

About Mining Cadastre Systems

A cadastre is normally a parcel based, and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities).

A Mining Cadastre is the cornerstone of a secure mineral rights system and records the geographical location, ownership and time validity of mining rights, and for compliance with the payment of fees and/or other requirements to keep a concession valid. Security of tenure is very important both to large and small scale mining operations both to ensure a return on investment over the life of a mine and to avoid legal disputes over ownership.

Successful implementation of a modern mining cadastre requires the development of a database of mining licenses with their status, location, ownership, fees and dues paid, and other relevant information. Modern tools, such as specifically adapted Geographical Information Systems (GIS), are used to provide a legally valid mapping system and a Global Positioning System (GPS) used to locate corner points of concessions.

A computerised mining cadastre covers all the transactions that take place during the life cycle of the mining title from the initial application, through the granting of the licence, payment of annual fees, tracking of the necessary annual reports, reassignment or lapsing, and final relinquishment of the title. It also allows the collection of annual statistical data showing the number of active licences, total fees collected and watch functions where annual reports or fees have not been received.

At the national level, a cadastre is prerequisite for:

- Efficient land administration including land regulation and administration of rights and obligations.
- Transparent real property market.
- Property valuation and taxation.
- Environmental regulation ensuring sustainable development.

The Mining Cadastre System in Sierra Leone

As a first step in implementing the cadastre system for mining in Sierra Leone, the Ministry of Mineral Resources has introduced a computerized cadastre system for artisanal mining activity in Kono. It plans to expand this system to other parts of the country, for which training on the new system is currently being delivered in Bo and Kenema districts.

Brief background and purpose of Mining Cadastre Systems

Developing countries need to promote and utilise their natural resources for the benefit of their population. Efficient and beneficial exploitation of natural mineral resources provides an important part of the economies of many countries, both in the developing and in the developed world. The ability to exploit mineral resources can be an important factor in the growth and a driving force for the national economy, increasing wealth and general infrastructure. The purpose of mining law is to regulate and manage mining in a country in order to have a secure and long-term mining industry.

Mining Law therefore regulates an industry that is seen as beneficial to the country but also has the potential for creating environmental problems. Good mining laws should allow for the efficient working of a deposit, give a return on investment for the mining company (state or privately owned) and benefit the country as a whole. The purpose of mining law is not to stop or prevent development but to regulate its activities, so that disputes over ownership are minimised, mining can proceed in an orderly and efficient manner and deleterious effects such as pollution and accidents are reduced to a low level. Mining Law also attempts to provide a balance between the interests of the surface land holder or occupants and the operator or mining company. In the past this has caused few problems in developing countries, but where the mining interferes with existing water supplies, agricultural practices etc. the rights of the surface owner and the mineral owner can be in conflict. A clear definition of these rights in a well drafted Mining Law will avoid such conflicts.

Security of tenure is very important both to large and small scale mining operations both to ensure a return on investment over the life of a mine and to avoid legal disputes over ownership. Countries where the mining law has broken down, such as Sierra Leone, have the following characteristics:

- large number of small, unregulated workings
- selective mining of deposits to the detriment of overall mineral recovery ('high grading')
- inefficient recovery of sought after mineral (gold, gems etc.)
- destruction of local habitats
- dangerous and unsafe workings
- pollution from toxic elements such as mercury
- criminal activity
- smuggling of production

A Mining Cadastre is the corner stone of a secure mineral rights system and records the geographical location, ownership and time validity of mining rights, and for compliance with the payment of fees and/or other requirements to keep a concession valid. Formerly this information was stored in a Mining Register and the locations of the mining rights recorded by hand on paper maps. Corner points of mining licences were marked on the ground by metal stakes, concrete beacons or similar fixed points, that were surveyed by conventional methods using a theodolite or older methods involving tape and chains. These methods are time consuming and demand a high level of skill to produce accurate surveys. In some cases the error in the locations of the points on the map and on the ground was considerable, up to a kilometre in some cases, mainly because of the inability to tie in the detailed survey to an accurately located, known base point on the map. Inaccuracies in the mapping can lead to frequent boundary disputes, particularly where small scale working is taking place. Larger mining companies may even withdraw from such informally mined areas because of the difficulty of enforcing their legal titles.

Modern surveying techniques involving Global Positioning Systems (GPS) allow a simple portable instrument to record a position to an accuracy of tens of centimetres. Recent instruments also act as data loggers and output the resultant polygons into a Geographical Information System (GIS). A Mining Cadastre records information in a database and on paper or digital maps. In the field these geographical locations must be marked by fixed objects

such as beacons or boundaries to avoid disputes on the ground. There is still a need to continue with this policy of marking boundary points, particularly in areas of small scale mining where claims are very close together. It is important in such areas to work closely with the miners and encourage the formation of mining associations or cooperatives to self regulate the mining operations.

Successful implementation of a modern mining cadastre requires the development of a database of mining licenses with their status, location, ownership, fees and dues paid, and other relevant information. Modern tools, such as specifically adapted Geographical Information Systems (GIS), are used to provide a legally valid mapping system and a Global Positioning System (GPS) used to locate corner points of concessions. Satellite imagery or aerial photography, topographically corrected by control points is recommended to provide reliable ground control for the location of concessions. The cost of scanning high resolution aerial photos for use in the GIS requires high precision instruments and the cost of the aerial photos have not been included in this estimate. If the purchase of high resolution satellite imagery is necessary it will significantly increase the cost of the cadastre implementation and has not been included in this estimate.

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The geographical locations of the mining rights need to be recorded at a variety of scales from a prospecting or exploration licence that may cover many thousands of square kilometres to a small scale artisanal licence which may be a fraction of a hectare. Modern GIS systems can handle this variety of scales and allow extremely detailed mapping of licences with a sub-1 m accuracy in the latter case. A modern geodetic network is, however, essential if the locations recorded by the GPS are to be fully integrated into an accurate countrywide mapping system. Detailed aerial photography as has been flown in Sierra Leone has to be accurately constrained by control points to be able to fit into the national projection system.