made to four countries of the sub-region (Burkina Faso, Senegal, Mali and Ghana) to gain more detailed information.

The countries were chosen on the basis of how developed their mining sectors are, on regulatory particularities and data accessibility (Guinea, which has the most mining activity, was not visited because of the restructuring underway following criticism of most mining concessions).

All the data gathered, whether on mining or the environment, were entered into a database and, insofar as possible, into a geographical information system (GIS). These documentary and mapping data are not exhaustive, giving just a snap-shot of a particular moment in time.

The Data:

The main difficulty in carrying out this study was gathering all the necessary data, i.e. data on mine locations, mining licences and mining occurrences that could at some stage become mines, the location and actual status of protected areas, the priority ecosystems for biodiversity, noted mining impacts etc.

- a. Ecoregions, ecosystems and biodiversity:
 - i. The WWF has put a map of the major ecoregions on line with lists of species (mainly vertebrates) present in these ecoregions. The data on the species can be downloaded however the maps are only available in image format. Nevertheless, all these data were obtained and transferred into the GIS.
 - ii. Many publications by scientific bodies, NGOs and international institutions describe biodiversity either on a national scale or for a specific zone (see bibliography)
- b. Protected Areas:
 - i. The WDPA (World Database on Protected Areas) is supposed to contain all information on protected areas. However, it is not always up to date and certain protected areas studied by IUCN are not mapped in the WDPA.
 - ii. The IUCN, through the RAPPAM, METT and EoH evaluations has data on a certain number of protected areas (those with a definite ecological value). Some protected area boundaries were traced geographically from maps or extracts of paper maps, to establish as comprehensive a database of protected areas as possible. In this case, the boundaries noted are subject to a certain degree of error.
 - iii. Regarding the exact status of protected areas, little information could be found. The protected areas monitored by the IUCN (RAPPAM and METT) were specifically studied because information was available, but their status is not necessarily clear.
 - iv. IBAs (Important Bird Areas) were also added, as well as WWF or CI biodiversity hotspots, to give an overview of important areas of biodiversity, even if in terms of national regulations these areas are not necessarily accorded a specific legal

status (see appendix for the criteria used to specify these zones). Birdlife International kindly provided the digital data on IBAs (upon closer examination, there are no IPAs in West Africa).

- v. Unfortunately, to our knowledge, there is no equivalent to the IBA for mammals or reptiles, apart from WWF data on the major ecoregions.
 - vi. Data from the World Resources Institute (WRI: <http://www.wri.org/>) were consulted, particularly those on “Intact High Conservation Value Areas”. The objective of these data is to show areas of high conservation value by cross referencing data from international biodiversity hotspots with those from Endemic Bird Areas, Frontier Forests and Global Ecoregion 200 areas. But the method used to combine these data was not specified, so they will only be used to show areas with a high biodiversity potential.
- c. Mining Data: there are essentially three types of mining data that can be used: inventories of deposits and occurrences, containing all the points of varying mineralisation; mining licence maps and; geological maps that can be extrapolated.
- i. Inventories: a considerable proportion of the data used comes from the “GIS Africa” project (2003) carried out in West Africa by BRGM and supported by WAEMU to map mineral deposits. These data have been supplemented by various other sources of information (websites, personal data and communication with mining companies). They are not necessarily geographically very precise, but give a reliable indication of the location of possible mineralisation.
 - ii. Mining licences: although in the public domain, this information is not directly accessible. It can usually be found in the national geological departments where it can be purchased (on paper or GIS format depending on the country). Mining licence maps change constantly and it is difficult to have completely up-to-date information.
 - iii. Certain economic data relating to the mining sector come from reports by the Extractive Industries Transparency Initiative (EITI), which is being set up in most countries (website: www.eiti.org). Unfortunately, the data for many countries is still incomplete and the most recent documents usually date from 2005 to 2007.
 - iv. Geological data: several geological maps have been drawn up on a West African scale; a certain number of national maps are accessible on the Internet. In this study, a simplified geological map belonging to the consultant was used.

References for all the documentation used are given in the appendices and the data base provided with this report contains a large number of these documents in digital form.

At the beginning of the study, a large number of mining companies, state institutions and NGOs were contacted by mail to try to find missing data. Apart from Guinea and Togo, no replies to these requests were received and the majority of the data was gathered directly from contacts during the field visits.

Approach:

Studying the impact of the extractive industries on the conservation of biodiversity requires a thorough understanding of the source of the impact (the mines) and of the target (biodiversity areas). As there is no uniform data on biodiversity for the whole region, the impacts were studied by taking into account both known protected areas and areas recognised as being important for biodiversity, whether or not they have legal protected status.

These impacts were examined from three different angles:

- A summary of environmental risks specific to each type of mining activity
- A study of reported pressures and threats on protected areas, whether from IUCN studies or other research
- A mapping analysis of possible interaction between protected areas or biodiversity hotspots and mining districts.

All the data and information were gathered into a database and a GIS so that they could easily be used again, to refine and update the data.

The data were then analysed to determine the weaknesses in the overall management of extractive industries as regards environmental protection and the threats they pose to biodiversity. The specific aspects for each country are given in detail Appendix VI, while the report itself presents the generic aspects.

Limits and limitations:

Not all the information was able to be gathered for all the countries covered by the study, that is to say the 17 countries of West Africa (Table 2). This is unfortunate as the more detailed the information on the mining context (exhaustive lists of licences and mineral occurrences), the easier it is to detect impact risks. Likewise, the more detailed the study of protected areas, the more their ecological particularities and hence their vulnerability can be understood. The main limitation is therefore the inconsistency of the data available.

IUCN Country	WDPA	RAPPAM	Mining inventory	Mining Cadaster	EITI
Benin	Yes	No	Yes	Yes	No
Burkina Faso	Yes	Yes	Yes	Yes	Candidate
Cape Verde	Yes	No	No	No	No
Chad	Yes	Yes	Partial	No data	Candidate
Côte d'Ivoire	Yes	Yes	Yes	Yes	Candidate
Gambia	Yes	No	Partial	No data	No
Ghana	Yes	Yes	Yes	Yes	Compliant
Guinea	Yes	Yes	Yes	Yes	Candidate
Guinea-Bissau	Yes	Yes	Yes	No	No
Liberia	Yes	No	Partial	Partial	Compliant
Mali	Yes	Yes	Yes	Yes	Candidate
Mauritania	Yes	Yes	Yes	Yes	Candidate
Niger	Yes	Yes	Yes	Yes	Compliant
Nigeria	Yes	No	Partial	No data	Compliant
Sierra Leone	Yes	No	Partial	Yes	Candidate
Togo	Yes	Yes	Yes	Partial	Candidate
Senegal	Yes	No	Yes	Yes	No

Table 1: National metadata available

The data on mineral occurrences and licences help to outline the main mining **districts**, i.e. the areas where there is a higher likelihood than elsewhere of finding an economically viable deposit. This does not mean that a deposit will definitely be found there, nor does it exclude the possibility of finding a deposit outside the district. Therefore great care needs to be taken in using these data.

This report is just part of the study results. The maps and databases produced have been submitted to the IUCN in digital form so that they can continue to be used. The data and interpretations are the consultant's own and cannot be used for any other purposes than this study.

PART I: The Extractive Industry Sector

I.1. Introduction

The term “extractive industries”, covers diverse activities that have very different impacts in environmental and economic terms. To monitor regulations in all the countries, the sector can be divided into three categories:

1. The Oil Industry, governed by an oil law, which is always separate from the mining law,
2. Quarries (raw materials for construction and road building, as well as fertilisers, substances used in the ceramics industry and other similar substances with the exception of phosphates, nitrates, alkaline salts and other salts).
3. The Mining sector¹ itself, covering all other substances.

The following categories are usually identified in the mining sector:

1. Artisanal mining, mostly for gold and diamonds,
2. Semi-industrial mines or “small-scale mines”: many countries have attempted to develop this type of mining activity, both to try to structure artisanal activities into small operations and to open the sector up to national investment. Such mines are for gold, but also phosphate and heavy metals or semi-precious stones. In the English-speaking countries (Ghana, Liberia and Sierra Leone) such operations are usually grouped under the term “Artisanal and Small Scale Mining (ASM).
3. Industrial mines, within which the following can be distinguished from an economic and environmental point of view:
 - a. Precious metals and gemstones (gold, diamonds): ores are exploited at low concentrations (around a few grams to a few tens of grams per tonne), and processed on-site. While not yet mined, rare earth elements and associated metals (Nb, Ta, Li etc.) are classified in this category. Uranium is also one of the substances mined at very low concentrations (a few ‰). For all these operations, almost all the rocks excavated remain on site.
 - b. “Heavy metals” (iron, bauxite, manganese): ores with high concentrations (several tens of %) are transported as they are (or after minimal enrichment on site), to a mining port or, if necessary, to an industrial zone where they are transformed². Mining requires specific transport infrastructure (railways).
 - c. Other substances in between the first two which, in West Africa, concern mainly phosphate (concentrations between 20 and 30% are mined, either being transported

¹ NB: The distinction made between mines and quarries is due to the fact that quarries are not seen to be separate from the land therefore they are governed by property laws, while mining rights override land rights. This distinction, introduced by the Napoleonic code of 1810, is now obsolete, given that few individuals mine on their own land and that even if this were to be the case, they must request authorisation to do so.

Nonetheless, this distinction exists in all the countries studied and it is worth noting that the laws governing quarries are generally much less restrictive in terms of environmental studies than mining laws.

² Few of the countries studied process heavy metals themselves. In Mauritania the SNIM converts a very small quantity of iron ore and in Guinea there are two factories for converting bauxite into aluminium. The rest of the ore is exported and processed abroad.

or processed on site). Base metals (copper, lead, zinc) are also in this intermediary group, despite being mined at lower concentrations of around several per cent. There is currently a copper mine (associated with gold) in Akjoujt, Mauritania, and a zinc exploration project in Burkina Faso (Perkoa deposit).

I.2 Mineral resource distribution

The distribution of mineral resources is directly linked to the geological history of the region. In general, there are:

- All the sedimentary basins in which oil, limestone (cement), gypsum (plaster) and phosphates can be found
- What are termed basement complexes (made up igneous or metamorphic rock, mainly from the Archaean and Birimian ages), which could contain gold, diamonds, copper, zinc, iron, manganese, bauxite or uranium.

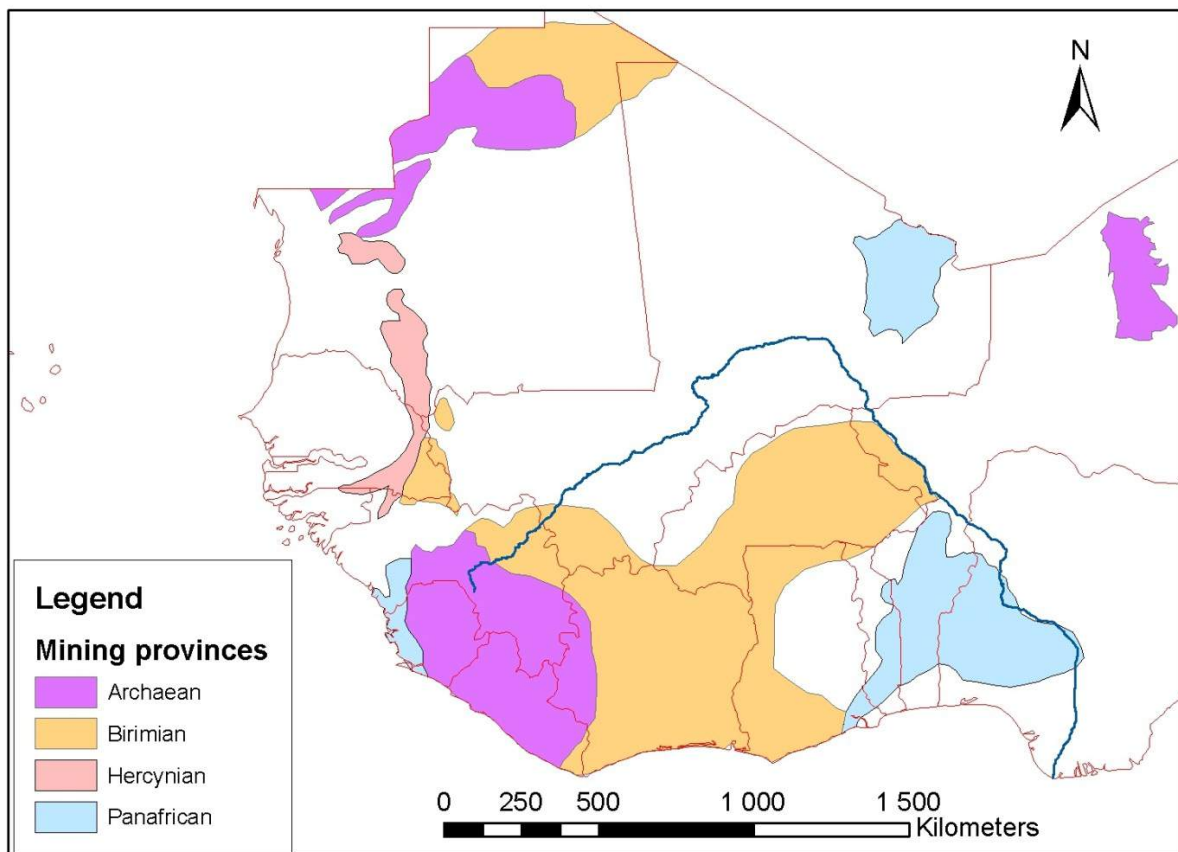


Figure 1: Main geological sequences in West Africa.

The main sedimentary basins are:

- The coastal Senegalese-Mauritanian basin
- The Taoudenit Basin (Mali-Mauritania)
- The Lullemeden Basin (Niger, Nigeria and eastern fringe of Mali)

This is a general distinction and it should not be forgotten that sedimentary basins can also contain base metal (Cu, Pb, Zn) and uranium mineralisation. As it happens, these basins are still under-explored and apart from a few uranium permits, there is little prospecting in these areas.

The countries studied have unequal quantities of mineral resources (cf. Figure 2). A country like Burkina Faso, 90% of which is basement rock, is unlikely to see the oil industry develop within its borders, while Guinea Bissau, which is only 5% basement complex, is unlikely to become a major gold producer. The surface area covered by mining licences (Table 2) illustrates this disparity.

However, this approach is too simplistic. Mali is in majority made up of sedimentary basin, but is the second largest gold producer in West Africa, just behind Ghana. This is due to cultural and historical factors: ancestral tradition of artisanal mining in Guinea and Mali, government efforts to develop the sector etc.

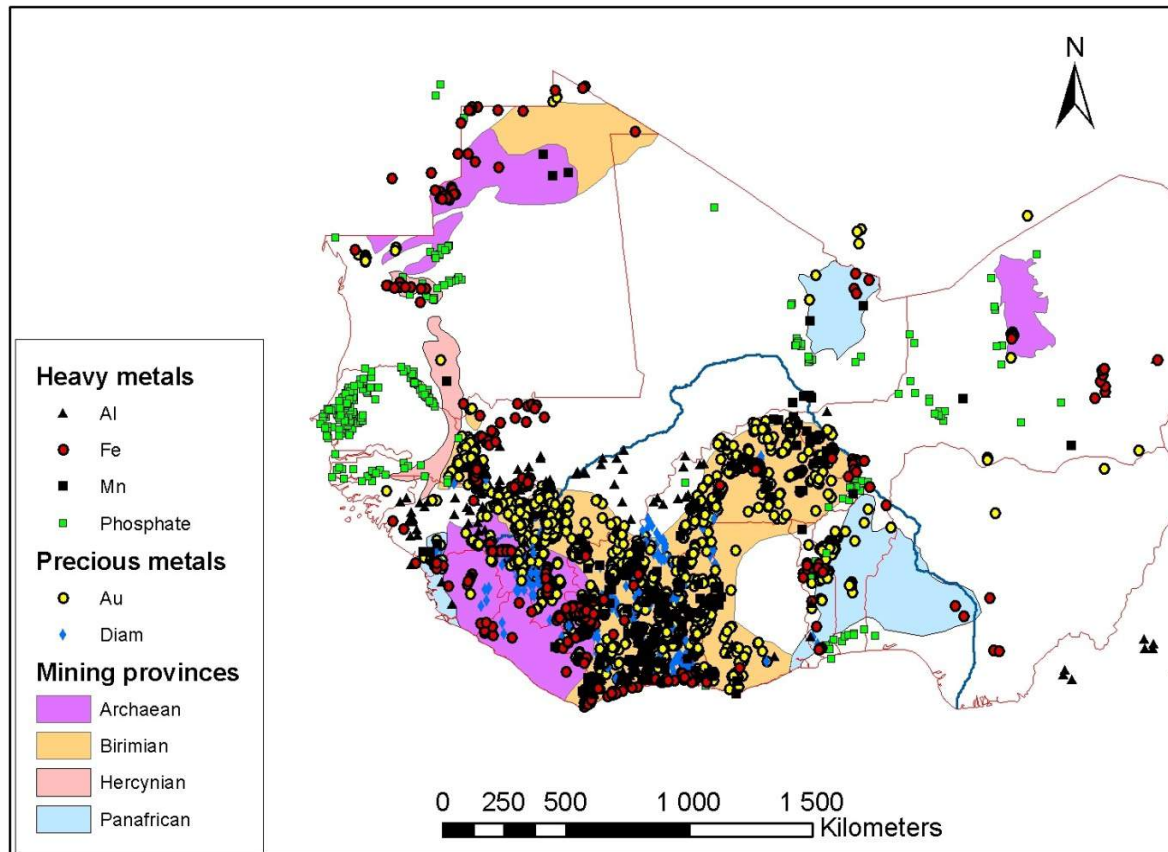


Figure 2: Distribution of some types of mineralisation according to the geological substratum.

The area with the highest mining potential is therefore all of Burkina Faso – Ghana – Côte d'Ivoire – Guinea – Liberia – Sierra Leone³ and the Mali – Guinea and Mali – Senegal borders. This is partially shown by national coverage in mining licences (Table 2).

These figures, although unfortunately not among the indicators used by organisations such as the World Bank, speak for themselves in terms of mining pressure on the environment. When more than 60% of the national territory is taken up with mining activities, this leaves little room for conservation areas.

³ The data concerning Liberia and Sierra Leone are incomplete, due to a lack of information.

Country	Surface Area km ²	Surface area covered by mining licences	% of the country covered by mining licences	Comments
Burkina Faso	274 200	80 260	29	
Ghana	238 540	62 720	27	
Guinea	245 860	155 260	63	
Liberia	97 754	47 710	48	Approximation
Mali	1 241 238	172 233	14	
Mauritania	1 027 000	120 247	12	Excluding iron ore licences
Senegal	196 720	25 000	8	
Sierra Leone	71 710	12 173	17	Approximation
Togo	56 785	6 994	12	

Table 2: Surface areas covered by mining licences (actual surface area corrected for overlap) in a few countries.

Gold is undoubtedly the largest mineral resource in West Africa. This has been known for many years (see the history of Kankan Moussa, King of the Malian empire from 1312 to 1332, who brought so much gold on his pilgrimage to Mecca that it devalued this precious metal for about ten years). More recently (since the 1980s), considerable investment has been made in gold exploration, with well-known success.

When gold is present, artisanal gold mining develops. Since ancient times gold has been the source of artisanal and cultural practices (for instance among the Lobi people, only women search for gold) and certain countries such as Guinea have always had large populations of artisanal gold miners. In countries like Burkina, artisanal mining had diminished considerably until the droughts of the 1970s which forced many people to find alternative sources of revenues to farming.

The other main substances mined besides construction and road-building materials are diamonds (Liberia and Guinea), iron ore (Mauritania and Guinea), bauxite (Guinea), phosphate (Senegal and Togo) and Uranium (Niger). Base metal mining is not very developed apart from copper in Akjoujt in Mauritania and the zinc project in Burkina Faso, the opening of which is constantly being delayed.

For several years now, even if there are no concrete results yet, certain mining companies in West Africa have been turning to other substances: manganese, lithium and zircon. One of the obstacles encountered by mining companies is the lack of infrastructure, particularly for substances like manganese, iron ore or bauxite, which can only be transported by train to ore shipping ports. Transport costs are the main factor holding back the development of many known deposits.

In the coming years, it is highly probable that iron ore, bauxite and manganese mines will be extended, and that niobium, lithium, tantalum and even platinum mines will appear. The field of solid fuels could also emerge in the near future, both to reduce countries' dependency on oil and to reduce the pressure on woodlands (the main domestic fuel outside of large agglomerations remains, by far, wood and charcoal). Coal is already mined in Niger and, in an ironic geological twist, fuels the uranium mines. Senegal is examining the extraction of peat from coastal zones (mainly around Dakar and along the coast between Dakar and St. Louis) as a substitute for firewood and Niger, in the context of the WAEMU PDER programme (development of renewable energies), has carried out feasibility studies on charcoal briquettes as a domestic fuel. Reticence regarding these initiatives stems from the fact that peat areas are often fragile ecosystems and the coal is usually of poor quality and contains a large number of impurities which endanger air quality.

I.3: Mining Licences

1.3.1: General Principles

In French-speaking countries all mining laws are based on the same single principle: mineral substances belong to the government, which can, through a mining licence, concede exploration and/or mining rights to a private company.

In other words, the government has no legal obligation to grant a mining licence and is free to grant them to whom it wishes and where it wishes.

In English-speaking countries, the basic principle is different *“the land owner owns the subsoil, that is to say he owns the mineral substances contained in the subsoil within the area over which he holds the property rights”* (Bandoki, 2008). In practice, this does not make much difference because *“land ownership rights can only be restricted if the mineral substances discovered are of strategic interest to the State. Frequently, government authorities adopt laws or regulations that list the mineral substances that due to their strategic nature within the context of the government’s mining policy engender a forfeit of private mining operations”* (Bandoki, 2008). Furthermore, Ghana modified its constitution in 1992 declaring that all minerals in their natural state are property of the Ghanaian Government (see Appendix VI – Ghana).

Mining licences are:

1. Permits for prospection or exploration (some countries distinguish between the two, the latter corresponding to a stage further on than the former)
2. Mining permits (sometimes a distinction is made between “small mines” and “large mines”)
3. Quarrying authorisation (with a distinction made between temporary and permanent quarries)
4. Artisanal and Small scale Mining (ASM)

For the most part, mining licences are “exclusive authorisations”, that is to say only the holder of the licence can look for or mine a given substance or group of substances. Therefore, they are managed via a mining cadaster, the main objective of which is to prevent the licences from overlapping.

While almost all the countries have an (almost) up-to-date mining cadaster, there are few exhaustive lists of quarries. For many countries, authorisation to open a quarry can be granted by the local authorities and it is almost impossible to list them all. This should not hide the fact that certain quarries can have considerable environmental impact.

1.3.2: Attributing Mining Licences

In general, there are two ways to obtain a mining licence: either the government opens a mining area via a call for tender (when there is a specific area the government wishes to develop for mining; this is fairly rare), or the mining company submits an application for an area that it is interested in. In this case, the main role of the mining cadaster is to check that the area is clear of all other mining licences (or that existing mining licences are compatible with the requested licence when the mining law allows for overlap among mining licences) and that the request does not concern an area where mining is forbidden.

There are three types of area where mining is forbidden:

- it is usually forbidden to prospect or mine in the vicinity of houses, places of worship, train lines or military zones. A minimum distance is set (between 100m and 1km),
- within a mining licence area, the government is able to exclude an area for social, environmental, aesthetic or strategic reasons etc. (provisions are made in almost all mining laws but it would seem these are never actually applied),
- areas exclusively reserved for another use.

The final category is rarely very clear, but it encompasses protected areas with often varying interpretations. There are various different possibilities:

- Either, a simple reference to other laws, which specify whether a given activity is permitted (this is the case in Ghana),
- Or the mining law clearly specifies excluded zones (for instance in Burkina, mining licences cannot be granted for environmental protection areas. However, in the interpretation of the texts, pastoral reserves are not considered to be protected areas but areas for “rational exploitation of pastoral resources” and mining licences are granted here),
- Or custom has it that mining licences are not granted in a given type of protected area (case of Mali where the mining law does not impose any restrictions but since 2008, following discussions between the Water and Forestry Ministry and the Mining Directorate, classified forests are taken into account),
- Or there are no provisions whatsoever either in the mining laws or the environmental laws (as is the case in Mauritania for instance).

Certain legal difficulties exist in many of the countries: environmental or forestry laws refer to “land usage rights”, while by their very nature, mining laws override land rights. A mining licence holder is therefore not affected by land rights.

In all the aforementioned cases, problems arise due to the boundary lines of protected areas and a lack of collaboration between mining authorities and those responsible for protected areas. The maps used for mining cadasters are rarely up-to-date and no longer show the current situation of protected areas.

Depending on the type of mining licence requested, the granting authority may differ: in general, “authorisations” (for mining or to open a quarry⁴) are managed by the Ministry of Mines and “licences” (exploration licences and mining licences) are granted by the Council of Ministers.

In all cases, the different mining laws and procedures set up in the past ten years have the same general basis: an *ad hoc* commission must be set up before the granting of any mining licences. This commission is usually made up of representatives from the Ministries of Mines, the Environment, Planning and Finance. In some countries this commission only meets for mining licences, in others all types of licence are concerned.

These measures help to ensure licences are not granted for areas that are protected or about to become protected or that are part of an environmental project. In the case of dispute, the matter is resolved by the council of ministers. Unfortunately, it would appear that in a certain number of cases this commission does not function as intended, as its members do not always have the necessary technical expertise.

⁴ In the general context of decentralisation, in several countries the Ministry specifies areas reserved for quarries, and the local authorities are responsible for granting mining licences.

1.3.3: The different types of mines in West Africa

The mining sector, although governed by a single law imposing the same rights and obligations on everyone, encompasses a wide variety of activities:

1. Artisanal mining, mainly concerning gold, but also certain semi-precious stones, diamonds and sometimes heavy metals (zircon, rutile) and, more rarely, uranium.
2. Mining of what are termed heavy metal ores, which in West Africa are mainly iron ore and bauxite (considerable quantities of these ores need to be transported as they are exported and refined abroad in the case of West Africa). Manganese can be included in this category. Exploration and mining of these substances in West Africa is mainly carried out by international mining companies with significant government participation.
3. Phosphates, which despite being used to improve land fertility are covered by mining laws and not those pertaining to quarries, constitute a specific group. In light of the different countries' objectives for agricultural production, the use of fertilisers, if possible national ones, is growing sharply and little heed is paid to the environmental impacts of either mining or the spreading of not completely purified products.
4. Energy sources: in West Africa this mainly concerns uranium, although in Niger peat is also extracted to fuel a thermal power station.
5. Gold, West Africa's flagship substance since ancient times which, due to its price, is the centre of attention. Besides artisanal mining, gold exploration and mining are carried out by listed international companies (many of which are Canadian in West Africa, but also Australian): Iamgold, Cluff Mining, Semafo, RandGold, GoldFields, Etruscan, etc.
6. There is currently little mining of base metals (copper, lead, zinc).

There are generally two types of licence for quarries: temporary quarries (open cast quarries for a specific purpose such as the construction of a road) and permanent quarries which include the following:

1. "Raw" materials: sand, gravel, aggregates, dimension stone etc. used without major processing. As a general rule these materials are extracted near to where they will be used, that is to say on the outskirts of urban centres.
2. Materials that require processing: gypsum (plaster) and limestone for cement. In many West African countries, these substances are far from omnipresent and quarries are opened where the geology is the most favourable (note that most of these countries import cement).

I.4 Current macro-economic aspects of the sector

After the colonial period and a subsequent nationalisation of the mining sector which did not generate the expected results, most African states, the World Bank and the European Union recognised at the beginning of the 1990s that the mining sector was the only realistic option for short-term development in a region lacking in skilled labour, providing it was entrusted to the private sector (OECD, 2002).

Thus the World Bank instigated a development strategy based on two principles:

- The high-risk investments that are exploration and mining should be made by the private sector (foreign direct investment and local investment)
- Governments must minimise the geological, political and economic risks by managing the attribution of mining licences and by setting up environmental management policies.

The financing mechanisms set up for geological and mining infrastructure (mapping, databanks, and mining cadasters) and revision of mining law have indeed enabled the sector to develop considerably since the 1990s with a large number of mines being opened.

Despite the fact that most West African countries have joined the EITI, it is fairly difficult to find consistent overall macro-economic data from one country to the next.

In the geographical context of the current study, the following classifications can be considered:

1. Oil producing countries (with mines): Nigeria (10th largest global producer), Mauritania, Côte d'Ivoire, Chad, Ghana since late 2010 and Niger (underway). La Sierra Leone would be a small producer.
2. Mining countries (without oil): Mali, Burkina, Togo, Senegal, Liberia
3. Non-mining countries: Guinea-Bissau, Benin

		Contribution of mining sector to GNP	Contribution of mining sector to export income	Contribution of the oil sector to export income
Burkina	2006	0.7%		
	2009	2.8%	41%	
Mali	2006	15%	70%	
Ghana	2006	12%		
	2005		35.1%	
Guinea	2004		74%	
	2005		86%	
Togo	2008	4.8%		
Mauritania	2006		25%	58%
Niger	2008	15%		

Table 3: Macro-economic contribution of the mining sector

Note that in Niger the uranium sector represented 82% and 84% of State mining revenues respectively in 2005 and 2006. Gold, held by the company SML (*Société des mines de Liptako*) only represents 15% and 12% for these same two years. The main mining company is AREVA, with a turnover of €9 104 million in 2010, in other words 2.5 times the GNP of Niger.

Unfortunately, there are no simple figures on employment in the mining sector. The data must be gathered from mining company reports which cannot be cross-checked.

		Direct Jobs	Indirect Jobs	
Mali	All gold mines	6085		2008 figures
	Loulo	1430		2009
	Morila	1750		2009
	Syama	300		2009
Burkina	Mana	350	600	2009
	Essakane	800		2010
Senegal	Sabodala	430		2010
Mauritania	SNIM	4600		2010

Table 4: Mines and jobs

In explanation of the figures given above, or rather the figures not given above, it should be noted that no quantitative data is available on the economic impact or the impact on employment of the oil industry or of quarries, and certainly not on that of artisanal mines.

Artisanal and small scale mining remains, in many countries like Guinea, Mali, Burkina and Côte d'Ivoire, the largest “employer” in the mining sector: 200 000 to 400 000 people in Burkina and one million in Guinea.

On a national level, industrial mines generate several thousand salaried jobs, which is far from negligible. Although well behind the public sector, these jobs, which are usually reasonably well paid and largely located outside the main towns, have a significant social impact: one salary in the bush will provide a living for 10 to 15 people. There are therefore indirect effects on the villages surrounding mines: development of trade but also population growth with all the associated effects (increased crops, firewood, hunting etc.). Detailed socio-economic studies should be carried out in order to better understand these aspects.

I.5: Mining companies and other stakeholders:

1.5.1: Who are these mining companies?

According to all mining laws, any person properly registered in the Trade Register can hold a mining licence. Although certain exploration licences belong to local individuals or small national companies, the majority of these licences and all mining licences are held by:

1. International mining companies (Anglogold Ashanti, Randgold, Iamgold, Avneel, AREVA, Etruscan, Gold Fields, Shield Mining, Rio Tinto, etc.). In West Africa, these international mining companies are mainly Canadian or Australian.
2. State or para-statal companies (*Société Nationale de l'Industrie Minérale* - SNIM in Mauritania, *société pour le Développement Minier* – SODEMI in Côte d'Ivoire, *Compagnie Sénégalaise des Phosphates de Taïba* – CSPT and *Industrie Chimique du Sénégal* – ICS, *Société Nationale des Phosphates du Togo* – SNPT, etc.)
3. The government itself: 10 to 20% of the capital of local mining companies

Generally speaking, state or para-statal companies work in the fields of bauxite, phosphate and iron ore mining, and very little in gold mining. They are left over from the post-colonial period when the mining sector was mainly nationalised. These companies are sometimes veritable “states within a state”. To take just one example, the SNIM, second largest employer after the Mauritanian government (which has a 78% stake in the company), has a turnover of around 15 to 20% of the national budget.

Quarries are usually owned by small national companies, often with more commercial than mining expertise. Very closely tied to the local construction or road building market, they are often close to political spheres.

The large mining companies that are listed on the stock exchange are obliged to project a “good environmental” image and all have internal codes of conduct and ISO 9000 and ISO 14000 certification. They also know that public disclosure of a highly negative environmental impact would have a direct impact on their share prices. Small national companies however, are relatively less concerned by these aspects.

All mining companies show deep concern for environmental and social issues, over and above the legal requirements and the environmental management plan set up at the beginning of the project and there is considerable reforestation, prohibition of hunting, electrification, construction of schools, health centres, water sources etc. Some mining companies have their own foundation for rural development and environmental protection (see Part III).

1.5.2: Oil Companies

The oil sector exclusively concerns international companies given the scale of financial investment required to find and produce oil. Contrary to mining sector practices, oil licences are granted for areas (called “blocks”) specified by the government and attributed via a call for tender. When a block is granted, an agreement is signed specifying the rules for sharing production or fees as well as all environmental obligations.

The overall structure of oil exploration and production activities is as follows: a public body contractually assigns an international oil company the right to explore and/or produce. This public body automatically holds x%, the government is either paid in cash or receives part of the petrol produced.

1.5.3: Other sector stakeholders

- Sub-contractors (surveying companies, public works, maintenance and logistics sub-contractors)
- Consulting firms responsible for the EIAs. These are either national firms that are recognised or certified by the government, or international firms.
- Local employees: managers and workers
- Civil society: villages, associations and NGOs
- “Artisanal miners” mostly for gold (artisanal gold mining) or for diamonds (artisanal mining of diamonds), although there are artisanal mines in other fields (river or beach sand, semi-precious stones etc.).

The problem posed by these artisans is two-fold:

1. They mine illegally, without a licence, therefore potentially in protected areas,
2. They mine “unprofessionally”, i.e. not complying with state of the art and giving no consideration to the environment. When a gold mining site begins producing, artisanal miners flock in their hundreds or even thousands to hitherto uninhabited areas.

“Civil society” stakeholders in mining activities, besides the village associations, the following can be noted:

1. An economic aspect, with in particular a coalition of more than 600 NGOs from around the world, brought together since 2002 under the banner “Publish What You Pay” (PWYP), fighting for all multinational companies and public enterprises to publish the annual figures they pay to governments, and to make them accessible to civil society *“because more than half of the poorest populations in the world live in the countries that are richest in natural resources - oil, gas and minerals such as gold, copper, diamonds and uranium. This is the paradox of plenty: the secrecy surrounding revenues from exploitation of these resources fuels corruption. Poverty, poor governance and economic failure are the three pillars of the resource curse”*. The PWYP coalition demands that the figures be checked by independent organisations. The campaign targets in particular the World Bank, the IMF, stock exchange authorities and commercial banks, so

that they will press both the extractive industry and the producing countries to give priority to revenue transparency requirements over confidentiality clauses.

2. NGOs working in local development and trying to use the wealth generated by the extractive industry to set up sustainable development activities. In West Africa the best known one is OXFAM, which brings together around ten other NGOs working at national level, but there are also ENDA, ORCADE, La Lumière, Guamina, etc.

1.5.4: Financial power plays

Given that the turnover of a multinational mining or oil company is higher than the national budget (the annual turnover of AREVA to quote just one example, is 6 times higher than the national budget of Burkina Faso), it is easy to understand how difficult it is for the governments to oppose a given mining project for social or ecological reasons. Their discretionary right to reject an exploration or mining licence application does not stand up well to the immediate economic pressure. Corruption aside, the lure of earnings over several years representing several percentage points of the GNP is understandable for indebted countries constantly in need of liquidities to pay their civil servants.

The “mining sector curse”, “resource curse” or the “paradox of plenty” to use the phrases well-worn by the press, are based on the fact that some of the richest countries in terms of mineral wealth also have the highest levels of poverty. At the same time, all environmental analysts and international environmental conventions agree that poverty is the primary cause of environmental and biodiversity degradation. To clarify this general finding somewhat, note that:

1. The extractive industries, as seen above, contribute significantly to national revenues,
2. The profits recorded by a mine should not overshadow the years and millions in investment required to discover and develop the deposits. Clearly it is profitable (otherwise there would be considerably fewer mining companies), however the financial risks taken by these companies should not be overlooked. During the exploration phase the annual investment is several million to several tens of millions of dollars depending on what stage the project is at, and around 500 million dollars must be invested to open a mine.

The whole problem lies in who assumes the risk: governments, which are the legal owners or holders of the mineral resources, do not have the financial resources to explore and develop the mines. The investments and the risks are therefore “sub-contracted” to the private sector which assumes all of them but which, if a discovery is made, shares a part of the profits with the government.

1.6: The environmental impacts of the extractive industries

A general analysis of the impacts of the mining sector can be found in the Good Practice Guide published by the ICMM in 2006:

“Mining has the potential to affect biodiversity throughout the life cycle of a project, both directly and indirectly. Direct or primary impacts from mining can result from any activity that involves land clearance (such as access road construction, exploration drilling, overburden stripping or tailings impoundment construction) or direct discharges to water bodies (riverine tailings disposal, for instance, or tailings impoundment releases) or the air (such as dusts or smelter emissions).

Indirect or secondary impacts can result from social or environmental changes induced by mining operations and are often harder to identify immediately. Cumulative impacts occur where mining projects are developed in environments that are influenced by other projects, both mining and nonmining.

The potential for significant impacts is greater when mining occurs in remote, environmentally or socially sensitive areas. Due to the continuing demand for minerals, the depletion of resources in

readily accessible areas and changing technologies and economics in the mining sector, mining is increasingly being proposed in remote and biodiversity-rich ecosystems that were previously unexplored and undeveloped for minerals. This has also been made possible by the implementation of mining sector fiscal and regulatory reforms to encourage foreign direct investment in many developing countries. This trend in opening up new prospective areas to mineral resources development provides an opportunity for the mining industry to demonstrate that practices have improved, including making 'no-go' decisions. It can also represent a threat, however, and poor performance could limit access to some highly prospective areas.

Despite the significant potential for negative impacts on biodiversity from mining operations, there is a great deal that companies can do to minimize or prevent such impacts in areas identified as being appropriate for mining. There are also many opportunities for companies to enhance biodiversity conservation within their areas of operations. Being proactive in the assessment and management of biodiversity is important not only for new operations but also for those that have been operating for many years, usually under regulatory requirements that were less focused on the protection and enhancement of biodiversity.

It is also important to recognize that not all mining takes place in remote or highly sensitive areas. Some greenfield or expansion projects will be developed in relatively highly populated areas, industrial settings or regions that have been intensively farmed for many decades, where biodiversity is of limited value. This will become apparent after a modest investment of effort to establish the biodiversity context of a proposed project. In such situations, the focus should be on developing a sufficient understanding of local biodiversity and exploring opportunities for biodiversity enhancement or creative conservation with appropriate partners."

The impacts of extractive industries on conservation areas must be envisaged according to two very different aspects:

1. Either it concerns legal activities, authorised in compliance with national regulations and validated by the national authorities,
2. Or it concerns illegal, undeclared activities. These activities mainly concern artisanal gold mining, diamond mining, certain quarries (sand and gravel in particular) and a few rarer cases of illegal artisanal mining of uranium and zircon. Artisanal gold mining is by far the most frequent illegal activity in West Africa, concerning several thousand people.

Today, artisanal gold miners work both alluvial (in water courses) and primary (quartz veins) operations and often use mercury or even cyanide to extract the gold. Attempts to control these "informal" activities have met with little success (WAEMU workshop in 2008).

These artisanal gold mining activities may be carried out in ecologically fragile areas or even in protected areas. Even if the volumes extracted are minimal in comparison with industrial mines, the number of people working on the site, the lack of technical equipment, and the lack of planning can have significant effects on the environment: soil erosion, deforestation, loss of habitat for animals, water turbidity and chemical pollution.

There are many more legal mining activities, and the issues are quite different. Like all industrial activity, mining has an impact on the environment. These impacts are normally foreseen in the EIAs, which have been compulsory in all mining laws of the sub-region for many years now. Depending on the country and the scale of operations, these may be impact assessment notices or environmental impact studies. Whichever the case, these documents must be validated by the national authorities (environmental discharge) before the licence can be granted.

Furthermore, all national legislation specifies areas where mining activities are prohibited, in particular protected areas. This may be formally written in law or, in certain cases, the different competent authorities must confer to exclude a given zone. Total reserves or national parks are, according to environmental law, zones where industrial activity is prohibited.

The impacts should therefore usually be known and managed as well as possible from the outset of mining projects. Therefore, any serious damage to the environment may be due to:

1. Problems in licence attribution (licences attributed when the impact study should have prevented its attribution),
2. An unrealistic impact study (effects minimised), which should not have received its environmental discharge,
3. Failure by the operator to comply with the environmental management plan and/or mining activity control faults,
4. Accidents, such as rupture of a dyke, which are not foreseen or provided for in the feasibility study or environmental impact study. This is the aspect most dreaded by local communities, particularly following the accidents of Baia Mare (Romania 2000) and Aznacollar (Spain 1998).

Environmental impacts on protected areas can be seen in the following cases:

1. Licences are attributed within the scope of a protected area,
2. A licence is attributed on the border of a protected area but the environmental impacts are underestimated or mining activities are poorly managed,
3. Normal mining activities are carried out on the border of a protected area but the protected area is too sensitive or does not have a suitable buffer zone.

Pragmatically speaking, and only taking into account the extractive industries present in West Africa or the ones that are likely to start operations in the coming years, the main mining impacts to be monitored can be classified as follows:

1. Exploration: this is a phase that lasts from 1 to 5 years, sometimes slightly longer. The different stages are:
 - a. Soil sampling: in wooded areas, this stage can require opening of access routes to enable prospectors to pass through. The impact is minimal and does not usually involve tree felling.
 - b. Geophysical prospection: if electric methods are used, lines are must be cleared in wooded areas to lay the cables. Transects are created just to enable people to pass through on foot.
 - c. Seismic methods (only for oil exploration): in this case, regularly spaced tracks must be opened up to enable trucks to pass through, hence more land is cleared and the seismic measurements can cause disturbing vibrations.
 - d. Digging of trenches: this requires tracks to be opened up to let the machines through (bulldozers and mechanical diggers) therefore trees are cut down and small areas are cleared (on average around 1000 to 5000m of trenches one metre wide are dug, so a maximum of 5000m² are cleared). Good practice guides recommend setting the arable land to one side, so it can be used to refill the trenches as soon as the samples have been taken, to limit potential dangers over time (risk of animals falling in the trenches). A trench sampling campaign takes several weeks, during which the noise can disturb animals.
 - e. Drill sampling: as for the trenches, access tracks must be created for the drills and drilling platforms must be constructed (an area of around 200m²). A drilling campaign can last from a few weeks to a few months. The main impact is the noise that can disturb animals.
2. Mining: apart from two gold mines that are partly underground, all West African mines are open cast. The size of the pits and the mine tailings vary greatly depending on the

substance mined. The table below gives a general idea of volumes handled and of pit sizes:

Substance	Annual volume excavated	Total volume excavated	End size of pit	Volume of tailings
Gold	2 to 5 Mt	20 to 100 Mt	5 to 30 ha	20 to 100 Mt
Iron ore and bauxite	10 to 20 Mt	500 to 1000 Mt	200 to 500 ha	200 to 400 Mt
Phosphate	1 to 20 Mt	50 to 200 Mt	50 to 200 ha	20 to 100 Mt
Crushed rock quarry	0.2 to 0.6 Mt	< 10 Mt	< 10 ha	
Gypsum quarry	0.1 to 0.2 Mt	< 5Mt	< 10 ha	

Table 5: Surface area and volume of main types of mine or quarry (on average, 1Mt corresponds to 0.4 Mm³)

3. Transformation:

- a. Grinding and crushing: in almost all operations the ore goes through a granulometric reduction phase before chemical processing or transport. Grinding and crushing mainly generate large quantities of dust.
- b. Ore processing: in West Africa, the main installations for processing mineral ores are for:
 - i. Gold: processing with cyanide in heaps or vats. The major risk is that one of the dykes supporting the basins may rupture, or that a basin may leak, discharging cyanide and metals (As, Cd, Pb, Se etc.) into the environment.
 - ii. Phosphate when it is transformed into phosphoric acid: the processing of phosphate produces waste containing metals such as cadmium, lead and uranium.
 - iii. Bauxite, when it is transformed into aluminium (for the moment, there are no plants in West Africa that can produce aluminium). The only plants are in Guinea (Kamsar town and port). The manufacturing of aluminium generates waste discharged into the air; mainly SO₂ and fluorides.

4. Mining camps: accommodation for several hundred people requiring infrastructure to manage solid waste and waste water.
5. Life around a mine: traders, villages, sub-contractors. This aspect of the impact is very difficult to quantify and no specific figures are available. The installation of industrial activities usually causes a rise in the surrounding population, resulting in greater human pressure on firewood and farmland. The greatest impact is probably more social than environmental, with significant changes in social structure: creation of salaried jobs, increased trade to the detriment of staple food crop production.
6. Transport and export: for the mining of heavy metals, transport is a fundamental factor and many deposits are not yet mined because of the cost of constructing the necessary railway infrastructure: in Mauritania, the SNIM maintains 600km of railways to export its iron ore. No fewer than ten quarries operate along the tracks purely to maintain them. In Guinea, the Mount Nimba iron ore mine project will need more than 1000km of tracks to be constructed and 750km of tracks are planned for the Falémé (Senegal) iron ore project. Besides the direct impact of the laying of these tracks, the economic, social and environmental impacts are considerable, hundreds of jobs will be created and hitherto untouched areas will be opened up. The railways lead to the mineral port or bulk carrier, where the ore is loaded for export. These ports, due to their size and the volume of ore

handled, can constitute black spots for coastal and marine ecosystems (discharge of oil, ore etc. along the coast and into the water).

Precious metals	Gold, Diamonds	Small volumes, air transport	The annual production of a mine is counted in tonnes or tens of tonnes. All ore is processed on site.
Heavy metals	Iron ore, bauxite, manganese	Large volumes, rail transport	Thousands to millions of tonnes are transported from the mine to the port (in West Africa very little processing is carried out on site; the ore is sold in bulk).
Quarries	Sand, gravel, crushed rock	Average volumes, usually transported by road	Trucks of 10 to 20 T go back and forth between the quarry and towns.
Oil		Pipelines	Impact along the pipelines, risks of leaks.

Table 6: Mining and transport

A few examples from international publications

1. CEPF - Critical Ecosystem Partnership Fund (French Development Agency, Conservation International, Global Environment Fund)

Both small-scale and industrial mining pose serious threats to the remaining tropical rainforests of the Guinean Hotspots, most of which are located on substrates rich in iron ore, diamonds, gold and bauxite. Large-scale mining is a particular concern in mountainous areas, such as Mount Nimba, where deposits of iron ore and bauxite are common and can severely affect freshwater systems and regional watersheds. Small-scale extraction of diamonds and gold poses threats to biodiversity through forest clearance and associated bush meat hunting.

2. Revue Enviro2B-Environnement & Société dated 4/01/2011

Following the rupture of an ExxonMobil oil pipeline on 1 May 2010, 4 million litres of crude oil flowed into the Niger delta for a week before the leak could be fixed. The coastline was polluted by thick oil cakes, causing significant damage for the already poor local inhabitants. This was just one of many accidents that are gradually wearing down a population that gains no benefit from this phenomenal wealth, but has to suffer it in their daily lives.

3. Amnesty international

The extent of the pollution and environmental damage has never been properly assessed. Existing figures vary considerably depending on the source, but hundreds of leaks occur each year. According to the UNDP, more than 6 800 oil spills were recorded between 1976 and 2001. According to the National Oil Spill Detection and Response Agency, in March 2008 in the Niger delta, at least 2000 sites needed to be cleaned up following oil-related pollution. The actual number may be much higher.

4. Aboubakar Hermann OUEDRAOGO (Médiaterre)

The artisanal mining sector plays a significant role in Burkina Faso's economy. Indeed, gold is the third largest export product and contributes to the balance of payments. Artisanal mining is carried out on more than 200 sites and generates income for more than 200 000 people living mainly in rural areas. This activity constitutes an effective means of reducing poverty. However, it also has enormous disadvantages, particularly for human health, but also for the environment and natural resources. It also carries social consequences.

Note that artisanal mining contributes to deforestation, soil degradation, air pollution from dust and carbon monoxide, ground and water pollution by used engine oil and chemical products (used batteries containing manganese or lead thrown into the bottom of a well), the loss of biodiversity, deterioration of landscape etc.

It has been shown that for each gram of gold obtained by amalgamation, around two grams of mercury escape into the surrounding environment, directly polluting the ground and water, not to mention the gases inhaled by the miners and their entourage.

PART II: Protected Areas and Biodiversity in West Africa

II.1 Overview

West Africa can be divided into five main bioclimatic zones which are, from North to South:

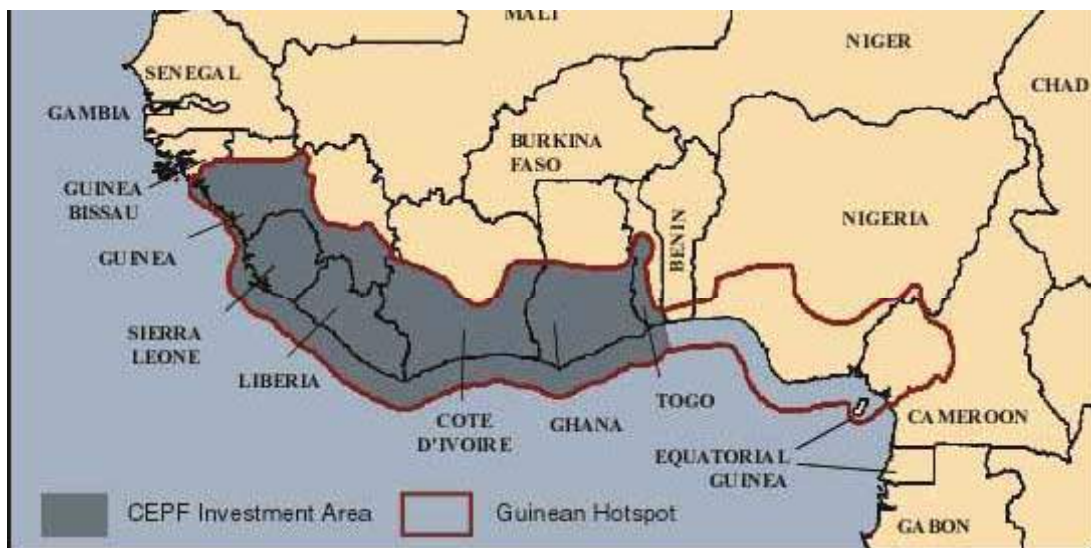
- Sahara zone (North Mali and North Mauritania)
- Sahel zone
- Sudanese zone (Acacia Savannah)
- Forest-Savannah mosaic
- Forest zone, known as Guinean zone, in which certain specific mountain zones can be found.

The tropical Guinean forest (which encompasses a large part of the coasts of Guinea, Sierra Leone, Liberia, Côte d'Ivoire and Ghana, certain continental forests such as the Fouta-Djalon in Guinea and some landscapes of Togo and Benin) is recognised as being one of the most important biodiversity hotspots in the world.

In addition there are coastal zones (mangrove swamps, estuaries and coastal sand dunes) and some continental tropical zones such as the Niger River bend in Mali and Lake Chad.

Critical Ecosystem Partnership Fund (CEPF)

"In terms of original extent, the Guinean Forest hotspot ranks fifth among the 25 hotspots identified by Conservation International. Its ranking rises to fourth when only the area still intact is measured.



Levels of faunal diversity and endemism in the Guinean Forests are also impressive. Mammalian diversity, with 551 species, ranks first among the world's 25 hotspots and represents almost half of the 1,150 mammals that are native to continental Africa. Of the Guinean Forests' 551 mammals, 45 (8%) are endemic, a global ranking of 13th in terms of number."

Box 1: The Guinean Forest Priority Area.

The WWF has listed the animal species found in these major climatic zones (the lists can be downloaded from the WWF website). These lists give a good indication of wildlife but are not useful on a mining basin scale.

Several countries have divided their territory into different ecoregions, eco-districts or phyto-districts. Working at this scale is more compatible with the objectives of the mining study but unfortunately the data are highly disparate. The example of the ecoregions in Ghana, Togo and Benin (Figure 3) shows this clearly: ecoregions are defined differently from one country to the next, are not in line with the main bioclimatic zones described above and accessibility of information regarding the flora and fauna varies greatly.

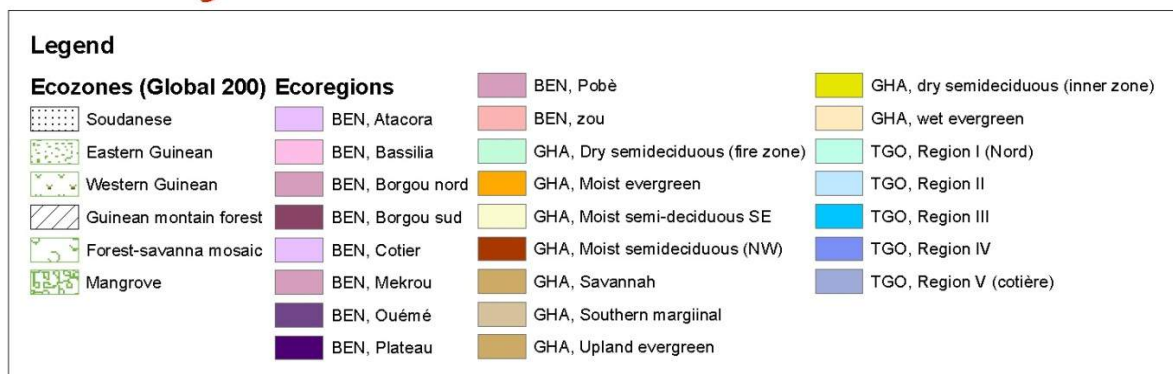
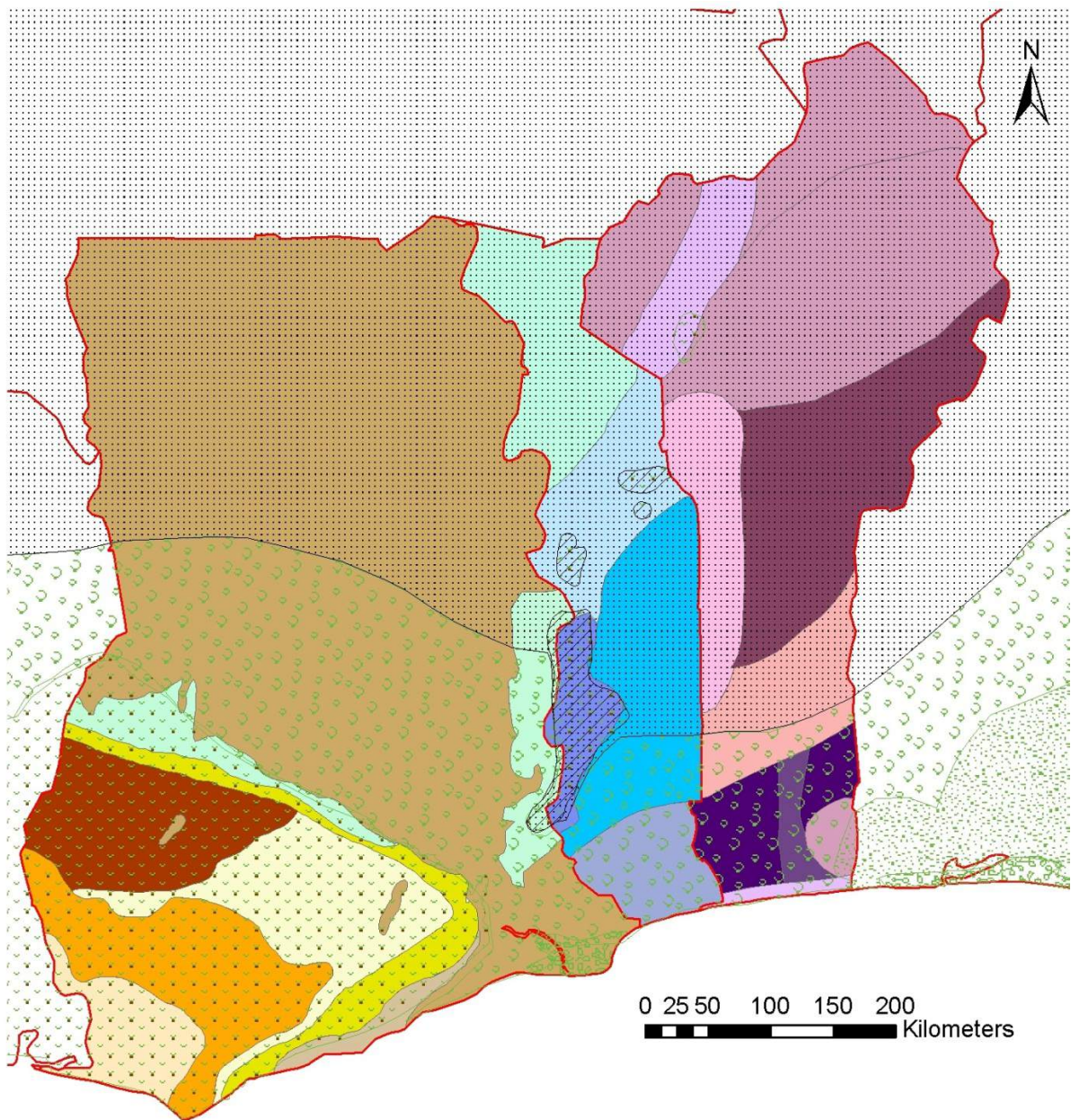


Figure 3: Ecoregions in Benin, Ghana and Togo

II.2 Protected Areas and Biodiversity Areas

II.2.1: Biodiversity Areas

Various international or national studies have identified important areas for biodiversity: around thirty are in the Guinean forest zone⁵ other rarer ones are in Savannah areas or the Sahel region. Regardless of their legal status (protected, about to become protected or not protected), these areas were taken into account in this study to estimate the sensitivity of the zone to potential mining impacts. The data from WWF West African Marine Ecoregion Programme (WAMER), Wetlands International etc were summarised.

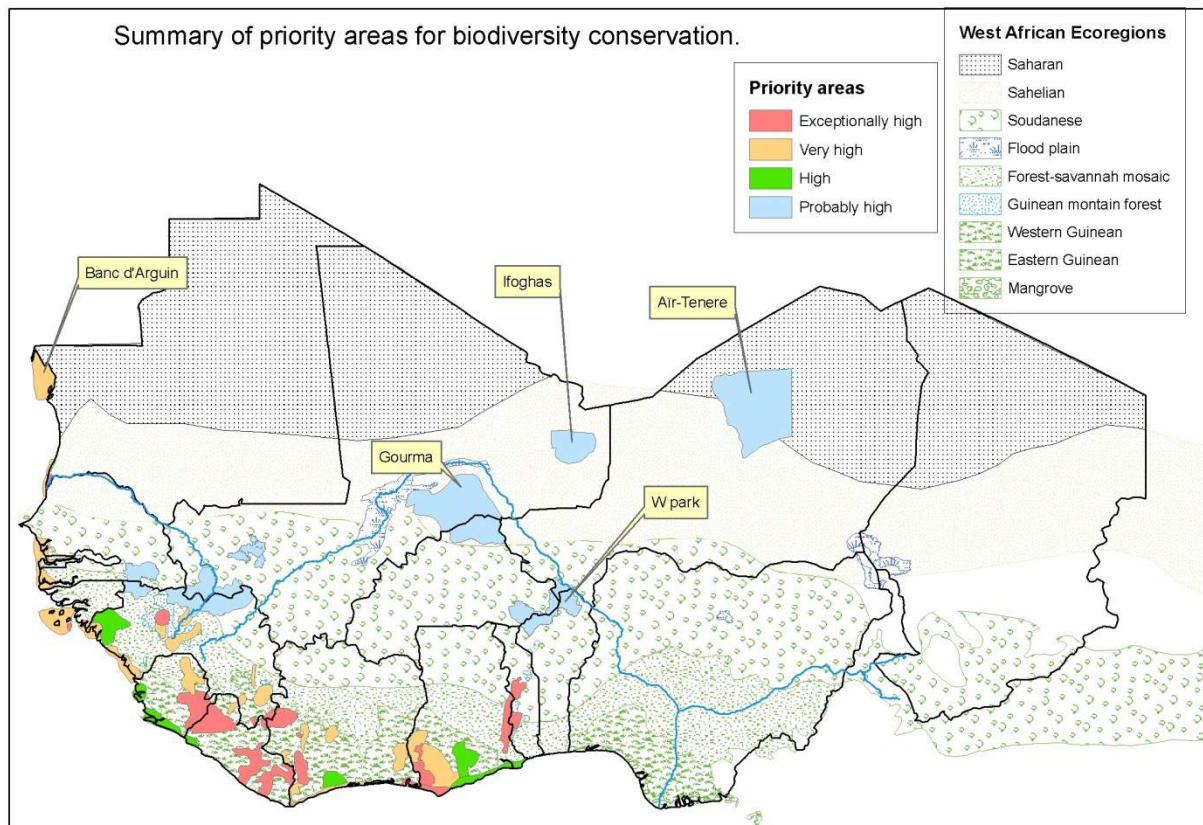


Figure 4: Ecoregions and conservation protected areas.

252 Important Bird Areas (IBA) have been identified in the area covered by this study, the majority of which are located in the coastal countries, but some are to be found right up to the north of Mali and Mauritania.

⁵ Specific diversity is clearly given priority in these approaches. The Guinean forest has the highest number of species, which means it is the top priority for conservation. Ecosystems lacking in species variety such as the Saharan zones are relegated to the background, and yet they can contain very specific ecosystems and species.

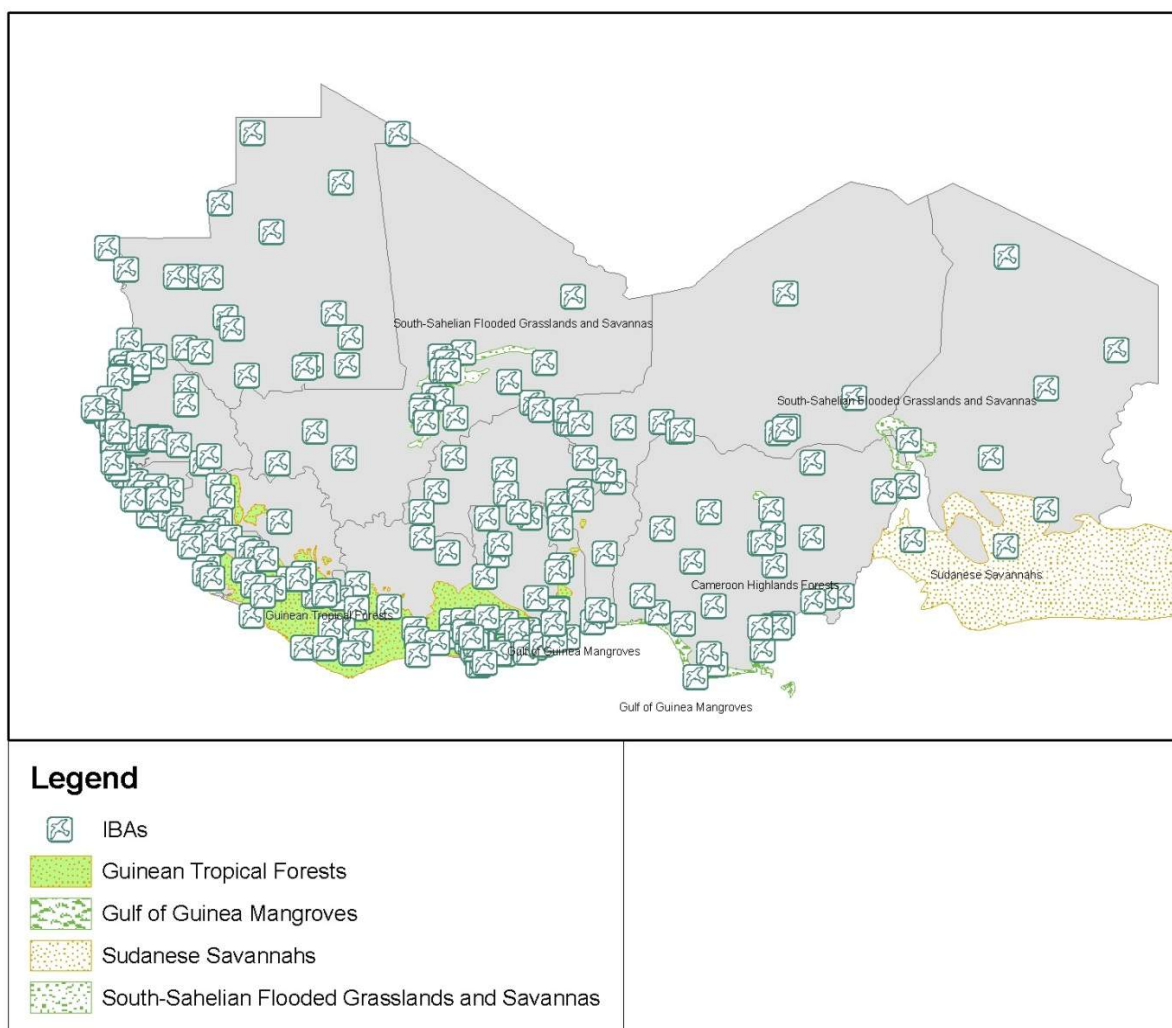


Figure 5: Distribution of IBAs in West Africa.

II.2.2: Protected Areas

Each country has its own regulations in terms of protected areas, sometimes using different terms⁶. The following terms will be used here:

- a. National park: strict flora and fauna reserves, in which only controlled tourism activities are permitted.
- b. Strict or partial wildlife reserves: areas to protect wildlife in general or certain specific species. Hunting, pastoral activities and timber felling are regulated in these reserves.
- c. Classified forests or protected forests: they represent the largest number of protected areas in the study. Many of them date back to the 1930s or 50s, but the protection or classification laws and regulations are not always accessible. Depending on the case, agriculture, pastoral activities, timber felling etc. can be prohibited or controlled.
- d. Pastoral areas: areas aiming at the rational use of resources to ensure their renewal. These are areas where pastoral activities are authorised but the clearing or cutting

⁶ Not all these areas are necessarily recognised as protected areas according to IUCN definitions (guidelines for protected area management categories, 2008) which recognise strict nature reserves, nature zones, national parks, natural monuments, habitat or species management areas, protected land or marine landscapes and natural resource management protected areas.

down of trees are not. They are intended to maintain woody vegetation rather than to protect specific species.

Depending on the country, these different areas can also be governed by different laws: forestry act, wildlife management act, hunting act or environment act. As a general rule, these laws give priority to wildlife and forest protection over the protection of arid ecosystems.

As well as these national areas there are internationally identified zones classified either under the Ramsar Convention (wetlands for the protection of birdlife), or by UNESCO (world heritage for humanity).

Depending on the country, and often within the same country, the activities that are authorised or forbidden in the different protected areas are either “generic”, that is to say stem from the rights and restrictions specified by law, or “specific”, meaning they are stipulated in the administrative act by which the protected area in question was created.

A large proportion of the protected areas in West Africa were created during colonisation, well before the current environment, hunting or forestry laws were passed. The original documentation for these areas, when it is still available, is rarely updated in line with regulatory changes, which means that the two are often incompatible. There is also the issue of “usage”: some protected areas (and even certain “national parks”) are “considered as such” but have no legal foundation.

Detailed maps of protected areas are also limited because they are not kept up to date either. It is common to read in the original documentation: “the northern boundary is defined by the track between village X and village Y”, while the location of the track could have changed considerably since the 1950s. In many cases, project promoters or mining authorities look at boundaries marked on topographical maps to ensure that they are not encroaching on a protected area. These topographical maps are not updated very often either.

Upon comparison with the World Database for Protected Areas (WDPA), significant discrepancies can be noted between the geographical boundaries and the status of these areas given by the government and that given by the IUCN.

If governed by national law; management of protected areas is often delegated to public or private structures (public establishments, associations, NGOs, private hunting companies etc.). It should be noted that many areas that are termed protected do not actually benefit from any protection or management and their importance in terms of biodiversity is often questionable.

II.3 Knowledge of biodiversity and endangered species

Overall, there is little quantitative information on biodiversity in West African countries. Country reports can be found, as can reports on a given protected area, but they tend to merely list the species present rather than give specific population numbers, and these lists are not necessarily exhaustive. Knowledge of biodiversity is generally limited to the diversity of species in a few specific areas. However, BirdLife International has set up a database of important bird areas, so that the species potentially present in any given area are known. There is no equivalent for other wildlife or for plant life. This lack of baseline data was also mentioned by the consulting firms responsible for EIAs interviewed for this study.

A significant source of information on biodiversity is the mining sector itself: a good number of EIAs give comprehensive data on the biodiversity in the mining zone. Unfortunately the authorities in

charge of biodiversity do not make use of these data which lie ignored in reports that are too rarely read.

There are two types of information on endangered species: the IUCN red list, and national lists of endangered or protected species, usually to be found in the laws on hunting or wildlife management. These lists of protected species primarily concern large animals (elephants, gazelles, antelopes, hippopotamus, lions and other felines etc.), quite often shrub flora and certain types of bird, but almost never non-shrub flora or reptile species other than crocodiles, or insects, rodents or other animals.

The national lists of totally or partially protected species do not always accurately reflect the species' rarity and need for protection. Certain species that according to scientists are really endangered are not on the lists, which often contain species that are either total absent or on the contrary quite common.

Attempts to compare vulnerable and endangered species with national lists of protected animals have shown considerable discrepancies. For instance, Burkina is in the Sudanese zone, which according to WWF data contains four endangered species and 13 vulnerable species, and yet in Burkina only one endangered and four vulnerable species are protected. The Dorcas gazelle and the lion are among those not on the list and yet they are present in the country. Whether it is an oversight or an incomplete list that was provided is of little matter. The case is repeated pretty much everywhere, highlighting a lack of visibility on a sub-regional level.

Another example is the black crowned crane (*Balearica Pavonina*) classified as "near threatened" by the IUCN and totally protected in Burkina, Mali, Senegal, Togo, Benin and Côte d'Ivoire and not at all in Niger (see map) or in Mauritania. It is protected in Côte d'Ivoire, but according to BirdLife data, it is not supposed to be present there.

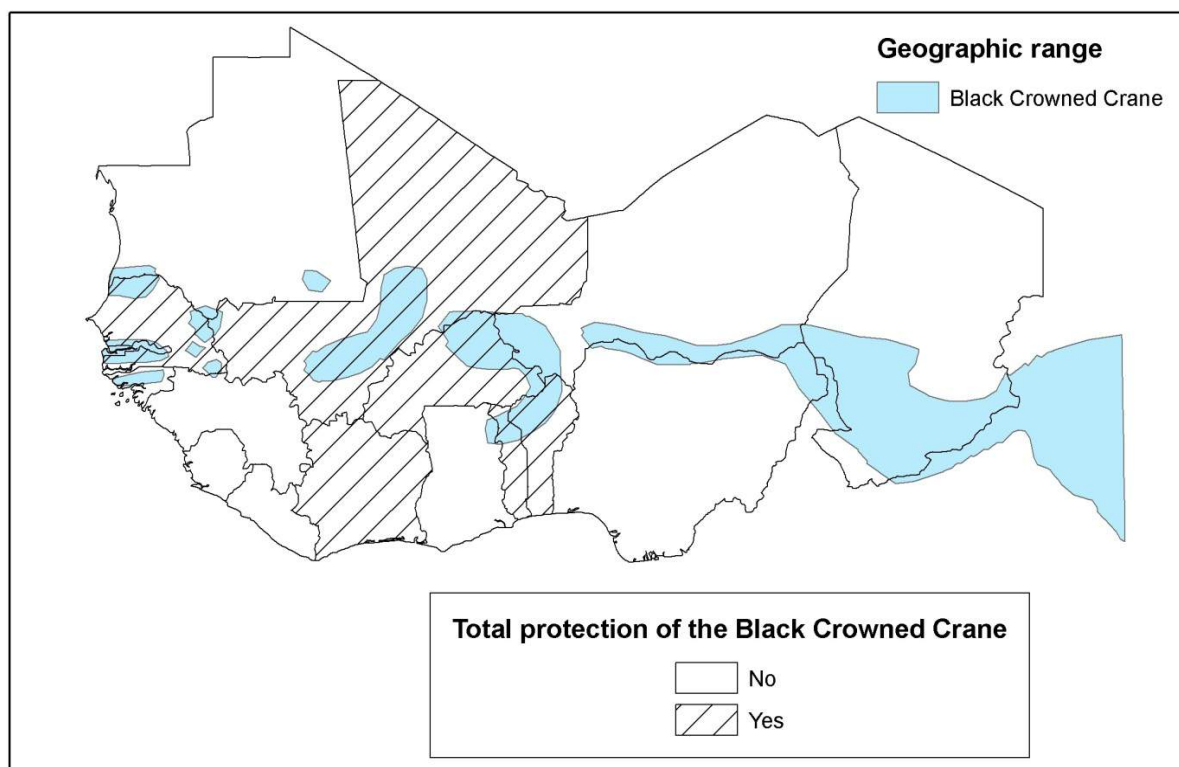


Figure 6: Zones where black crowned cranes are present and protected.

PART III: Extractive Industries, the Environment and Protected Areas

III.1 Mining laws and EIAs:

From beginning of mining laws (since the Napoleonic code of 1810 to be precise), the basic premise has been that mineral resources belong to the state and that no one may undertake prospecting, exploration or mining of these resources without prior authorisation from the government.

Each country has its own mining laws with their own particularities, but as regards West Africa, these laws must comply with the WAEMU mining code (2003) for member countries, and with the ECOWAS “Mining Directive” of 2009.

The WAEMU Mining Code of 2003 stipulates in Article 18, that EIAs must be carried out before beginning the operational phase and that environmental monitoring and rehabilitation plans must be set up. The ECOWAS Mining Directive (2008) has reinforced environmental protection measures including:

- *Involvement of the authorities responsible for forests, the environment and public health in the granting of mining licences,*
- *Setting up environmental audit mechanisms,*
- *Compulsory submission of mining site rehabilitation and closure plans to the competent authorities,*
- *Setting up of a fund for environmental rehabilitation.*

Furthermore, since 2008, WAEMU countries are subject to additional law No. 01/2008/CEG/UEMOA, on the adoption of a common environmental improvement policy. In Article 9, this law establishes the principle that an environmental assessment and study must be carried out *prior to any policy decision, any investment or any action liable to have an impact on the environment*. It also provides for harmonisation among all national environmental regulations, but this is still in its early stages.

National mining laws are rarely more detailed as regards EIAs and usually refer to “good practices”.

At a July 2003 joint IUCN/ICMM workshop in Gland, ICMM also committed to developing and promoting a library of good practice guidelines and case studies in order to support member companies implementing and measuring performance against the principles. This Good Practice Guidance (GPG) has been prepared in response to that commitment. It is aimed at providing the mining industry with the steps required to improve biodiversity management throughout the mining cycle. By implementing this guidance, mining companies should be better placed to:

- identify and evaluate biodiversity;
- understand the interfaces between their activities and biodiversity;
- assess the likelihood of their activities having negative impacts on biodiversity;
- develop mitigation measures for potential impacts on biodiversity and rehabilitation strategies for affected areas; and
- explore the potential to contribute to biodiversity enhancement or conservation.

Box 2: ICMM Good Practice Guidance.

Even if the actual content is not given in detail, the procedure for carrying out and validating EIAs is often clearly stipulated in the mining laws that have been updated in recent years. There is an evident tendency either to set up inter-ministerial commissions to validate the EIAs (made up of the ministry of the environment, the ministry responsible for mining, ministry of planning etc.), or to require that the ministry for the environment deliver an “environmental discharge” before the

ministry responsible for mining can continue to process the application. Previously, only the ministry responsible for mining examined applications.

In Ghana and Liberia, the environmental permit is delivered by the national Environmental Protection Agency (EPA), an independent public body.

Environment laws, which generally post-date mining laws, nowadays also govern EIA procedures, which now almost systematically include public surveys. These surveys are led by the ministry in charge of the environment, usually in collaboration with the ministry responsible for the activity concerned.

This concurrent evolution of mining and environment laws is understandable since mining laws made provisions for the environment before the environment laws existed, but it can cause problems. Should mining investors refer to mining laws or environment laws regarding aspects covered by both? The case is blatant in Côte d'Ivoire where the mining law, which predates the law on the environment, stipulates in Article 76, that:

*“Activities regulated by the mining law must be carried out such as to ensure the protection of environmental quality, rehabilitation of sites and conservation of forest heritage according to the terms and conditions stipulated **in the mining regulations**”*

None of the mining or environment laws consulted make specific provisions for projects on the periphery of protected areas with the exception of Ghana, which published a guide for mining activities in forest areas. Unfortunately this guide was unable to be obtained.

There is no uniformity in who is responsible for EIAs. Some countries specify consulting firms certified by the ministry of mines or the environment; others leave the choice up to the mining companies.

III.2 Oil Laws and EIAs

Oil laws differ significantly from mining laws. Oil blocks are specified by the government and granted through a call for tender process or by direct negotiation with the oil companies. Oil licences (exploration and production licences) are entirely covered by oil agreements or contracts which govern the holders' rights and obligations more than the mining law does. While standard oil agreements are in the public domain, the actual agreements themselves are not and it is impossible to know their specific content.

By way of example, the standard oil agreement in Guinea-Bissau contains the following clauses:

The (oil) company recognises and accepts that oil operations can cause environmental damage. Therefore, during execution of this contract, it must ensure that the environment and natural resources are conserved. To this end, the company must:

- a. Use techniques compliant with good oil industry practices to prevent damage,*
- b. When environmental damage is inevitable, limit the effects on people and goods in compliance with legislation and good oil industry practices.*

In all oil laws, the EIA is compulsory, but the relationship between mining licences and protected areas is rarely specified and a good number of oil blocks contain protected areas (see oil block maps for Mauritania, Senegal, Mali and Guinea-Bissau), including national parks and areas classified or proposed for classification as world heritage areas (Bac d'Arguin, archipelago of Bijagos, Djoudj National Park, Saloum Delta).

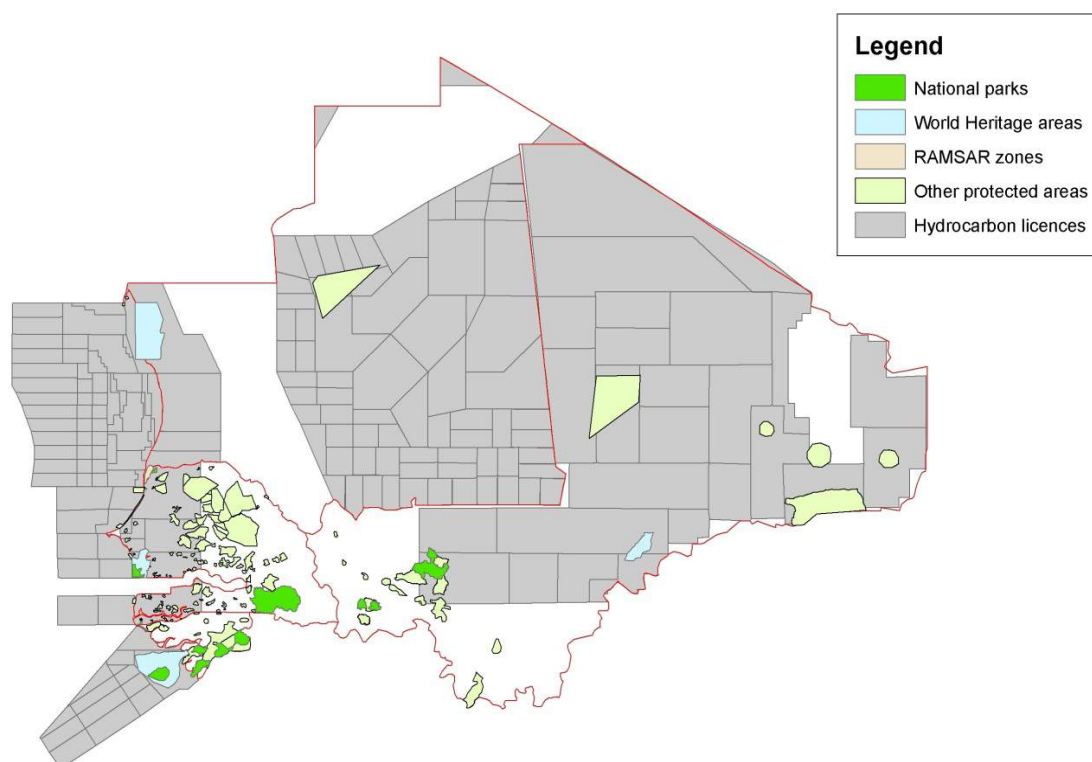


Figure 7: interferences between hydrocarbon licences and protected areas in Bissau-Guinea, Mali, Mauritania and Senegal..

III.3 Impact assessment content

The content of the EIAs examined for this study varied greatly. Some were very well documented in terms of the initial state of flora and fauna, sometimes covering an area well beyond that which would be affected by the mine, others were excessively succinct.

Large mining companies usually comply with EIA requirements with good grace, partly because of increased environmental awareness in all industrialised countries and partly because it contributes favourably to the company's image and indirectly to their share prices. That said, it is not in their interests to cripple themselves, and their primary objective is to develop their mining projects. This means that while they do not skimp on EIAs, nor do they make an inordinate effort: the environmental data available is used and analysed appropriately, but an EIA is not a doctoral thesis and no extra effort will be made to find information that is not easily available.

Quarries are more often run by business people than miners, whose environmental conscience is rarely as developed, and all too often the EIA is treated as just another administrative document.

Similarly, the environmental management plan is an integral part of the ISO certification that most large companies have or are trying to obtain and therefore it is fairly closely monitored. However, without strict control by the mining and environmental authorities, things can become somewhat lax. It is true that at the present time, none of the mining authorities in any of the countries studied had any real means of control (for instance by carrying out their own analyses).

As a general rule, the national consulting firms that carry out the EIAs employ competent professionals who work conscientiously, but who are not always specialists in all fields. The finding on reading recent EIAs is that the environmental issues are well covered in terms of hydrology and hydrogeology, but mining sector-specific knowledge is lacking and mining particularities are not

taken into account (for instance an EIA of a phosphate mine failed to take into account the possible presence of cadmium or uranium in the ore).

III. 4: Environment and Mines Administration

The mining authority, a department of the ministry of mines or the national directorate of mines is responsible, in all the countries studied, for monitoring and controlling mining activities. Its role is to check that mining activities are carried out in compliance with the feasibility study and the environmental management plan. Such controls require field visits, independent chemical analyses etc. and thus technical and financial resources; these are rarely up to par.

As a general rule, it can be noted that environmental monitoring by the administration is almost non-existent, the latter being content to gather data provided by the mining operator.

The only exception that is worth highlighting is the AKOBEN programme in Ghana, led by the EPA to evaluate the environmental results of mining and manufacturing operations. These are given a rating according to a five-level scale. The levels are colour-coded: gold (for an excellent level), green, blue, orange and red (for poor results). The rating is reviewed and published annually. The final rating takes into account more than 100 indicators including qualitative and quantitative data, measuring companies' compliance with the obligations specified in their EIAs. Thus, the environmental monitoring is quantified and publicly available.

Company	1. Legal Issues	2. Haz. Waste Mngt	3A. Toxics Releases	3B. Non-Toxics Releases	4. Monitoring and Reporting	5. Env. Best Practices	6. Community Complaints	7. Corporate Social Respons.	Final Rating
ABOSSO GOLDFIELDS LIMITED--DAMANG	BLUE	BLUE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GOLD	ORANGE
ANGLOGOLD ASHANTI (IDUAPRIEM) LIMITED--IDUAPRIEM	RED	RED	RED	ORANGE	ORANGE	ORANGE	NOT ADEQUATE	GOLD	RED
ANGLOGOLD ASHANTI LIMITED (OBUASI MINE)--OBUASI	BLUE	RED	RED	ORANGE	ORANGE	ORANGE	GREEN	GOLD	RED
CHIRANO GOLD MINES LIMITED--CHIRANO	BLUE	BLUE	NOT APP	BLUE	ORANGE	BLUE	GREEN	GOLD	ORANGE
GHANA BAUXITE COMPANY LIMITED--AWASO	RED	RED	NOT APP	BLUE	ORANGE	ORANGE	NOT ADEQUATE	NOT ADEQUATE	RED
GHANA MANAGANESE COMPANY LIMITED--NSUTA	BLUE	BLUE	NOT APP	BLUE	ORANGE	BLUE	NOT ADEQUATE	GOLD	ORANGE
GOLDEN STAR (BOGOSO/PRESTEA) LIMITED--BOGOSO	BLUE	BLUE	RED	BLUE	ORANGE	ORANGE	NOT ADEQUATE	NOT ADEQUATE	RED
GOLDEN STAR (WASSA) LIMITED--AKYEMPIM	BLUE	BLUE	RED	BLUE	ORANGE	BLUE	NOT ADEQUATE	GOLD	RED
GOLDFIELDS GHANA LIMITED (TARKWA MINE) --TARKWA	RED	RED	RED	ORANGE	ORANGE	BLUE	NOT ADEQUATE	GOLD	RED
NEWMONT GHANA GOLD LIMITED--KENYASI	BLUE	RED	BLUE	ORANGE	ORANGE	BLUE	NOT ADEQUATE	GOLD	RED
PRESTEA SANKOFA GOLD LIMITED--PRESTEA	RED	RED	NOT APP	ORANGE	ORANGE	NO DATA	NO DATA	NO DATA	RED

Figure 8: Ratings for mines in Ghana.

Part IV: Extractive Industries and Protected Areas

IV.1 Examination of the data available for the different protected areas

Analysis of RAPPAM studies

For the most part, these data come from studies using Rapid Assessment and Prioritization of Protected Areas Management (RAPPAM), the Management Effectiveness Tracking Tool (METT) or the Enhance our Heritage Toolkit (EoH Toolkit for world heritage classified sites) carried out by IUCN PAPACO in recent years.

Out of the 111 documented protected areas (see list appended), 25% (i.e. 28 PAs) list extractive industries as a pressure or threat. The other main pressures and threats indicated are poaching, over-grazing and bush fires. A detailed view of pressures and threats is given in the figure below.

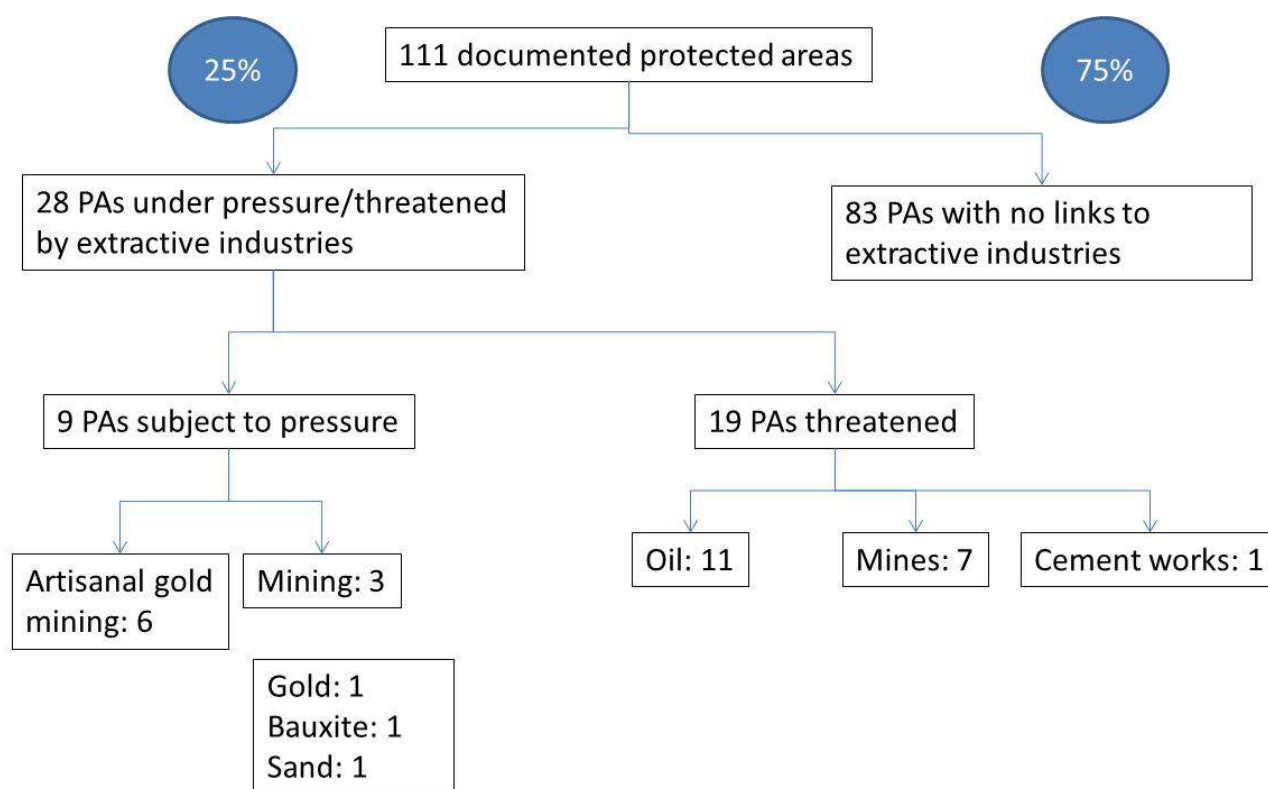


Figure 9: Analysis of pressure and threats from mining mentioned in RAPPAM studies.

It is reassuring to note that 2/3 of protected areas are not considered to be affected by extractive industries, but it should be recalled that these rapid assessment methods identify the most salient points and no doubt minimise the impact of extractive industries when activities are limited.

Artisanal gold mining is by far the main type of pressure noted. The others are bauxite mining (Rio Kogon in Guinea), gold mining (National Park of the Upper Niger in Guinea) and a sand quarry (Baie de l'Etoile in Mauritania).

Remarks:

1. The gold mining mentioned in the National Park of the Upper Niger is the Kiniero mine, operated by the company SEMAFO and located more than 20 km from the park boundaries.
2. The transboundary protected area of Rio Kogon (protected areas being created) includes long-identified occurrences of iron ore and bauxite both in Guinea and Guinea-Bissau.
3. The protected area (PA) of Baie de l'Etoile is currently being created and the quarrying of sand for construction sites in Nouadhibou pre-dates the PA's creation.

The main threat is the discovery of oil (oil blocks covering protected areas) or mines in the vicinity. The Termit and Lake Chad oil basins entirely overlap with the Termit PA (being created) in Niger. The exact location of the oil field (operated by the Chinese company China Oil and Gas Development and Exploration Corporation - CNODC) is unknown, but it would appear to lie 60km to the south of the PA. But there is also an occurrence of oil located within the PA.

Mining threats are:

1. Bafing falémé PA (being created) which contains more than 200 gold occurrences and several mined deposits (Léro, Fayala),
2. Kankan PA, in which 2 gold occurrences have been noted, but which would not appear to be of significant economic interest and are outside known gold deposit areas. However, artisanal and small-scale miners may be operating there,
3. The Upper Niger PA, bounded on the east by a series of gold occurrences liable one day to become mines, like Kiniéro,
4. Manden Wula, located in the Siguiri district, where the presence of gold has been known about for centuries,
5. Aïr-Ténéré PA: the known uranium occurrences (mentioned in the RAPPAM study) are located around 100km from the PA.

This short list demonstrates the limitations of these self-assessments: the PA managers do not always identify pressures that are outside their usual professional sphere (forestry). Therefore, it is surprising to see that a reserve like Mount Nimba (in Guinea and Côte d'Ivoire), where considerable mining exploration is underway, is not considered to be threatened by it! Another example is the basalt quarry in Niokolo Koba National Park in Senegal, which is not listed as a pressure in the park management analysis.

Plans to extend protected areas such as Rio Kogon or Bafing-Falémé do not always take into consideration existing mining licences or identified deposits.

IV.2 Geographical Approach

Three geographical approaches were taken on varying scales: one was an overall approach; the second was on a national scale and; the third on the scale of each protected area. All these approaches suffer from the same limitation, the heterogeneity of the data means that the results cannot be widely extrapolated.

Overall Approach:

1. Priority areas and principal mining zones: the map below shows that a large proportion of West African deposits are located in or on the edges of the Guinean forest area. The priority areas most exposed to mining pressure are Bafing-Falémé, South-West Ghana, the Ivorian-Guinean border, W Park and the Gambia River delta.

Priority areas and mining potential

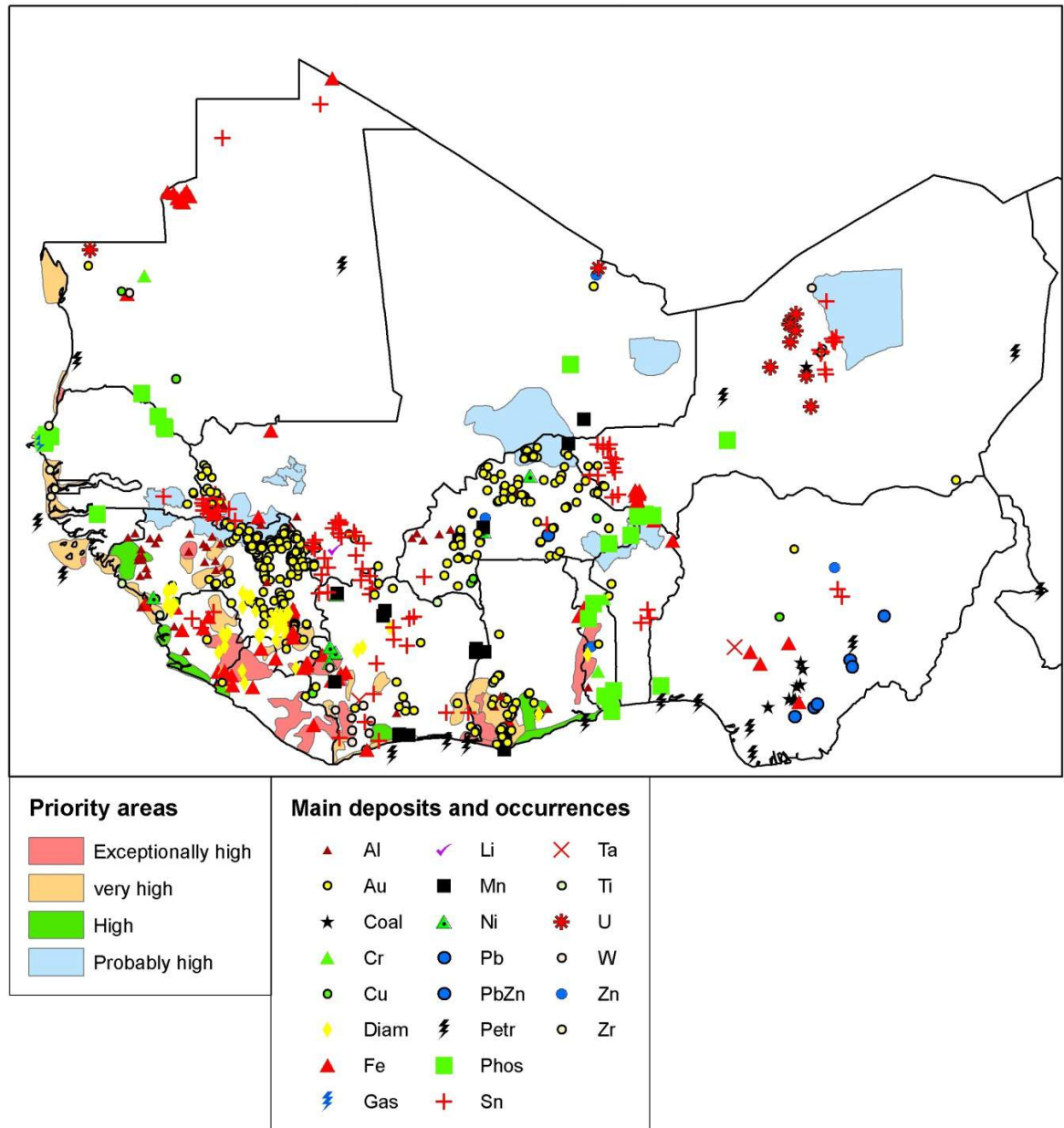


Figure 10: Priority areas for conservation and mining deposits

A zoom in on the fringe of coastal countries illustrates the situation well:

Priority areas and mining potential

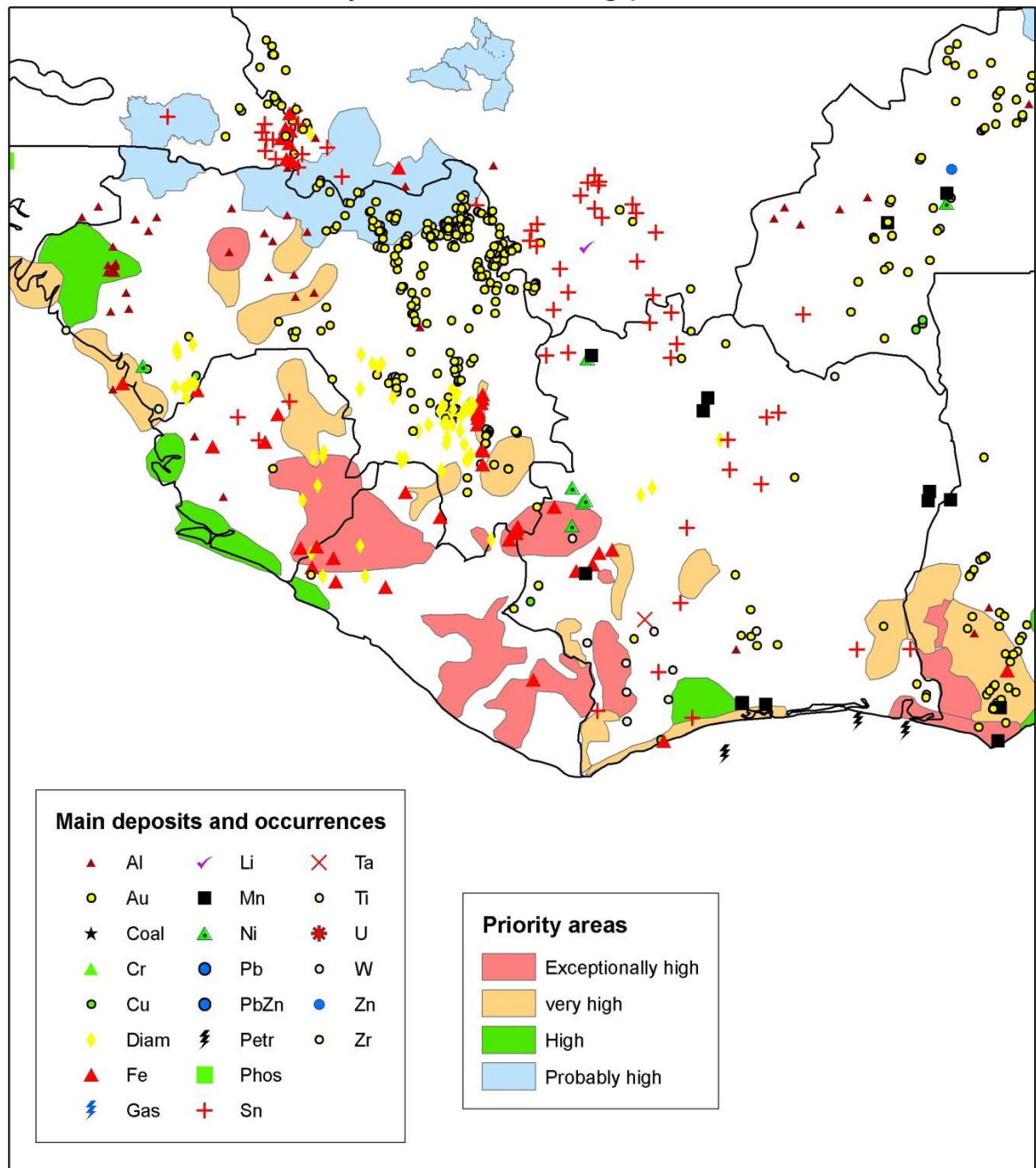


Figure 11: Deposits and priority areas on the South-West coast.

Gold and iron ore deposits present the primary threat to these priority conservation areas. As not all these areas have any official legal status, far from it, the boundaries of the areas to be protected must be reviewed in conjunction with their mineral wealth at a regional level.

2. Mines and protected species: when data allows, it is also possible to consider the mining pressure on particular species. The figure below illustrates the situation for four endangered species: *Falco Cherrug* (Saker Falcon, endangered), *Falco Naumanni* (Lesser Kestrel, vulnerable), *Neotis Denhami* (Denham's Bustard, quasi-endangered) and *Torgos tracheliotos* (Lappet-faced Vulture, vulnerable). Such an approach would be more pertinent on smaller

ecosystems but clearly demonstrates the utility of a GIS approach: in Niger, Burkina Faso and Mali, the areas where Lappet-faced Vulture can be found are under pressure from mining.

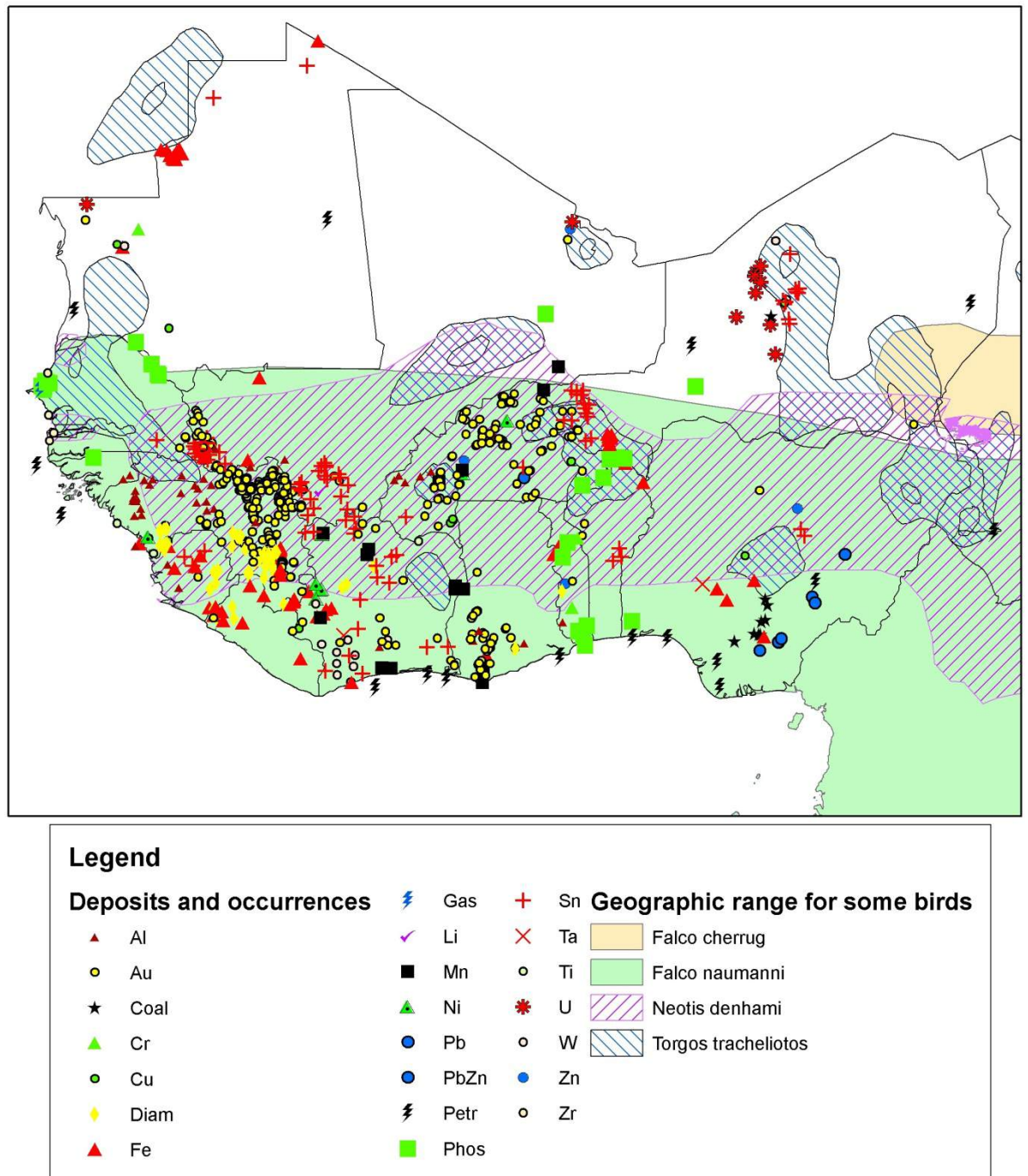


Figure 12: Deposits and areas where some bird species are found.

National analysis of overlap between licences and protected areas

The lack of consistent data makes it difficult to compare the different regions however, by analysing regulations, mining licence maps and their interaction with protected areas and by making an overall estimation of the environmental risks for all PAs in a country, the situation can be illustrated in a simplified table.

The “score” is based on findings and not estimations. Burkina Faso has good scores because the major protected areas are outside mining districts.

Poor	Mediocre	Adequate	Good	Excellent

	Regulatory Protection of PAs	Consideration of PAs for attribution of mining licences	Threats on the main protected areas	Final Score
Burkina Faso				
Chad		N.D.		?
Côte d’Ivoire		N.D.		
Ghana				
Guinea				
Guinea-Bissau	N.D.	N.A.		
Mali				
Liberia				
Mauritania				
Senegal				
Sierra Leone				
Togo				

N.A: not applicable, N.D: not documented

Table 7: Attempt at country classification according to the consideration of protected areas in mining industry management (the oil component was not considered).

Simplified Risk Analysis

In an attempt to take a semi-quantitative approach to the mining risks hanging over PAs whose boundaries are known, a very simplified risk assessment was carried out.

It takes into account known mineral occurrences either inside or on the periphery of the PA, the presence of mining licences, the nature of the mining substance present and its potential for future exploitation, bearing in mind its geological and geographical position:

1. The distance taken into consideration was limited to 50km (100km for oil-related risks) with distance classifications as follows: <5km (coeff. 1), 5 to 10 km (coeff. 0.6), 10 to 25 (0.4), and 25 to 50 (0.2)
2. The weighting coefficient is 1.5 for mineralisation within the PA
3. The probability of future exploitation is relatively subjective, rated between 1 and 4 depending on:
 - a. The geological context
 - b. Demand for the substance: Fe, Al, Au, Rare Earth Elements (REE) and U are in much higher demand and more sought after than Cu, Pb, or Zn

4. The environmental “dangerousness” takes into account the following elements, rated between 1 and 3 (low, average and high): potential volumes of tailings, dangerousness of the chemical products used, dangerousness of sub-products.

Substance	Own dangerousness	Product dangerousness	Volume of tailings	Total Score
Au	1	3	3	7
Fe	1	1	2	4
Al	1	1	2	4
Diamonds	1	1	2	4
Phosphate	2	1	1	4
Cu, Pb, Zn	1	2	3	6
REE	1	2	3	6
U	3	2	3	8
Oil	3	3	3	9

Table 8: Parameters for assessing environmental dangerousness

For each mining risk identified for a given PA, a “risk” is calculated as being the probability of extraction x dangerousness x distance coefficient.

As each PA can be at risk from several factors, and in order to take into account the potentially cumulative effect of the impacts, the risk is calculated for each PA as being:

Maximum Value Observed + (sum of the risks/maximum value)

This approach is over-simplified, but the objective of this study was not to develop a methodology for assessing mining risks for PAs. It merely helps to draw attention to those protected areas that are more exposed than others to mining risk, as summarised in the table below. Protected areas that are not shown are not necessarily safe from mining impact, but may be in areas where there is a lack of mining data.

Three protected areas top the list of around 120 areas for which potential mining pressure was identified:

- The partial wildlife reserve of the Sahel (Burkina Faso): with two mines (gold and manganese) located within the reserve, it is ranked top of the list. However, Burkinabe legislation does not forbid mining activities in the reserve.
- The Aouk hunting domain (Chad): it is located in an oil basin, with a high probability of future production.
- The Bafing-Falémé transboundary protected area project (Mali – Guinea): the boundaries of this planned PA encompass a gold mining permit and a uranium permit, both with high probabilities of discovery, as well as a diamond permit, with a lower probability of discovery.

If only officially recognised PAs with a real biodiversity potential (i.e. not including classified forests which often are of questionable interest in terms of biodiversity), the 20 protected areas most exposed to mining risk are:

Name	Status	Country	Risk	Main cause
Sahel	Partial wildlife reserve	BFA	43.9	Active mines
Lacs de Cufada	Natural park	GNB	32.5	Buba mineral port project
Nazinga	Game ranch	BFA	32.5	High probability of gold mining
Pama	Partial wildlife reserve	BFA	29.2	Artisanal and small-scale gold mining
Bontioli	Wildlife reserve	BFA	29.2	Artisanal and small-scale gold mining
Douentza	Special elephant reserve	MLI	29	Presence of industrial limestone quarrying and two permits for manganese, one of which looks promising
Joal	Marine Protected Area	SEN	28.7	Oil block, heavy metal and phosphate occurrences
Rio grande de Buba	Protected area	GNB	28.6	Mineral port project (Buba and sand quarry)
Kayar	Marine Protected Area	SEN	28.5	Oil block and phosphate deposit
Basse Casamance	Natural park	SEN	28.2	Oil block and phosphate occurrence
Abéné	Marine Protected Area	SEN	28.1	Oil block
Air Tenere	National natural reserve	NER	28.1	Base metal occurrences
Niadel	Wildlife reserve	SEN	28	Oil block
Djoudj	National Park	SEN	28	Oil block
Ilhas formosa	Marine community protected area	GNB	28	Oil block
Bijagos	Birdlife reserve	GNB	28	Oil block
Matas de Cantanhez	Protected area	GNB	28	Oil block
Orango	National Park	GNB	28	Oil block
João Vieira Poilao	National Park	GNB	28	Oil block
Varela	National Park	GNB	28	Oil block

Table 9: the 20 most threatened protected areas (excluding classified forests)

While the first five are at risk from mining operations, the threat of oil exploration can be felt on all the rest. Countries such as Senegal and Guinea Bissau have several marine protected areas and are therefore often to be found in this table.

Note that the size of the deposits is not taken into account in this classification, as this parameter is only known once the feasibility study has been carried out. Therefore, Mount Nimba, considered to be one of the most important biodiversity hotspots, is ranked “only” 32nd, although the mining risk is enormous as the entire Mount Nimba constitutes an iron ore deposit.

IV.3 Some examples:

Mining ports (Mauritania, Senegal, Guinea-Bissau, Togo)

Although attention is often focussed on the mines themselves mining ports constitute both major centres of economic development and areas of environmental risk.

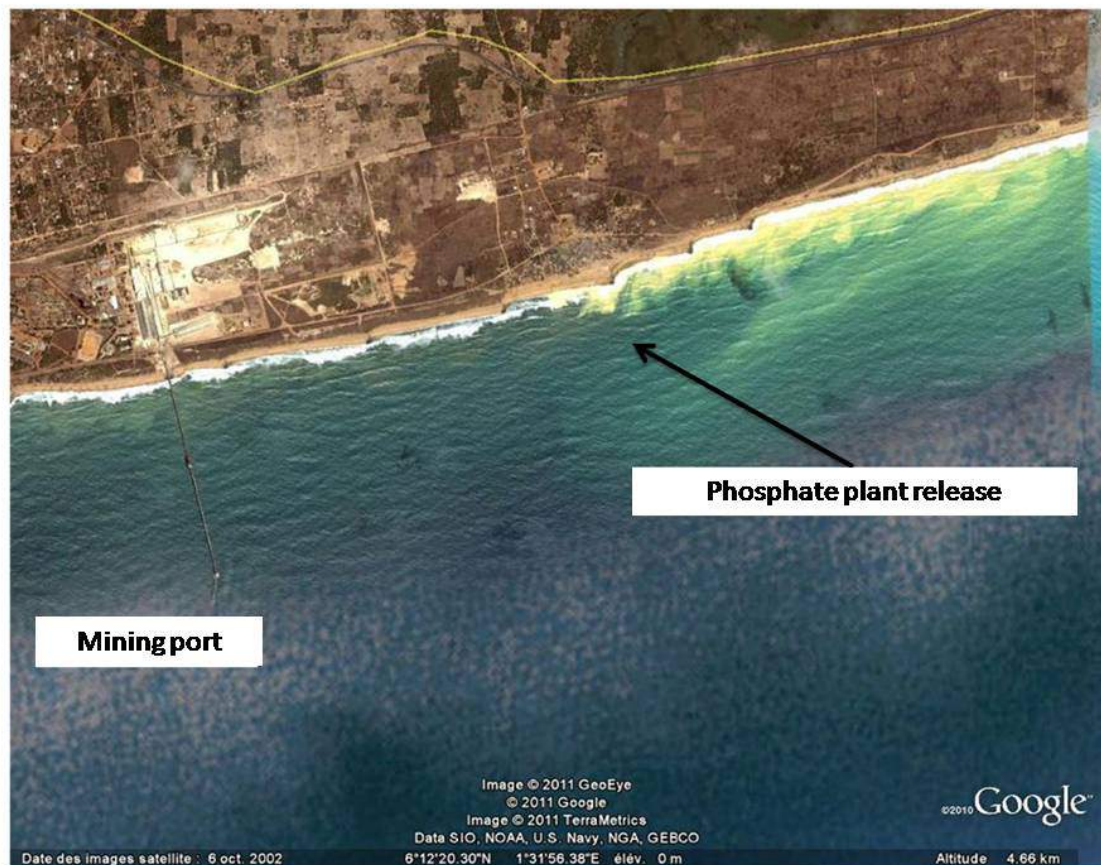


Figure 13: Mining wharf in Togo and visual impact of waste discharge from the phosphate plant into the sea (image from Google Earth).

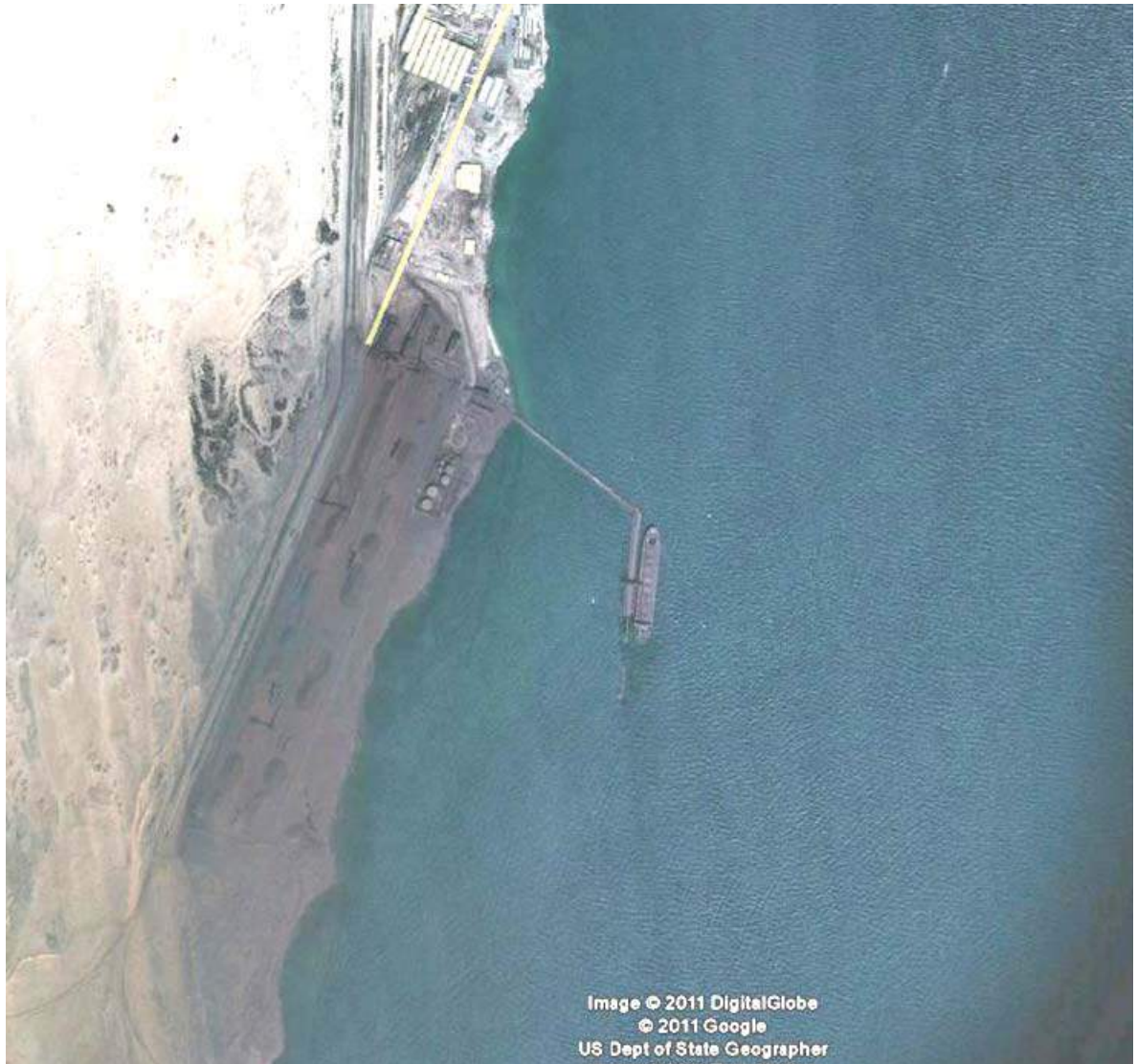


Figure 14: SNIM Mining Port (Nouadhibou, Mauritania): in two years' time, the port will increase its capacity from 12 to 24 Mt per year, just a few cable lengths from the Banc d'Arguin.

At the cross-roads of Mali – Burkina Faso – Niger:

This zone, located in the north of the Sahel pastoral reserve and not far from Oursi Lake (RAMSAR Convention site), contains manganese deposits both in Mali and Burkina. While these deposits are not yet mined, this is mainly due to their geographical isolation and the lack of a railway line to transport ore to a port. Some projects envisage exporting the ore by road to Togo or Ghana, others plan to extend the existing railway line from Ouagadougou (the section between Ouagadougou and the Ivorian coast exists but is not designed for transporting ore and would have to be reinforced).

Opening up this zone is of great strategic importance. Access to the south would also open the way for mining Burkina's phosphate resources, located in and around W Park.

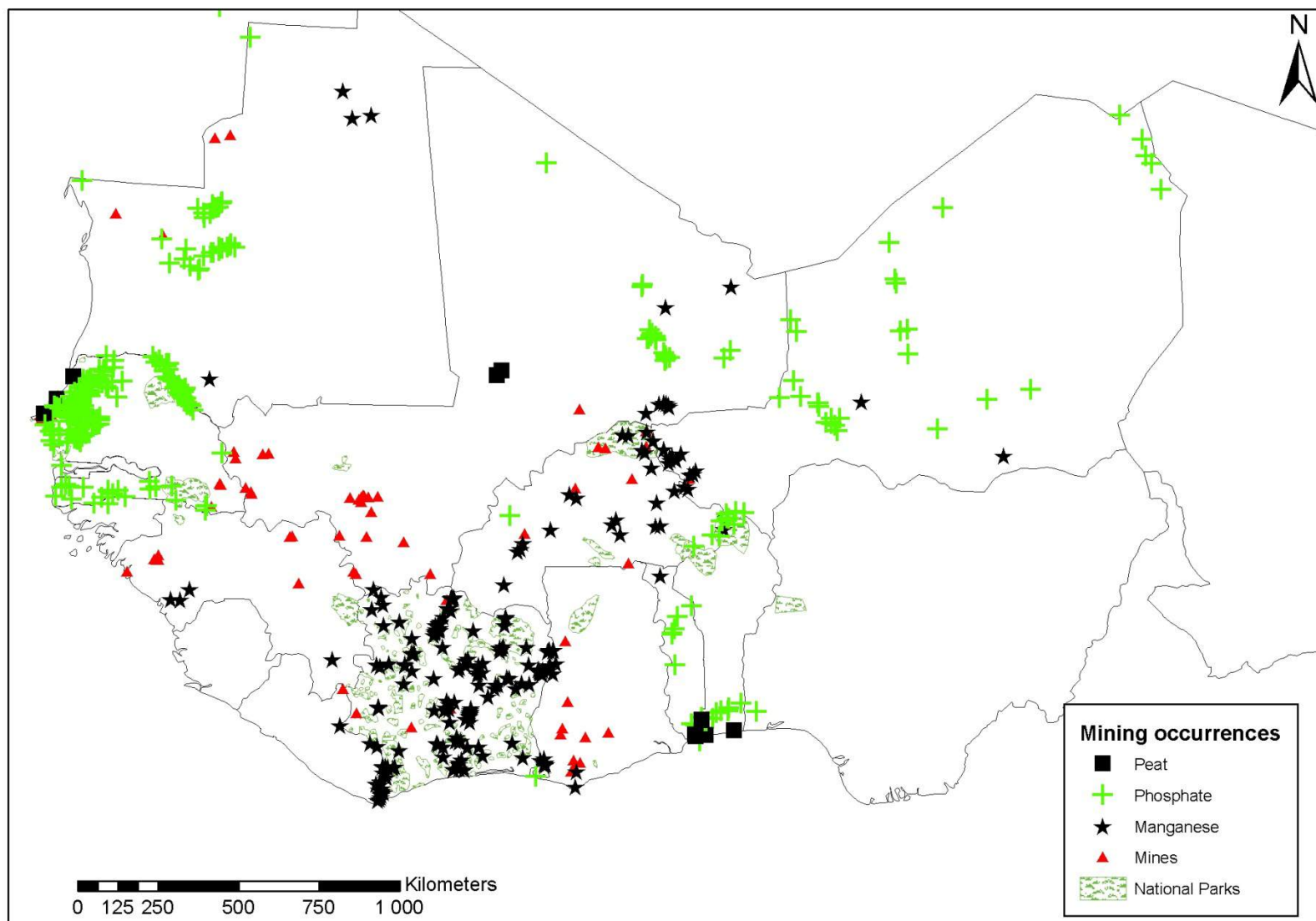


Figure 15: Manganese sector of Burkina Faso – Mali – Niger

Mount Nimba Iron Ore:

Mount Nimba sits at the three-way crossroads of Guinea – Liberia – Côte d'Ivoire and constitutes both a very rich and specific ecosystem and a huge iron ore deposit. In theory, Mount Nimba is totally protected but a deposit was mined on the Liberian side, with a railway linking Mount Nimba to the mining port of Buchanan. On the Guinean side, an area with high mineralisation has been de-classified as a World Heritage site to enable mining exploration to take place.



Figure 16: Former iron ore mine of Mount Nimba (Liberia). Photo T. Johannesson (Google Earth)

Given Liberia's economic and political instability, Guinea plans to construct more than 1000km of railway line to link Mount Nimba to Kamsar mining port. The planned line would pass along the boundary of the strict natural reserve of the Ziama mountain range. For more than 20 years, the mining of Mount Nimba iron ore in Guinea has been an issue of contention between environmental activists and mining supporters. On the one hand there is a unique mountainous ecosystem harbouring species not found elsewhere (in particular the Western Nimba toad *Nimbaphrynoides occidentalis*, but also the Nimba otter shrew *Micropotamogale lamottei*, also endemic to Mount Nimba) and which, due to its altitude, influences the climate in the region. On the other hand there is a project worth several billion dollars (the railway line and deep-water port of Conakry were estimated in 2008 at \$US4 billion, to which can be added several hundred million to develop the mine itself), tens of thousands of jobs and royalties guaranteed for around 20 years. To date the project is restrained by the high investment cost however if metals maintain their current prices, the project could soon be begun. On the Ivorian side preliminary prospecting has also been noted.

NB: the situation for the Falémé iron ore deposit is the same on the Senegalese side (450km of railway tracks, investment of \$US2 billion and 20 000 jobs created). See below.

Bafing-Falémé transboundary protected area project:

Previous examples demonstrate attempts to develop mining projects in or around protected areas that are important for biodiversity. The case of the Bafing-Falémé transboundary protected area project is just the opposite: it aims to develop protected areas within a mining zone! The project affects Mali and the north of Guinea, and aims to create a vast protected area linking Kouroufing and Wonga national parks as well as the chimpanzee sanctuary to the classified forest of northern Guinea, to encourage natural migration of the wildlife still living there. On the Malian side, the project was signed in May 2011 (in partnership with UNDP) and is thus in its infancy. More than 50% of the area is covered by licences, some of which are for mining (Léro-Fayalala in Guinea) and overlaps with gold and iron ore districts.

The Malian project manager hopes to collaborate with the mining companies to gradually develop the protected areas, based on the National Water and Forestry Directorate's experience with Sadiola mine (where the Water and Forestry Directorate and the mining company collaborated to improve environmental conditions beyond the provisions of the EIA).

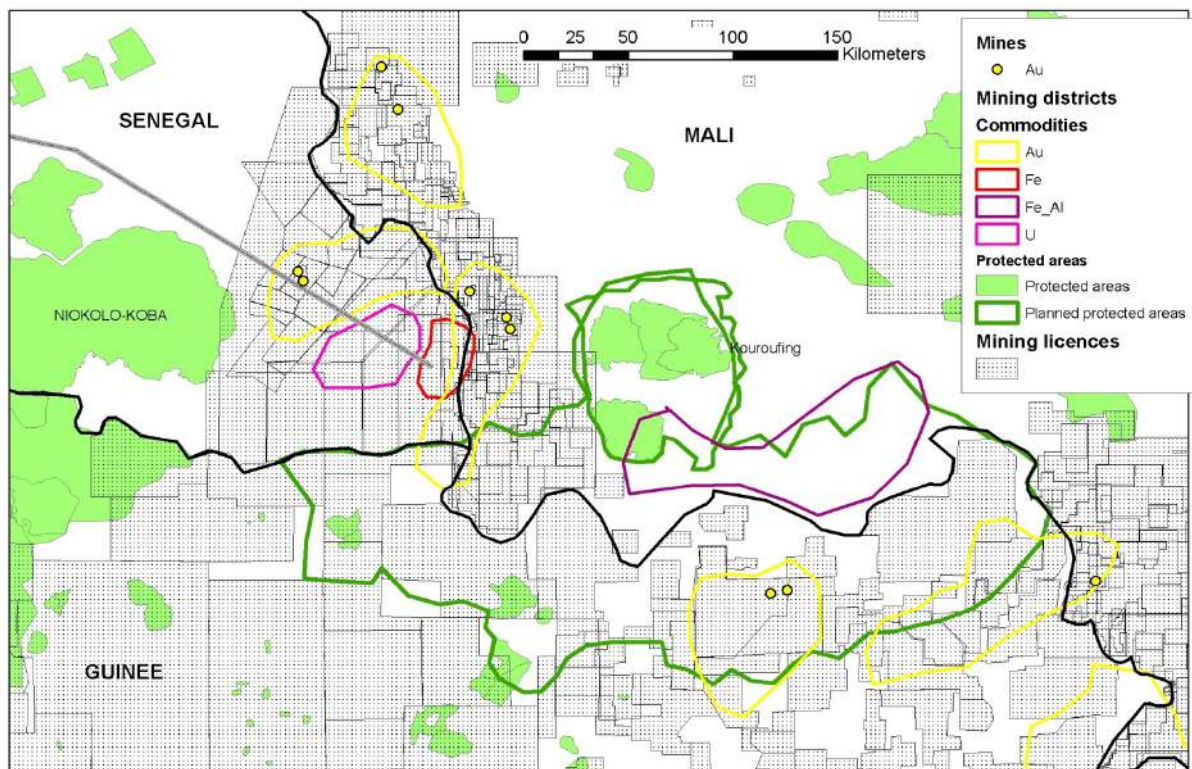


Figure 17: Bafing-Falémé transboundary protected area and mining districts.

Note that the Fé-Al district located in Mali could be developed if Senegal began exploiting the iron ore in Falémé, extending the planned railway through the future transboundary protected area.

Part V: Gaps, problems and opportunities for improvement

V.1: Overview

The problems highlighted in the study can be divided into three different levels:

1. Lack of environmental and mining infrastructure and lack of national planning for optimising national land use.
 - a. On the environmental level
 - i. It is difficult to obtain the boundaries of protected areas and their original documentation (legal status)
 - ii. There are very few strategic data (flora, fauna and ecosystem inventories). The few data available only concern a few protected areas.
 - b. On the mining level: maps of mining licences are generally available with the exception of licences for quarries, but there is only rarely a national plan to promote mineral resources. The creation of a “mining observatory” at national level or, even better, at a supra-national level (WAEMU/ECOWAS) would enable better visibility of the sector.
2. Regulatory difficulties
 - a. Overlapping of the different regulations (environment, forest, hunting, mining) in particular as regards right of usage and environmental obligations,
 - b. Confusion among land, forestry and mining rights,
 - c. Status of protected areas is not always clear as to which activities are authorised,
 - d. Oil prospecting is not restricted by the presence of protected areas.
3. Institutional difficulties and governance problems
 - a. Poor functioning of inter-ministerial commissions responsible for attributing mining licences,
 - b. Several structures are in charge of protected areas,
 - c. Lack of synergy between mining authorities and water and forestry agents,
 - d. Under-representation of civil society during EIAs.

There is also the problem of uncontrolled artisanal operations. Many projects and studies have looked at this issue, all the countries have sought solutions but the results fall below expectations. The tradition of artisanal gold mining, poverty and the hope of making a fortune are stronger than all regulations, evictions and other measures taken by the forces of law and order. It would perhaps be necessary to focus efforts on sensitive environmental zones.

V.2: Details on some specific aspects

V.2.1. Data Availability

The first difficulty encountered in carrying out this study was in gathering and organising the data. All the data sought for the study (on protected areas, mining licences, mines, legislation) are in the public domain, but are not all that easy to access. This is due to reticence on the part of administrations to provide them, lack of databases and/or GIS, data being dispersed among different

departments or ministries. As for data on biodiversity, these are virtually non-existent at a government level and international databases are usually set up to track a specific species and not to do a search by geographical zone.

A further difficulty arose in the course of the study in that national data on the geographical boundaries of protected areas differ from those of the WDPA.

V.2.2. Regulation

Apart from the need to clarify the legislation among the various different laws (on mining, the environment, water, forests and wildlife), the main regulatory improvements needed are:

1. Clarification and standardisation of protected area statutes and authorised activities, and updating of by-laws or other acts that govern each of these areas individually to ensure they are compliant with national legislation. The often non-existent notion of buffer zones should be reinforced as part of this process.
2. Increased professionalism in the quarry sector, in terms of mining and environmental knowledge, particularly by requiring a minimum level of technical skill (as is the case for mines) and by making EIAs compulsory.
3. The body responsible for checking that a mining licence request does not overlap a protected area and the checking procedure should be specified in the regulations (if it is to be done by the mining cadaster, how are protected area boundaries updated? If it is another body, how are mining licence requests managed?).

V.2.3. Governance

Difficulties are found at various levels:

1. Mining licences are granted by an ad hoc commission of representatives from the various ministries (mines, industry, the environment, budget, agriculture etc.). Two different problems have been encountered at this level:
 - a. The commission is more political than technical and the representatives of the different ministries are not always aware of the different requests being processed,
 - b. When mining projects are evaluated, it is difficult to put a figure on the environmental value or the value of the environmental services of the land that will be affected by the mine (whether or not protected areas are involved), whereas the mining project itself can easily be quantified in terms of fees, taxes and royalties. There is a lack of “environmental compatibility” that would help balance discussions.
2. Whether a protected area is involved or not, civil society does not usually have enough information or documentation to be able to constitute any real counterweight, particularly during public hearings for the EIA⁷.
3. Too often, the strict minimum is done for EIAs and environmental and social management plans, and yet they are validated.
4. There is a lack of land development plans that would help to compensate for the impact of a mining project in another area (medium-term planning).
5. Generally speaking, there is a deficit of environmental control by national authorities (mines and the environment), which do not have the technical means to fulfil their role independently of the mine operators.

⁷ It would be possible to envisage that civil society could have recourse to a body like the WAEMU Court of Justice if the impact assessment rules were infringed or if licences were attributed in areas where mining is prohibited.

6. Regarding the environment, there is a lack of centralised data on biodiversity at national level. This makes it difficult to analyse the EIAs (lack of points for comparison). Furthermore, their data should be put to better use: some EIAs are very comprehensive, containing data on biodiversity and descriptions of ecosystems that should be put to better use.

Mining project environmental and social plans also pose a governance problem. Too often they are reduced to the implementation of compensatory measures such as the construction of schools, dispensaries, water supply points etc. In themselves, these measures can be beneficial but it is not healthy for mining companies to replace the government in its official areas of action such as health, education and local development. These measures should be strictly governed by national policy and not left up to the initiative of private industrial companies.

V.3 Proposals

Therefore, to enable the mining sector to develop while ensuring environmental preservation, the important areas for action are as follows:

1. Clarify or even standardise the status of PAs and clearly define the activities that are prohibited or permitted: indeed, many of the problems arise because the status of certain PAs is unclear. It is often said that “a good international mining company has more lawyers than geologists” and all loopholes can be used to reach the mining company’s objectives. These days, a boundary should be defined not only according to a certain number of points, but also according to a digital polygon, to avoid debate on the real limit between two points. A structure such as the National Geographic Institute, or its equivalent, could be the official holder of PA boundaries to which the mining cadaster would have to refer.

Remark 1: the system in English-speaking countries of dividing the country into graticular blocks has a certain number of advantages: each square has a clear status (free, protected area, mining licence), and all ambiguity regarding kilometre-wide buffer zones around PAs is lifted.

Remark 2: the majority of West African countries have signed the African Convention on the Conservation of Nature and Natural Resources, which clearly specifies the different types of PA. This convention, which dates from 1969, could be updated, but it already gives a clear general framework (cf. Appendix 2).

2. Environmental Impact Assessments: action can be taken at three levels:
 - a. Make the EIA procedure compulsory for all licence applications, in accordance with an assessment level hierarchy dependent on the risk generated by the mining activity. The following general diagram could be used as a basis:

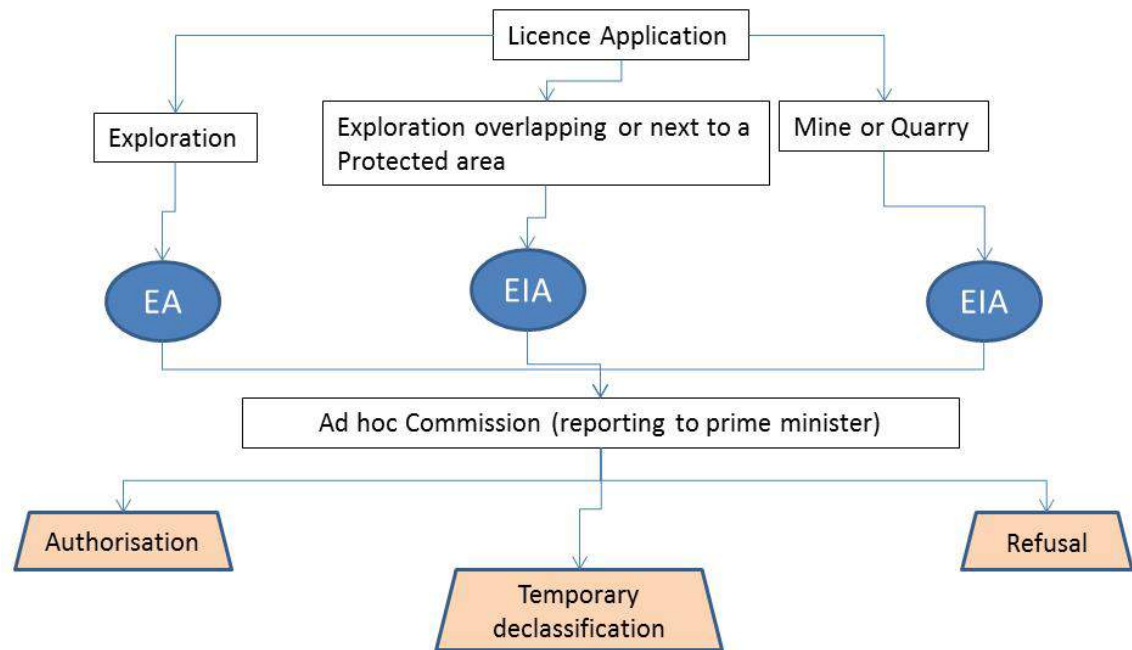


Figure 18: Proposal for organising EIA management

Remarks:

- i) The commission that rules on the EIA should answer to the prime minister rather than a ministry, as it needs to arbitrate between the stances taken by two (or more) ministries,
- ii) The members of the commission should have the technical skills needed to assess the quality of the EIAs, as the final decision is taken in the council of ministers, which alone may arbitrate between the economic, social and environmental interests of the State.
- iii) This commission should be able to call on resource persons who are specialists in mining environments and/or biodiversity,
- iv) All work not initially planned must be clearly declared and be subjected to a specific impact study,
- v) If mining activity is accepted in a protected area, this zone could be declassified, or its classification suspended, but in either case a mining agreement must be drawn up, specifying the means for restoring the environment, compensatory measures and the environmental management plan, even if the licence is only an exploration one, because the latter gives the right to receive a mining licence if a deposit is discovered.

- b. Restrict the content of the EIAs to the specific conditions of the mining sector. This will require mining environmental specialists and perhaps specific technical guidelines for the sector should be drawn up.

- c. Strengthen the aspects associated with public consultation, by setting up a network of associations that could have experts in the different domains.
3. Specify strategic development plans and perhaps create areas where mining exploration is prohibited. As mentioned above, mineral resources in essence belong to the government, and the latter has complete latitude to designate mining areas and others where it is forbidden, at least for a certain lapse of time. This real land development strategy could include wider reflection on a West African scale: what are the advantages in developing a given deposit while resources of better quality or that are accessible more easily (or at least while incurring less environmental damage) exist in a neighbouring country? In this case, inter-government compensation mechanisms need to be invented.
 4. Adapt sector laws and in particular the mining law, in order to clarify environmental obligations: sector laws can only impose specific constraints in the context of generic constraints imposed by environmental law.

It would be worthwhile in particular to have an environmental law that sets the basic principles of protected area conservation:

- PAs are: nature parks, strict or partial wildlife reserves, wildlife sanctuaries, classified forests, reforested areas (cf. guidelines for applying PA management categories, IUCN, 2008),
- Areas with restrictions on how they can be used are: pastoral reserves, hunting zones and buffer zones around PAs. Restrictions or bans are defined in the official area documents, in line with their environmental situation.
- "Rights over land, the subsoil and the natural resources contained within it do not apply in PAs unless an agreement between a project promoter, the ministry responsible for the project and the ministry for the environment authorise certain activities under strict conditions regarding the use of natural resources, restoration of the site and sustainability of the protected area.

In the different sector laws, for instance the mining law (but also of course legislation on oil, industry, craftwork or agriculture as appropriate) the following should be specified:

- a. Mining licences of all types can be obtained anywhere in the country except for:
 - i. A protection area of X metres around agglomerations, military sites, water sources etc.
 - ii. A protection area of X metres around PAs
- b. When a promoter wishes to carry out activities of any sort within a PA as defined in the environment law, they must submit a detailed project proposal including:
 - i. A detailed description of the work envisaged, with a schedule, including the potential discovery of a deposit,
 - ii. The technical reasons why this zone is of particular interest, demonstrating the specific mining potential of the area concerned,
 - iii. An environmental management plan including:
 1. Measures to limit the impact of activities
 2. Measures to restore or replenish the environment in the areas affected by the activities

3. Measures that will eventually help to increase the ecological value of the area and to improve management conditions⁸.
- c. The project area will be subject to approval by the council of ministers and a mining and environmental development agreement must be signed and bonds provided for the environmental obligations according to the different project phases. Depending on the specific nature of the zone, areas where mining is prohibited could be defined within the mining licence area in order to protect a particularly important ecosystem.
5. Improve baseline knowledge of biodiversity by:
 - a. Carrying out strategic environmental assessments of the main mining basins,
 - b. Review of the different environmental studies already carried out in a given sector
6. Strengthen environmental control before, during and after the mining project, with agents competent in mining, forestry and the environment.
7. Clarify tax issues relating to mining licences: taxes should be strictly defined in mining laws, however, a by-law can plan a certain distribution of mining revenues ("equalisation" fund in Senegal for instance) particularly to help strengthen mining and environmental authorities in order to enable real and independent control of mining installations.

Different proposals are appended in the form of "Project Sheets". They are grouped into three main categories:

- Category 1: the clarification, standardisation and up-dating of statutes governing all protected areas with regard to this topic,
- Category 2: the strengthening of mining environmental legislation (in particular for quarries) and of the role and resources of the law enforcement authorities,
- Category 3: the increase of communication on environmental and mining regulations and data, whether it be between the ministries concerned, for mining investors or the general public (EIA, PA maps, PA status, protected species etc.).

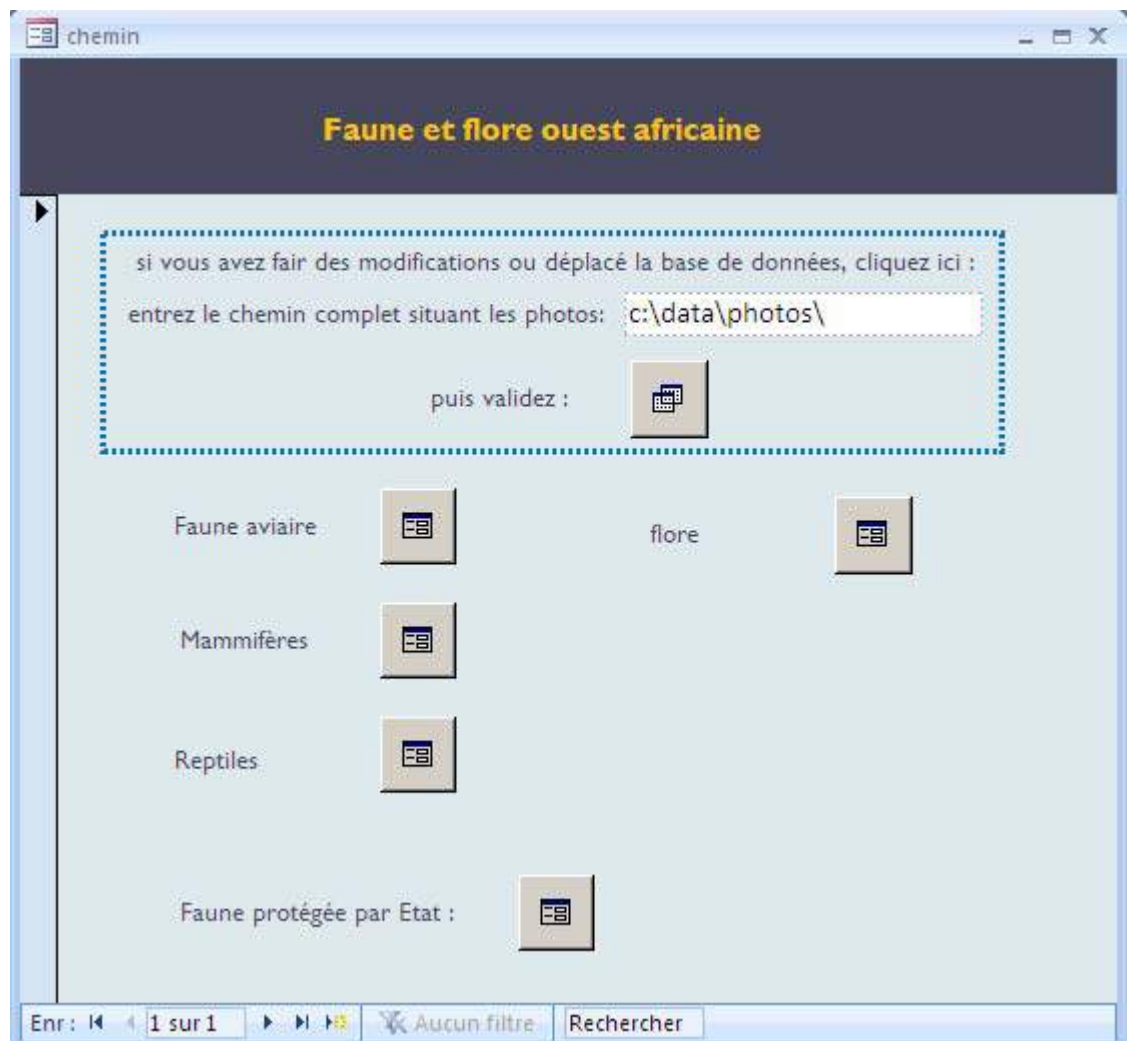
⁸ For instance transforming a pit into a waterhole for wildlife, building enclosures for tree nurseries if needed, leaving operational buildings for forestry guards, planting trees during the project in areas not directly affected (under the supervision of forestry agents), etc.

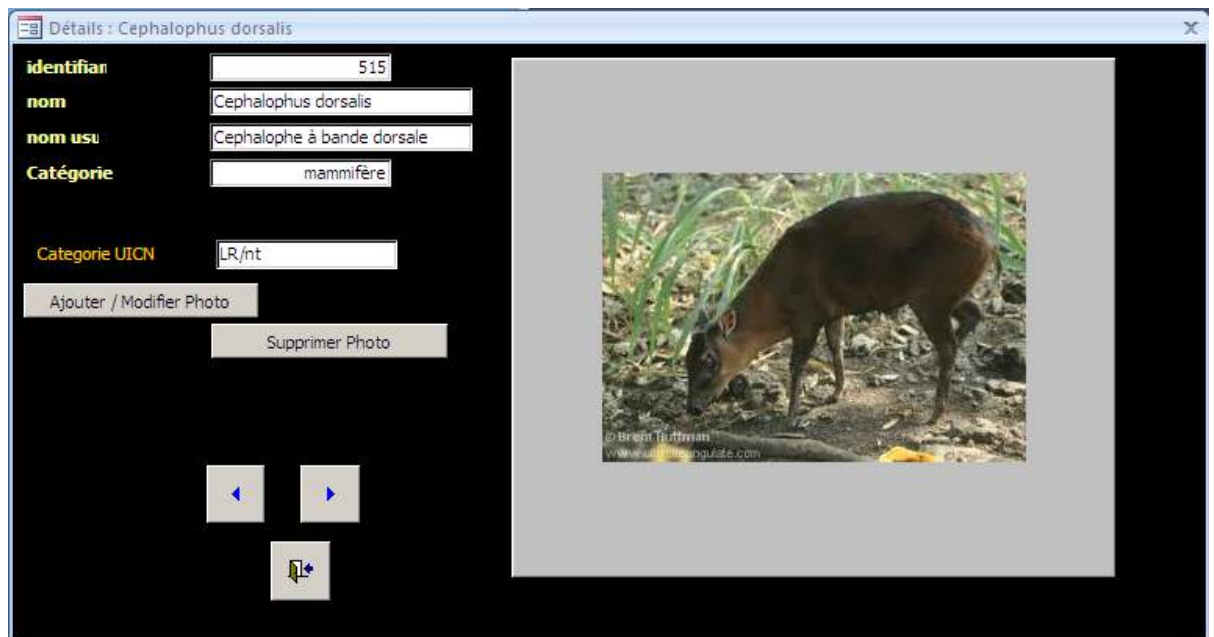
PART VI: DIGITAL DATA

A set of digital data is provided along with this report, in the form of an Access database or maps (ArcGIS). The list and description of these data are given below:

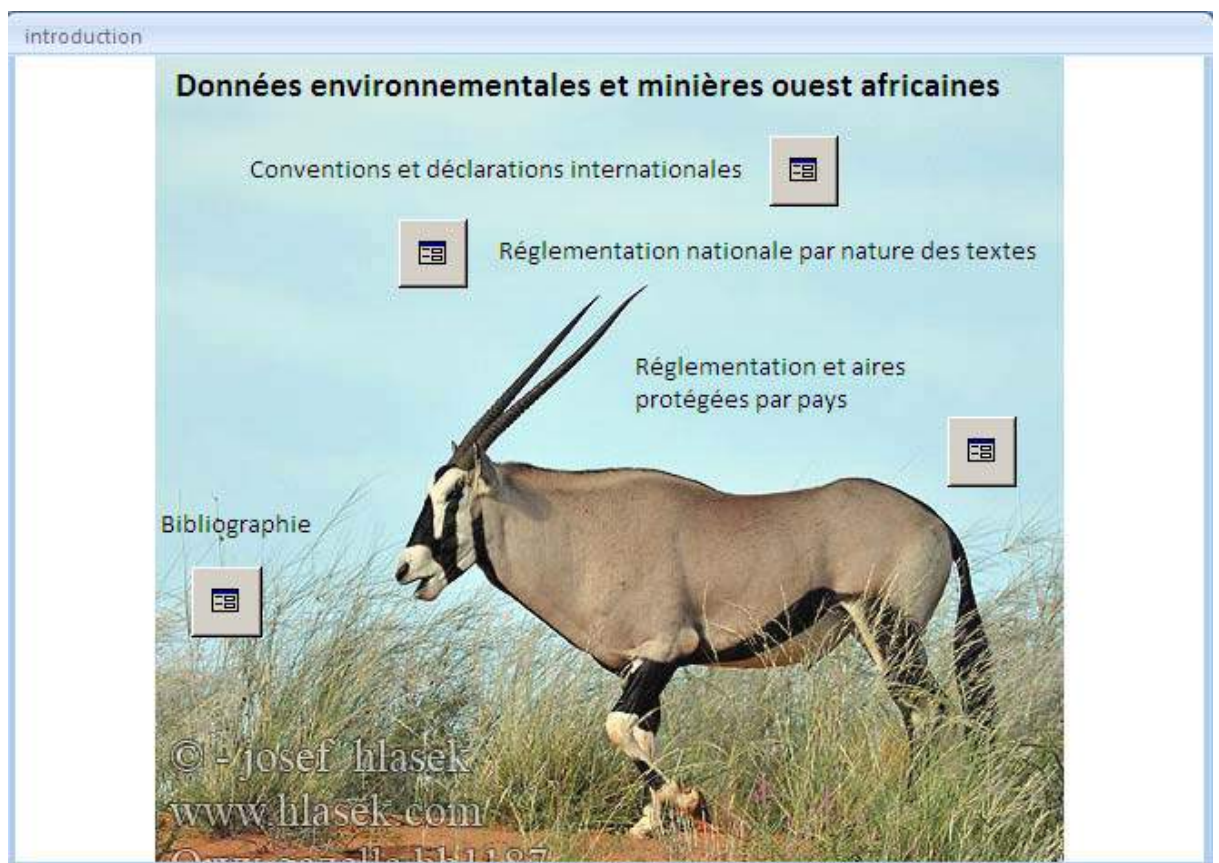
VI.1: Databases

1. Flora and fauna: database containing the names of wildlife and plant species found in the countries studied, with a certain number of photos. The IUCN classification is also given. The database also contains the IUCN “red list” and the WWF wildlife lexicon.





2. Protected areas: database containing all information gathered for the different PAs in the region studied, and the bibliography



For some PAs the list of their flora and fauna is also available in the database.

VI.2: GIS Data

All GIS data is given in WGS84 geographical coordinates.

Name	File name	Description
West African countries	Frontiere.shp	Administrative boundaries
Deposits	Exploitation_mines.shp	
Mining districts	Districts_miniers.shp	
Mining occurrences	Indices.shp	GIS Africa Data
Ecoregions	Global200_1.shp	Global 200
Ecodistricts	Ecoregion_pays.shp	
Oil blocks	Blocs_petroliers.shp	Partial data
IBAs	IBAS_1.shp	Birdlife
Bird distribution areas	Aire_oiseaux.shp	Birdlife
Mining licences	Permis.shp	
Oil deposits	Gites_petrole.shp	
Oil basins	Bassins_petroliers.shp	
Mining ports	Ports_mineral	
Simplified geology	Geol_simple	
Protected areas (WDPA)	WDPA_1.shp	WDPA data + corrections
National parks	P_N.shp	Extract of WDPA
World heritage areas	Aires_unesco.shp	Extract of WDPA
Planned protected areas	AP_projets.shp	
Areas of Biodiversity importance	Aires_priorite.shp	Consultant's own list
Areas of the World Resource institute	Wri_AO	WRI data

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- Woodside – 2005 – Projet de mise en exploitation de Chinguetti: Etude d’impact sur l’environnement.
- World Bank – Mining in developing countries
- World Bank – Environmental Standards

General Internet Sites

	Birdlife: IBA Search	http://www.birdlife.org/datazone/site/search
	UNCCD (combatting desertification): access to national reports	http://www.unccd.int/regional/africa/menu.php
	A-Z of areas of biodiversity importance	http://www.biodiversitya-z.org/pages/17
	UNEP website	http://www.unep.org/
	ICMM website	http://www.icmm.com/
	WWF: downloadable data	http://www.worldwildlife.org/science/data/item1872.html
	global200 website	http://www.nationalgeographic.com/wildworld/profiles/g200_index.html
	Extractive Industries Transparency Initiative (EITI)	http://www.eiti.org
	Critical Ecosystem Partnership Fund (CEPF)	http://www.cepf.net/fr/Pages/default.aspx
	RAMSAR Convention: list of sites by country	http://www.ramsar.org/cda/fr/ramsar-pubs-annolist-annotated-ramsar-23851/main/ramsar/1-30-168%5E23851_4000_1
	WWF: Wild World	http://www.worldwildlife.org/sites/wildworld/index.html
	IUCN: National studies	http://www.papaco.org/nos%20etudes.html (studies in English: http://www.papaco.org/angl%20nos%20etudes.htm)
	World Resource Institute	http://www.wri.org/
	World Heritage Convention (UNESCO)	http://whc.unesco.org/fr/list/
	World Database on Protected Areas (WDPA)	http://www.wdpa.org/
	International Finance Corporation	http://www.ifc.org
	Birdlife: general website	http://www.birdlife.org
	US Environmental Protection Agency	http://www.epa.gov/
	Conservation international	http://www.biodiversityhotspots.org

Some national websites

Ghana	association WACAM	http://www.wacamghana.com/
Mali	Forest Information system	http://www.sifor-mali.net/
	Ministry of the Environment	http://www.environnement.gouv.ml
	National Directorate for Geology and Mines	http://www.dngm.org/
Senegal	Ministry of the Environment	http://www.denv.gouv.sn
	Ministry of Mines	http://www.dirmingeol.sn

APPENDIX I: Key Biodiversity Areas

There are different levels of biodiversity area:

1. Biodiversity hotspots (<http://www.biodiversityhotspots.org>) defined by Conservation International are large areas of biodiversity like the Guinean forest. These areas have no national status.
2. Key Biodiversity Areas (KBA) have been defined internationally as zones where there is biodiversity of a particular sort, worthy of conservation. KBAs include different sites such as IBAs (important Bird areas), IPAs (Important Plant areas), important sites for Freshwater Biodiversity, Ecologically and Biologically significant Areas in the High seas (EBSAs), and Alliance for Zero Extinction sites (AZEs). KBAs are identified nationally or regionally on the basis of standardised criteria regarding their vulnerability (presence of individual endangered species or critical species) or irreplaceability. You must pay to use the data on the Integrated Biodiversity Assessment Tool (IBAT) website. Data may be consulted for free after registering on the site, but it costs to download the data.
3. Specific areas have been defined for birdlife, Important Bird Areas (IBAs) and Endemic Bird Areas (EBAs). IBAs are key sites for conserving bird species identified by BirdLife International. This programme has chosen to identify areas that are small enough to enable total conservation (they are often part of a wider protected area) and insofar as is possible, the habitat and ornithological importance of these areas is different from that of the surrounding environment. IBAs are selected according to internationally recognised standardised criteria that are regularly updated. For more information go to the web site <http://www.birdlife.org>
4. IPAs, are the equivalent of IBAs for plants. There are no IPAs in the zone studied.
5. Internationally recognised sites are:
 - a. World Heritage Sites: UNESCO Convention to protect world cultural and natural heritage (Paris, 1972)
 - b. RAMSAR wetlands (convention on internationally important wetlands, adopted in Ramsar in 1971 which came into force in 1975)
 - c. UNESCO MAB (Man and the Biosphere programme), a scientific programme.

The majority of these biodiversity areas, as well as protected areas with a purely national status are listed in the World Database on Protected Areas (WDPA: <http://www.wdpa.org/>), although some discrepancies have been noted between national maps and the data that can be downloaded from the internet site.

APPENDIX II: African Convention on the Conservation of Nature and Natural Resources (Alger)

Appendix of the convention that defines conservation areas.

Strict Nature Reserve: protected area managed mainly for science

Definition

Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

Objectives of Management

- to preserve habitats, ecosystems and species in as undisturbed a state as possible;
- to maintain genetic resources in a dynamic and evolutionary state;
- to maintain established ecological processes;
- to safeguard structural landscape features or rock exposures;
- to secure examples of the natural environment for scientific studies, environmental monitoring and education, including baseline areas from which all avoidable access is excluded;
- to minimise disturbance by careful planning and execution of research and other approved activities; and
- to limit public access.

Wilderness Area: protected area managed mainly for wilderness protection

Definition

Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

Objectives of Management

- to ensure that future generations have the opportunity to experience understanding and enjoyment of areas that have been largely undisturbed by human action over a long period of time;
- to maintain the essential natural attributes and qualities of the environment over the long term;
- to provide for public access at levels and of a type which will serve best the physical and spiritual well-being of visitors and maintain the wilderness qualities of the area for present and future generations; and to enable local communities living at low density and in balance with the available resources to maintain their life style.

National Park: protected area managed mainly for ecosystem protection and recreation

Definition

Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational,

recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

Objectives of Management

- to protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes;
- to perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity;
- to manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state;
- to eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation;
- to maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation; and
- to take into account the needs of local communities, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

Natural Monument: protected area managed mainly for conservation of specific natural features

Definition

Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

Objectives of Management

- to protect or preserve in perpetuity specific outstanding natural features because of their natural significance, unique or representational quality, and/or spiritual connotations;
- to an extent consistent with the foregoing objective, to provide opportunities for research, education, interpretation and public appreciation;
- to eliminate and thereafter prevent exploitation or occupation inimical to the purpose of designation; and
- to deliver to any resident population such benefits as are consistent with the other objectives of management.

Habitat/Species Management Area: protected area managed mainly for conservation through management intervention

Definition

Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Objectives of Management

- to secure and maintain the habitat conditions necessary to protect significant species, groups of species, biotic communities or physical features of the environment where these require specific human manipulation for optimum management;
- to facilitate scientific research and environmental monitoring as primary activities associated with sustainable resource management;
- to develop limited areas for public education and appreciation of the characteristics of the habitats concerned and of the work of wildlife management;
- to eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation; and

- to deliver such benefits to people living within the designated area as are consistent with the other objectives of management.

Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation

Definition

Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

Objectives of Management

- to maintain the harmonious interaction of nature and culture through the protection of landscape and/or seascape and the continuation of traditional land uses, building practices and social and cultural manifestations;
- to support lifestyles and economic activities which are in harmony with nature and the preservation of the social and cultural fabric of the communities concerned;
- to maintain the diversity of landscape and habitat, and of associated species and ecosystems;
- to eliminate where necessary, and thereafter prevent, land uses and activities which are inappropriate in scale and/or character;
- to provide opportunities for public enjoyment through recreation and tourism appropriate in type and scale to the essential qualities of the areas;
- to encourage scientific and educational activities which will contribute to the long term well-being of resident populations and to the development of public support for the environmental protection of such areas; and
- to bring benefits to, and to contribute to the welfare of, the local community through the provision of natural products (such as forest and fisheries products) and services (such as clean water or income derived from sustainable forms of tourism).

Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

Definition

Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Objectives of Management

- to protect and maintain the biological diversity and other natural values of the area in the long term;
- to promote sound management practices for sustainable production purposes;
- to protect the natural resource base from being alienated for other land-use purposes that would be detrimental to the area's biological diversity; and to contribute to regional and national development;
- to contribute to regional and national development.

Note that in 2008, the World Commission on Protected Areas (IUCN WCPA) produced guidelines on how to apply protected area categories (six management categories, the first of which has two sub-categories) which follow the definitions of the Alger Convention and give a specific definition for protected areas.

APPENDIX III: Extracts from *Tendances d'évolution du droit de la faune et des aires protégées en Afrique occidentale* (Changes and trends in legislation on wildlife and protected areas in West Africa), Ibrahima Ly, 2001:

Legislation on wildlife and protected areas in West Africa is fairly disparate, not only because of the different legal systems in force (French-speaking, English-speaking and Portuguese-speaking countries, all have different legal systems), but also because of differences in the main legal components governing wildlife and protected areas (legislation and regulations, jurisprudence, customary standards, international conventions on wildlife species etc.). Nonetheless, these differences do not prevent the countries of West Africa from coming together on a regional level to meet the objectives for integration stipulated in their respective constitutions (ECOWAS, WAEMU etc.).

1.1.1 The Principle of Protection

This principle is based on the recognised status of wildlife and protected areas in the different countries. Indeed, the majority of the countries concerned by the study now include wildlife and its components as elements of national heritage, which must be sufficiently and appropriately protected. Thus, for example, legislation in Benin, Mauritania, Burkina Faso, Guinea and Togo respectively mentions wildlife as “an essential element of the nation’s biological heritage that the Government will protect and that each citizen must respect and ensure it is protected” (Article 2 of the law in Benin), as “shared biological heritage” (Article 3 of the law in Mauritania), as “elements of national heritage that everyone has the duty to respect and help to protect” (Article 4 of the law in Burkina Faso), as “public heritage” (Article 3 of the law in Guinea), and as “a national good” (Article 2 of the law in Togo).

a) Strict nature reserves

These are usually areas where nature is left to itself, with no external intervention apart from the safeguard measures needed to ensure its existence. The taking of specimens or other forms of exploitation (forestry, agriculture, mining etc.) liable to harm or disturb the flora and fauna are forbidden. Any activities carried out within these areas require special prior authorisation from the competent ministry.

b) National Parks

The bill in Benin gives a comprehensive definition of the notion of national park: “it is an area dedicated to the conservation and propagation of wild flora and fauna and biological diversity, to the protection of sites, landscapes and geological formations of particular aesthetic value and to scientific research, public education and recreation” (Article 17 of the bill). Grazing, land clearance, hunting, agriculture, forestry, mining, dumping, polluting, uncontrolled fires and, in general, any activity that is incompatible with the conservation and protection of the environment are forbidden in national parks. Only safari tourism is permitted and the conditions of entry, movement and stay are regulated (Articles 117 to 124 of the bill in Benin on safari tourism).

In West Africa, depending on the country, national parks are created either by law (Benin, Mali and Burkina Faso), or by decree (Côte d’Ivoire, Guinea, Mauritania, Togo, Senegal).

c) Wildlife reserves

These are areas dedicated to the conservation, management and propagation of wildlife and to the development of its habitats. Hunting, capture of wild animals and other activities are either

prohibited in these reserves, or else are strictly limited and carried out under the control of the authorities. These types of reserve are created in the majority of the countries by decree. This is the case in Benin, Burkina Faso, Guinea, Mauritania, Senegal, Côte d'Ivoire and Mali. In Togo, a by-law is passed by the minister responsible for forest resources to set them up. This is more flexible than the decree which has to be signed by the President.

d) Special reserves or wildlife sanctuaries

These are defined in most legislation as areas for the protection of characteristic wildlife communities, more specifically wild birds and endangered animals, as well as of the habitat essential for their survival. All activities carried out in these reserves must be intended to achieve the specific objective for which they were created. Furthermore, any developments must help the animals being protected. These areas are usually created by decree, except in Togo where the minister responsible for forest resources sets them up by passing a by-law.

Appendix IV: Some Suggestions for Improvement

Some practical suggestions are made here to improve interaction between the extractive industries and the environment, bearing in mind the specificities of the West African region and the elements discussed in this study. Some priority lines of action are identified.

Line of Action 1: clarify and up-date the status of all protected areas with regard to mining risks.

Objectives: to be able to really protect PAs, they need to have a clear and official status, leaving no ambiguity surrounding the laws on the resources they harbour. Large mining companies have teams of international lawyers who will take advantage of any loophole in the legal arsenal to promote their rights to operate in areas with high mining potential.

Suggestion 1: Update Protected Area Status

Finding: during the study, it became apparent that certain PAs did not have a clear legal status. Some areas are “considered as”, some types of PA do not have a real status in national laws, the status of some areas is not the same in the WDPA (filled in by Governments) as in the analysis of IUCN management categories, some PAs were created in the 1930s and their status has not been revised since etc.

Action Plan: for all countries of West Africa:

1. Establish standard terms (see Appendix II) to classify the different protected areas (classified forest, nature reserve, wildlife reserve etc.), if possible based on the IUCN management categories as these are widely used elsewhere.
2. Update national legislation in line with this terminology,
3. Draw up an inventory of the original documents for the different protected areas and update them in line with current regulations,
4. Map the boundaries of all protected areas in detail, as an official reference for all projects, mining or not, that is freely available.

Such a project could be supported by the sub-regional bodies (ECOWAS, WAEMU) and by development partners (World Bank, UNDP, bilateral donors etc.).

Suggestion 2: Protected Areas Database

A start of what this database could be was begun to store the data gathered during this study. It would reference the different types of PA in each country (with links to their regulatory documents), the legal constraints associated with these types of PA, as well as the list of the PAs themselves with their original documentation and the specific constraints (a distinction would be made between the generic constraints associated with the type of PA and specific constraints imposed on the PA itself). A detailed list of the local flora and fauna would be given for each PA (many of these data are available in the different RAPPAM and METT evaluations, but not in the form of a user-friendly database, and yet these are fundamental environmental data that should be widely disseminated).

Such a database could be envisaged as a participatory regional project with the contribution of ministries, NGOs, conservation and hunting associations, nature groups etc.

Suggestion 3: Strategic biodiversity assessments in known mining basins

One of the gaps identified by all stakeholders was a lack of “baseline” data on biodiversity. Carrying out strategic environmental assessments systematically in the main mining basins would help to fill this gap. Such a project should be carried out in two stages:

1. Definition of priority areas, a common methodology and terms of reference. Priority areas should have a regional dimension corresponding to a specific ecoregion and to a common geological substratum such as the “fenêtre de Kéniéba” for instance (gold zone in Senegal and Mali), the iron ore deposit of Mount Nimba (Côte d’Ivoire, Guinea, Liberia), the phosphate basin of Thiès, the iron ore basin of northern Mauritania, the Guinea-Guinea Bissau bauxite area etc.
2. Carrying out of strategic evaluations involving local consulting firms, academics and local communities (awareness-raising on biodiversity) as well as the mining companies working there.

Such a project could be financed by trans-national structures (ECOWAS, WAEMU, IUCN, World Bank, Bilateral Cooperation or the EU) and with the participation of mining companies.

Suggestion 4: update the lists of species that are fully or partially protected, according to ecoregions: in some countries, the list of protected species does not correspond to the actual situation, making it inapplicable and casting doubt on all protection actions. Updating these lists according to a coherent partition into ecosystems, to current knowledge on endangered species (IUCN red list) and progress made on knowledge of certain species endemic nature, would provide better visibility and enable the actions and obligations of mining companies in particular to be better targeted.

Such a project could be led by IUCN with the collaboration of universities and protected area managers.

Line of Action 2: Strengthen environmental legislation in the mining sector

Objectives: as mining activity is primarily governed by mining laws, the environmental component of these should be strengthened or clarified, in line with the laws on the environment, forestry etc. Transparency should be improved in how mining licences are granted by involving other administrations.

Suggestion 5: mining licence attribution guidelines

The current trend for granting mining licences via an inter-ministerial commission should be strengthened in line with the Ghanaian model: the commission meets when the licence application is submitted, before the application is processed to make sure there are no obstacles to granting a licence (protected area, development project or such), and again after the dossier has been processed and the EIA submitted. This commission should be mainly made up of “technicians” in the sectors concerned (environment, water, development and agriculture in particular). To be more independent, this commission should report to the president or the prime minister, and not to one of the specific ministries (mines or the environment).

Suggestion 6: Draw up a charter for carrying out mining EIAs

This study and previous studies have highlighted the great disparity in the quality of environmental impact assessments. While in some reports the baseline study seems very exhaustive (which does not mean that they are accurate), some are very cursory, and in all cases there is a tendency to minimise impacts: after pages of descriptions of wildlife, plants, impacts, evaluation methods etc. the conclusion is invariably “scale of impact: very low to low”.

Naturally a loss of habitat is to be expected for a certain number of animals and birds in the region with the construction of the mine and its infrastructure. From this point of view, the creation of a tailings dam on around 390 ha, in the valley located 3 kilometres South-East of the quarry will constitute the greatest impact.

The largest mammals, reptiles and birds will be able to emigrate outside the affected region while the smaller species, which are less mobile, will unfortunately disappear. This minor animal exodus will not increase pressure on the surrounding habitat, as the population of large and medium-sized mammals is already below the habitat capacity in the region. This is the case, particularly in the Sadiola region, because they are hunted for food or to eliminate competition for domesticated animals.

Texts like the one above are unfortunately all too common and these EIAs are nonetheless validated.

As we have seen, given the financial weight of the large mining companies, it is difficult for a country and even more so for a ministry or the technical department of a ministry to oppose certain EIAs.

The EIAs should be able to be judged or commented on by one or several internationally recognised independent experts (or at least by a commission that reports directly to the prime minister and not to a ministry). The publication of EIAs and of the expert report (the expert thus putting his credibility on the line) would also help to counter certain irregularities.

Support from credible international organisations (conservation NGOs) could reinforce the credibility of this process if they themselves are not financed by the extractive sector.

Suggestion 7: Restrict EIAs

As a general rule, mining companies draw up the terms of reference for the EIAs, submit them to the appropriate ministry and then carry them out.

The administration's poor knowledge of the environmental situation in the field means that specific requirements are rarely imposed on mining operators. For instance, demanding a specific study for a given licence because there is a particular species in that area would require both access to the Internet and a good command of GIS tools and databases, as well as the time (see example of IBAs).

Therefore, the data and tools should be made accessible to all (basic GIS software costs 2 million CFA Francs) and a good command of English is also usually needed to consult the WDPA or Birdlife database.

1. Role of international institutions (WWF, IUCN, Birdlife) and regional ones (WAEMU, ECOWAS)
2. Involve recognised international experts (who would finance this?)

Suggestion 8: improve expertise in the mining environment

The mining environment has specific characteristics which, if not properly understood, can invalidate the EIAs. Therefore a sufficiently sound knowledge of both the different types of ores and their possible impacts on the environment and a good understanding of the ore processing procedures are needed. To this end, two options can be explored:

1. Specific professional training (to be integrated into an environmental master's programme or similar)

2. The production of technical guidelines (geochemistry of ores, geochemistry of soil, chemical mobility of the elements, metallurgy and ore processing)

Suggestion 9: Make better use of the data from EIAs

Many EIAs (e.g. the EIA of Loulo, RandGold, 2008), but unfortunately not all, contain interesting environmental data like flora and fauna biodiversity studies (qualitative and sometimes quantitative data) and in some cases a fairly exhaustive inventory of ecosystems. These data are filed away in the reports and never used again (except by the consulting firm that carried out the study which is able to re-use the data).

These biodiversity data concern areas of several tens or several hundreds of square kilometres and could contribute to national efforts to better understand the country's biological diversity.

In Mali, this information could be entered into the environmental application set up by the National Directorate for Geology and Mines in Mali (see the Appendix on Mali). Unfortunately, this application is not yet in use and when it will be, the information will only be accessible to the Mining Directorate. Therefore it is necessary to:

1. Make it compulsory to enter environmental data from EIAs
2. Make the data useable by all stakeholders (ministry of the environment and wildlife, consulting firms, international institutions)
3. Establish means to validate the data (comparison with nearby licences, control visits).

This work could be financed by:

1. Mining fees and taxes
2. Perhaps a set tax for control visits to check data in the field

Suggestion 10: Step up environmental controls

Combine the efforts of the mining authorities, forest guards and other official agents who could help monitor the impact of mining activities on the environment in general and on biodiversity in particular.

APPENDIX V: Signing of international conventions on biodiversity

COUNTRY	African convention on the Conservation of Nature and Natural Resources	United Nations Convention to Combat Desertification	International Plant Protection Convention (Rome)	Convention on Wetlands of International Importance	Convention on the Conservation of Migratory Species of Wild Animals	Convention on Biological Diversity (Rio de Janeiro)	World Heritage Convention	Convention on International Trade in Endangered Species	Cartagena Protocol on Biosafety
BEN		29/08/1996	12/10/2010	01/01/1900	01/04/1986	13/06/1992	14/06/1982	28/05/1984	02/03/2005
BFA	16/08/1969	26/01/1996	08/06/1995	01/01/1900	01/01/1990	12/06/1992	02/04/1987	11/01/1990	04/08/2003
CIV	15/01/1969	04/03/1997	17/12/2004	01/01/1900	01/07/2003	10/06/1992	09/01/1981	19/02/1995	
CPV				01/01/1900	01/05/2006		28/04/1988	08/11/2005	
GHA	17/05/1969	27/12/1996	22/02/1991	01/01/1900	01/04/1988	12/06/1992	04/07/1975	12/02/1976	30/05/2003
GIN		23/06/1997	22/05/1991	01/01/1900	01/08/1993	12/06/1992	13/03/1979	20/12/1981	11/12/2007
GMB		11/06/1996		01/01/1900	01/08/2001		01/07/1987	24/11/1977	
GNB		27/10/1995	24/10/2007	01/01/1900	01/09/1995	12/06/1992	28/01/2006	14/08/1990	19/05/2010
LBR	21/09/1978		02/07/1986	01/01/1900	01/12/2004		28/03/2002	09/06/1981	
MLI	20/06/1974	31/10/1995	31/08/1987	27/09/1987	01/10/1987	29/09/1995	05/04/1977	16/10/1994	04/06/2002
MRT		07/08/1996	29/04/2002	01/01/1900	01/07/1998	12/06/1992	02/03/1981	11/06/1998	22/07/2005
NER	10/01/1970	19/01/1996	04/06/1985	01/01/1900	01/11/1983	11/06/1992	23/12/1974	07/12/1975	30/09/2004
NGA	02/04/1974		17/08/1993	01/01/1900	01/01/1987	13/06/1992	23/10/1974	01/07/1995	15/07/2003
SEN	03/02/1972	26/07/1995	03/03/1975	01/01/1900	01/06/1988	13/06/1992	13/02/1976	03/11/1977	08/10/2003
SLE		25/09/1997	23/06/1981	01/01/1900			07/01/2005	26/01/1995	
TCO		27/09/1996	05/03/2004	01/01/1900	01/09/1997	12/06/1992	23/06/1999	03/05/1989	01/11/2006
TGO	24/10/1979		02/04/1986	01/01/1900	01/02/1996	12/06/1992	15/04/1998	21/01/1979	02/07/2004

NB: "01/01/1990" indicates that the convention has been signed but the date is unknown.

APPENDIX VI: NATIONAL CASE STUDIES

I. Countries visited for the study

- 1. Burkina Faso**
- 2. Mali**
- 3. Senegal**
- 4. Ghana**

II. Countries not visited but for which certain data are available

- 1. Liberia**
- 2. Guinea**
- 3. Guinea-Bissau**
- 4. Mauritania**
- 5. Togo**
- 6. Chad**
- 7. Côte d'Ivoire**
- 8. Sierra Leone**

Protected Areas

In Burkina Faso, the main regulatory text governing PAs is the law on forestry. It distinguishes two specific categories of PA:

1. Public forests (Livre I, art.16), which are all classified or protected.
 - According to Article 16, depending on how important a forest is to the general interest, the forestry classification can subject it to a special restricted regime regarding the rights of usage and exploitation. Forests that have not been classified are called protected forests. They are subject to the general rights of usage and exploitation.
 - The classification text specifies the objectives of classification, the surface area, the exact boundaries of the forest, its main or exclusive purposes and how it should be managed (Article 29)
 - Forests are protected against all forms of degradation and destruction, whether natural or provoked (Article 43).
2. Wildlife protection areas (Livre II, Article 77 onwards), which include:
 - National parks,
 - Strict or partial wildlife reserves
 - Biosphere reserves
 - Sanctuaries
 - Ranches
 - Local refuges
 - Village hunting zones

Apart from exceptional cases, and depending on the provisions of the original documentation or development plan, national parks are exempt from land-use rights. The park's original documentation must, if necessary, specify compensatory measures planned to benefit the local community.

Within national parks grazing, land clearance, hunting, farming, forestry activities, mining, dumping, polluting, uncontrolled fires and in general any acts incompatible with the conservation and protection of the environment are prohibited.

Strict wildlife reserves are set up to protect all wildlife species and hunting is prohibited there. Partial wildlife reserves are set up to protect certain species and hunting is permitted.

In other words, apart from bans or restrictions on hunting, wildlife protection areas other than national parks are not exempt from land-use rights.

Out of the 76 PAs identified (some very small ones were not taken into consideration), there are 2 national parks (Kabore-Tambi and W), 21 partial or strict wildlife reserves and 53 classified forests.

Within the Ministry of the Environment and Sustainable Development, the Wildlife and Hunting Directorate and the OFINAP (national office for PAs, a public body) are responsible for monitoring PAs (cf. RAPPAM Burkina Faso).

NB: classification and protection by-laws, often old, were not able to be consulted apart from those from 1913 to 1983 that concern wildlife and are available at the Wildlife and Hunting Directorate.

Mining Law

The mining law, like all mining laws in the sub-region, stipulates that all mineral resources are Government property and that no one may undertake exploration or mining of these resources without prior authorisation.

The articles in the mining law that concern PAs in particular or environmental protection in general are the following:

- a. *Exclude from mining licences areas set aside for environmental preservation and the protection of archaeological sites (Article 64). Activities governed by mining law must be carried out such that the environment is preserved and managed and that mine sites are rehabilitated according to the standards, terms and conditions stipulated in current legislation (Article 76).*
- b. *Anyone submitting a mining licence request, except for exploration permits or quarry permits, who wishes to carry out activities liable to affect the environment must, in compliance with the law on the environment and depending on the case, provide an impact notice or carry out an Environmental Impact Assessment as well as a public survey, and provide a plan to mitigate or strengthen the negative or positive impacts. Any change in the planned actions must receive prior authorisation by the mining authorities (Article 77).*
- c. *All holders of a mining licence other than an exploration permit or any beneficiary of a mining licence apart from a quarry permit is required to open and contribute to a trust fund account at the Central Bank of West African States or in a commercial bank in Burkina Faso, in order to accumulate funds to cover the costs of the environmental preservation and rehabilitation programme. The amounts used in this way are tax deductible against industrial and commercial profits. The terms and conditions for managing and contributing to these funds are established by mining regulations.*
- d. *In addition to the provisions of mining law, holders of mining licences and beneficiaries of permits are also subject to the general laws and regulations in force, particularly those concerning environmental preservation and management, buildings classified as dangerous, unsanitary or uncomfortable and the protection of forest and cultural heritage*

In the process of granting mining licences, the protection of classified areas is applied: all licence requests must be checked by the mining cadaster (Directorate of Geology and Cadaster), which verifies that the licence requested (whether it be an exploration or a mining permit) does not encroach on either classified forests, national parks or strict reserves.

However, note that the mining cadaster uses topographical maps at a scale of 1/200 000 to define the boundaries of PAs, without taking into account any changes to these boundaries made by the OFINAP.

Furthermore, no map of archaeological sites or cultural heritage is available at national level, even though these sites are in theory excluded from mining activities.

Environmental Legislation

The law on the environment and the associated decree on impact assessments specify the terms and conditions for carrying out environmental impact assessments (EIAs).

Note that the Ministry of the Environment published a “*Guide général de réalisation des études et notices d’impact sur l’environnement*” (General guidelines for carrying out environmental impact assessments and impact notices) (2007), as well as various sector guides including the “*Guide sectoriel d’étude et de la notice d’impact sur l’environnement des projets miniers*” (Sector Guidelines for mining project environmental impact assessments and impact notices) (2007)

The process for carrying out environmental impact assessments is shown in Figure 1.

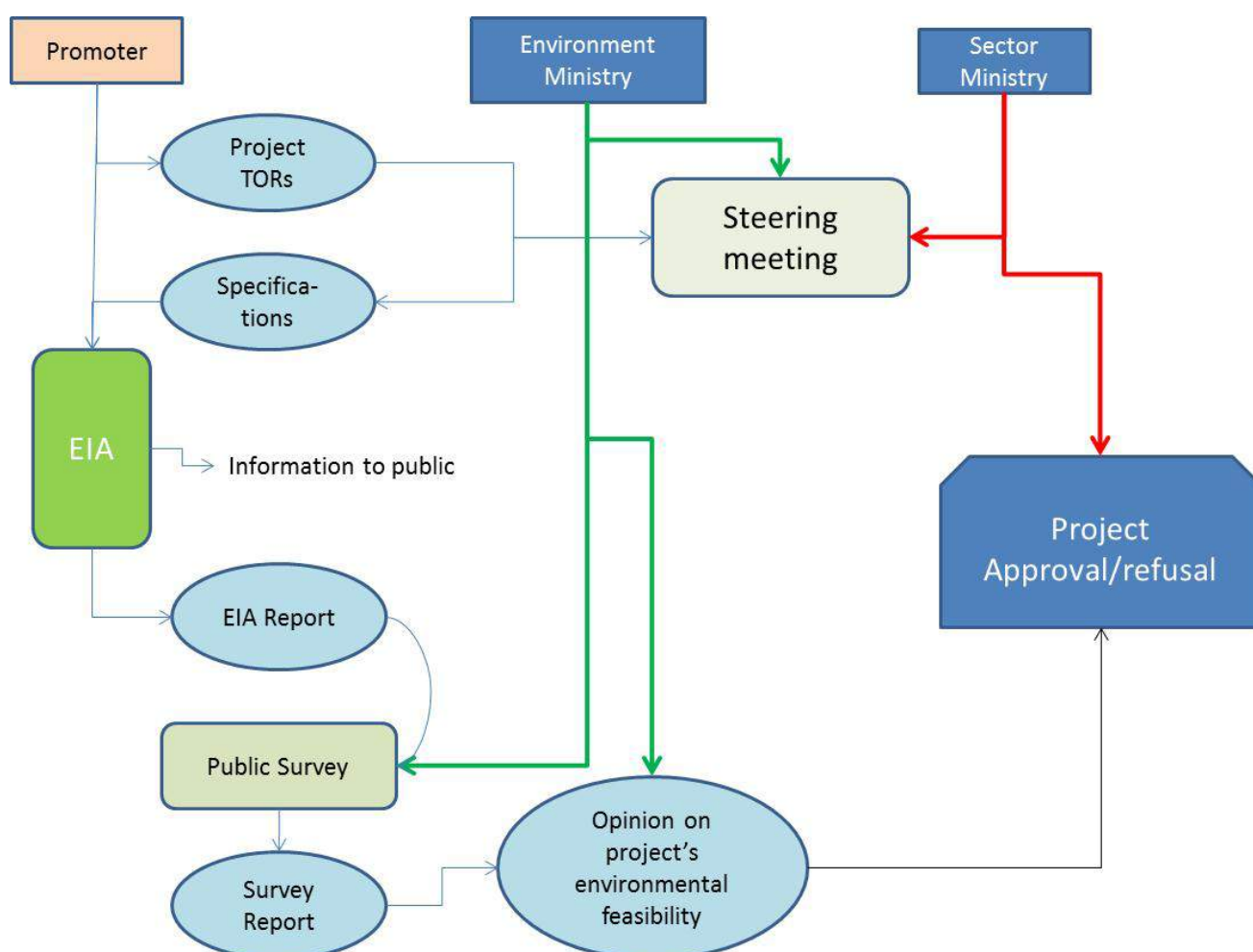


Figure 1: General procedure for Environmental Impact Assessments.

The terms of reference for the EIA are submitted to the Ministry of the Environment before it is carried out. The specifications are drawn up by the Ministry of the Environment, with the support of the ministry responsible for mining.

Once the EIA is received, the Ministry of the Environment organises a public survey and awaits the results of the survey before issuing an opinion on the project's environmental feasibility. Only after this does the Ministry responsible for mining accept or refuse the project.

As regards the public survey itself, it is publicly posted at the *Préfecture* and in the Town Hall and is published in the press.

Geological and Mining Situation

Geological Context

Burkina Faso is predominantly basement complex. Sedimentary basins only cover a small part of the country at the north-western border and at the border with Niger and Benin. Mining potential is as follows:

- Gold along all the “green rock” belts (volcanic sediment of the Birimian): many occurrences are known, 6 gold mines are in operation (Inata, Essakane, Youga, Taparko, Mana and Kalsaka) and a seventh should soon open (Bissa).
- Zn: the Perkoa deposit has been known about for a long time and, after several unsuccessful attempts, should soon be opened.
- Mn: the two main areas with manganese are Kiéré (Houndé region) and Tambao (north of Dori). These mines have been on the point of opening... for a very long time. (Mining of these deposits poses problems because they are far from a maritime port. Manganese is a heavy metal, usually exported by ship. Several projects are under consideration: transport of the ore by road, a railway to link Ouagadougou to Tambao and then reinforcement of the existing line between Ouagadougou and the Ivorian or even Senegalese coast.)
- Diamonds: the south-western border of the country (south-west of Banfora) is known for alluvial diamond occurrences (but no mining is envisaged for the moment).
- Bauxite: some occurrences of bauxite are known in the region of Kaya, but do not have much economic value in comparison with the deposits in Guinea or Mali.
- In the sedimentary basins the following is found:
 - o Limestone for cement production in the Sahel (north of Dori): these occurrences are too far from the main towns to present any real economic interest (if a railway line were opened for manganese this could change).
 - o Phosphates at the border with Benin and Niger: some of these occurrences (in particular Kodjari) present real economic potential but are located in the W National Park or in the neighbouring classified forests.

Distribution of Mining Licences (data updated January 2011)

- a. Exploration licence: more than 420 exploration permits are currently valid, totalling 57 430 km², of which 56 000 is for gold. In relation to the 274 000 km² of the country, this means 29% of the national territory is covered by mining exploration licences.
- b. There are seven mining licences, covering a total of 959 km² of which 667 km² are for the Taparko mine alone. All the other mining licences are for areas of less than 100 km² (less than 50 km² for Mana and Essakane, even though these are international scale companies).

- c. There are also “traditional artisanal or semi-mechanised mining permits” and “quarry permits”. Artisanal gold miners must work in clearly specified areas and several “expulsions” of those working outside these authorised zones have occurred.

In economic terms, Burkina Faso produced 12.15 tonnes of gold industrially in 2009. The contribution to the GNP of the mining sector in 2009 was barely 3%, despite the fact that the sector represents more than 40% of export revenues.

Mining Pressure on the Environment:

According to the RAPPAM data analysis, the only mining pressure noted in the surveys on PA management is the presence of artisanal gold mining in the Sahel reserve. This activity has been carried out here for decades (and is not actually prohibited because this area is a pastoral reserve) and the human pressure can be very high. There are regularly several hundred people looking for gold in the area. However, this is not the only area for artisanal gold mining in Burkina: the classified forest of 2 Balés and the surrounding classified forests are regularly visited by gold miners.

Mining licences and quarry permits are attributed outside PAs, with a few rare exceptions:

- a. The classified forest of Nazinga is covered by a gold exploration permit (Tiakané, Randgold) granted in 2005. Officially, Nazinga is a game ranch, which does not officially prohibit mining prospection.
- b. Nakambé classified forest is covered by a gold exploration permit (Tanéma, Randgold) also granted in 2005.
- c. The Deux Balés National Park (currently under creation), partly overlaps with the Poura I (SOREMIB) gold exploration permit. However, there is some doubt as to the validity of this exploration permit, granted in 1991.
- d. The status of pastoral area and partial wildlife PA of the Sahel reserve (Decree 70-302/PRES/AGRI dated 09/12/1970) forbids all industrial cropping, bushfires and timber felling, but no other human activities. The exploration and mining licences (Essakane and Inata) are therefore legally compliant.
- e. Artisanal gold mining: in Burkina Faso, artisanal gold mining can be carried out with a “traditional gold-mining licence”, which covers an area of 1 to 100 ha, and is valid for 2 years. After several illegal expulsions of artisanal gold miners, as soon as a site begins to produce enough gold, it is usually the buyers who request the licence, which is only granted if it is outside a PA (and does not overlap with another mining licence). This policy has helped to reduce clandestine gold-mining activities, but not to eliminate them completely (furthermore, the search for new artisanal gold mining areas is usually uncontrolled and can happen in PAs).

Protected Area Name	Confirmed Risk	Location	Probable Risk	Potential impact
Arli			Phosphate	average
Singou			Gold	low
Pama	Artisanal gold mining	Outside PA		
Deux-Balé	Artisanal gold mining	Outside PA	Gold	average
W du Niger			Phosphate	average
Nazinga			Gold	high
Pâ	Artisanal gold mining	Within PA		
Sahel	Industrial mining	Within PA	Gold	
Mare d'Oursi			Iron ore	low
Sorobouly	Artisanal gold mining	Within PA		
Ouilingue	Industrial mining	Outside PA	Gold	
Bontioli	Artisanal gold mining	Outside PA		
Nabere	Artisanal gold mining	Outside PA		
Nakambe			Gold	low
Laba			Gold	average
Boulon	Artisanal gold mining	Outside PA		
Tui			Gold	average
Baporo			Gold	average
Tiogo	Artisanal gold mining	Outside PA		

Summary of the risks posed to PAs in Burkina.

Civil Society

Representatives of civil society were met through ORCADE (Organisation for capacity building and development). ORCADE is involved in the EITI process in Burkina Faso. They help with the public surveys for the EIAs and around mining sites they work with village associations set up to monitor the effects and impacts of mining operations. From April 2011, ORCADE is going to set up training courses on mining sites for mining companies, local elected representatives, government representatives (prefects and decentralised government technical departments for Health, the Environment, Agriculture, livestock farming etc.) and local communities. This training will focus on environmental monitoring and natural resource management, the economic impacts and opportunities of mining exploration and the rights and obligations of the local populations.

The key points highlighted by ORCADE are:

- Local communities must be involved from the outset in the feasibility and impact studies.
- The mining companies must communicate and inform local elected officials and Government representatives of their various actions. In particular, they should not replace the Government in terms of policy on health infrastructure, hygiene and training. They can,

of course, support national or local programmes, but should not undertake actions that have not been agreed upon with the local authorities.

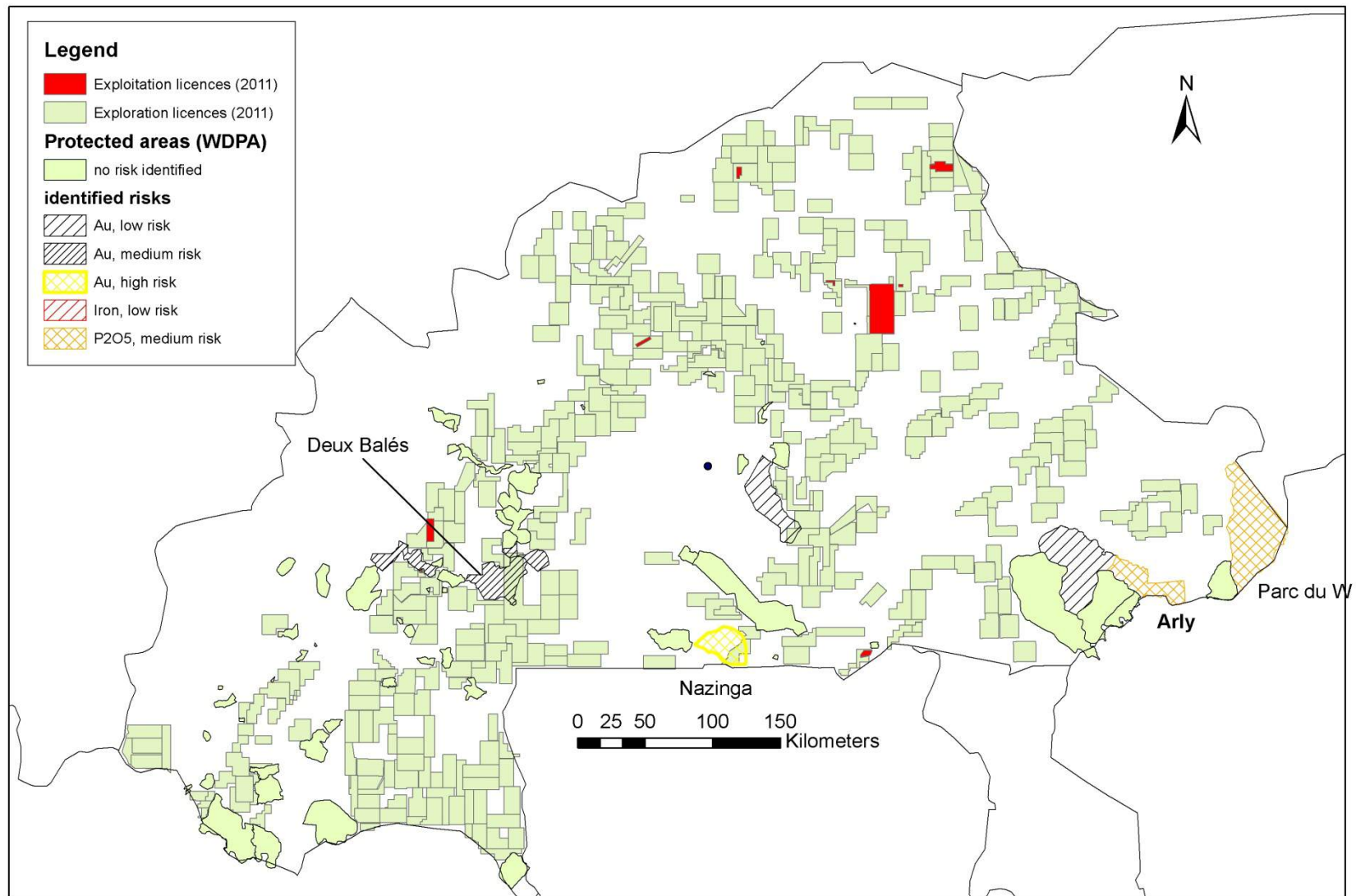
- The environmental departments must mobilise the necessary resources to ensure effective environmental monitoring of mining projects.

Specific Problems

- a. Modification of the statutes and boundaries of the Sahel partial wildlife reserve: the OFINAP is currently reviewing the Sahel reserve, which, in its current state only fulfils a few biodiversity conservation functions. The area could be replaced with five areas that encompass in particular the main waterholes (important stopover for migratory birds, two of which are IBAs), and protection could be increased. The potential difficulty lies in the prior existence of a mining licence, including a manganese exploration permit (Tambao mine) which is currently undergoing a feasibility study.
- b. Risk of phosphate in W Park: the entire W PA and more specifically the Nigerien and Burkinabe sections contain phosphate occurrences which could be economically interesting (the production of phosphate fertilizer is also strongly encouraged to support agricultural production).
- c. Lack of resources at ministry level: both OFINAP and the Directorate for environmental audits and inspections, lack the financial resources to effectively control mining activities in the field. In addition, there is no laboratory specifically for mining analyses (the environmental laboratory, which is part of the Ministry of the Environment, is only equipped to carry out waste water analyses). A bill is being studied to ensure a percentage of financial sanctions is attributed to inspections (but in fact, no financial sanctions have yet been decided upon). The OFINAP must generate its own revenues through tourism, hunting and fishing in the areas it monitors (the greater the human pressure, the greater the revenues...).

Some Proposals

- “Back to basics”: above all, environmental departments should gather all the data on PAs and organise the information in the form of documents that are easily accessible by the public (digital maps of PA boundaries, the by-laws creating the PA, list of authorised and forbidden activities).
- Draw up an inventory of the biodiversity for each national eco-region that can be used by everyone (one of the difficulties encountered in the EIAs is the lack of “baseline data” on animal and plant biodiversity. Existing EIAs contain some of this information that should be made better use of, rather than just letting it lie dormant in documents that are difficult to access).
- The environmental rehabilitation fund: difficult to disburse funds because it depends on a tri-partite agreement among the Ministries of Mines, the Environment and Treasury.
- Establish and/or reinforce participatory frameworks involving mining companies, the Government (in particular via local elected officials) and the population.



References

- Forest Law: 006197/ADP dated 31/01/1997
- Mining Law: 31-2003/AN dated 08/05/2003
- Law on the Environment: 005/97/ADP dated 30/01/1997
- Decree governing EIA application: 2001-342/PRES/Pm/MEE

Other documents:

- *Parcs et réserves du Burkina Faso* – 2009, UICN
- *Les orpailleurs du Burkina Faso: exclusion sociale et rapport à l'environnement* – 2004, Doctoral Thesis, D.B. Somé
- *L'exploitation artisanale de l'or au Burkina Faso, sa place dans l'économie, son organisation, ses impacts socio-économiques et environnementaux* - S. Savadogo, Ecole des mines d'Ales.
- *Etude diagnostique du cadre institutionnel et juridique de l'activité minière industrielle au Burkina Faso: cas de Poura et Essakane* – 2006, ORCADE-OXFAM

MALI

Summary

Mali is one of the largest mining countries in West Africa and the main mining areas are located on the borders with Senegal and Guinea, which are also the areas in Mali where a minimum of biodiversity still survives.

Protected area management in Mali is in the early stages. Only Baoulé National Park has a Park Manager, the others are just under the surveillance of Water and Forestry agents. Newly created PAs are often privately managed but this is too recent to be able to assess their management effectiveness.

There is currently some tension between the Ministry of the Environment and that of Mines, despite the basic regulations which should enable them to work side by side to everyone's satisfaction. The plans to enlarge certain PAs in the mining zone (UNDP), will perhaps help to provide solutions to this situation.

Protected Areas

Legal Aspects

In Mali, classified forests are defined by the law on forestry, while other PAs are defined by the law on wildlife management.

Classified forests are defined in the forestry law of 1986 and then in law No. 95-004 on management of forestry resources and finally in law No. 10 of July 2010, abrogating the previous one:

- **Article 5:** State classified forests include natural forests, protection perimeters, restoration areas, re-planting areas, green belts, forestry plantations and woodlands that are protected for sociocultural, religious or aesthetic purposes in the national interests and which have been officially classified by the Government.
- **Article 41:** Forest land rights do not apply in State classified forests, including mining, exploring, prospecting, surveying and all other form of occupation. NB: in the former law, the text stipulated that "before exploring or operating quarries or mines, opening a transport line or modifying its layout, or building structures in (national) forests, all persons or organisations must have prior authorisation from the competent authorities and must take all measures to protect the environment as required by law".
- **Article 110:** any person or organisation that, without permission, digs the ground, extracts or removes sand, peat, grass, stone, earth or generally speaking organises exploration and/or mining in a classified forest, whether they occupy the land or not, will be fined 500 CFA Francs per m² of area damaged and/or occupied, in addition to confiscation, restoration of the site and damages etc.

The different reserves are defined in the wildlife management law (law 95-031) as follows:

Article 2: National wildlife reserves include areas set aside for the conservation of wildlife: strict nature reserves, national parks, wildlife reserves, special reserves or sanctuaries, biosphere reserves, hunting areas and all areas dedicated to protecting and promoting wildlife.

Article 14: Strict nature reserves are areas set aside to enable natural ecological factors to interact freely without outside intervention, except for measures to safeguard the existence of the reserve itself.

Article 15: National parks are areas set aside for the protection, conservation and propagation of wildlife and plant life and to protect sites, landscapes or geological formations that have particular scientific or aesthetic value.

Article 16: Wildlife reserves are areas set aside for the conservation, development and propagation of wildlife and to protect and develop its habitat.

Article 17: Special reserves or sanctuaries are areas set aside to protect characteristic communities of wild animals or birds or to protect animal or plant species that are particularly endangered as well as the habitats they need to survive.

Article 18: A biosphere reserve is a national reserve declared as world heritage due to its biological, ecological, cultural or historic particularities.

Article 19: A hunting area is a prepared area where hunting, capture, fishing or tourism activities are organised.

Article 20: A leased area is an area where the right to use the land is leased to a person or organisation, referred to as a hunting guide in a hunting area, a wildlife reserve or special reserve.

Article 21: A buffer zone is an area designated to protect natural reserves, for scientific research and the rational use of natural resources.

Article 22: A game ranch is an area that is specifically designed to raise wild animals for commercial purposes.

Article 39: The following activities are strictly forbidden in strict nature reserves: hunting and fishing, all forestry, agricultural and mining activities, grazing, exploration and prospecting, surveys, landscaping or construction, all work that will modify the landscape or vegetation, all water polluting activities and in general any activities that will damage or disturb wildlife or plant life and any introduction of exotic animals or plants.

Article 40: In strict nature reserves, it is also forbidden to reside, enter, circulate, camp or fly over at an altitude of less than 200 metres without special authorisation from the wildlife director.

Article 41: In national parks, hunting, killing and capture of wildlife and the destruction or gathering of plant life are forbidden, unless it is for scientific purposes or to develop the area. In these cases special measures will be taken by the park authorities or under their supervision.

Article 42: The activities forbidden in Articles 39 and 40 are also prohibited in national parks, unless required by the park management authorities.

Article 43: The hunting, killing or captures of wildlife are forbidden in wildlife reserves unless it is for development purposes to achieve the results stipulated in Article 16, and when these measures are taken by the reserve authorities.

Mining activities are expressly forbidden in classified forests and reserves. The law was even tightened up in 2010, as negotiation was previously possible.

However, while the law on wildlife management is clear, the law on forestry remains ambiguous on two counts:

- Mining is classified along with the different activities that are covered by forest land laws, and yet mining rights override land rights.
- The creation of specific sanctions for a sector of activity that is not governed by the law itself seems legally questionable.

The Agency for the Environment and Sustainable Development (French acronym AEDD) was created in July 2010. Its mission is to coordinate the implementation of the National Environmental Protection Policy and to ensure that environmental aspects are taken into account in all policy. This public body answers to the Ministry of the Environment and is governed by a board, on which the

ministries of Agriculture, Finance, Industry, Livestock Farming, Craft and Education are represented. Strangely, the Ministry of Mines is not mentioned.

Since 2008, the Ministry of the Environment has been attempting to pass a tax covering the cost of processing EIAs: Decree 346 of 26/06/2008 established a tax of 1.5% of the total cost of the project. At the request of the Ministry of Mines, this decree was reviewed in 2009 by Decree 09-318 of 26/06/2009 which stipulates that the tax is set by common agreement among the ministries concerned. Finally, inter-ministerial by-law No. 10-1509, signed by the Ministers for the Economy, the Environment and Industry (but not the Minister of Mines and with no mention of the mining law) defines eight categories of investment with varying tax rates from 1.5% (investment < 100 million CFA francs) to 0.003125% (investment > 100 billion CFA Francs). This by-law also creates a special account in the name of the National Sanitation Directorate, into which the tax must be paid.

The mining law of 2003 allows that, in Article 102, “during the validity of a mining licence, the tax base and the rate of taxation and tariffs will remain as they were when the said licence was granted and no new tax or tariff of any kind will be applicable to the holder or beneficiary during this period, except for mining royalties, taxes and fees”.

The Ministries of the Environment and Mines are having difficulty finding common ground.

Protected Areas in Mali

A map of the classified forests, albeit a sketchy one, can be obtained from the SIFOR website (forest information system), which is managed by the National Water and Forestry Directorate. Only the location of the forests was obtained, as the names, surface areas and classification dates were not yet up-dated, although the directorate is currently summarising this information.

There are three national parks in Mali, all located in the western part of the country: Baoulé Park, Kouroufing Park and Wongo Park. Baoulé Park is surrounded by three wildlife reserves (Badinko, Fina and Kongossambougou). The other two are very close and surround the Bafing chimpanzee sanctuary.

There are two partial wildlife reserves, one in the centre of the country (Gourma reserve) and one in the south-east, at the Nigerien Border (Ansongo Ménaka). Note that the notion of “partial wildlife reserve” is not specified in Law 95-031.

Two partial wildlife reserves, Mandé Wula and Wula Nema were created by decree in 2010 and are privately managed. It would appear that biodiversity is limited here and that eventually private management will not prove to be particularly profitable.

Note that there is a hunting area (near Wongo Park) in the south west, near the border with Guinea. Other hunting areas are mentioned in the documentation but their exact status is unclear.

NB: the Bandiagara cliffs have “World Heritage” classification.

Several classification projects are underway. In the Bafing area, there is a project to create a PA encompassing the two existing parks and the adjacent hunting zone. There is also a larger project, signed in May 2011, to create a PA that encompasses the Bafing and the two partial reserves created in 2011 (see map). The boundaries of this future area include areas where exploration and mining permits have been granted.

Another area is planned in the east of the country, not far from the Nigerien border (Tamesna project).

The water and forestry directorate is making a precise inventory of these areas and the associated documentation. From the documents that are already available, the following points can be noted:

- Faragama hunting area, created in May 2011: the decree specifies (Article 3) that forestry, farming and mining as well as grazing of domestic animals are forbidden throughout the Faragama hunting area. However, mining exploration activities may be authorised under the protocols signed between the mining authorities and the hunting area authorities in compliance with current law.
- Kouroufing and Wongo Parks: the national park is exempt from all forest land rights.
- Chimpanzee sanctuary: no activities are specifically forbidden and agricultural activities are authorised.
- Nema Wula and Mandé Wula: the wildlife reserve is exempt from all forest land rights (although it is not a classified forest but a wildlife reserve). Forestry, farming, mining and grazing of domestic animals are forbidden throughout the wildlife reserve (although these reserves were created after the mining permits were granted).

Thus there is some confusion between the forestry law and that on wildlife. Furthermore, the texts only mention land rights and not the rights to what is contained in the subsoil (mining rights override land rights), which is likely to pose a problem.

The Ministry of the Environment and Sanitation is posting all environmental regulations as well as data on forest and wildlife reserves and data on the flora and fauna on its website (<http://bd.stp.gov.ml/flore/index1.php>). Unfortunately the site is not completely operational, but is a step towards better communication on environmental problems and should be commended as such.

Environmental Impact Assessments

Decree 03-594 and its appendix clearly specify the obligations in terms of EIAs. In particular:

- **Article 4:** Projects, whether public or private, involving works, development, construction or other activities in the industrial, energy, agricultural, mining, artisanal, commercial or transport sectors, the implementation of which is likely to affect the environment must firstly undergo an EIA.
- **Article 12 onwards:** “The EIA must include [...] a description and an analysis of the initial state of the site and its natural, socio-economic and human environment, [...] the results of the public consultation process, the environmental monitoring and surveillance programme. [...] The terms of reference are submitted by the project promoter to the competent authorities for approval. [...] The environmental analysis is carried out by an environmental analysis technical committee made up of representatives of all technical departments concerned. [...] The minister for the environment may, after consultation with the sector ministry, suspend the environmental permit when the promoter does not comply with the obligations set forth in the EIA.”
- **Appendix:** the list of projects covered by the environmental impact assessment includes specifically large mines, the construction of refineries, industrial quarries, artisanal quarries and the clearing of more than 10 hectares.

Mining Law

The mining law does not specify whether there are areas in which mining licences cannot be granted (PAs etc.). However, since 2008, following conflict between the Ministry of Mines and the National Water and Forestry Directorate, no mining licences have been granted in classified forests, at least not in those mentioned on the topographical maps used by the Mining Cadaster, which does not have more up-to-date documents.

The Inter-ministerial Mining Commission (inter-ministerial by-law 3-0934 of 07/05/2003) examines all mining permit requests. The Ministries for Mines, the Environment, Land, Trade, Labour, Customs and Taxation are represented in the commission.

NB: since its members are not technical experts, the commission's effectiveness is limited.

Decree 99-255 imposes EIAs for industrial quarries and small and large mines.

For industrial quarries, the EIA must include:

- A baseline study in accordance with environmental directives,
- A technical description of the quarry site, the work and activities planned and the major ecological impacts of the project,
- An emergency plan if high-security risk activities are planned,
- A provisional programme and budget for rehabilitation and restoration,
- A non-technical summary of the environmental impact assessment,
- An analysis of replacement solutions,
- A brief description of the method or methods used to consult with the local authorities and organisations concerned and the results of this process,
- A cost/benefit analysis
- A plan for monitoring impacts.

For small mines, the impact notice must include:

- A baseline study in accordance with environmental directives,
- An assessment of archaeological heritage before work is undertaken,
- The measures envisaged to mitigate the negative impact of mining on the environment,
- A provisional programme and budget for rehabilitating and restoring the mining sites.

All mining permit requests must include:

- A baseline study in accordance with environmental directives,
- An assessment of archaeological heritage before work is undertaken,
- A technical description of the quarry site, the work and activities planned and the major ecological impacts of the project,
- An environmental monitoring programme,
- An emergency plan if high-security risk activities are planned,
- A provisional programme and budget for rehabilitation and restoration,
- The measures to prevent or mitigate the major impacts of the project,
- A non-technical summary of the environmental impact assessment,
- An analysis of replacement solutions,
- A brief description of the method or methods used to consult with the local authorities and organisations concerned and the results of this process,
- A cost/benefit analysis
- A plan for monitoring impacts.

For mines, as for quarries, the amount required for rehabilitation must be deposited in a bank account (Article 17).

Examination of several EIAs reveals the following points:

- Some EIAs (Morila - 1999, Segala – 1997, Tabakoto – 1999, Tamico – 2010, Goukoto – 2010) contain a wealth of information and are well documented, constituting comprehensive environmental reports of the mining area (density and volume of woody plants, estimation of volume by species that will have to be cut down, detailed wildlife inventories, soil mapping, identification of crops and sacred areas etc.).
- EIAs carried out for quarries are much more cursory.

For 2 years now, the National Directorate for Geology and Mines (French acronym DNGM) has had an environmental database financed by a European Union project, designed not only to monitor the EIAs from an administrative point of view, but also to be able to store and use the technical data contained in these EIAs (see Appendix). Unfortunately, this tool has not been used since the project came to an end.

Mining Economy

Mali is the second largest gold producer in West Africa after Ghana. Annual production is around 50 tonnes (52t in 2007, 43t in 2008, 49t in 2009 and 42t in 2010). The government's income from mining has been close to 200 billion CFA Francs since 2009, in other words more than 10% of the state budget.

As well as the gold mining sector, with new mines planned to open in 2011-2012, Mali aims by 2012 to 2015, to produce 1 million tonnes of cement per year (WACEN project), to boost production of phosphate fertilisers (Malian company TOGUNA), to produce iron (Tienfala) and to become the largest African producer of alumina, overtaking Guinea, with an annual production of 3 million tonnes.

Advanced prospection has been carried out for uranium (in the Falémé sector), but following population movements, this project would appear to be on stand-by.

Mining pressure on the Environment

In the 2009 report on the state of the environment in Mali, the main scourge affecting forests and PAs was land clearance for cropping. Estimations rise to more than 300 000 ha per year (Maïga 1999).

Mining and more specifically gold mining is mentioned as an activity which affects the soil (slag deposits, mud holes covering large areas, consumption of large quantities of water) and which presents a threat to ecosystems because of the presence of cyanide. In the conclusions of the report it is stated that "particular attention must be paid to the following mitigation measures:

- *Intensification and optimisation of agriculture and livestock farming*
- *Rational use of forest resources in the context of implementation of forest development and management plans*
- *Rehabilitation of mines after closure*
- *Restoration of quarries after operation*
- *Reforestation of slag deposits, processed ore piles and mud ponds from gold mining".*

The RAPPAM evaluation for Mali mentions artisanal gold mining specifically as a threat to PAs.

The highest density of mining permits is in the west of the country, along the border with both Guinea and Senegal. Artisanal gold mining is also heavily practiced in these areas, which poses a social and economic problem, particularly in Bafing, but also towards Sikasso: sustainable development projects run by NGOs suffer from a shortage of manpower for agricultural activities, land used for artisanal gold mining is useless for any other purpose and there is considerable chopping down of trees and poaching.

- The Badinko wildlife reserve is covered to a large extent by an iron and bauxite exploration permit, which could eventually become mines.
- In the Malian part of the transboundary Bafing-Falémé project, there are several diamond and gold exploration permits and one for uranium which look promising.
- The special elephant reserve of Douentza encompasses an industrial limestone quarry and a permit for manganese which could lead to a mine (linked to the opening of another mine on the Burkina Faso side).
- This area with manganese also threatens the partial wildlife reserve of Ansongo Ménaka. However, it should be noted that the notion of “partial wildlife reserve” is not recognised in the law on wildlife management.

Regarding the Tamesna area project, there is an occurrence of lignite and one of manganese within the currently proposed boundaries. 30km to the West there are gold permits and 80km to the west are uranium permits.

Whether it be Ansongo or Tamesna, these two areas are totally integrated into the oil blocks (Block 11 is attributed to Mali Oil for Ansongo and Block 14 is attributed to Terraliance Petroleum for Tamesna). The same goes for Baoulé National Park (Bloc 25, attributed to Petroma).

There is indirect pressure from artisanal gold mining on Kouroufing and Wongo parks: loss of manpower in villages neighbouring the parks, which harms the AMCFE sustainable development projects.

Protected Area	Type	Probably mining threat	Possible risk
Baoulé	National Park	None	Oil
Kouroufing	National Park	None	
Wongo	National Park	None	
Badinko	Wildlife Reserve	Iron-ore and bauxite (moderate)	Oil
Fina	Wildlife Reserve	None	Oil
Kongossambougou	Wildlife Reserve	None	Oil
Gourma	Wildlife Reserve	None	Oil
Ansongo Ménaka	Wildlife Reserve	Manganese (moderate)	Oil
	Sanctuary	None	
	Scientific area	Bauxite (low)	

Some experiences of collaboration between mining companies and the water and forestry directorate have given good results, particularly around the Sadiola mine, where some joint development has taken place and the objectives initially set by the environmental impact assessment have been exceeded (better reforestation, development of waterholes and reintroduction of fish, measures to keep game away from sensitive areas etc.)

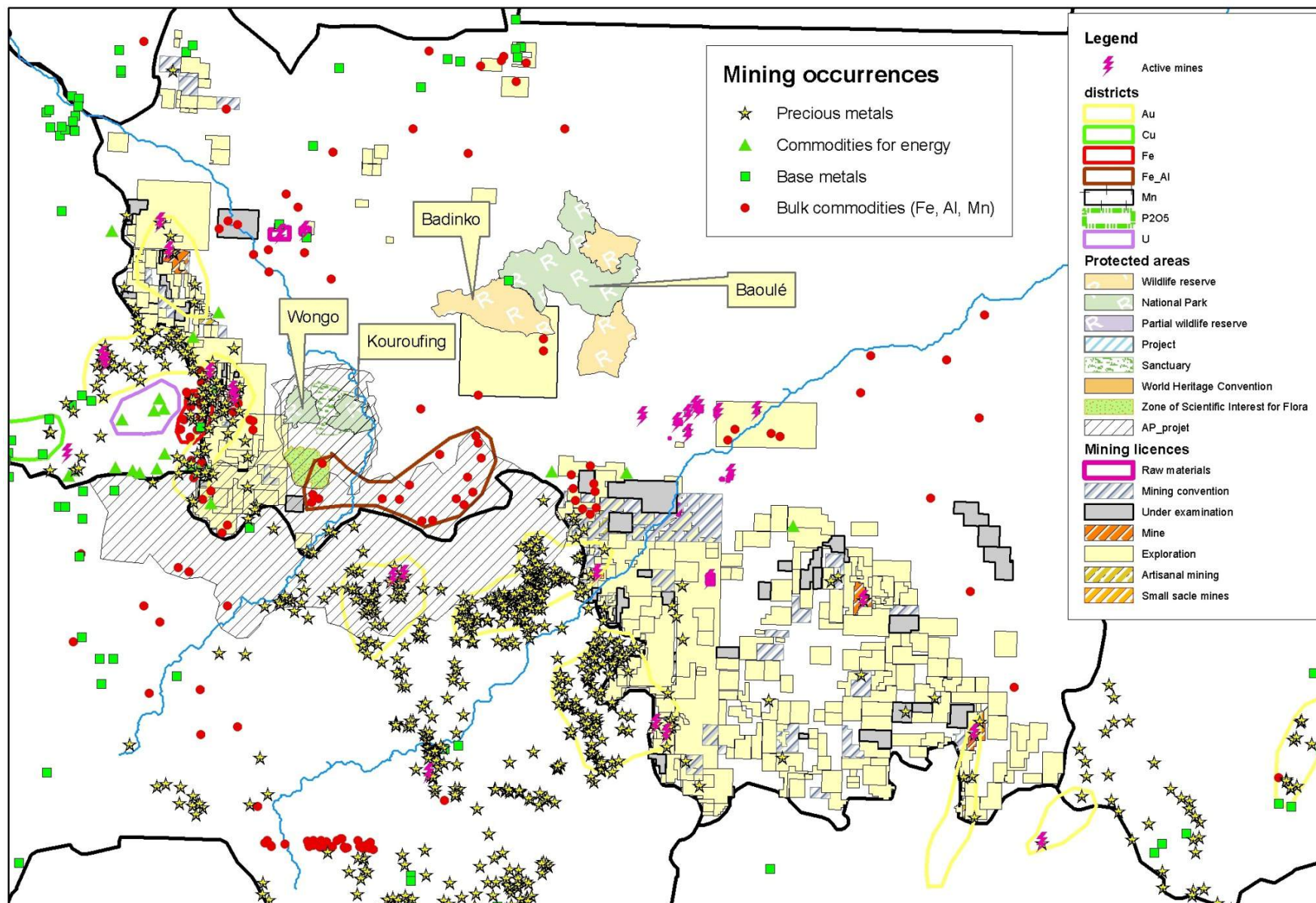
Conclusion

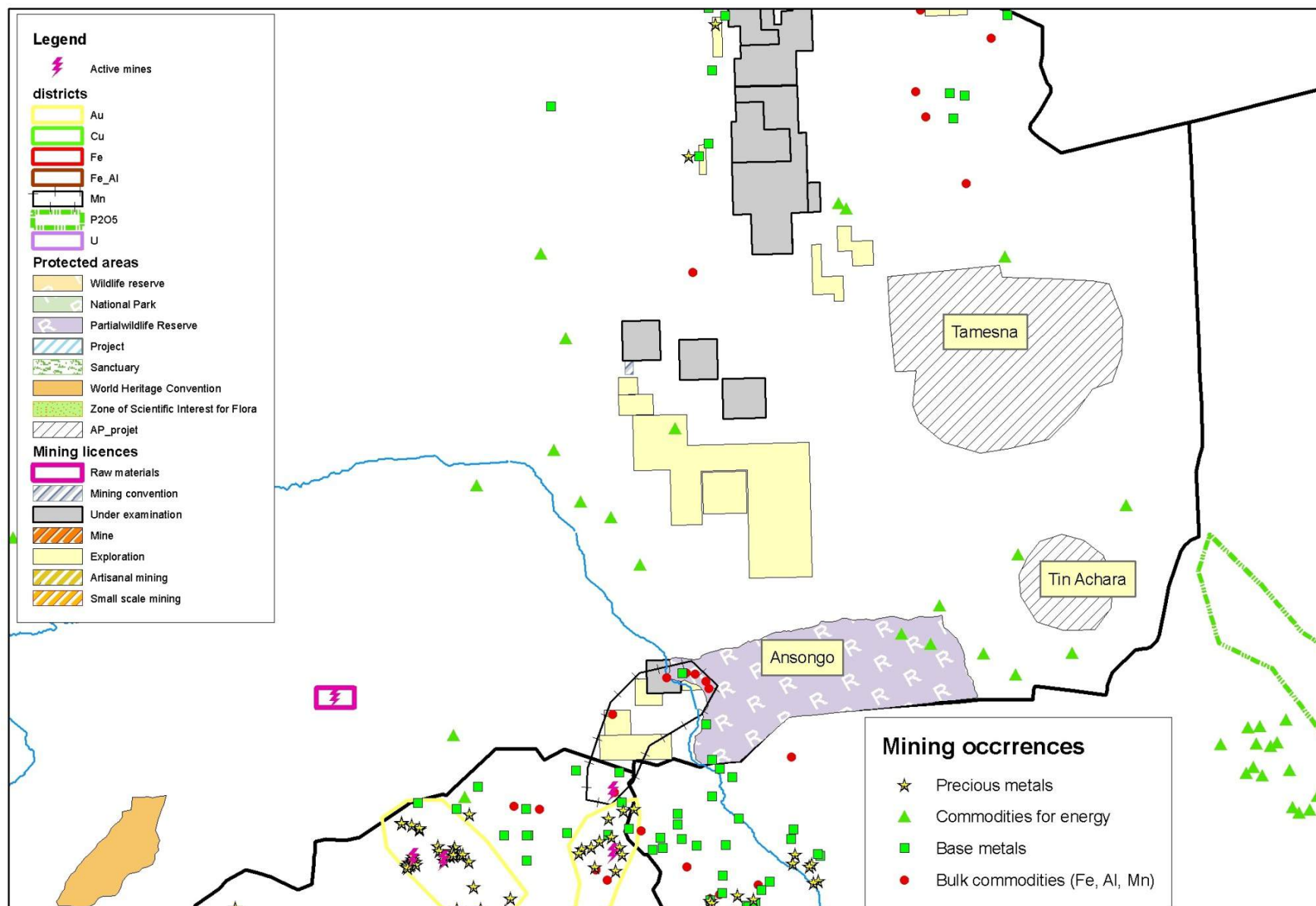
Some PAs in the east are subject to significant threats, but they are probably not of great value in terms of biodiversity (Douentza, Ansongo).

In the west, there is more biodiversity, although it is already subject to significant stress, but the plans to extend PAs in this sector will come up against the presence of large mines.

References

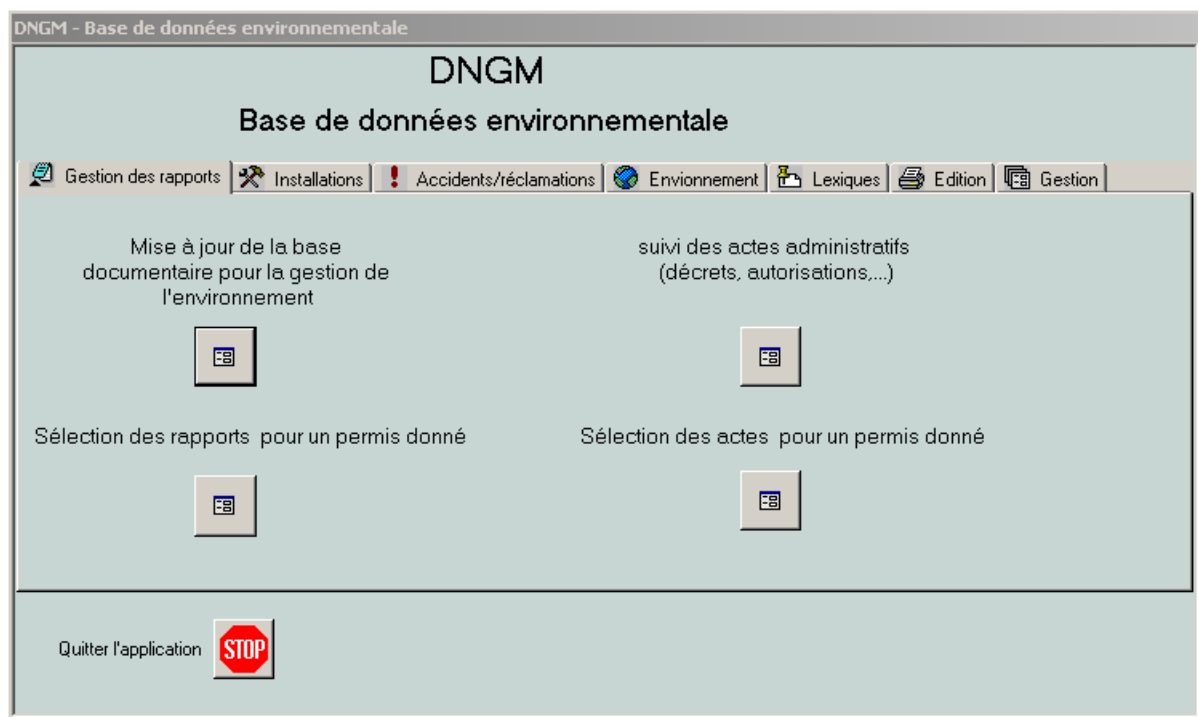
- Decree 99-255/P-RM dated 15/09/1999 which sets the terms and conditions for application of *Ordonnance n° 99-032/P-RM* dated 19 August 1999 on the mining law in Mali
- *Ordonnance n° 99-032/P-RM* dated 19 August 1999 on the mining law in Mali
- Decree 03-594/P-RM dated 31/12/2003 relative to the execution of Environmental Impact Assessments
- Appendix to Decree 03-594/P-RM setting the list of projects subject to an Environmental Impact Assessment
- Law 01-020 dated 30/05/2001 relative to pollution
- Law 00-27/P-RM dated 22/03/2000 on land laws
- Law 86-42/AN-RM on forest law
- Law 95-004 dated 18/01/1995 setting the conditions for managing forest resources
- Decree n° 00-22/P-RM dated 19/01/2000 setting the terms and conditions for classifying forests, reforestation areas and PAs within government forests.
- Law 95-031 dated 20/03/1995 setting the conditions for managing wildlife and its habitat.



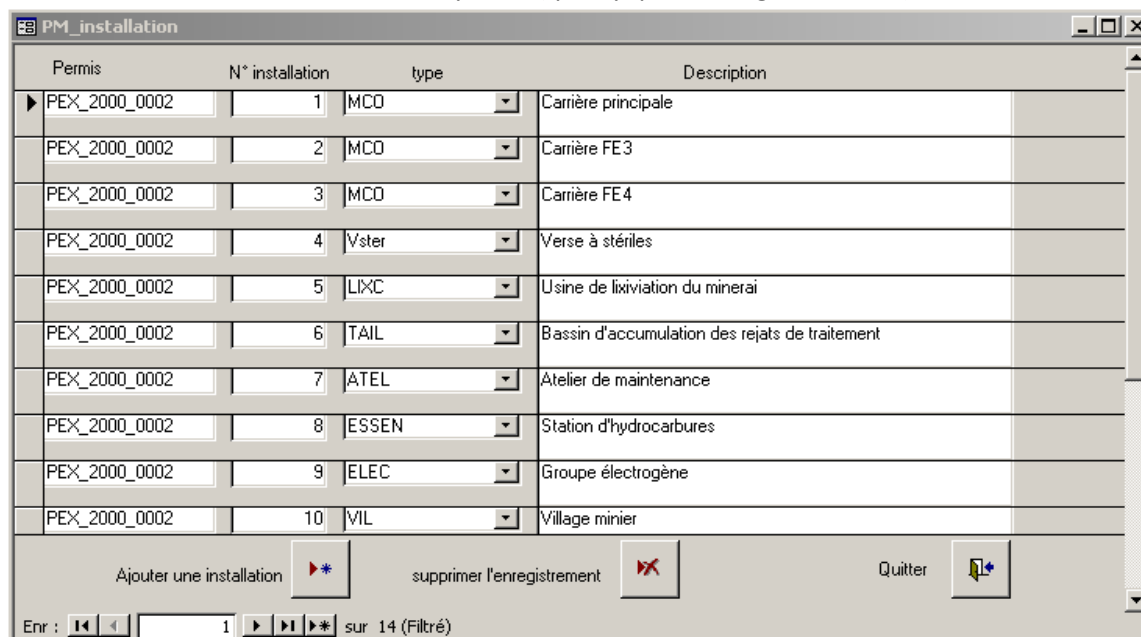


APPENDIX: Environmental database of the DNGM

1. General overview of options proposed by the application: all the reports and administrative documents relating to a given permit can be managed, and all environmental data can be entered.



2. Description of the installations on mining sites: each mine can describe in detail the installations or structures they have (quarry, pits, tailings dams etc.)



- Management of environmental monitoring data: this includes monitoring accidents, claims and measuring stations. The types of discharge as defined in the EIA can be entered as can inventories of biodiversity.

DNGM - Base de données environnementales et minières

DNGM

Gestion des données environnementales minières

documentation Installations Accidents/réclamations Environnement Lexiques Edition Gestion

Stations de monitoring		<i>visualiser et compléter les données sur des stations de monitoring existantes</i>
Ajouter une station de monitoring :		<i>créer une nouvelle station de monitoring pour un permis donné</i>
Rejets prévus dans l'EIE :		<i>saisir les objectifs de rejet tels que définis dans l'EIE</i>
Saisir un inventaire de biodiversité :		<i>Saisir la liste de la faune et de la flore répertorié à une date donnée pour un permis donné</i>

Quitter l'application

- Different monitoring stations can be entered with their geographical location, the type of environmental monitoring (water, air, soil etc.), the frequency of measurements as set forth in the EIA:

PROJET_MINIER_STATIONS

Numéro Permis: AEC_1997_0001 NOM_PROJET_MINI: [do]

SF_POINT_MESURE

Identifiant Station	Nom de la station de mesure	Type Monitoring	DATE CREATION	Coordonnées géographiques	Fréquence mesures EIE	description	Données EIE	Monitoring	Installations
							Ajouter Voir	Ajouter Voir	Ajouter Voir
65	sortie groupe electrog	rejets atmosphérique		Long: 0 Lat: 0			+ -	+ -	+ -
*	[numéroAuto]			Long: 0 Lat: 0			+ -	+ -	+ -

Enr: 1 sur 1

- The readings from the monitoring stations can be entered, as well as who took the reading (government, mining company or NGO).

SSF_MONITORING						
	Date	substance	Valeur	Unité	Responsable mesure	Observations
▶	01/01/2009	Aldr	200	µg/l	Admin	premier test
	01/01/2009	Argil	200	%	ONG	premier test
*						

PART I: REGULATION

Protected Areas:

The officially recognised PAs (Forestry Law 1998) are:

- Classified forests: national forests classified for conservation, enhancement and soil regeneration purposes through appropriate management and protection. As part of the national forest, only local communities have certain rights (gathering of deadwood, fruit etc. livestock transit),
- Pastoral reserves: “natural formations where restrictions apply, particularly as regards industrial cropping in order to ensure utilisation of biomass is compatible with their wooded state”.
- Strict nature reserves: “areas constituting a collection that is representative of natural formations, classified for ecological or scientific reasons. All hunting, fishing, agricultural, mining, grazing or development activities are prohibited”.
- Special reserves: areas where for scientific, tourism or ecological reasons, certain temporary or permanent restrictions regarding hunting, fishing, capture of animals, use of vegetation or products from the ground or within it and infrastructure construction are necessary for scientific, tourism or ecological purposes.
- National parks: subject to restrictions or bans on hunting, capturing of animals, use of vegetation or products contained in the soil. No formal bans seem to be stipulated, and the original texts must be consulted to find out which activities are restricted.
- Reforestation and restoration areas: areas that are temporarily classified for protection, restoration or reforestation.

The law on forestry makes specific reference to mining:

- Article L44 specifies that “all mining operations, all exploration that damages the ground and forest formations are forbidden in classified forests, unless authorised by the Ministry for Water and Forests”. Outside classified forests, these activities must be authorised by the President of the Regional Council after deliberation by the rural council concerned. In all cases, authorisation is only granted after examination of a dossier containing a report from the Water and Forestry department, an EIA, an evaluation of the cost of restoration, an evaluation of the taxes to be paid before felling trees, a location map and map of vegetation, soil and surface waters, including runoff.
- The law also provides (Article R.42) that, in *départements* where state forests represent less than 20% of the area, requests for declassification can only be examined if they are accompanied by proposals to classify an equivalent area.

There are four national parks in Senegal: Niokolo Koba, Basse Casamance, Saloum Delta and Djoudji, even if the WDPA database only shows Niokolo Koba and Djoudji national parks.

Niokolo Koba National Park was created in 1954 (Decree of 4 August 1954) and enlarged in 1964 and again in 1968 with the addition of classified forests and a hunting reserve. It was not until 1976 that internal regulations strictly prohibiting the disturbance of wild animals and the gathering of non-timber forest products were created. The regulations also stipulate that it is forbidden to “take samples of earth or rocks or to carry out any public or private project without authorisation”.

According to a study carried out in 2001, Niokolo park lacks an official boundary to the north-east (corresponding to the boundary path).

In addition to the national parks, there are three wildlife reserves (Ferlo-Nord, Ferlo-Sud and Ndiael), a group of pastoral reserves in the centre-north of the country, four marine PAs (Saint Louis, Kayar, Joal and Abéné) and a great number of forest reserves. There is also a massive filao plantation on the northern coast called the “Filao Strip”. This strip is supposedly classified as a reforestation area, but this could not be confirmed.

Type of PA	Area
National park	9145 km ²
Forestry reserve	10 842 km ²
Marine PA	891 km ²
Wildlife reserve	12 211 km ²
Pastoral reserve	15 785 km ²

Surface areas covered by the different types of PA in Senegal.

NB: the exact boundaries of the Filao strip could not be established, so it is not listed above.

Law on the Environment

According to the Law of 2001 on the environment, classified installations are defined as being factories, workshops, depots, work sites, quarries, industrial, artisanal or commercial installations and all other activities that could constitute a danger to health, security, hygiene, agriculture, nature and the environment in general, or inconvenience the people living in the vicinity.

Such installations are classified either as Level 1 (serious danger or inconvenience), or Level 2. At Level 2, only the general requirements must be met. For Level 1, specific measures must be stipulated (following a public survey) in a ministerial by-law to prevent such danger or inconvenience. Authorisation to operate these installations is granted by the Minister for the Environment.

Environmental Impact Assessments (EIA)

Sector guidelines for EIAs have existed since 2006. “Extractive and mining activities” are clearly on the list of projects for which an in-depth EIA is necessary. It is specified that activities to extract and process non-metal ore or minerals for energy production and the extraction of aggregates (marble, sand, gravel, shale, salt, potassium and phosphate) require an initial environmental analysis.

There are guidelines concerning the oil production and transformation industries, on exploration for oil deposits, on mining exploration, on quarries and on cement works.

Procedure: the TORs are submitted by the promoter, validated by the EIA division often accompanied by a site visit by the regional correspondents.

The assessment must be carried out by a consulting firm certified by the Ministry of the Environment (there is a list on the website, but it is not functional). The promoter must organise a public survey before handing in the impact assessment. An inter-ministerial technical committee presided over by the ministry responsible for the activity gives its ruling on the report and grants (or refuses) a provisional authorisation followed by a ministerial by-law. Once validated, the EIA is presented at a public meeting organised by the local authorities.

Exploration however, is not subject to an EIA, although activities such as the digging of large trenches can have an impact. For the exploration permit, the promoter often just obtains support from the

local authorities. The ministry is trying to set up a system to regulate this, so that EIAs can be carried out.

Mining Law (2003)

The mining law requires EIAs for two types of mining licence:

- *The exploration phase includes in particular geological, geophysical, geochemical and mining work, chemical analyses, metallurgical tests and if necessary an economic feasibility study, as well as the drawing up of a programme to develop and mine any economically viable deposit found. It also contains a brief analysis of the initial state of the exploration site and its environment (Article 15),*
- *Any request for a mining permit or mining concession or small mine authorisation must include, at the promoter's expense, an environmental impact assessment in compliance with the law on the environment and associated by-laws (Article 83).*

Article 85 of the mining law also requires classified forests to be respected: *"mining licences granted under this Law must comply with the provisions of the Forestry Law, in particular those of Article L44".* Article 44 stipulates that *"any mining operations, any excavation that harms the land and forests are forbidden in classified forests unless authorised by the Ministry for Water and Forestry"*

The law of 2003 also set up a "mining site rehabilitation fund" defined in Article 84 as follows: *"Notwithstanding the obligations under Article 82, all holders of a mining licence must open and contribute to a trust fund in a commercial bank in Senegal. This account is intended to build funds to cover the cost of the rehabilitation programme"*.

No environmental obligations specifically pertaining to quarries are mentioned in the mining law.

Analysis Problems

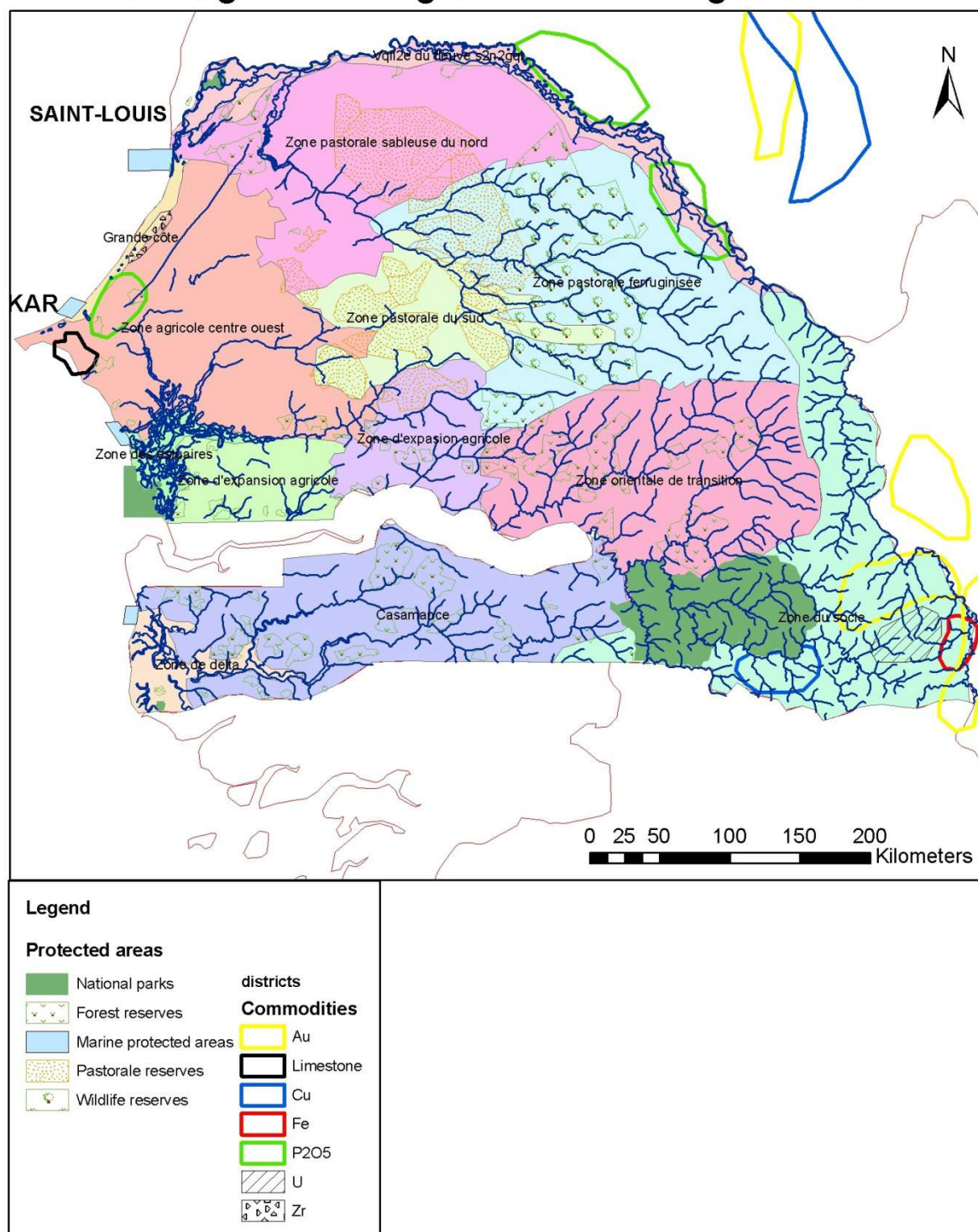
1. Although Article 85 of the mining law is clear (no mining licences in classified forests without authorisation from the ministry), it is difficult to apply, because the mining cadaster does not currently have a map of all PAs. Overlap between mining licences and PAs is discovered after the event by Water and Forestry agents.
2. Declassifications have been made, particularly in the phosphate district of Taïba-Thiès, without any equivalent classification measures being taken prior to the impact assessments.
3. Application of the by-law on the Niokolo-Koba national park amounts to: the park administration can authorise the opening of quarries...
4. Article 73 of the mining law stipulates that "possession of a mining licence confers a right of occupation (...) which includes authorisation to: (...) take the timber needed for the work. Thus it constitutes a right to fell trees exempt from the timber tax.
5. According to the law on the environment, quarries are subject to impact assessments, but they are not mentioned in the mining law.

Remarks

The forestry law, which predates the mining law, contains specific provisions regarding the mining sector, which are for the most part repeated in the mining law. The law on the environment, which comes after both these, sets a general framework and specifies the terms and conditions for carrying out EIAs. Some reorganisation appears necessary: the forestry law should not specifically mention mining activities, but can lay down the general rules concerning forests, unless these are

defined in the law on the environment. The mining law should then simply refer to the law on the environment for all issues relating to EIAs or areas subject to special authorisation.

Senegal : Ecoregions and mining districts



PART II: MINING DEVELOPMENT AND THE ENVIRONMENT

Geological and mining situation

In Senegal, only the border areas with Mali and Guinea are basement complexes. The rest of the area is a vast sedimentary basin.

- The basement complex contains gold occurrences and mines (zones used mainly for artisanal mining at the Malian border on Falémé and deposits in the Sabodala region) and uranium occurrences mainly at the Guinean border.
- The sedimentary basin is particularly known for its phosphate deposits and occurrences (mines are mainly located around Dakar). It also contains limestone, cement and clay for bricks. The 250km along the Atlantic coast are also covered by oil blocks that are being explored.

Senegal's main mining districts are:

- Kédougou gold district with the Sabodala mine
- The iron-ore district (Guinean-Malian border) with a project that is currently on stand-by with Arcelor-Mittal (700km of railway to transport the ore). If iron ore prices remain high, this district will end up being exploited (synergy with other deposits such as the bauxite in Guinea-Bissau, or liaison with the phosphates of Matam).
- Phosphate district of Thiès, main Senegalese mine
- Matam phosphate district
- Limestone district in Dakar (limestone for cement)

While Senegal has mainly phosphate, there has been considerable diversification of its mineral resources: the mine of Sabodala should soon be followed by two others, the iron ore project of Falémé and the zircon project of Niayes have passed the feasibility study stage and mining of resources such as decorative stone, limestone and marble should increase in the future, not to mention construction materials (cement limestone, sand) which are already heavily excavated in the Dakar region.

The rare economic data available on the mining sector in Senegal show:

- Annual production of slightly more than 1 million tonnes of phosphate,
- Annual production of around 2.5 million tonnes of cement limestone
- The Sabodala gold mine had 430 direct staff in 2010. Production for 2009 and 2010 is around 5 tonnes of gold. Two new gold mining projects could start up around Sabodala by 2013-2014.

Knowledge of Biodiversity

The most studied area in Senegal is without a doubt Niokolo-Koba National Park, where new species of grass and also woody plants were recently discovered.

In the context of the PGIES project (integrated ecosystem management project), studies have been carried out on the distribution of several species of vegetation considered to be endemic. At the same time, the project has set up 19 community-managed nature reserves.

Note that according to the specialists, the list of protected species given in the regulations is not realistic (some species on the list are actually very common, and some truly endangered species are not on it).

Mining Pressure on the Environment

The National Action Plan for the Environment (1997) highlighted the following problems regarding mining:

“The irrational operation of quarries can cause multiple problems: soil degradation, deforestation, air pollution etc. Over-exploitation of sand and salt from Retba lake could cause the sea to encroach on the continent and eventually cause the lake to disappear.”

The RAPPAM evaluations indicate the risk of pollution in Niokolo-Koba National Park: pollution of the water by cyanide and sound pollution from the explosions for exploration. Note that the gold mines are located more than 30km to the east of the Niokolo-Koba boundaries, which limits the risks of pollution, although part of the mining area drains to the west via a river that flows through the park. A quarry for crushed rock is also mentioned within the Niokolo, not far from the northern boundary track, i.e. where the boundary is not legally clearly defined.

Geographical Analysis

According to the mining data available, there are numerous mining pressure risks hanging over the different PAs. The most significant are:

- Niokolo Koba National Park: There is a phosphate occurrence, a cobalt occurrence, a tin occurrence and a molybdenum occurrence within the park, but these occurrences do not offer mining potential. Pressure on the park comes from outside: a good part of the gold district (including the Sabodala mine) is located at the head of the catchment of the Niokolo River which flows through the park. The 30km separating the mine from the park protect the latter against disturbances such as noise and vibrations, but any accidental polluting by the mine would affect the park. Another consequence of this geographical situation is the presence of gold downstream from the mine, where there is considerable artisanal gold mining activity, particularly in the forests along the river banks, forests which are clearly rich in biodiversity.
- The marine PA of Kayar is directly downstream from the phosphate mines and is affected by the discharges.
- The marine PA of Saint Louis, in the mouth of the Senegal River, is downstream from the phosphate deposits of Matam and the Kédougou gold district.
- The reforestation area of Niayes is adjacent to a Zircon concession and many known peat occurrences. Projects to use peat to replace firewood have been under examination for several years.

While of lesser importance, the following can also be mentioned:

- The Saloum Delta and the Joal marine PA: two phosphate occurrences and a cement limestone occurrence,
- St Louis marine PA: occurrences of brick clay and a peat occurrence,
- Six Forages pastoral reserve: Three phosphate occurrences,
- Ferlo wildlife reserve: an undocumented uranium occurrence at the boundary between Ferlo North and Ferlo South.

The most sensitive areas are clearly the marine PAs and the Saloum delta, should oil be discovered off shore or along the coast.

Impact Assessments

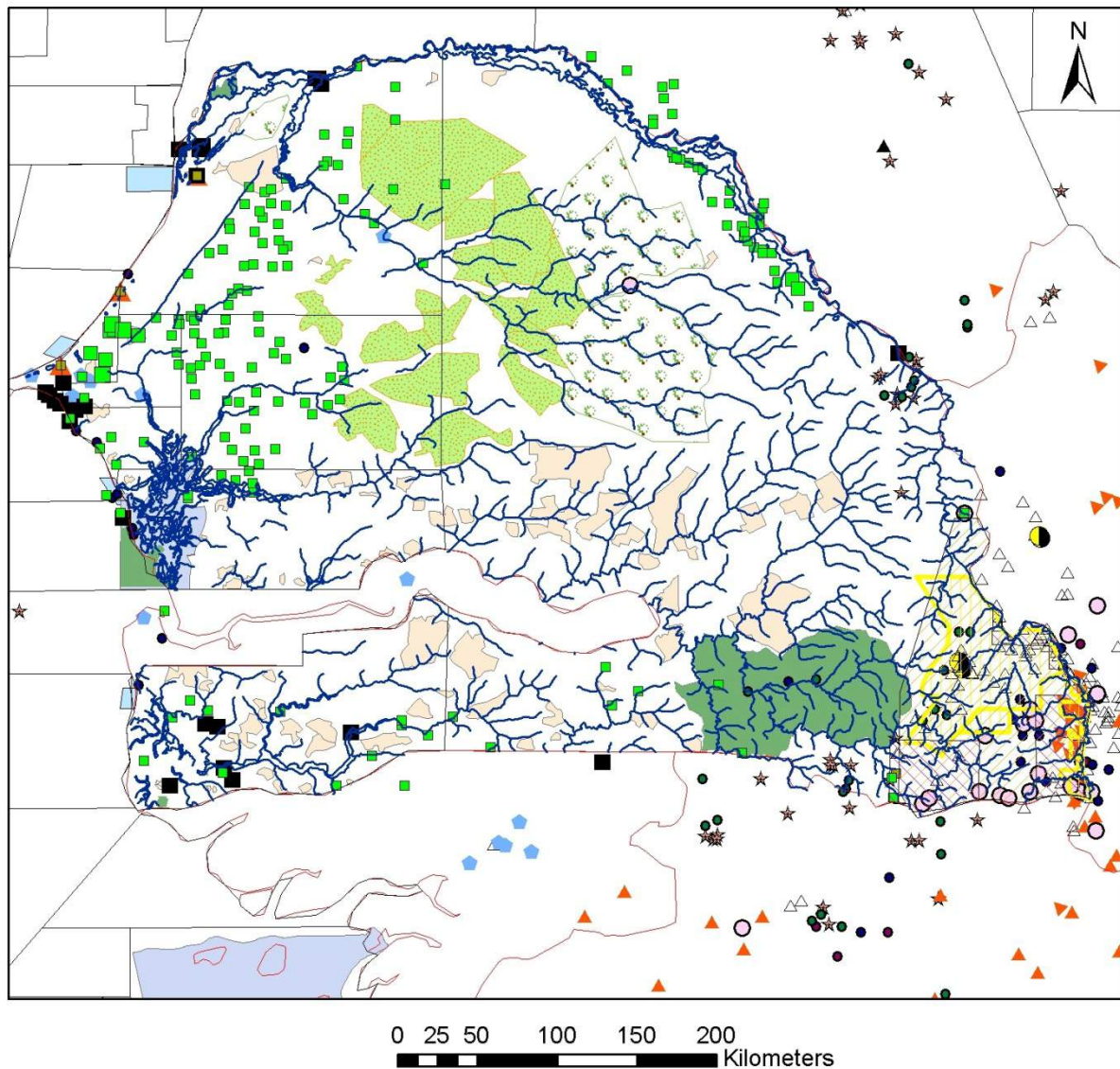
Several impact assessments were available at the Ministry for the Environment. Without giving a detailed critical analysis, it can be noted that they are of a generally high standard, perhaps thanks to the obligation under the law on the environment to use a nationally certified consulting firm. However, two major comments should be made:

- The particularities of the mining sector are not sufficiently taken into account (for instance, there is no analysis of cadmium, lead or uranium on a phosphate project, and no analysis of arsenic or selenium on a gold mining project),
- The natural environment is taken into account, but biodiversity is rarely mentioned.

References

- Law on the Environment: 2001-01 of 15/01/2011 and Decree 2001-282 of 12/04/2011
- Forestry Law: 98/03 of 08/01/1998 and Decree 98/164 of 20/02/1998
- Mining Law: 2003-36 of 24/11/2003
- Oil Law: 98-05 of 08/01/1998
- Decree of 4 August 1954 on the transformation of three strict wildlife reserves in West Africa into national parks
- Decree 65-684 of 13/10/1965 on the enlargement of Niokolo Koba National Park
- Decree 68-551 of 14 May 1968 on the enlargement of Niokolo Koba National Park by the addition of the zone of the “boucle du Damantan”
- By-law 007163/PM/DGT of 24 June 1976, on the internal regulations for Niokolo Koba National Park
- National Action Plan for the Environment (1997)
- National Action Plan for climate change adaptation (2006)
- <http://www.denv.gouv.sn> (site of the Environment Directorate and classified installations)
- <http://www.dirmingeol.sn> (website of the Mining Directorate)

Senegal : Protected areas and mining activities



Legend		
Hydrocarbon licences	agroindustrial commod.	Limestones & clay
Mining licences	Peat	Raw materials
Au	Phosphate occur.	Energy commodities
Diam	Phosphate deposits	Peat
U	indust. mines of P2O5	U
	Precious metals	ferrous metals
	△ Au, Ag occur.	Al
	● indust. gold mines	Fe
	✚ Artisanal gold mines	Mn
	● Heavy metals	Other commodities
		★ Base metals

Protected areas	
■	National parks
■	World heritage
■	RAMSAR areas
Other protected areas	
■	Forest reserves
■	Marine protected areas
■	Pastorale reserves
■	wildlife reserves

GHANA

In Ghana, mines and PAs are governed by the same ministry (Ministry of Land and Natural Resources). The mining sector is governed by the “Minerals Commission” and PAs are under the control of the Forest Commission, divided into a Forest Division and a Wildlife Division).

Ghana also has an Environmental Protection Agency (EPA), a public body under the authority of the Ministry for the Environment, but which has decision-making authority and financial independence. The EPA is responsible for all environmental aspects, particularly all aspects concerning EIAs such as validation of TORs, granting of environmental permits and the publication of guidelines and standards for carrying out these EIAs. The EPA has a special mining department.

Environmental Laws

General Framework

The laws on the environment, classified forests and wildlife protection are fairly complex: since the first laws were passed in the 1960s, many amendments have been made and no summary documents exist to date. Therefore it is usually necessary to consult various texts to obtain all the pertinent information.

No document clearly defining the different types of PA could be found. Only forest reserves are clearly identified and it is specified that no activities affecting the ground can be carried out there (Timber & trees act, 1974, article 14):

A person who is not exercising rights under a concession and who, in a PA without the written consent of the Minister:

- (a) fells, uproots, lops, girdles, taps, injures by fire or otherwise damages a tree or timber, or
 - (b) makes or cultivates a farm or erects a building, or
 - (c) sets fire to grass or herbage, or kindles a fire without taking due precautions to prevent its spread,
- commits an offence and is liable on summary conviction to a fine not exceeding one thousand penalty units or to a term of imprisonment not exceeding five years or to both.

The key point of this article is the “without the written consent of the Minister”. For reasons of national strategy, certain mining licences have been granted to mining companies both in gold zones and to develop the aluminium industry, both deemed strategic for the country. At the same time, the EPA published specific environmental procedures for mining in forest reserves.

Protected Areas

In Ghana, PAs are:

- forest reserves, managed by the Forestry Division
- wildlife reserves or game reserves, managed by the Wildlife Division

Certain areas may have dual status – forest reserve and wildlife reserve. National parks do not have a very clear status and seem to be accorded one or other of these two definitions, but we did not find documents to clarify their status.

Ghana has eight national parks, six resource reserves, two wildlife sanctuaries, one strict nature reserve and five coastal wetland zones (Ramsar convention), according to the Forestry Division, even if the status of these different areas does not appear to be very clear in the documents consulted. To this can be added a large number of forest reserves (around 200 are identified on the mining licence map).

While mining licences can be granted in forest areas, exploration is strictly forbidden in wildlife reserves.

Mining law and relative acts

The first document to mention concerning mining laws is the constitution of Ghana of 1992. In Chapter 21, Article 257, it states that:

“Every mineral, in its natural state in, under or upon any land in Ghana, rivers, streams, water courses throughout Ghana, the exclusive economic zone and any area covered by the territorial sea or continental shelf is the property of the Republic of Ghana”.

In the following articles, the constitution establishes the principle for setting up different “commissions” (Land, Forestry and Mining).

The Mining Act of 2006 stipulates the rules for granting mining licences. Unlike the French-speaking countries, Ghana is divided into blocks of 15” by 15” (approximately 400 x 400 m) and each block is either free, reserved for a PA (forest reserve, wildlife reserve or national park), reserved for artisanal and small-scale mining (ASM) or attributed to a mining company. Therefore, theoretically there is no risk of overlap between mining licences and PAs unless a deliberate decision is made by the ministry for natural resources. This has happened on several occasions, either to install gold mines or to develop the bauxite industry. In these cases, specific environmental obligations are established by the EPA (note however that the document relating to mining in protected forests could not be obtained from the EPA).

Mining licences are granted according to a process of double public consultation: the mining licence request is firstly examined by the Minerals Commission which checks the availability of the area in the field and on the cadaster. If there are no impediments, the request is officially published for 21 days. If no comments are made, the applicant can then request an environmental permit from the EPA: they must submit the terms of reference approved by a commission including representatives from the EPA, the Minerals Commission and the Water Commission (the Forestry Commission is not yet included but should be shortly), then carry out the EIA which must include a public consultation. The EIA is then examined by the same mixed commission before receiving or being refused EPA approval.

The second public consultation is managed by a panel of three, two of whom are from the local communities and the third from the EPA.

The attribution of a mining licence is therefore both a public and an inter-ministerial act.

The Extractive Industry in Ghana

Ghana is the largest gold producer in West Africa, with more than 60t produced annually (up to more than 80t in 2008).

The mining industry contributes to 5% of the GNP and totals more than 30% of all exports (of which more than 90% due to gold).

Exports	1984	1990	1995	2000	2001	2002	2003	2004	2005
Gold (US\$)	103.3	201.6	647.3	702.0	617.8	689.1	830.1	840.2	945.8
Total minerals exports (US\$)	115.3	242.3	678.9	756.0	691.4	753.9	893.6	880.0	995.2
Total exports (US\$)	567.0	896.7	1,431.2	1,936.3	1,867.1	2,015.2	2,602.6	2,739.2	2,836.2
Mineral as % of exports	20.34	27.02	47.44	39.04	37.03	37.41	34.33	32.1	35.1
Gold as % of total exports	18.22	22.48	45.23	36.26	33.09	34.19	31.90	30.7	33.3
Gold as % of all minerals	89.59	83.20	95.35	92.87	89.36	91.40	92.90	95.5	95.0

Contribution of the mining sector to gross export value (1984–2005)

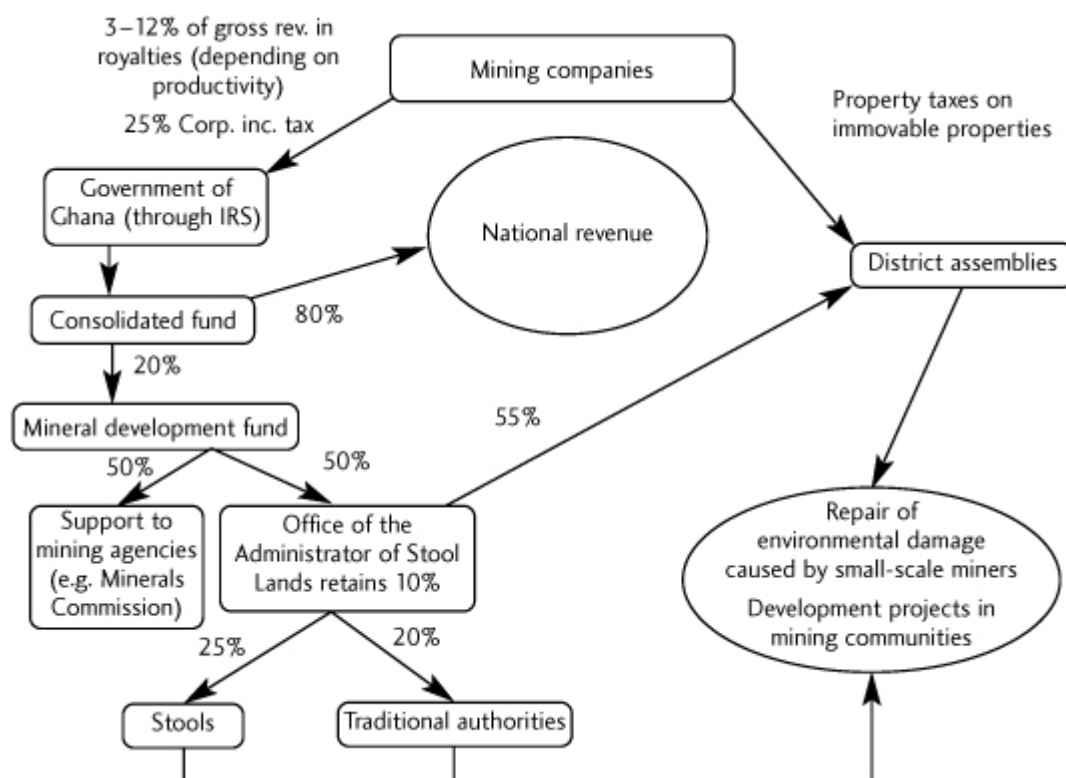
Source: Minerals Commission (2007).

Ghana also produces bauxite, manganese and diamonds (there are 23 “large mines” operating and 300 small mines are registered).

Ghana also produces natural gas and oil off shore.

Mining royalties are distributed as follows:

- 80% for the national budget
- 20% for the mining development fund, created to promote mining sector development and to compensate for the negative effects of mining on local communities.
 - o 50%: mining sector development and support for academic institutions
 - o 50%: district assemblies and traditional authorities in mining areas



Source: after Botchie et al. (2007).

Impact of the extractive industry on protected areas and biodiversity.

Many articles, NGO studies and scientific studies have focused on the impacts of the extractive industries:

Africa Action:

"Mining in forest reserves also contravenes the principles underlining the establishment of forest reserves in Ghana. The 1994 Forest and Wildlife Policy of Ghana aims at 'conservation and sustainable development of the nation's forest and wildlife resources for the maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society'. Mining especially surface mining in forest reserves have no place in this policy objective because surface mining does not conserve, sustain the use of nor preserve biological diversity, water resources and the environment. By removing the entire forest biomass (plants and animals) biodiversity is lost, water cycle function of the forests is lost, local climate for agricultural production is seriously distorted, headwaters of streams and rivers get vanished with consequent distorted effects on domestic and industrial water supplies even in remote settlements. If these are some of the adverse effects of surface mining in forest reserves of which Ghana seeks to protect through Forest Certification, then a clear contravention is established by any attempt to permit mining in forest reserves".

"The forest reserves in question include: Subri River Forest Reserve, a globally important bio-diversity area which is also the largest forest reserve in the country. It is also a critical watershed between major rivers -Rivers Bonsa and Pra. Others are the Supuma Shelterbelt; Opon Mansi Forest Reserve in the Western Region; Tano-Suraw and Suraw Extension also in the Western region; Ajenjua Bepo

Forest Reserve in the Eastern region; Cape Three Points Forest Reserve in the Western region and the Atewa Range Forest Reserve in the Eastern region.”

“Chirano Goldmines Limited, Satellite Goldfields Limited, Nevsun/AGC, Birim/AGC and Newmont Ghana Limited are the companies fronting to mine in these reserves”.

“Forest reserves have important environmental and ecological linkages. They are linked to water and soil resources, genetic resources of plants and animals and to food production and food security. In particular they constitute a major source of fresh water bodies for domestic and industrial use and enhance local climatic conditions for agricultural production. In Ghana most freshwater bodies take their source from forested areas. For example, rivers Ankobra and Suraw take their source from the Tano-Suraw forest reserve, which also protects river Tano that passes through it. Clearly, if this reserve is being considered for mining then we are being confronted with serious livelihood and environmental consequences in a much larger magnitude. Forest reserves are also important to the economic and social-cultural relationship of rural communities and the nation as a whole. They create jobs, provide health and food security and help in the cultural identity of a people. It is for these and many other important reasons that Ghana Government has committed herself to several international conventions and has also enacted various legislation to protect and conserve forests and forest resources.”

“In spite of the important role that forest reserves play they have been undergoing qualitative and quantitative deterioration over the years. Already, much of the original vegetation of the country has been removed or considerably deteriorated. The size of existing forests and forestry resources and their adequacy for supplying critical goods and environmental influences necessary for the continued viability of local production is dwindling year after year. The nation's total forest cover has reduced from the 8.2 million hectares around 1900 to less than 1.6 million hectares as at now, which is even less than the initial 1.76 million hectares reserved as permanent forest estates. Out of the 1.6 million hectares, only 32,000 hectares representing 2% of the remaining forest reserves is said to be in excellent condition.”

Ghanaweb:

“Gold, a mining resource, buried deep under the forest reserve of Ghana, is to be mined only after getting all stakeholders (government, citizens, shareholders, environmentalists, mining companies) to agree on the most effective means of exploitation to minimize the negative impact of mining on the environment. A plan of action for effective mineral development requires broad objectives of ensuring optimal use of indigenous land to stimulate rural development for the benefit of the locals and shareholders”.

“The reported granting of mining leases in the Ghanaian forest reserve to some international mining companies can only be justified with a detailed study of the impact on the environmental, legal, social, political and other sectors. Such a report should be in the public domain for all to review and evaluate for a public discussion on the pros and cons of the exploitation of the mineral resources”.

AKOBEN Programme:

The AKOBEN, programme, led by the EPA, consists in rating the environmental performance of mining and manufacturing industries. There is a five level rating system. The levels are colour-coded, gold (for excellence), green, blue, orange and red (for poor performance levels). The rating is revised

and published annually. The final rating takes into account more than 100 indicators including qualitative and quantitative data, thus measuring companies' compliance with their obligations as set forth in their EIA. It is therefore a quantified and public environmental monitoring system.

AKOBEN RATING SYSTEM		
Rating Level	Performance	Implications
RED	POOR	Serious Risks
ORANGE	UNSATISFACTORY	NOT in Compliance
BLUE	GOOD	In Compliance
GREEN	VERY GOOD	Applies Best Practices
GOLD	EXCELLENT	Committed to Social Performance

Mining company results for 2010:

Company	1. Legal Issues	2. Haz. Waste Mngt	3A. Toxics Releases	3B. Non-Toxics Releases	4. Monitoring and Reporting	5. Env. Best Practices	6. Community Complaints	7. Corporate Social Respons.	Final Rating
ABOSSO GOLDFIELDS LIMITED--DAMANG	BLUE	BLUE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GOLD	ORANGE
ANGLOGOLD ASHANTI (IDUAPRIEM) LIMITED--IDUAPRIEM	RED	RED	RED	ORANGE	ORANGE	ORANGE	NOT ADEQUATE	GOLD	RED
ANGLOGOLD ASHANTI LIMITED (OBUASI MINE)--OBUASI	BLUE	RED	RED	ORANGE	ORANGE	ORANGE	GREEN	GOLD	RED
CHIRANO GOLD MINES LIMITED--CHIRANO	BLUE	BLUE	NOT APP	BLUE	ORANGE	BLUE	GREEN	GOLD	ORANGE
GHANA BAUXITE COMPANY LIMITED--AWASO	RED	RED	NOT APP	BLUE	ORANGE	ORANGE	NOT ADEQUATE	NOT ADEQUATE	RED
GHANA MANAGANESE COMPANY LIMITED--NSUTA	BLUE	BLUE	NOT APP	BLUE	ORANGE	BLUE	NOT ADEQUATE	GOLD	ORANGE
GOLDEN STAR (BOGOSO/PRESTEA) LIMITED--BOGOSO	BLUE	BLUE	RED	BLUE	ORANGE	ORANGE	NOT ADEQUATE	NOT ADEQUATE	RED
GOLDEN STAR (WASSA) LIMITED--AKYEMPIM	BLUE	BLUE	RED	BLUE	ORANGE	BLUE	NOT ADEQUATE	GOLD	RED
GOLDFIELDS GHANA LIMITED (TARKWA MINE) --TARKWA	RED	RED	RED	ORANGE	ORANGE	BLUE	NOT ADEQUATE	GOLD	RED
NEWMONT GHANA GOLD LIMITED--KENYASI	BLUE	RED	BLUE	ORANGE	ORANGE	BLUE	NOT ADEQUATE	GOLD	RED
PRESTEA SANKOFA GOLD LIMITED--PRESTEA	RED	RED	NOT APP	ORANGE	ORANGE	NO DATA	NO DATA	NO DATA	RED

Waste management, and environmental monitoring and reporting are the two weakest points for all mining companies.

Geographical Analysis

The map of mining licences shows the boundaries of PAs. If these boundaries are superimposed on those provided by the WDPA, there are a certain number of discrepancies:

- Difference in the boundaries of some areas: probably related to a problem in the system of projection
- The extension of many PAs is lower on the permit map than that of the WDPA

- Some areas in the WDPA are not on the mining licence map (including Digya National Park for instance)

Ghana: Protected areas

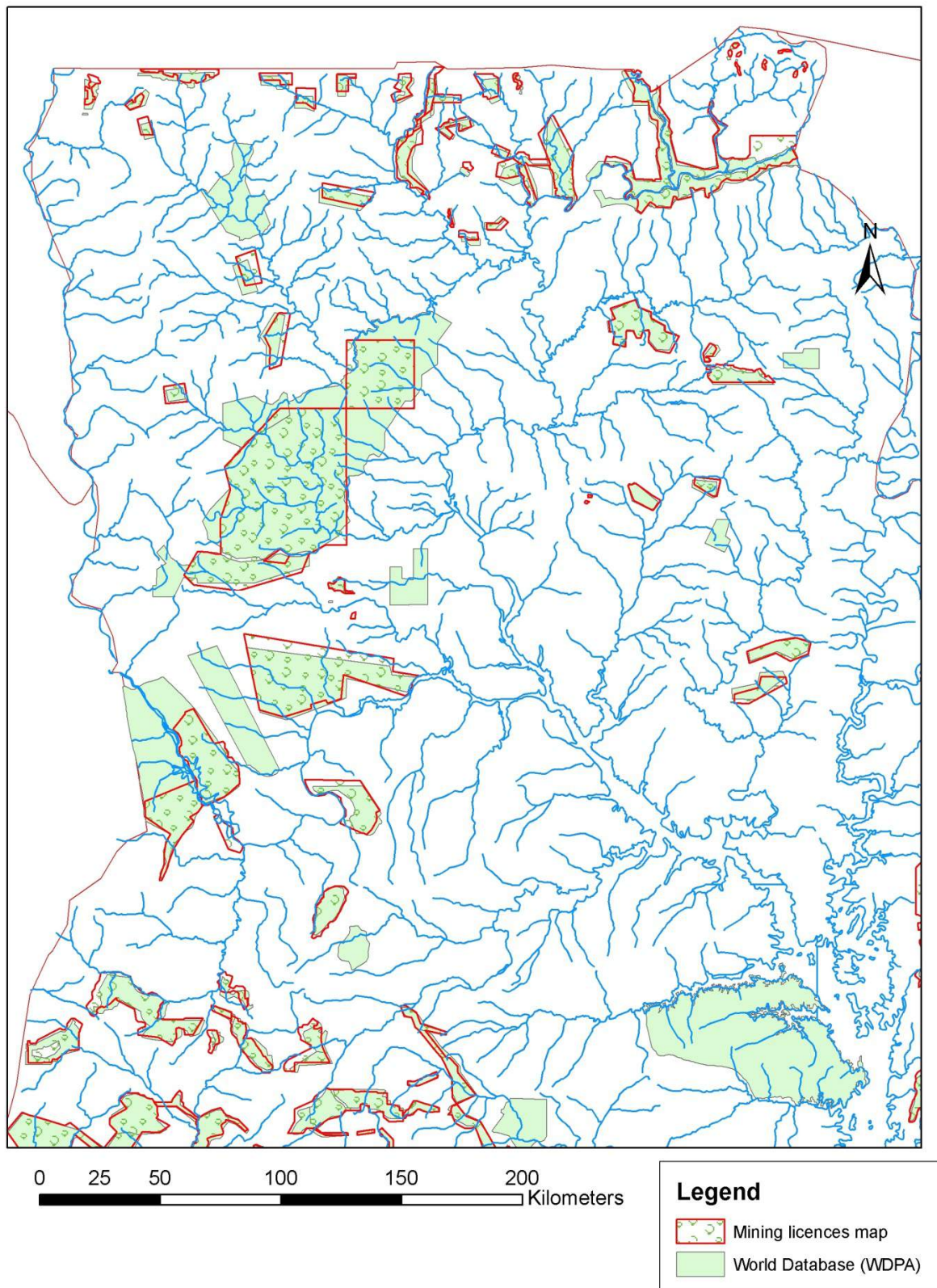
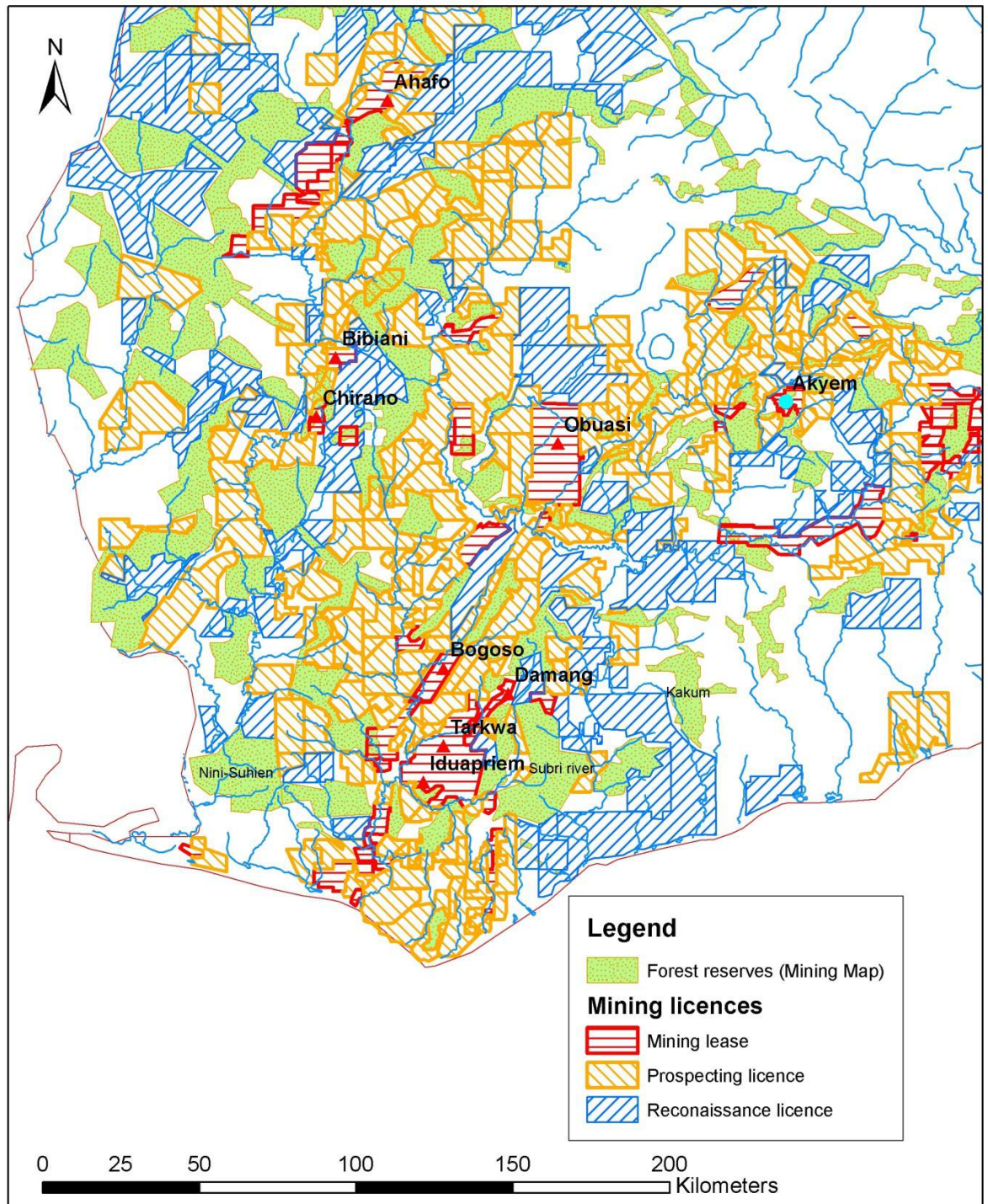


Figure above: Superimposition of PAs of the WDPA and the mining permit map.

The application of the rules for not granting mining licences in PAs is based on the PAs identified on the mining permit map.

This can be seen on the map, even if almost all the PAs are totally surrounded by mining activities.

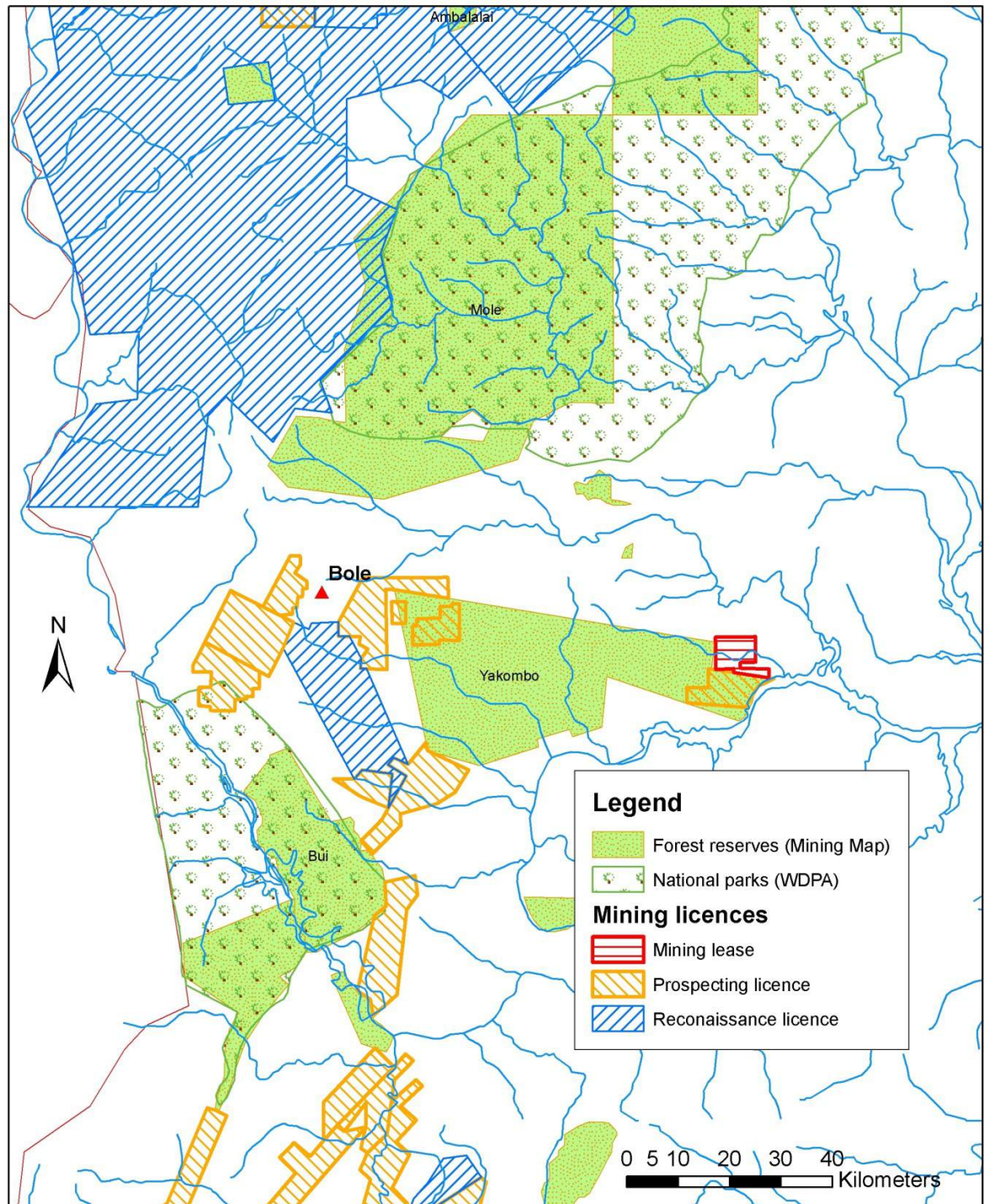
Ghana: Protected areas and mining licences



According to the Forest Commission and the Minerals Commission, there are five mining companies that have been authorised to hold mining licences within PAs. According to the

map, there is somewhat more overlap, but this is perhaps due to the problems in outlining PA boundaries. The example of Mole National Park is interesting in this regard: the reconnaissance licences granted in the North-West respect the park boundaries as defined in the WDPA and not those on the mining map. This is not the case for Bui national park, the northern part of which according to the WDPA is partly covered by a prospecting licence.

Ghana: National parks and mining licences



Apart from Kyabobo and Digya National Parks, located in the sedimentary zone and which have no nearby mining activity, the other parks (Mole, Bui, Kakum, Bia and Nini-Suhien) are all bordered by mining licences with different effects:

- Kakum: reconnaissance licence downstream from the park
- Bia: prospecting licence downstream from the park
- Nini-Suhien: reconnaissance licence and prospecting licence upstream from the park
- Bui: prospecting licence upstream and downstream from the park
- Mole: reconnaissance licence upstream from the park. Part of Mole Park is located in the Bole gold district.

Study of some Environmental Impact Assessments

The EIAs are available at the EPA. They are of very varying quality, some barely mention flora and fauna-related aspects (Chirano Gold Mine or Awaso bauxite for instance), others constitute in-depth local reports, covering much more than what is required for the mining licence (Newmont and Golden Ridge project for example). Regarding the latter, the wildlife, plant and ecosystem inventories are worthy of use elsewhere.

Protected Areas

The different protected areas of Liberia are defined in the Forestry Law of 2006:

- national park
- strict nature reserve
- nature reserve
- national forest
- Game reserve

According to WDPA data, Liberia has only one national park (Sapo National Park), the other known protected areas being national forests, including the Liberian part of Mount Nimba. The other types of protected area do not feature in the database.

In Sections 8 and 9, the forestry law explicitly stipulates the activities that are allowed and those that are prohibited in the different protected areas. Mining activities, whether prospecting or exploitation, are clearly prohibited:

“No Person shall:

- (i) In a Strict Nature Reserve, pursue activities other than Conservation management and research.*
- (ii) In a National Park, Nature Reserve, or Game Reserve, prospect, mine, farm, hunt, fish, extract Timber or non-timber Forest Products, or take any other action except those for management or non-consumptive uses, such as tourism, recreation, and research.*
- (iii) In Communal Forests, prospect, mine, farm, or extract Timber for Commercial Use.*
- (iv) In Cultural Sites, prospect, mine, farm, hunt, or extract Timber or non-timber Forest Products.*
- (v) In a National Forest, prospect for minerals, undertake Class B or C mining, or farm.*
- (vi) In a Multiple Sustainable Use Reserve, farm or extract Timber for Commercial Use”.*

“The Government shall not grant Class B or Class C Mineral Rights in Protected Areas or Proposed Protected Areas.

The Government shall not grant Class A Mineral Rights in National Forests or Proposed Protected Areas unless:

- (i) The Authority has concurred with the grant;*
- (ii) The Authority has written appropriate guidelines for maximum protection of the Environment and sustainable management of the forest during exercise of the grant;*
- (iii) Compliance with the guidelines is a condition of the grant”.*

Environmental Impact Assessments in the Extractive industries

Under the mining law, an EIA is compulsory for a licence to operate large and medium-sized mines (Class A and B). Oil contracts are also subject to an EIA and furthermore, it is stipulated that no work can be carried out in a protected area:

Section 9.2 – Restricted Use of Land: *Except in cases of special authorization, the holder of a petroleum contract may not occupy nor carry on construction or execute any petroleum operations on any of the following parcels of land:*

- Land located less than fifty meters from any building whether religious or not, Governmental building, or those in use by a public entity, walled enclosures, court and gardens, residence and groups or residences, villages, settlements, cultural reserves, burial grounds, wells, water*

sources, reservoirs, roads, paths, railroads, water drains, pipelines, work declared to the of public interests and works of art.

- Land located less than one thousand (1,000) meters from a foreign border or any airport.

*- **Land declared by the State as national parks, protected areas, or comparable Reserves.***

The Environmental Protection Agency (EPA) also specifies that no authority may grant authorisation for an activity subject to an impact assessment until the “Environmental Permit” has been conferred by the EPA.

Mining Activity

Very little mining data could be obtained for Liberia. The country has gold, diamond and bauxite resources and it is a mineral and oil producer.

Mining revenues for 2009 were estimated at \$US10 million and oil revenues at \$US4.5 million.

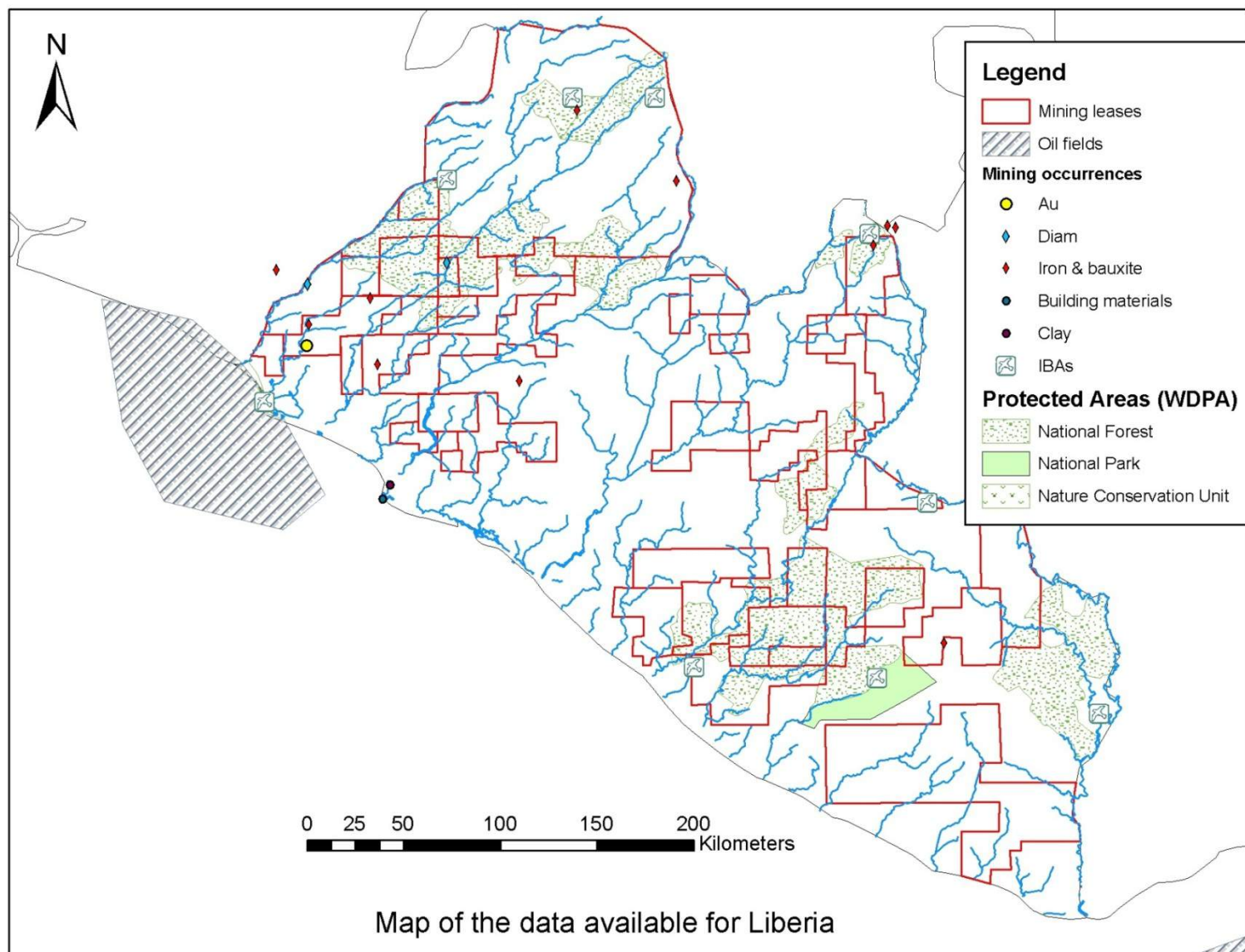
Only a recent map of mining licences could be obtained, which does not specify the minerals or the type of licence.

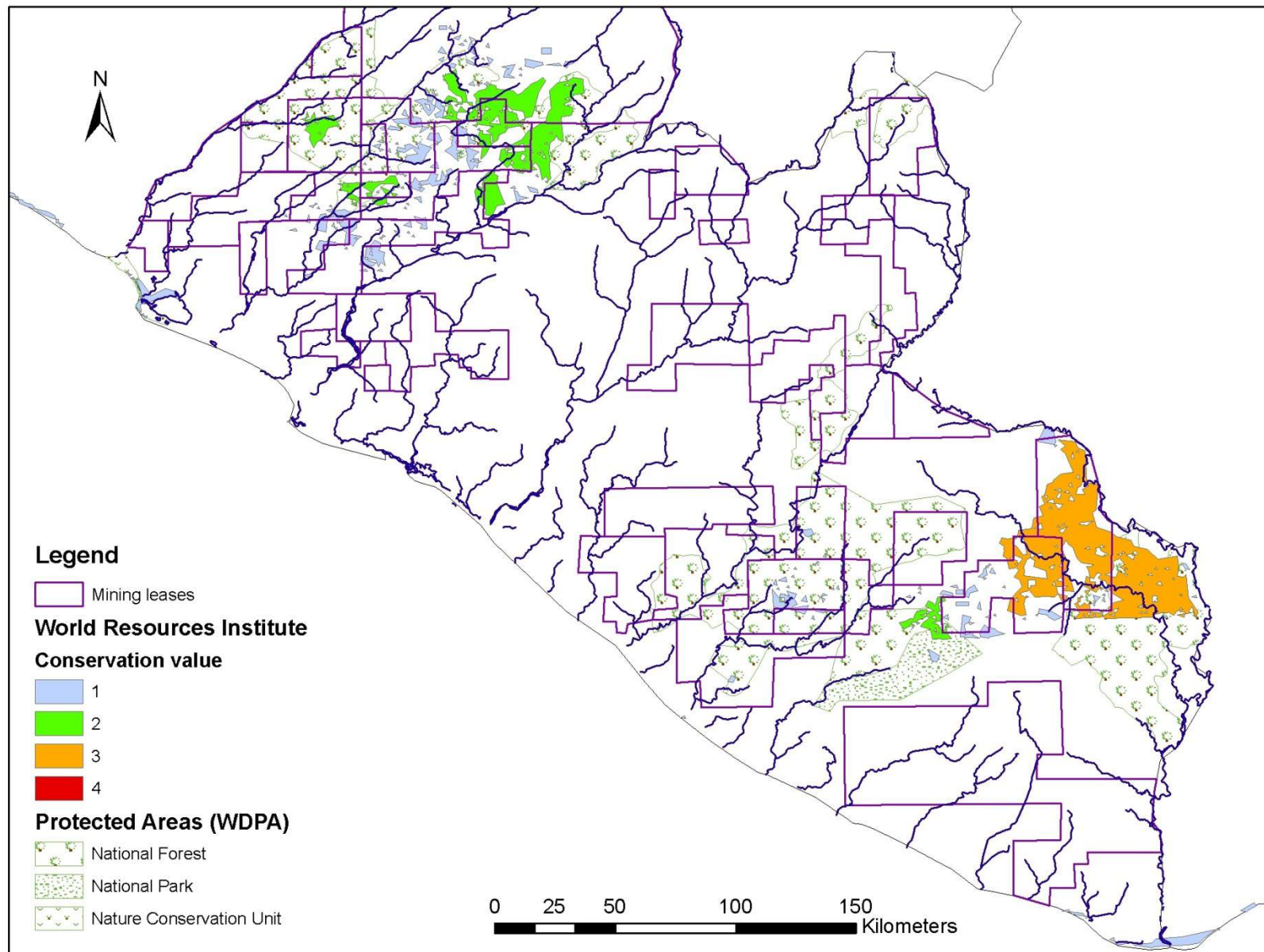
However, this map does show that 48% of the country is covered by mining licences and that all national forests to the north-west and centre of the country are covered by mining permits, which in theory is an infringement on the regulations mentioned above. Sapo national park however is preserved from mining activities.

Piso IBA is clearly threatened by the nearby oil field.

No data could be obtained on artisanal gold and diamond mining, but they are both very developed in Liberia and it is highly probable that they affect various protected areas.

As Liberia is the country with the highest “conservation value” according to the WRI, areas of high value are also on the second map. This demonstrates both that the protected areas are not aligned with areas of high biodiversity and that mining licences have been granted in areas that this organisation deems to be among the richest in West Africa.





References

- Mining Act
- Forestry development authority Act
- Environmental Protection Agency Act
- Forestry Act

Protected Areas

“Guinea Conakry has a large number of protected areas. A project to build a Guinean protected area network encompasses 43 sites representing the country’s major ecosystem groups. However, often these sites are designated as protected areas but do not have the appropriate legal status and benefit from minimal protection. Legally designated protected areas include Badiar National Park, Upper Niger National Park, the strict nature reserve of the Ziama mountain range¹, the strict nature reserve of Mount Nimba, Loos island wildlife sanctuary, Kankan-Folonigb wildlife reserve, Kounoukan nature reserve² and Pinséli nature reserve” (Cuq, 2008).

The IUCN documents also refer to Kouya National Park which, according to WDPA data corresponds to the classified forest of Gban. The data are not clear as to whether or not it is integrated into the National Park of the Upper Niger (WDPA only considers Mafou forest as a national park). In light of this uncertainty and to better highlight the potential threats to this sector, the maps below consider both Mafou forest and that of Gban as national parks and the peripheral areas as wildlife and nature reserves, even if this does not strictly correspond to their official classification.

Regarding Ramsar Convention site, the same study (Cuq, 2008) states:

“Ramsar Convention sites recognised as wetlands of international importance does not have a legal status at national level. Furthermore, Tristao and Alcatraz islands are not yet officially protected but a project is underway to classify them as a marine protected area.”

One of the difficulties encountered in Guinea is the fact that certain protected areas are specified in the law on wildlife protection (as is the case in particular for national parks and strict nature reserves), others in the forestry law (classified forests).

The status of the national parks (wildlife protection act) prohibits in particular *“all forestry exploitation, agriculture, fishing, fish farming and mining, grazing of domestic animals, exploration or prospecting, surveys, landscaping or construction and in general any work that may modify the land or the vegetation”*. The same applies to strict nature reserves in which the following are strictly forbidden: *“all types of hunting or fishing, all forestry exploitation, agriculture, fishing, fish farming and mining, grazing of domestic animals, exploration or prospecting, surveys, landscaping or construction and in general any work that may modify the land or the vegetation, all pollution of waterways, the introduction of exotic animal or plant species and, in general, any act that may harm or disturb the flora and fauna”*.

Regarding classified forests, the forestry law stipulates in Article 80 that *“Prospecting or the operation of quarries or mines, the construction of roads and railways envisaged in forest areas require approval by the ministry for forests as well as, if necessary, a timber felling or clearance permit.”*

Mining activities are therefore explicitly mentioned for different types of protected area.

1 According to WDPA data, Ziama is considered to be a classified forest, not a strict nature reserve.

2 The boundaries for these two reserves are not specified in the WDPA.

The Law on the Environment

The main articles of the law on the environment concerning mining activities are the following:

*Article 19: The Ministry concerned and the ministerial authority responsible for the environment must give their prior approval for any attribution or development of land for agricultural, industrial, urban or other purposes, **as well as for prospecting or mining of underground resources** liable to affect the Guinean environment in the cases set forth in the associated by-laws. These by-laws set the conditions for granting the authorisation as well as the list of activities or uses which, due to the dangers they incur for the soil, subsoil or the resources contained within, must be forbidden or subject to specific constraints set by the administration.*

*Article 20: In application of Article 121 of “ordonnance” 076/PRG of 21 March 1986 on mining in the Republic of Guinea, **the quarry or mining licence holder must establish a plan to restore the land for agriculture or reforestation, subject to the prior joint approval of the Minister for Mines and the ministerial authority for the Environment.***

When necessary to maintain an ecological balance, all areas of wood or forests, regardless of who owns them, can be classified as protected forests, thus prohibiting any change in attribution or occupation of the land that could compromise the quality of the timber and stipulating the conditions for using said forest.

Article 82: When developments, structures or installations, due to their size, the type of activities carried out there or their impact on the surrounding milieu, risk harming the environment, the applicant or project promoter will carry out and submit to the ministerial authority responsible for the environment an environmental impact assessment enabling the direct or indirect impact of the project on the Guinean ecological balance to be evaluated, as well as the context and quality of life for the local communities and the consequences on environmental protection in general.

Article 83: On the basis of the report drawn up by the National Environment Council:

- *A by-law to this law sets the list of the different operational categories for which the ministerial authority for the environment may require an impact assessment to be carried out prior to the implementation of any activities.*
- *A by-law passed by the ministerial authority responsible for the environment may stipulate the content, the methodology and the procedure to be used for the impact assessment. The document submitted to the administration must contain the following:*
 - *An analysis of the baseline situation at the site and its environment,*
 - *An assessment of the foreseeable consequences of the implementation of the project on the site and its natural and human environment,*
 - *A list of the measures envisaged by the applicant to eliminate, reduce and if possible compensate for the damage caused by the project on the environment and an estimation of corresponding costs,*
 - *A presentation of other possible solutions and reasons why the project is being presented from an environmental protection viewpoint.*

Forestry Law

The Forestry Law is fairly explicit as to the actions that are banned in the different protected areas:

Article 80: *Prospecting, **quarrying or mining**, road and railway construction planned in forest areas must be authorised by the Ministry in charge of forests and must include, if appropriate, a timber felling or clearance permit.*

This authorisation determines the measures the beneficiary must take to protect and restore the environment in compliance with the provisions of the present Law.

Article 96: *unless there are exceptional circumstances, specially protected areas such as a national park or nature reserve, and reforestation areas **are exempt from all usage rights.***

Mining Law

The current mining law dates from 1995, although it appears that a new mining law is being prepared for 2011. No indication as to the modifications that will be made could be obtained.

Unlike the forestry law, the mining law remains vague about environmental conditions and protected areas. The “protected areas” mentioned in Article 64 could be nature conservation areas but it would appear that the article has never really been applied.

Article 16: Protection of the environment

Mining or quarrying activities must be carried out in such a way as to ensure the environment is protected in compliance with the law on the Environment. Companies must take the necessary measures to prevent pollution of the environment, to process waste, discharges and effluents, and to preserve the forest heritage and water resources.

Article 6: Protected or prohibited areas

Areas of any given size within which reconnaissance, prospecting and exploitation of mineral substances or quarries can be subject to certain conditions or prohibited without the licence holder being able to claim any indemnities can be established to protect buildings and agglomerations, cultural sites or sites of worship, water sources, roads, works of art and public works, and all locations where it will be deemed necessary in the general public interest.

Geological and Mining Situation

Guinea is “the” mining country of West Africa, with the largest world reserves of iron ore and bauxite, but also gold and diamond deposits. As can be seen on the map (the data on the mining licences date from the beginning of 2010), more than 80% of the country is covered by mining licences (only the permits for iron ore, bauxite and gold were taken into account, the remaining data was not available at the time of the study): bauxite takes up the whole western half of the country, while the other half is divided into two: in the north are the gold permits, in the south those for iron ore.

Mining pressure on the environment

Given the extent of the mining licences, pressure on the environment is unavoidable. The following points can be noted:

1. The classified forests are all, with one or two exceptions, covered by gold, iron-ore or bauxite mining licences. Even if the forestry law does not prohibit exploration (it only bans mining), any discovery of a deposit would cause considerable damage to these classified forests.
2. In the strict definition of national parks, i.e. the boundaries of what was Mafou classified forest and the strict boundary of Badiar park, mining is prohibited. However, the extended boundaries of the Upper Niger and Mafou parks are partly covered by iron ore and/or bauxite permits.

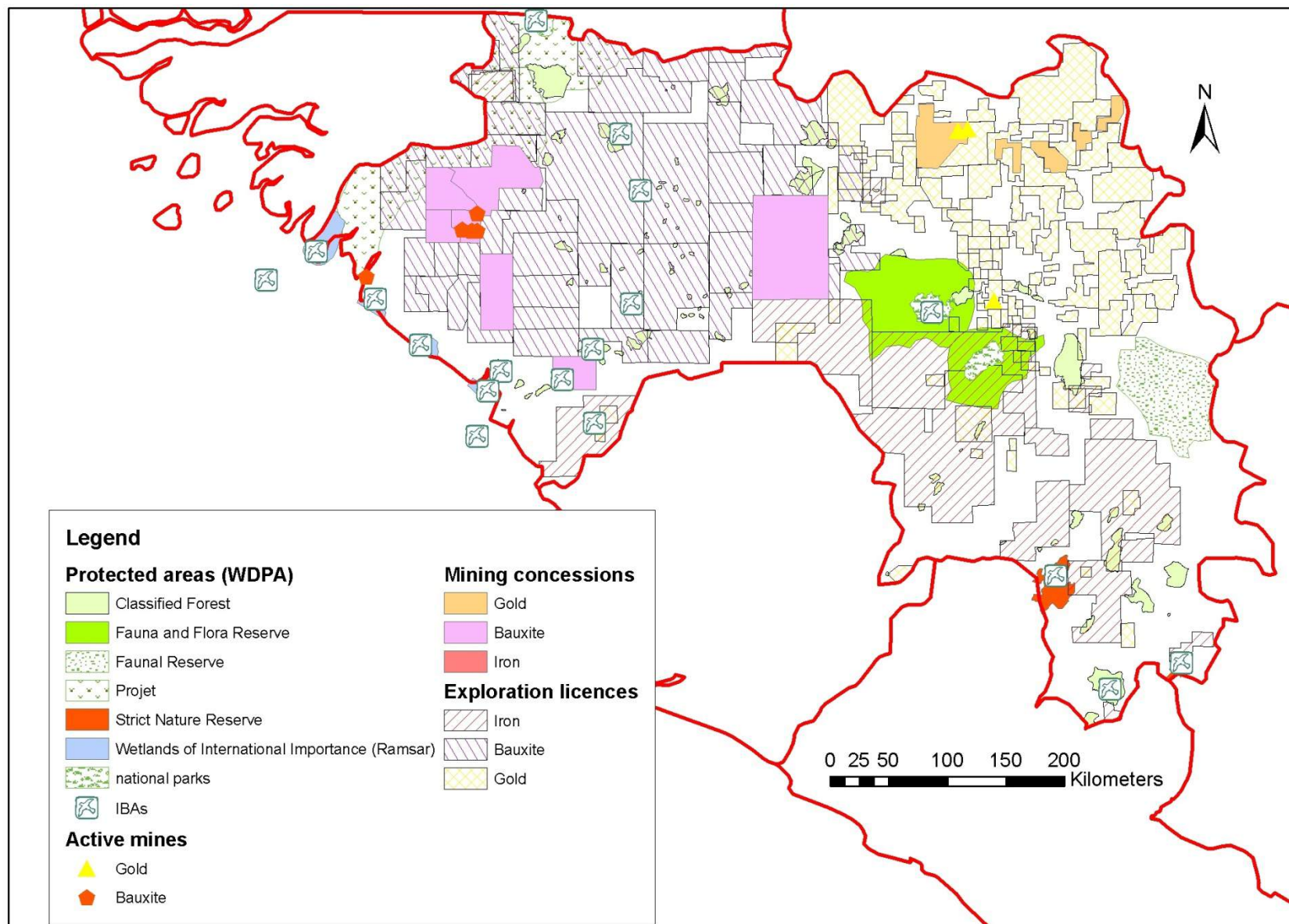
3. Kankan – Folonigbé wildlife reserve is surrounded by permits but is entirely protected, as are the strict wildlife reserves of Ziama and Mount Nimba,
4. The planned boundaries for the large protected area projects of Rio Kogon and Bafing Falémé encompass many mining exploration licences and even exploitation licences that are currently valid,
5. The case of Mount Nimba is particular: the whole of the Mount Nimba range spans the borders between Guinea, Ivory Coast and Liberia. Mount Nimba constitutes an exceptional wildlife reserve, with endemic species such as the Western Nimba toad (*Nimbaphrynoides occidentalis*), and the the Nimba otter shrew (*Micropotamogale lamottei*). This mountain range due to their altitude, have a recognised impact on the weather. This border zone is also politically sensitive because many Liberians took refuge here. Finally, the mountains offer great mineral wealth with an iron ore deposit of than one billion tonnes at a concentration of 65%. Located on the other side of the country from the port of Conakry, 100km of railway line will need to be built to extract this ore and the current mineral port will need to be completely redesigned. In total, the project would create 5 000 direct jobs and more than 100 000 indirect jobs. The other alternative would be to extract the ore via Liberia where a railway already exists (used for iron ore on the Liberia side). Planned since 1970, this project is an example of the political power plays between politicians, mining companies and environmental protectionists. The first stone of the Trans-Guinean railway should be laid in March 2011.

References

- Law on environmental protection and promotion: *ordonnances* 045/PRG/87 and 022/PRG/89
- Forestry Law: L/99/013/AN
- Law on the protection of wildlife and regulation of hunting: L/99/038/AN
- Mining Law: L/95/036/CTRN

Other bibliographical references

- M. Cuq (2008) - *Analyse comparée des cadres juridiques relatifs aux Aires Protégées des zones côtières et marines des pays du PRCM – Rapport Final RAMPAO*.
- *Plan d'action national pour la conservation des Chimpanzés en Guinée – 2005* – Direction Nationale des Eaux et Forêts, GRASP project.



GUINEA-BISSAU

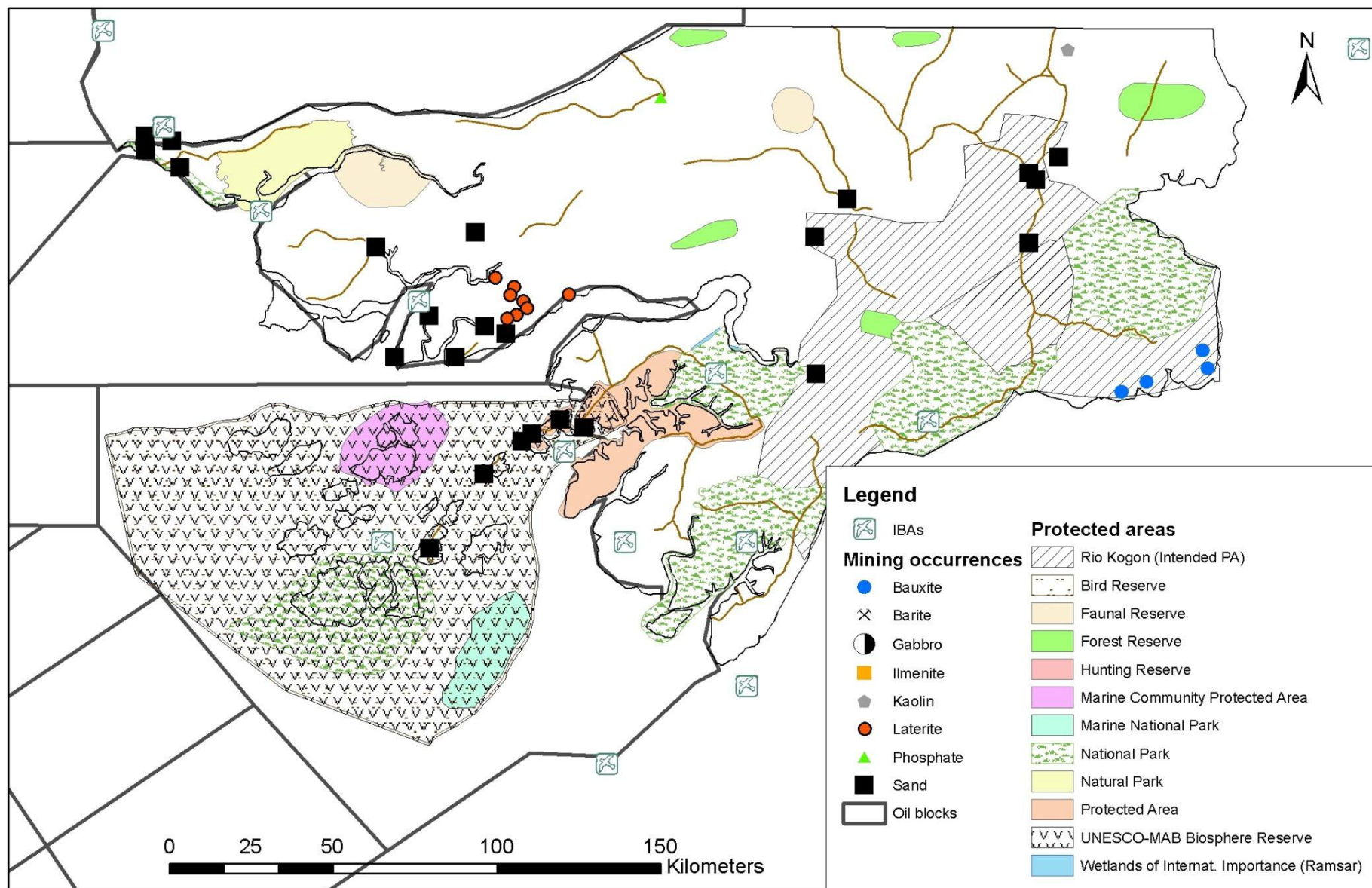
Guinea-Bissau is not a mining country and virtually no mining licences have been granted.

The laws on mining and the oil industry were reviewed in 2009 (UNDP project), but they would not yet appear to have been officially adopted. The main modifications brought by the new texts concern the protection of the environment, strengthening of EIAs and the obligation to have an “environmental permit”.

Although there is not a mining tradition in Guinea-Bissau, two extractive activities could pose a threat to the environment and protected areas:

1. The extraction of sand and shell sand either not far from Bissau to provide sand for construction, or in the Bijagos archipelago (shells used for improving soil fertility or as an ingredient in cement). These are small-scale operations but they directly affect coastal areas and wetlands. Locally, some quarries are seen to help keep waterways clear in certain coastal rivers that tend to silt up.
2. The existence of a phosphate district in the east of the country, along the border with Guinea. These phosphates have been known about for a long time and several projects to mine them have been examined. Overall, a mining port would have to be built at Buba (upstream of the estuary of the Rio Grande de Buba), and connected to the deposits either by road or railway. For Guinea-Bissau, this is the most viable solution for exporting the ore. They cannot yet export via Guinea (unless Guinea builds a railway to the equivalent deposits on its side of the border) and the Senegalese mining port is too far away. However the problem is two-fold:
 - a) The deposits are located within the boundaries of the transboundary protected area project of Rio Kogon
 - b) The planned port would be located in the Rio Grande de Buba protected area, not far from Cufada National Park.

This situation is far from simple: on the one hand Guinea-Bissau is one of the “good students” in terms of the extent of their protected areas and does not plan to sacrifice any for mining projects. On the other hand, the primary resource that could bring the country out of its deep economic stagnation is phosphate. In light of the still relatively intact area of Guinea-Bissau, those who defend the mining project propose to modify in particular the boundaries of the Rio Kogon transboundary protected area project. Another alternative could be cooperation with Guinea which also has mining development projects planned on its side of the border. An overall EIA of both options is needed to be able to really estimate the comparative advantages and disadvantages.



MAURITANIA

Mauritania is a special case in terms of mining: iron ore was the only mineral resource in the country for a long time, controlled by the National Mining Industry Company (French acronym SNIM). It was not until 2005 that oil replaced iron ore in export revenues and since 2007 the gold sector has been making considerable headway with the Tasiast mine.

Forestry Law (1997)

The forestry law only mentions classified forests. The only explicit bans are on growing crops and grazing animals, “*unless stipulated otherwise in a development plan*”. No development plans could be obtained to find out if other activities were mentioned.

Article 17 of this code allows for declassification in the following cases:

A classified forest can be declassified according to the terms and conditions stipulated in a by-law and if the following conditions are fulfilled:

- *Declassification must be necessary to build a structure or carry out a project of public interest, which could not be properly carried out outside the forest,*
- *An impact analysis must analyse the effect of the structure or project on the ecosystem and propose solutions liable to remedy the negative effects of declassification.*
- *The opinions of the local authorities and representatives of local communities must be sought*
- *Compensation in reforested land must be proposed by the applicant.*

Law on Hunting and Environmental Protection³

Protected areas other than classified forests are governed by the law on hunting.

Article 5: *In order to preserve wildlife and bird habitat areas, all wetlands important to wildlife and all areas usually occupied by wild animal species will be developed and organised in ways stipulated in the associated by-law, in order to meet the requirements for the sustainable conservation of these resources.*

Following this are the conservation objectives for national parks, nature reserves and hunting areas. There is no mention of which activities are permitted within these areas.

Law on the Environment (2000)

The Mauritanian law on the environment is not very strict and is generally limited to compliance with “good practices”:

Article 26: *industrial, urban, farming, mining, tourist or other activities liable to harm the flora and fauna or destroy their natural habitats are either forbidden or subject to prior approval by the Minister for the Environment, according to the conditions set forth in the law in force and the provisions taken to apply these laws.*

³ As in other countries, a distinction is made between the forestry law and the law on hunting and environmental protection, as if forests were not part of the environment. This is not anecdotal, but a firmly entrenched fact throughout the sub-region: wildlife is protected while hunting opportunities are developed and forests are exploited while trying to preserve their productive potential.

Article 42: *To guarantee protection of the soil, subsoil and the natural resources contained within it, the rational and sustainable use of land and compliance with land protection measures is necessary. In particular, prospecting and mining shall be carried out in compliance with this requirement.*

Article 44: *Quarrying, mining and prospecting activities must be designed and carried out such that:*

- *The environment is not damaged around the sites and erosion is not caused or aggravated*
- *The worksites can be returned to their initial state*

In terms of protected areas, no classified forest is shown either in the WDPA or on any maps available at the time of the study, and only five protected areas are mentioned:

- Arguin National Park, classified as a world heritage site,
- Diawling National Park at the border with Senegal, classified as a Ramsar Convention site,
- Guelb El Richât, theoretically in the planning stages
- Two small protected areas on the Nouadhiboudou peninsula, Cap Blanc and the Baie de L'étoile (which is also an IBA),

Furthermore, 25 IBAs have been identified in Mauritania, both on the coast and inland.

Mining Law and associated by-laws

The mining law is not explicit and nothing in it clearly prohibits prospecting or mining in protected areas. As in Guinea, the notion of “reserve” is defined in the mining law: *“The Government can declare any area of Mauritania that has not been declared a promotional zone under this law or within which no mining licences have been granted to be a reserve and thus not eligible for mining operations.”* Therefore these are not protected areas in the sense of nature conservation. Furthermore, no by-law or other legislation creating reserves was found.

Article 15: *Any person can undertake reconnaissance activities as defined in Article 1 above anywhere in the country, outside promotional zones or reserves, and excluding existing mining areas.*

The mining law does not impose the carrying out of an EIA either, even for a mining licence but refers to the laws on the environment:

Article 33: *To obtain a mining permit the applicant must have the technical and financial capacities necessary to carry out the mining activities, to comply with the provisions of Articles 53 and 54 above and to meet the environmental requirements laid down by national and international law applicable in Mauritania as well as to comply with the appropriate general principles of international law.*

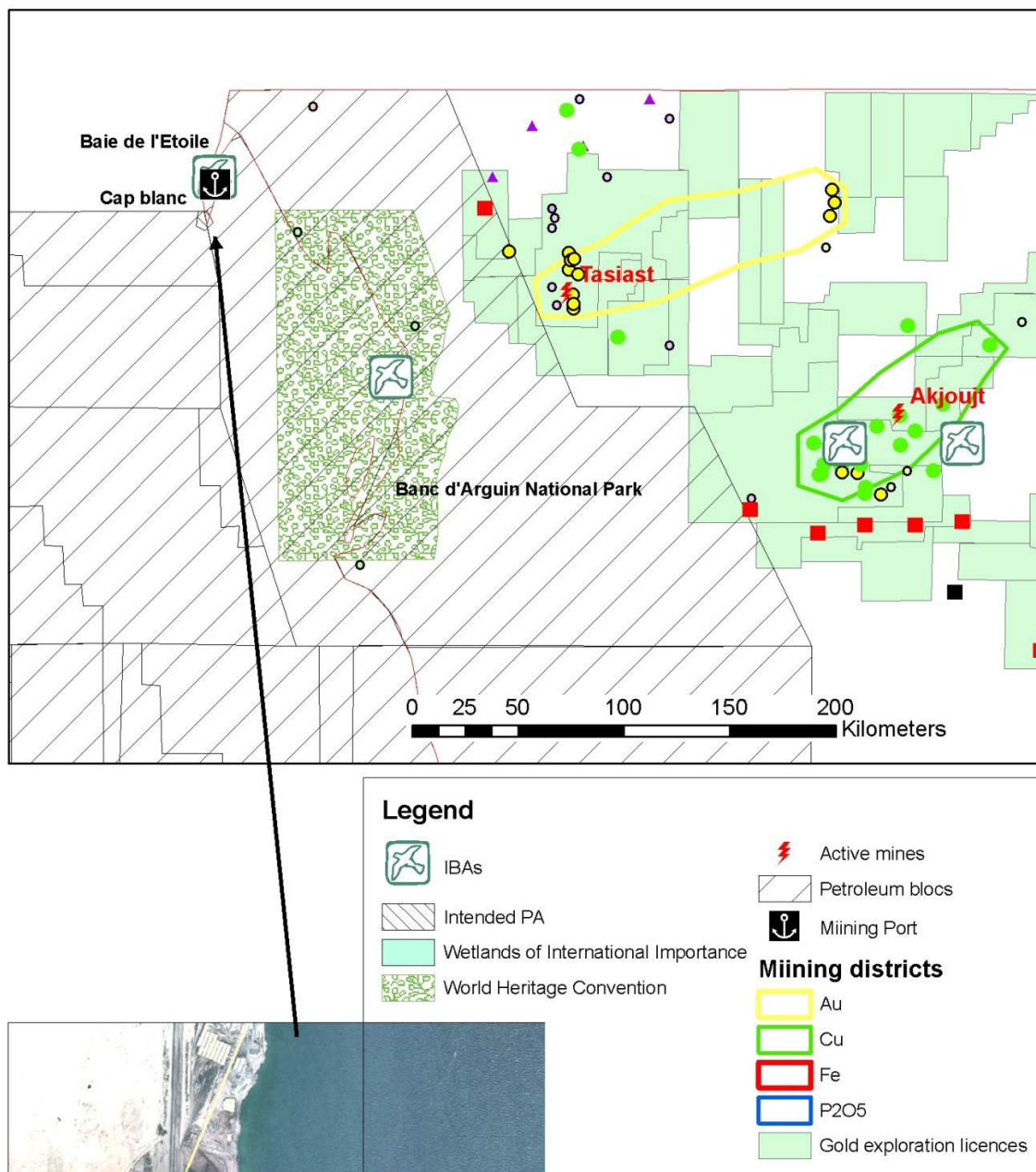
The associated by-law setting the terms and conditions for attributing mining licences and the operation of the mining cadaster makes no reference to protected areas:

Article 9: *The Mining Cadaster Unit processes licences and reconnaissance permit applications, ensuring they comply with the provisions of the mining law and this by-law, particularly in regard to the required payment, the location and availability of the area in question. If the application does not comply with the mining law and associated by-law, the Mining Cadaster Unit will submit to the Minister responsible for Mines a letter explaining the rejection of the application for signature. Once signed, the letter is sent back to the Mining Cadaster Unit for transferral to the applicant.*

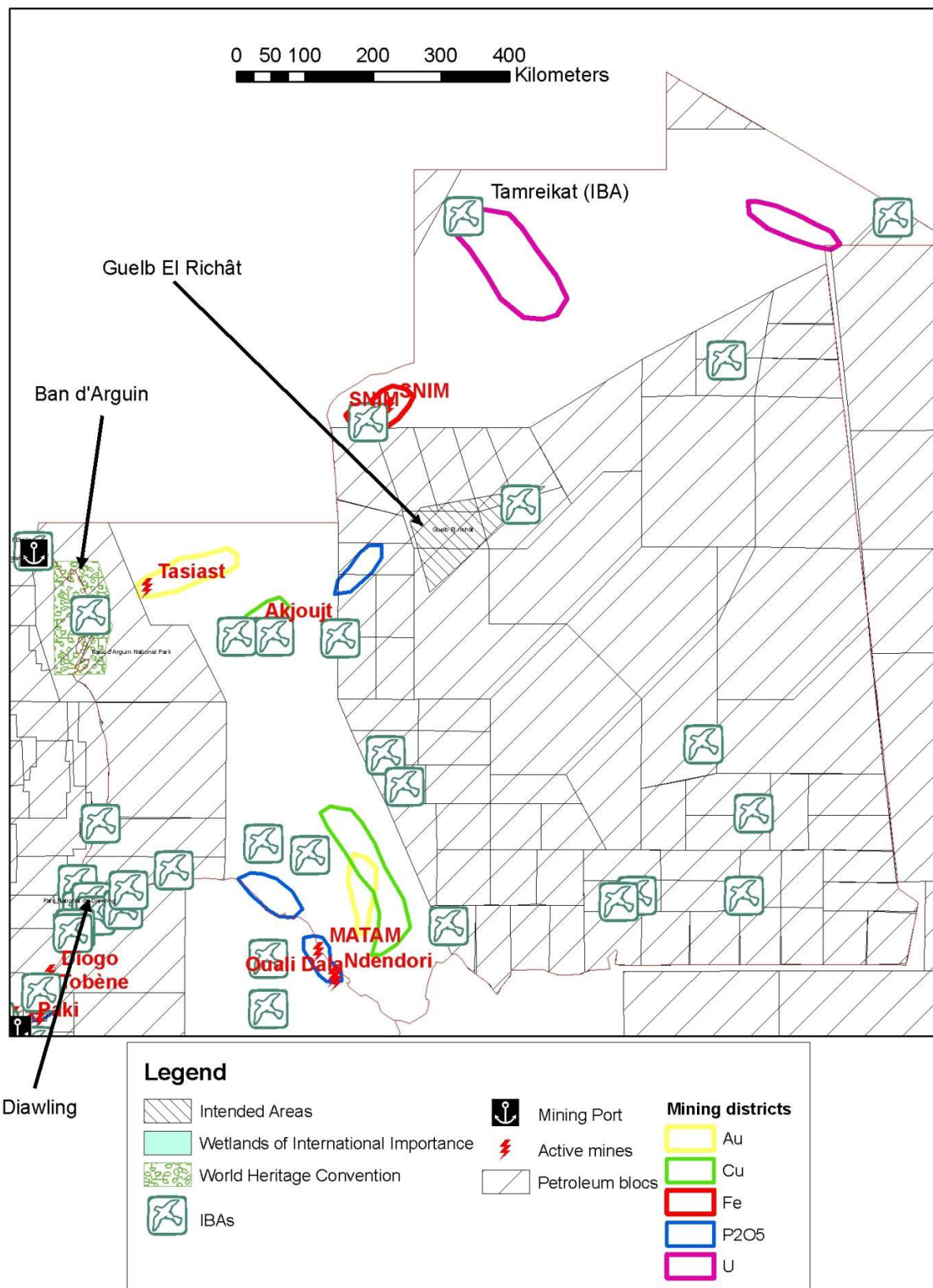
Mining activities and protected areas

As there are no data on any classified forests, only the five protected areas can be considered.

1. Banc d'Arguin: this is the largest protected area in Mauritania. It is located on the coast, less than 30km to the south of Nouadhibou. While gold licences have been granted 15km inland and the Tasiast gold mine is around 50km from the park's boundaries, the iron-ore mines are actually a greater threat. They are located more than 450km away but all the ore is shipped through the port of Nouadhibou. 12 million tonnes per year currently pass through the port and this figure is set to double in the next two years. The Banc d'Arguin is also entirely set within an oil block.
2. The two protected areas of the Nouadhibou peninsula (Cap Blanc and Baie de l'Etoile) are also threatened as they are located either side of the mineral port. They are also located within an oil block.
3. Diawling National Park and the two adjacent IBAs (Diawling and Chott Boul) are far from any mining activity but are, like the others, located within an oil block.
4. Guelb el Richat protected area (in theory planned) and the IBA within it, are located outside mining areas (the closest mineralisation is the phosphate occurrences, located more than 50km downstream) but are again covered by an oil block.
5. As for IBAs, that of Kediet el Jill is located at the heart of the iron-ore basin mined by the SNIM. Two IBAs are located in the copper district of Akjoujt, actively mined and explored. Finally, note that the Tamreikat IBA, located to the far north of Mauritania is located in a uranium district. This mining zone is currently on stand-by due to the political troubles at the country's borders but should be developed relatively soon.



Situation of protected areas in the Nouadhibou region with a satellite picture of the mineral port.



TOGO

Togo is not a significant mining country. Iron ore has been mined there, some deposits of ornamental stones (quartzite) have been informally mined, but the main mining activities concern phosphate; the main mine is located around 20km from the coast. Phosphate mining represents 21% of the GNP and 40% of export income. It is 50% owned by the Togolese Government (the share distribution of the phosphate company has been modified many times).

Mining Law

The mining law is fairly succinct as regards environmental protection measures in general and mentions nothing of protected areas:

Article 34: the holder of a mining licence must avoid as much as possible any negative impact on the environment, particularly pollution of the soil, air and water and damage or destruction of wildlife, in compliance with the provisions of this law, the law on the environment and their associated by-laws.

Environmental Impact Assessments are not mentioned.

Framework Law on the Environment

This framework law is barely more explicit than the mining law and refers to “good practice”.

Article 59: Mines and quarries must be operated such that natural resources are used in a rational and sustainable manner and the environment is protected. Companies must use approved mining industry techniques and take the necessary measures to prevent environmental pollution, to treat waste and to preserve forest, wildlife and aquatic heritage and water resources.

The associated by-laws could not be obtained.

Forestry Law and Hunting Law

The forestry law defines the different categories of protected area which are:

- Strict nature or scientific reserves
- National parks
- Natural monuments
- Habitat or species management reserves
- Protected landscapes
- Wildlife areas
- Natural resource management protected zones
- Biosphere reserves
- World heritage sites

But nothing clearly indicates which activities are permitted in these different protected areas. At most, Article 58 stipulates: “Areas where water, forests, land and other sites are protected can be exempt from the rights of use. After information, public access may be prohibited”.

It would appear on reading these laws that the “forest development plans” or “wildlife management plans” should indicate specific protection measures for each area. These plans were not able to be obtained as Togo was not visited for the study.

Title IV of the forestry law entitled “Wildlife Regime” repeats several points from the 1968 law on hunting, without specifying whether the forestry law overrules the hunting law which clearly stipulates in Article 6 that “*strict nature reserves and national parks are exempt from all rights of use and constitute part of classified forest areas*”.

Mining activities and protected areas

1. National Parks

- a. The Fosse au Lion National Park in the north of the country is far from all mining activity.
- b. Kéran National park is bordered to the east by a mining licence (it is not specified for which substances the licence has been granted, but it includes a chromite occurrence). There would not appear to be major mining risks in this sector.
- c. Fazao-Malfakassa National Park, the largest of the three national parks, is slightly within the boundaries of two exploration permits, one in the north-eastern tip (iron-ore zone) and the other to the south (iron-ore and phosphate occurrences). Furthermore, several large phosphate occurrences lie to the north of the park. These phosphate occurrences and the iron-ore occurrences are located at the head of the catchments that cross the park. Mining these areas could have a significant impact on the park’s biodiversity.

2. Wildlife Reserves

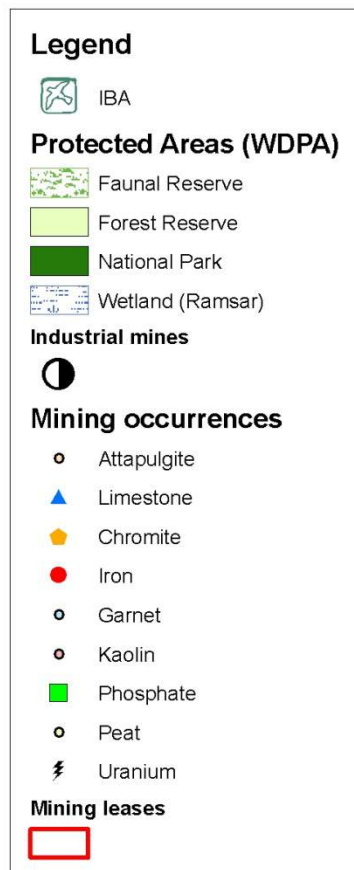
- a. The Galangashie reserve in the north is completely outside any mining zone
 - b. Djamdè reserve is completely encompassed by a mining licence. It contains occurrences (classified as “deposits”, as they are relatively large) of iron-ore and uranium in particular. The known iron-ore occurrence is located within the reserve itself if the maps can be relied upon.
 - c. The Abdoulay wildlife reserve in the centre of the country, not far from Fazao Park is bounded by a mining permit located on the opposite bank of the main river that borders the reserve.
 - d. The Togodo wildlife zone and wetlands is located well upstream from the main phosphate zone and is not threatened by any mining expansion.
3. Classified forests: around ten classified forests lie within mining licence areas (Monda, Koularo, Kindja, Kémini, Aou-Mono, Assoukoko, Haito, Eto, Ouatchidome, Haho-Baloe). The most endangered is without a doubt the classified forest of Haho-Baloe, crossed by the phosphate deposit currently being mined.

Togo only has four IBAs, all far from mining areas with the possible exception of the Fazao IBA for which the risk is minimal.

Probably the most negative point for Togo is the area where the phosphate processing effluents are discharged into the sea. Several contradictory studies have been carried out on contamination of the food chain by metals along the coast, but it is clear that the effluents, particularly of cadmium and probably uranium, elements present in the ore, are discharged into the sea, and can be seen in the plume of turbidity visible in the satellite photos (see main report).

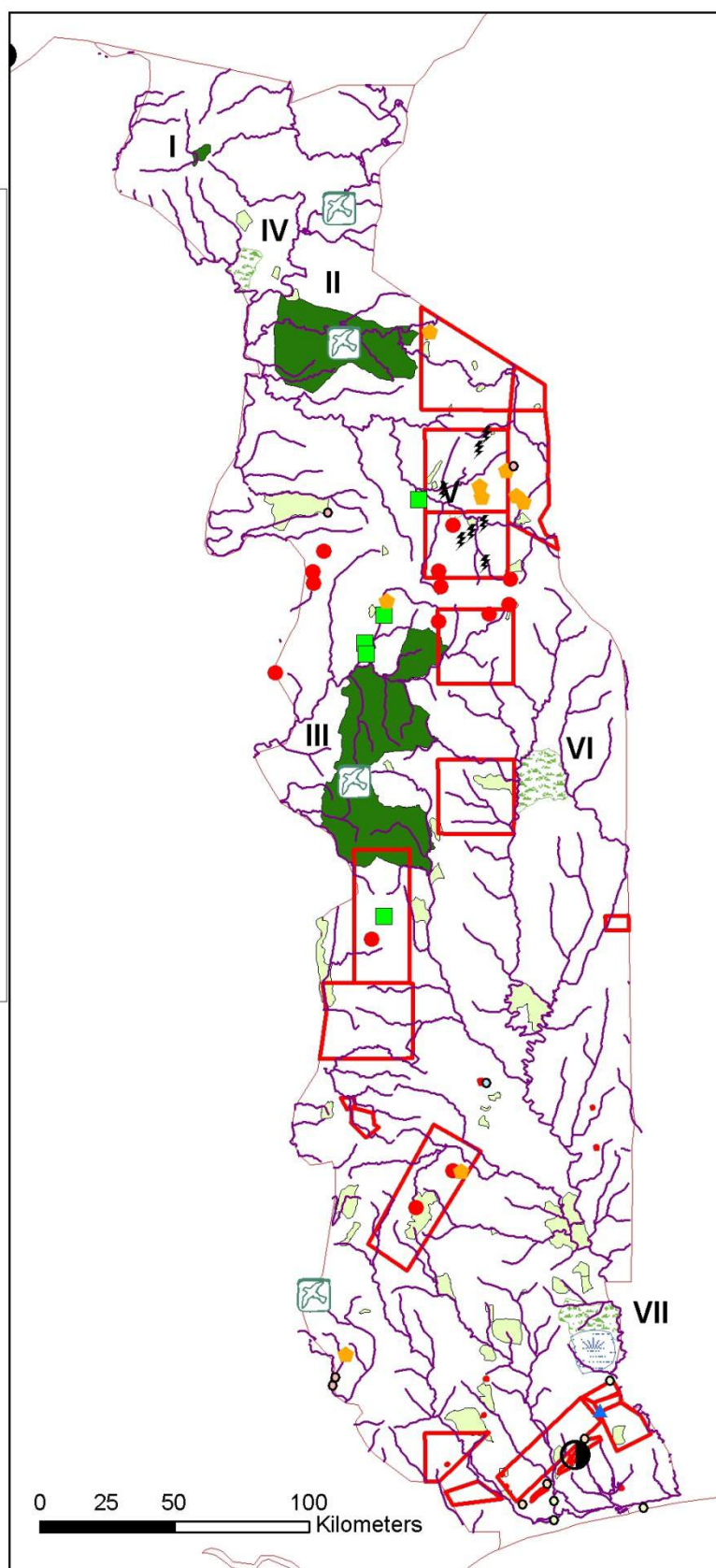
References

- Law 2008-05 – framework law on the environment
- Law 2008-09 – Forestry law
- *Ordonnance* n°4 of 16 January 1968 regulating wildlife protection and hunting in Togo.
- Law 2003-12 – mining law of the Togolese republic



Parks and Reserves

I : Fosse aux lions
 II : Kéran
 III : Fazao
 IV : Galangashie
 V : Djamdè
 VI : Abdoulaye
 VII : Togodo



TCHAD

Chad has relatively recent environmental legislation (the law governing forests and wildlife dates from 2008), apart from that governing protected species, which dates from 1963. The mining law is relatively old, dating from 1995.

Laws on the Environment

The framework law of 1998 sets forth the general principles for environmental protection. It establishes the general framework for protection of the soil and subsoil in Articles 20 and 21.

Article 20: the soil and subsoil, and the wealth contained within it in terms of limited or non-renewable resources, are protected against all forms of degradation and are managed in a rational manner.

Article 21: Prior authorisation must be obtained to dedicate and develop land for industrial, mining, tourism, commercial and urban development purposes as well as for research with a view to exploring or mining for surface or underground resources, liable to affect the environment in the cases stipulated in the by-laws associated with this law. This legislation specifies the conditions for granting authorisation and the list of activities or uses which are forbidden because of the damage they may cause to the soil, subsoil or the resources contained within it.

This same law specifies the different protected areas, i.e. National Park, strict nature reserve, special reserve or wildlife reserve. They are “*protected and preserved from all intervention or activity liable to modify or degrade them*”.

It also establishes the principle that an EIA must be carried out prior to any project or structure that might harm the environment (it would appear that the specific by-laws pertaining to these EIAs have not yet been passed).

In application of this framework law, the forestry and wildlife legislation was reviewed in 2008 (Law 14/PR/2008). Contrary to the situation in other countries, the notion of classified forest includes wildlife and plant life protection areas:

Article 16: *The following are considered as classified forests:*

- *Wildlife protection areas such as national parks, wildlife reserves, strict nature reserves,*
- *Forest reserves such as forests for protection or recreational purposes, reforestation and restoration areas, botanical gardens*

Authorised activities within a protected area must be specified in the development plan. However, the law generally provides that:

Article 107: *Grazing, land clearance, hunting, agriculture, forestry, mining, fishing, gathering, waste disposal, polluting activities, uncontrolled fires and in general any activity incompatible with the conservation and protection of the environment are prohibited within national parks.*

Article 111: *Strict nature reserves are government classified areas. They are established to protect a biotope or an ecosystem and to permit it to evolve naturally. They have absolute protection. Activities which may disturb the flora or fauna are forbidden. As is the introduction of plant species or indigenous, exotic, wild or domesticated animal species. They are exempt from all rights of usage and all activities are forbidden.*

Article 113: *Wildlife reserves are established to protect all wildlife species; hunting is prohibited in these areas.*

Article 116: *Wildlife reserves are subject to a development plan and internal regulations which stipulate the rights of usage in particular.*

The protection of waterways is also covered by this law and directly targets mining activities:

Article 221: *Before undertaking exploration in water, operating quarries or mines, building roads or railways or constructing buildings, all people and companies must:*

- *Have prior authorisation to do so from the competent authorities, on the basis of an environmental impact assessment,*
- *Take all environmental protection measures required by law.*

Article 225: *In order to protect habitats and fisheries, certain areas of the country may be classified and set aside for protected areas, which include aquaculture reserves and grazing areas.*

Mining Law

The mining law clearly specifies that mining is forbidden in certain areas:

Article 51 – Bans

No surface prospecting, exploration or mining may be carried out without prior authorisation by the competent authorities within a fifty metre radius:

- *Around walled enclosures, villages, groups of dwellings, **national parks**, wells, religious buildings, places of worship, and sites considered to be sacred, without the consent of the owner, and*
- *Either side of roads, railways, water pipelines and generally speaking around public works and works of art.*

Article 52 - Protected zones

*Protected zones of any size within which prospecting, exploration or mining may be restricted or subject to certain conditions may be established to protect buildings, agglomerations, cultural sites, places of worship, tourist sites, water sources, roads, railways, works of art, public works, **national parks, wildlife reserves, classified forests** and anywhere it may be deemed necessary to preserve the environment and public interest.*

The notion of EIA is not explicitly mentioned for mining permits. Article 29 provides for a “public survey to evaluate the consequences of proposed mining activities on the environment”.

Furthermore, the request for a mining permit must be accompanied by “a programme to protect and manage the environment”. This programme and all substantial modifications to it must be approved by the Director of Mines (Article 30).

Protected areas and mining activities

The protected areas identified in Chad are:

- 3 national parks: Zakouma, Manda and Sena Oura
- 7 wildlife reserves: Ouadi Rimé, Fada Archei, Abou Telfane, Mandelia, Binder-Léré, Siniaka Minia and Bahr salamat
- 1 wetland zone (Ramsar Convention): Lac Fitri
- Hunting zones (concessions, blocks, domains): Aouk and Melfi
- 1 protected area of unknown status: Douguia (probably a hunting zone).

The ecosystems of Lake Chad, Fitri Lake and the oasis and land of the Koros are given priority (monitoring report on combating desertification).

In Chad, the Lamantin, a protected species, only lives in the Léré and Tréné lakes.

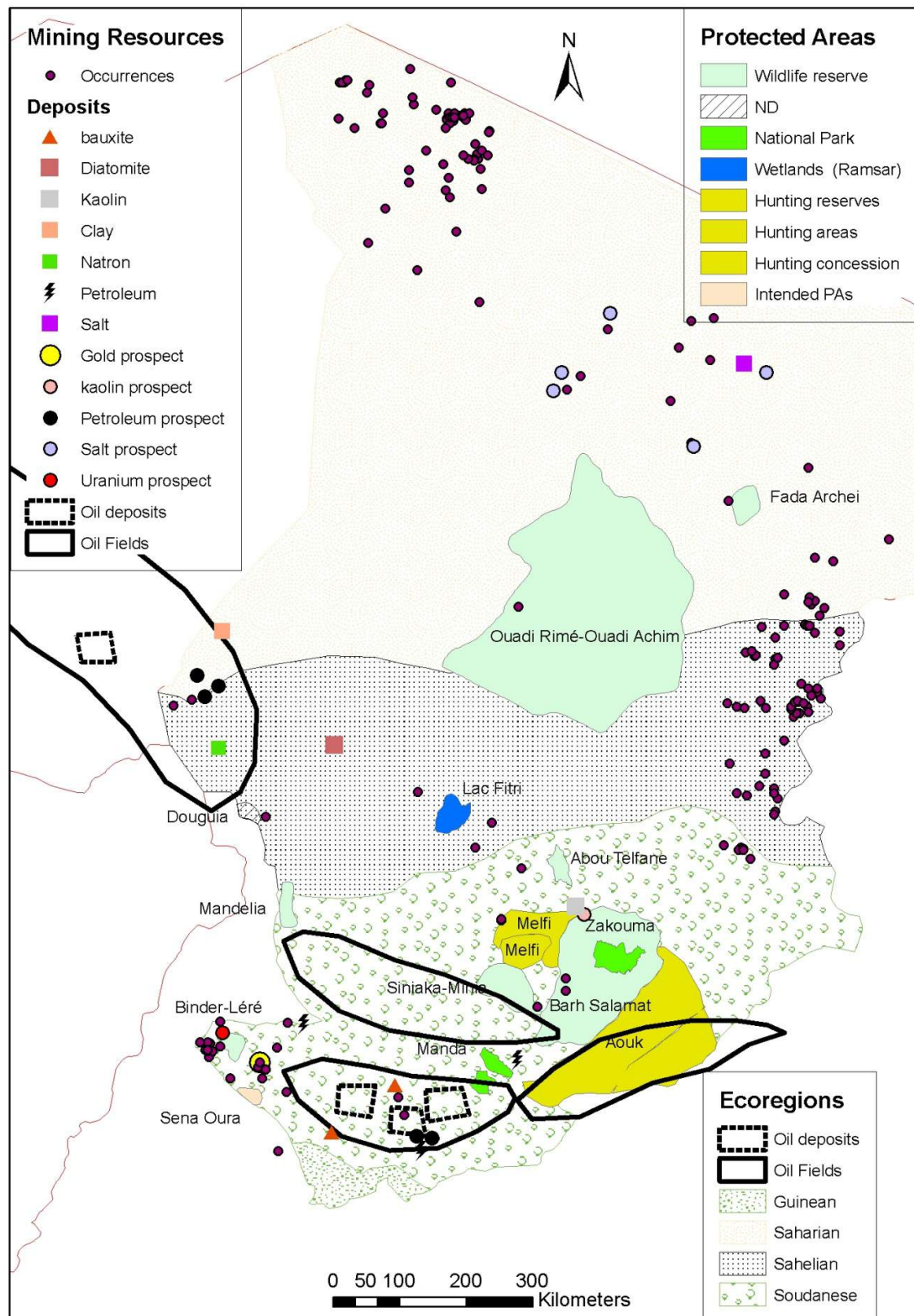
The map of mining licences could not be obtained for this study. Therefore it only refers to known prospects and mineral deposits to describe the potential risk of mining on protected areas.

The main risk identified concerns Manda National Park (IUCN Category II) with a known oil deposit 20km from the park.

The other threats concern:

- Binder-Léré wildlife reserve (IUCN category IV) which contains an iron-ore occurrence but most importantly a gold occurrence 7km away (artisanal gold mining is practiced here) and a uranium prospect along its boundary.
- The Bahr Salamat wildlife reserve which contains a Kaolin deposit (the substance itself is not dangerous, but mining it could affect ecosystems)

The protected areas of Fada-Archei, Ouadi Rimé and Siniaka-Minia contain or are nearby mining occurrences of low economic value according to the information available (a uranium occurrence 5km from Fada Archei, an iron-ore occurrence on the boundary of Siniaka Minia, and a gypsum occurrence in Ouadi Rimé).



Environmental Context

The entire southern half of Côte d'Ivoire is covered by the Guinean tropical forest, a biodiversity hotspot.

According to WDPA data, there are 64 725km² of protected areas, in other words 20% of the country. The largest is the Comoé National Park which covers 11 746km², also classified as a UNESCO world heritage site. The other national parks are Taï (4390 km²), Mont Sangbé (903 km²), Marahoué (1189 km²) and Azagny (238 km²). The first two and Azagny are also classified as IBAs. The remaining 46 500km² are mainly classified forests.

Given the current political situation in Côte d'Ivoire, no information on the status of these different protected areas could be obtained.

Regulations on forestry and wildlife in Côte d'Ivoire are based on two main laws:

1. Law 65-255 of 4 August 1965, relating to wildlife protection and hunting.
2. Law 65-425 of 20 December 1965, the forestry law, which defines the forests, protected areas, reforestation areas and the rights that exist in such forests. The forestry law covers the setting up of reserves and classified forests, the exercise of customary rights and the granting of forestry concessions in the Government forests.

The law on the environment was passed in 1996.

The following can be noted:

1. Classified forests are "exempt from all rights of use applicable to forest lands". Therefore, in theory this does not protect them from mining activities, governed by rights that override land rights.
2. National parks and strict nature reserves are "exempt from all rights of use".
3. Impact assessments are compulsory for all projects that could disturb the environment and they are managed by the National Environmental Agency, an independently-managed public body.

Mining Context

Côte d'Ivoire is relatively rich in mineral resources, which are still relatively untouched. There are many gold and diamond occurrences, but also manganese, Colombite-tantalite (coltan) and some occurrences are being or have been mined:

- Tongon (Nielle): Gold (currently mined)
- Ity: Gold (currently mined)
- Bonikro: Gold (currently mined)
- Angovia: Gold (mined, then closed, then re-opened)
- Agbaou (Divo): Gold (unknown status, but deposit at least at feasibility stage)
- Bobi: Diamond (mine closed)
- Tortiya: Diamond (mine closed but useable reserves remain)
- Lauzoua (Grand Lahou): Manganese (semi-industrial mining)
- Issia: Coltan (currently mined)

Gold is the country's leading substance, although with industrial production in 2009 of 6.54t it is well behind Mali or Ghana. But several deposits have been identified, and with the return of political stability there should be a significant increase in production.

There are also several industrial quarries for construction materials at San Pedro, Adzopé, Yamoussoukro, Singrobo, etc. In 2008, declared production of crushed granite and by-products were slightly more than one million tonnes.

Côte d'Ivoire is also an oil producing country with three operational oil fields (or at least at an advanced exploration stage): Panthère, Espoir and Baobab.

The mining law mentions zones that are closed to mining exploration, but these are boundaries defined by mining regulations and not areas for nature protection. In other words, the mining law itself does not impose any bans on protected areas.

The mining law is also "self-sufficient" regarding environmental protection:

*Article 76: "activities regulated by the mining law must be carried out in such a way as to protect the quality of the environment, rehabilitate sites and conserve forest heritage in accordance with the terms and conditions set forth in the **mining regulations**".*

The mining law provides in general for impact assessments (Article 77):

Any holder of a mining licence or beneficiary of authorisation to operate a quarry must, before undertaking any work whatsoever in the field, prepare and submit for approval by the mining administration and the environment administration, and all other departments as stipulated under the mining regulations, a complete environmental impact assessment and an environmental management programme including a site rehabilitation plan and associated budget.

Mining pressure on protected areas

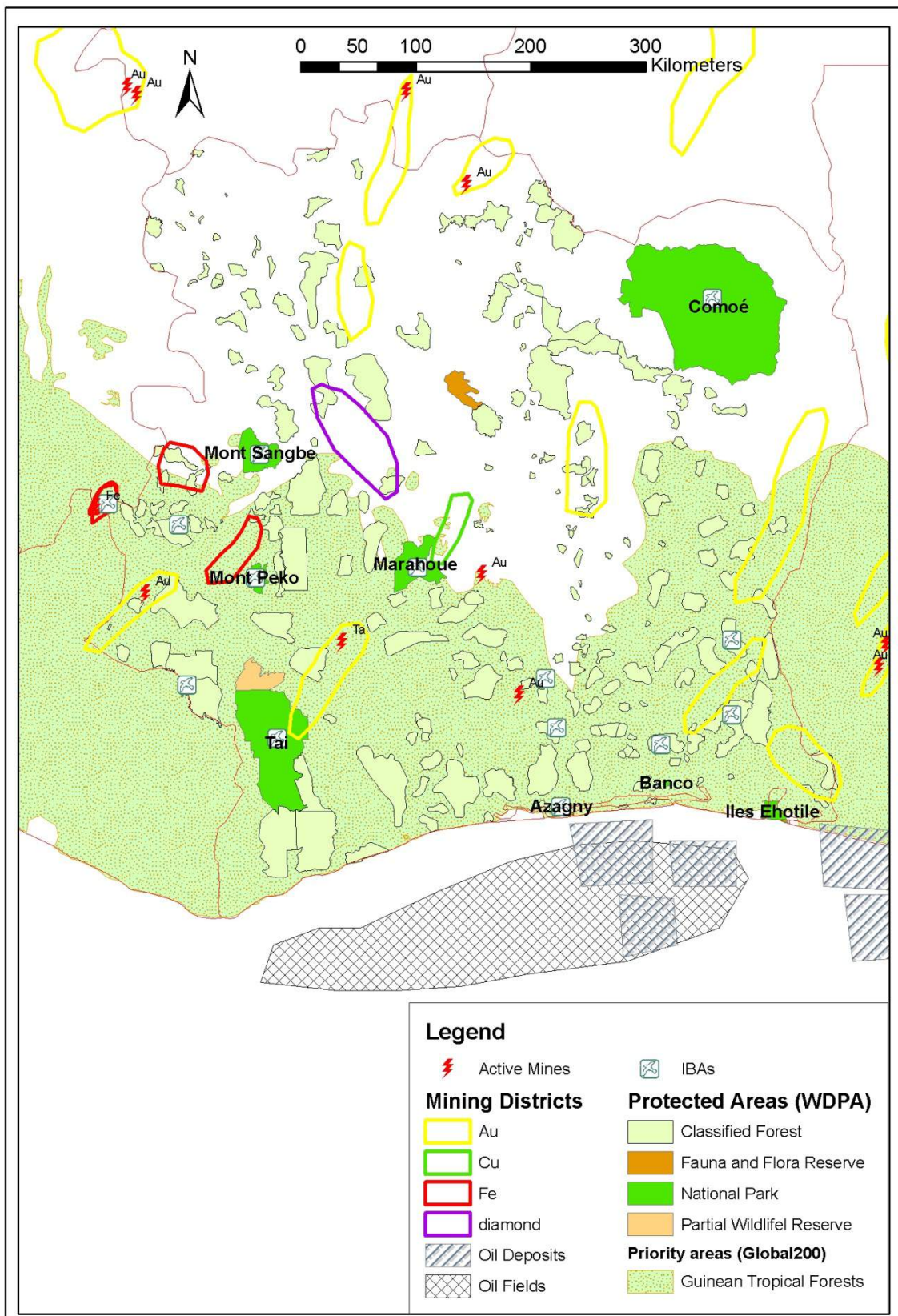
As there is no map of mining licences, we refer only to known deposits and districts to assess the risks to protected areas.

1. Taï National Park: contains many gold occurrences and is partially covered by the Issia gold district (gold and rare earths, the Issia mine is for tantalum 50km north of the park. This mine is adjacent to Issia classified forest). There is also a manganese occurrence in the park, but apparently of no economic interest.
2. Comoé National Park encompasses many gold occurrences and two diamond occurrences. These occurrences are not part of the country's main mining districts but may be locally mined (artisanal mining).
3. The mine of Ity is located less than 10km from the classified forests of Krozalie and Scio. There is much artisanal mining activity in this zone.
4. Lauzoua manganese mine is located less than 5km from the classified forest of Dogoudou.

The development of mining activities in Côte d'Ivoire could affect a considerable number of classified forests which overlap with the different gold districts (mainly towards the border with Ghana) and iron-ore districts (towards the border with Guinea).

Artisanal and small-scale mining is highly developed throughout the country, with higher concentrations of activity along the borders with Guinea and Ghana and at the intersection between Côte d'Ivoire, Mali and Burkina Faso.

Off-shore oil operations are located between 10 and 130km from the coast and represent a definite threat for Azagny park (national park and IBA) and the Ehotile Islands park.



SIERRA LEONE

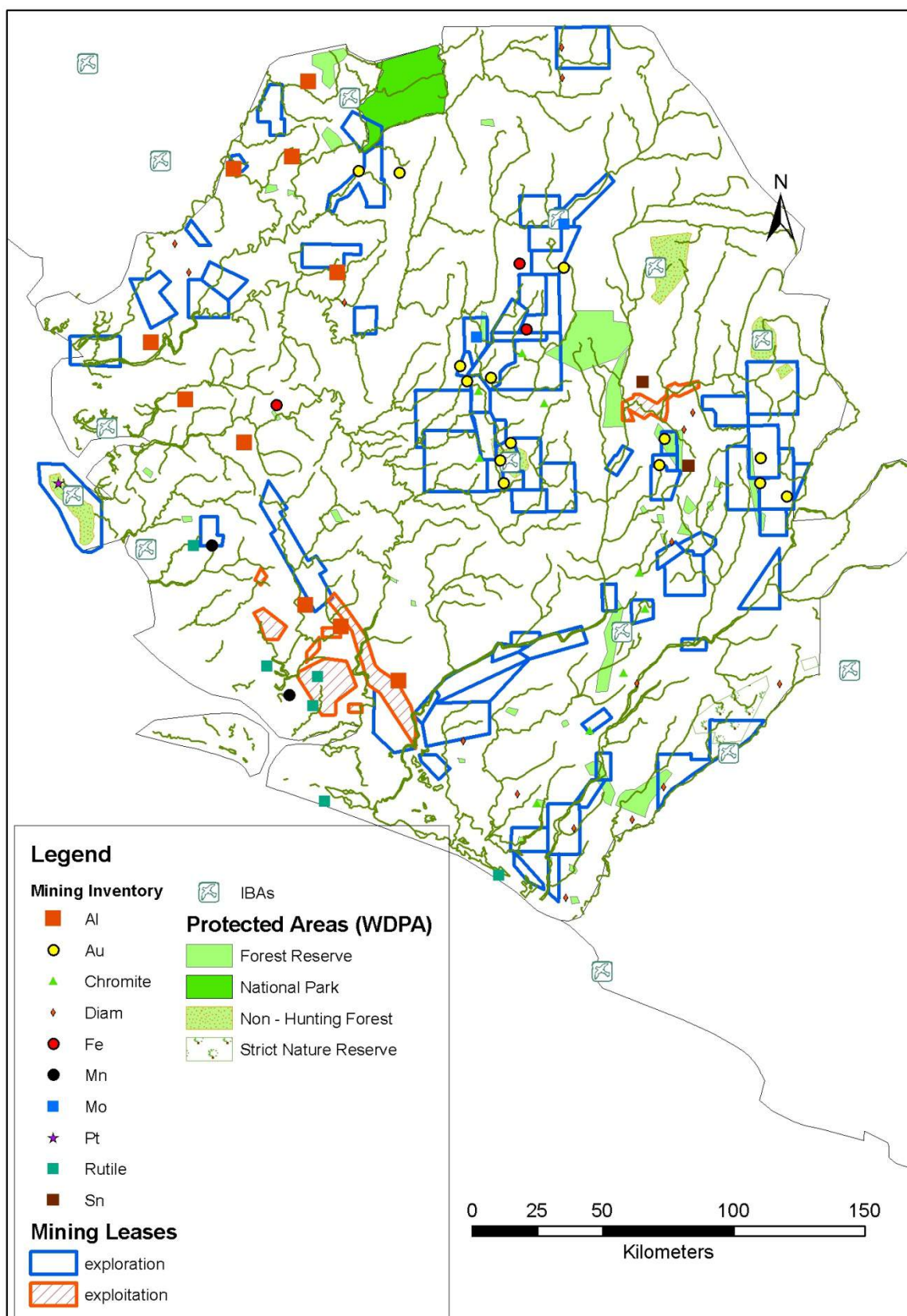
We have very little data on Sierra Leone, apart from a national inventory of mineral resources and a map of licences that does not specify the substances concerned. The map of protected areas and mining permits does however give rise to some comments:

1. The mining licences appear (if the licences are correctly referenced, which is not entirely guaranteed) not to consider the existence of protected areas because several of them overlap with classified forests, hunting reserves and even Outamba national park.
2. The bauxite mines in the south of the country are far from any protected areas
3. Two IBAs are particularly endangered by mining activities: that on the western peninsula (on which there is apparently a platinum occurrence) and that of Kangari Hills, located in the middle of a gold zone.

Regarding the regulatory aspects, the mining law of 2009 does not mention protected areas but imposes an EIA for small and large-scale mines, in compliance with the Environmental Protection Act (2000).

The Forestry Act of 1988 establishes the principle of protected areas but does not specify their type or restrictions on how they may be used.

Finally, note that within the World Resources Institute (WRI), only very small coastal areas are identified in Sierra Leone, with the lowest conservation value. However some small zones are found on the western peninsula.





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