

UNITED NATIONS  
ECONOMIC COMMISSION  
FOR AFRICA



NATIONS UNIES  
COMMISSION ECONOMIQUE  
POUR L'AFRIQUE

MULTINATIONAL PROGRAMMING AND OPERATIONAL CENTRE  
(ECA/MULPOC) FOR EASTERN AND SOUTHERN AFRICA

---

Distr.  
LIMITED

ECA/MULPOC/LUS/ICE/IV/14(c)  
December, 1996

Original: ENGLISH

FOURTH MEETING OF THE INTERGOVERNMENTAL  
COMMITTEE OF EXPERTS (ICE)

PRETORIA, REPUBLIC OF SOUTH AFRICA  
24-28 MARCH, 1997

RESTRUCTURING THE EASTERN AND SOUTHERN AFRICAN  
MINERAL RESOURCES DEVELOPMENT CENTRE

## **Objectives of ESAMRDC in a Changing Mineral Sector**

There is little doubt that the broad objective of the Centre; to pool resources for the development of minerals as a basis for socio-economic advancement of the Eastern and Southern African subregion, has always remained relevant throughout its troubled existence. However, it must be remembered that the ESAMRDC came into existence at a time when the State was the major developer of mineral resources. Essentially the policy structures and operational strategies had evolved to support a system in which the State, and its various organs, were the beneficiary of services in return for paying contributions to sustain the operations of the Centre. In the last decade, the role of the State in mineral development has changed drastically from active participation to creating and maintaining legal and fiscal structures in which international mining capital is responsible for the larger part of exploration and mine development expenditure. While these changes have been taking place, ESAMRDC has not, unfortunately, had the means, capacity and adequate direction to keep pace. It is generally acknowledged that ESAMRDC must shift its original emphasis on state beneficiary and benefactor to a private clientele. However, the interface it must have with this clientele, the potential markets, and the structures it must put in place to win confidence are yet to be fully examined.

## **The Current Realities of R & D in the Mineral Industry**

The liberalization of the minerals industry to leave it primarily in the hands of the private sector, coupled with the rejoining of South Africa into the subregional community, have drastically changed the minerals R & D environment especially in the following sense:

- Much of the exploration and mine development in the subregion is now undertaken by international mining corporations, mostly from South Africa, but also from Australia, Canada and USA.

Theoretically, these companies represent a potential pool of clients. However, demand for R & D services by these companies, which are global investors, is driven by quality and cost-effectiveness;

- The majority of these companies have excellent and technically very competitive in-house R & D facilities which are crucial to their specific operations and maintaining competitive advantages in their areas of interest. R&D is thus a most important part of their corporate strategy;
- The "open" environment of R & D prevailing in the subregion, coupled with the current liberal mobility of mine investment has brought more intense competition from highly capable institutions from the subregion including Mintek, CSIR, Council for Geoscience (South Africa) and IMR (Zimbabwe), in addition to research capacities at Universities particularly in South Africa and Zimbabwe. Mining companies are the major sponsors of this research with each institution increasingly specializing in some specific aspect of minerals development which make it a centre of excellence;
- There also exists many private sector-based facilities in the subregion particularly in South Africa and Zimbabwe;
- Added to this is the large number of National Geological Surveys although most of them have depleted capacities and expertise. A few have been building up capacities on donor-funded projects but sustainability in view of increasingly sophisticated operations (eg. digital map products) remain a major hurdle;

Table 1 takes a quick look at some of the R & D capacities, particularly in southern Africa where facilities are more developed.

Table 1: A quick Look at Subregional R&D Institutes

Institution	Areas of Expertise	Capability
CSIR (SA)	<ul style="list-style-type: none"> <li>• Mining Technology</li> <li>• Rock Engineering</li> <li>• Environment and Safety</li> <li>• Mining Systems</li> <li>• Building Technology</li> <li>• Technology Transfer to Industry</li> <li>• Techno-economic studies</li> </ul>	<ul style="list-style-type: none"> <li>• World Class</li> </ul>
Mintek (SA)	<ul style="list-style-type: none"> <li>• Laboratory and Pilot Scale Investigations</li> <li>• Mineral Processing</li> <li>• Extraction Metallurgy <ul style="list-style-type: none"> <li>• hydrometallurgy</li> <li>• pyrometallurgy</li> </ul> </li> <li>• Technology transfer to industry</li> <li>• Techno-economic studies</li> </ul>	<ul style="list-style-type: none"> <li>• World Class</li> </ul>
IMR (Zimbabwe)	<ul style="list-style-type: none"> <li>• Mineralogy and agogeology</li> <li>• Mineral economics</li> <li>• Bench scale extraction metallurgy and mineral processing</li> <li>• Rock mechanics</li> <li>• Services to small scale miners</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate</li> </ul>
Metallurgical Laboratory (Zimbabwe)	<ul style="list-style-type: none"> <li>• Bench and pilot scale mineral processing</li> <li>• Limited industrial minerals lab</li> <li>• Fire assay</li> <li>• Physical metallurgy</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate</li> </ul>
NCSR (Zambia)	<ul style="list-style-type: none"> <li>• Building Materials</li> </ul>	<ul style="list-style-type: none"> <li>• Limited</li> </ul>
SARUJI (Tanzania)	<ul style="list-style-type: none"> <li>• Building Materials</li> </ul>	<ul style="list-style-type: none"> <li>• Limited</li> </ul>
Geological Surveys	<ul style="list-style-type: none"> <li>• Regional Geoscience <ul style="list-style-type: none"> <li>• mapping, geochemical and geophysical surveys</li> </ul> </li> <li>• Applied Geoscience</li> <li>• Data Bases</li> </ul>	<ul style="list-style-type: none"> <li>• Facilities mostly limited</li> <li>• One or two (eg. Council for Geoscience (SA) and Geological Survey of Namibia) have excellent facilities</li> </ul>
<u>Universities</u> Pretoria	<ul style="list-style-type: none"> <li>• Metallurgical research</li> <li>• Mine safety</li> </ul>	<ul style="list-style-type: none"> <li>• Very high</li> </ul>
Witwatersrand	<ul style="list-style-type: none"> <li>• Metallurgical research</li> <li>• Rock engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Very high</li> </ul>
Zimbabwe	<ul style="list-style-type: none"> <li>• Operations research and computer-based mine design</li> </ul>	<ul style="list-style-type: none"> <li>• Very high</li> </ul>
Zambia	<ul style="list-style-type: none"> <li>• Bench scale and pilot mineral processing</li> <li>• Pilot scale agogeology</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate</li> </ul>

Given the above realities, the prospects of Government funded R&D facilities are difficult unless they can convince mining houses that they are crucial to the latter's technical and business competitiveness. Difficulties are already visible for well established R&D facilities like Mintek and CSIR, the largest concentration of mining R&D expertise in Africa. Mintek are under pressure to attain higher commercial levels and are likely to restructure operations to increase their relevance and impact in the evolving subregional R&D market.

Table 1 does not attempt to give a complete picture of the R&D capabilities in the subregion. It simply seeks to create a quick understanding of some of the existing facilities and their capacities. The Lusaka-based MULPOC is planning a detailed study on existing R&D capacities in the subregion to determine how cooperation and integration can enhance the development of the minerals industry in the subregion. The incompleteness of the table may further be illustrated by the fact that it does not include company-based R&D. An indication of company capacities may be shown by looking at Anglo American Research Laboratories whose facilities include:

- Modern analytical facilities including argon mass spectrometry
- Process design and modelling
- GIS
- Novel geophysical, geochemical and remote sensing capabilities
- Project design and management
- Feasibility capabilities
- Technology improvement R&D programmes

Anglo's facilities are at the disposal of their large mining family not just in Africa but elsewhere. The facilities are used by non-Anglo mining houses as well.

### Which Way for ESAMRDC

In sharpening its mission, ESAMRDC cannot, and should not, attempt to establish a capacity to address the broad needs of the mining companies. Rather it needs to develop a fuller understanding of the evolving role of R&D in a subregional private sector driven mineral development environment and identify specific areas in which it can be both most effective as well as complement the current body of R&D efforts. It also needs to continuously reassess the mix of its clients and its full achievable potential to provide R&D products. Current assessment of the subregional mineral sector suggests that the target market for ESAMRDC mainly comprises:

- Government Geological Departments most of whom will continue to struggle due to underfunding.
- Junior mining companies migrating into the subregion most of whom have no in-house technical back-up.
- Small scale mining sector.
- Non-metallic minerals developers.
- Mining-related sectors such as road construction (Geotechnical information).

The areas of small scale mining and non-metallic minerals exploitation are not primary targets for major mining corporations migrating into the subregion. There is therefore a "vacuum" in such areas and effective services are much easier to establish. Looking at the above areas, it is clear that the work programme of ESAMRDC should aim to:

- establish high quality working chemical and mineralogical services particularly for use in exploration activities. At this end of the market, even major mining companies do not wish to send thousands of bulk samples back to base.
- establish working bench and pilot scale mineral processing facilities, as well as working geotechnical services to cater for small and medium scale mines. ESAMRDC should not attempt to establish large competitive capabilities in these areas with the intention of serving the large scale corporate mines particularly in process and mine design and feasibility-related services. The expertise required at this level is highly competitive and in any case no mining company would invest the large sums of money characteristically involved on the basis of an ESAMRDC feasibility. This is just not feasible!
- build up capability in mapping and exploration methods (geophysical, geochemical and remote sensing) and especially computer-based processing of geo-data which allow image processing and deposit model-building. This capability must aim at producing packages of commercial information to attract the attention of mining houses to existing prospects. This is also an area in which ESAMRDC is assured of work due to inadequacies in government funded facilities.
- establish extensive computer based mineral resource data bases on the subregion's resources and aim at electronic inter-connectivity with Geological Surveys, national, subregional and international sources of mineral resources data.
- establish good working bench and pilot scale non-metallic minerals laboratory facilities to stimulate growth of the sector. R&D in this area is least developed in the entire subregion with the exception of the Building Technology Division of CSIR. The reason is simply that non-metallic

minerals do not attract Foreign Direct Investment to the same level as high unit value minerals and their carrying capacity for R&D, especially from the private sector, is low due to low returns on investment.

- network extensively in the subregion particularly with Mintek, CSIR, IMR and the various universities. Through networking ESAMRDC can subcontract, or jointly implement mineral development projects for which they have no capacity. Networking will provide ESAMRDC with access to:
  - technology not available at their facilities
  - expertise for a fuller range of project activities and capacity building at ESAMRDC and in the member States through various human resources development programmes.
- increased involvement in capacity building in member States especially in the above areas where expertise would be readily available at ESAMRDC.

In various discussions with Mintek and CSIR, they have both expressed a strong desire to network with national and subregional research institutes. Mintek has particularly expressed the wish to consider:

- Technology transfer programmes to R&D centres in the subregion;
- Training programmes;
- Examine the possibility by the other member States to partially offset the operational budget of Mintek in return for services yet to be agreed upon; something close to "co-ownership" of Mintek.



Mutually agreeable and equitable arrangements should be discussed with such like-minded institutes. Underwriting of R&D services in a technology and expertise transfer network appear more relevant than "co-ownership" with its potential for political and bureaucratic inefficiencies.

### **Closing Thoughts**

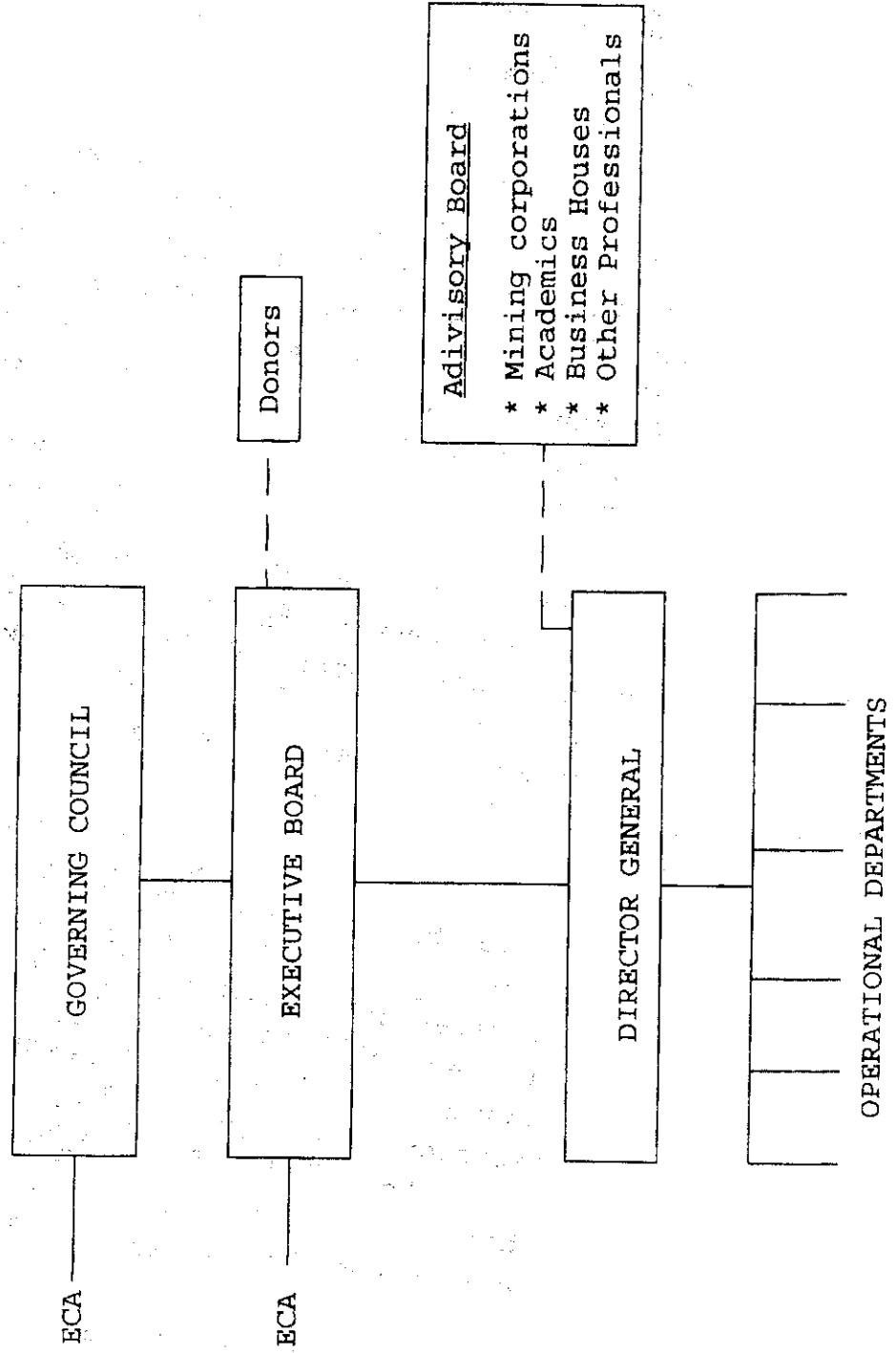
#### Role of Governments

It is evident that ESAMRDC would be most effective in those areas which large mining corporations will not fully participate. These include: mapping and preliminary exploration activities; small scale mining; non-metallic minerals (in general); capacity building and information dissemination. Yet these areas are all important to the development of mineral resources and the national economies of the subregion. This suggests that Governments have a long term role to play in the mission of the Centre. What should this role be?

Governments' major role lies in policy direction, control and financing of the Centre particularly during its transition years. Are the current policy structures adequate for an efficient, high quality, private sector-sympathetic R&D institute? Fig 1 shows the current policy making structure of ESAMRDC. A major criticism is that the current structure of a Council of Ministers, advised by a Board of Permanent Secretaries to which the Director-General reports does not have any provision for in-puts from the private sector; the major clients of ESAMRDC's R&D products. This robs the institute of a close relationship with those it should serve. A close relationship is necessary to:

- cultivate confidence by the private sector in the institution
- monitor developments in the industry

Fig. 1: Structure of ESAMRDC Policy Organs



- understand the "thinking" of mining corporations and structure the R&D products accordingly.

In a perfect private sector-based mining economy there should be little need for a Council of Ministers and an Executive Board of Senior Government Officials. The Director-General should ordinarily be supervised by a Board of Advisors (or Directors). Yet as indicated earlier, there is a long-term need for Government services in development-oriented areas which clearly the mining corporations will not invest in. As long as this situation persists, where Government must provide its complement of services to further develop the mineral sector, the concept of an Inter-Governmental Organization to pool resources is clearly an efficient way to develop the mineral sector. An Inter-Governmental institute cannot, however, exist without the present policy structure much as mining corporations are averse to such structures viewing them as primarily inefficient, bureaucratic and politically inspired.

This is the major policy dilemma facing ESAMRDC. One solution would be to retain the current policy-making structure but reinforce it with a private sector-led Advisory Board comprising representatives from mining corporations, the academic world, business houses and other professionals such as accountants and lawyers. This would introduce private-sector thinking and decision-making into the operations of the Centre. In the same vein, the Agreement establishing the Centre should be revisited so that its original mission of existing for Governments is changed to reflect the changes in the present day mining sector.

#### Pre-requisites to success

Much is known about the Centre's traditional weaknesses regarding financial constraints, lack of management capacity and lack of credibility. Although contributions have been constrained by declining economic capacities of the member States, aspects

less discussed are the political undercurrents associated with running an intergovernmental institution. It has not been entirely uncommon for contributions to be withheld because specific nationals from defaulting countries are employed by the Centre. Such sentiments have of course been exacerbated by the large contributions in dollar terms which contracting Governments must make and which in many cases exceed national budgets for Departments of Mines. Thus much as the political will to sustain the Centre may run high, timely financial support to the institution may prove more difficult to achieve due to political perceptions of the distribution of benefits. Yet financial support must be certain during the transition years. More definitive ways of ascertaining that contributions will be forthcoming in the next few years should be investigated. These could include:

- Relocating the national budgetary lines for the Centre's contributions to the Ministry's direct control such that these are met from mineral royalties and other economic rent directly attributable to mineral-related earnings.
- Creating a transitional trust fund specifically devoted to the rapid development of the Centre, much along the lines of the dedicated Capital Development Fund from which the Centre's laboratories were built.
- Member States collaborating to sponsor the development of specific activities they see as crucial to the development of their mineral sector e.g. gold mining for Ethiopia and Tanzania.
- Lobbying the private sector for support in specific programmes.

With respect to management capacity and credibility, it simply is not possible to cut staff costs and secure the best personnel as suggested elsewhere. In the formative transition years, the

Centre's full time staff must be as technically competitive as possible to contribute to a build up of credibility. Private mining corporations are skeptical and always difficult to convince that skills and competencies are competitive unless this is truly the case. Compromises in the skills and competencies are possible only in the case of counterpart staff who may be seconded by Governments. These are necessarily perceived as undergoing training.

#### Role of ECA

There are a number of areas in which ECA can add impetus to the development efforts of ESAMRDC. These include:

- Providing advisory services at the policy and strategy levels to further develop the Centre.
- Promoting harmonization, networking, cooperation and integration of ESAMRDC into the broader subregional and regional R&D efforts based on identified best practices and centres of excellence from within and outside the subregion.
- Providing peer review of the technical work of the Centre. The practice of peer review of work programmes has yet to take root at ESAMRDC.
- Assisting ESAMRDC with mobilization of resources from the donor community and UN family of which ECA is a member.
- Providing development-oriented information using ECA's extensive information sources.

- Undertaking thematic studies on behalf of ESAMRDC using ECA's extensive human resource capacities, which could also find use in capacity-building activities at the Centre.
- Minimizing effects of any friction which may arise between the member States using ECA's strength of neutrality.