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**Environmental Governance of Sand Mining in an
Urban Setting: Macassar Dunes, Cape Town,
South Africa.**



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Format of Paper: Journal of Environmental Management

Paper submitted in partial fulfilment of the course requirements for the Master of Philosophy Degree in Environmental Management at the University of Cape Town.

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July 2001

Environmental governance of sand mining in an urban setting: Macassar Dunes, Cape Town, South Africa

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Sand is a resource in high demand for urban expansion and development. Sand mining operations are often located on the edges of cities. The Macassar Dunes are an important source of building sand for the City of Cape Town. The area is located within the Cape Floral Kingdom, the smallest and richest of the six floral kingdoms of the world. The Macassar Dunes area has been identified as a core flora conservation site due to its unique habitat diversity and quality. South Africa is a developing country and this case study is used to highlight the tensions that arise between the need to provide building sand for development and the need for integrated and accountable management that allows for the sustainable functioning of natural physical and ecological processes as well as enhanced social and economic benefits for people. This study, however, has shown that the environmental governance of sand mining at the Macassar Dunes is not satisfactory. Some of the main problems identified are the discretionary powers assigned to the Regional Director of the National Department of Minerals and Energy, the lack of monitoring and policing of the sand mining operations in respect of rehabilitation and the fact that environmental supervision of mining is undertaken sectorally by the Department of Minerals and Energy and not through a lead environmental agency or in partnership with the lead agency. In addition, there are insufficient incentives for small mining companies to subscribe to a voluntary environmental code of conduct. Even though the administration of mining in South Africa is deemed to be an activity of exclusive national competence, local authorities and communities are becoming increasingly concerned that sand mining is an activity that should be responsibly managed. The new Mineral Development Bill provides an opportunity to create a framework for the sustainable development of South Africa's mineral resources.

Keywords: sand, vegetation, mining, rehabilitation, environmental management, sustainable development, monitoring.

Abbreviations

CFR	Cape Floristic Region
DME	Department of Minerals and Energy
EMPR	Environmental Management Programme Report
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EEU	Environmental Evaluation Unit, University of Cape Town
I&APs	Interested and Affected Parties
IIED	International Institute for Environment and Development
NEMA	National Environmental Management Act
MDMP	The Macassar Dunes Management Plan
MMSD	Mining and Minerals Sustainable Development Project

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Introduction

Sand is an essential requirement for building and construction. Consequently, sand is a resource in high demand for urban expansion and development. As a result of high transport costs and the relatively low price of sand, sand mining operations are often located on the edges of cities. The Macassar Dunes are an important source of building sand for the City of Cape Town in the Western Cape Province of South Africa (Figure 1).

Sand mining on the Macassar Dunes is a controversial issue as it causes the loss of habitat in an important flora conservation area. The dunes are situated within the Cape Floristic Region (CFR), a global priority area for conservation action (Cowling *et al.*, 1999). Covering less than 90 000km² or less than 0.04 % of the terrestrial surface of Earth, the CFR is marked by particularly high levels of plant endemism and has been identified as a conservation hot-spot (Myers, 1990) of international significance. About 68 % of its approximately 8 500 species are endemic (Cowling and Richardson 1995) and the CFR has the distinction of being regarded, in its own right, as one of six floristic kingdoms on Earth (Bond and Goldblatt, 1984).

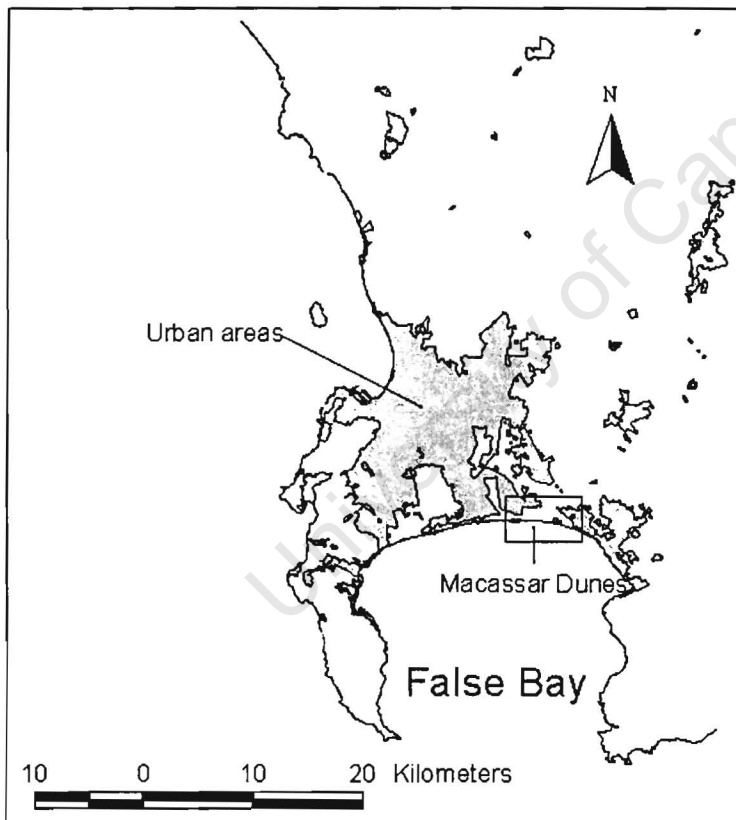


Figure 1. The location of the Macassar Dunes area relative to the urban areas of the City of Cape Town.

South Africa is a developing country and this case study highlights the tensions that arise between the need to provide building sand for development and the need for integrated management of coastal ecosystems that allows for the sustainable functioning of natural chemical, physical and ecological processes and the provision of environmental goods and services for people. The Macassar Dunes area is characterised by a range of land uses and competing interests (Chittenden Nicks de Villiers, 2001) including: (1) sand mining; (2) recreational interests such as off-road vehicles, walking and fishing; (3) two sewage plants; (4) harvesting of flora; (5) grazing of cattle; and (6) pressure for future urban use.

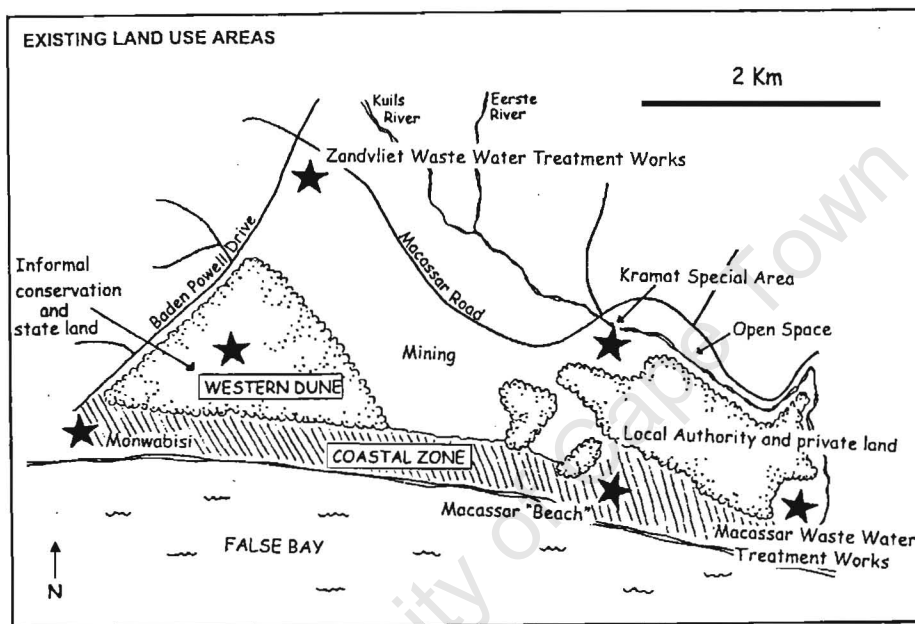


Figure 2. Land uses in the Macassar Dunes Area (After EEU, 2001).

The aim of this paper is to examine the bio-physical and socio-economic setting of the Macassar Dunes area and to analyse the legal requirements for environmental assessments and the environmental management of sand mining within the context of an urban environment in a developing country. The legal requirements are compared with the actual impacts of sand mining in the Macassar Dunes. Attention is focused on methods to reduce or mitigate the impacts of sand mining as well as to identify best practice in environmental management and governance of sand mining in urban areas.

In order to place the issue of sand mining at Macassar in a broader context, relevant environmental issues associated with sand mining in other countries are reviewed briefly.

Environmental and international context

Poorly regulated sand mining activities have caused problems in coastal environments around the world in developing countries. Israel, for example, is running out of sand as a result of decades of poorly regulated sand mining for construction (Soares, 1998). Sand mining has destroyed dune habitat along Israel's southern Mediterranean coast. The coastal highway has separated wildlife from the hinterland, leaving them with nowhere to go as the coastal sand is removed (Soares, 1998). In China, Cicin-Sain and Knecht (1998) report that coral and sand mining have contributed to sea water invasion and shoreline erosion in Shandong Province. Between 1985 and 1990, a stretch of coastline ten kilometres long retreated 60 to 80m as a result of sand mining and caused damage estimated at more than US\$ 1 million. In Sri Lanka, the mining of construction sand mainly takes place at river mouths and in coastal dunes (Cicin-Sain and Knecht, 1998) and results in a serious resource use conflict between sand miners and local fisherman. In Africa, mining activities also threaten coastal biological diversity. In Tanzania, for example, the mining of building materials, salt, limestone and beach sand (Mwandosa *et al.*, 1997) has led to several resource use conflicts and environmental problems.

In contrast, strong control over the environmental impacts associated with surface mining activities is provided for in the United States of America, Australia and New Zealand (City of Cape Town, 2000).

Pring *et al.* (1999), in a review of international environmental law affecting the minerals industry, note that the mineral resources industry is entering an era of change. They state that these changes can be seen in many areas – including political restructuring, economic transformation, social and cultural developments, supply and demand, changing public attitudes about mining and the emergence of the new international paradigm of 'sustainable development' – all of which are promoting a rapid increase in the laws and regulatory frameworks governing the minerals industry throughout the world.

Sustainable development incorporates the following recurring elements: (1) the promotion of social equity (including intergenerational equity); (2) the maintenance and restoration of natural ecosystems; and (3) economic opportunity and vitality. Glavovic (2000) describes sustainable coastal development as the process through which current and future generations of coastal stakeholders reach their potential by meeting basic needs and improving their quality of life whilst maintaining diverse, healthy and productive coastal ecosystems.

Reforms to South Africa's laws have reflected the reorientation of international and national laws to comply with sustainable development. The National Environmental Management Act (Act 107 of 1998) (NEMA) defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision making so as to ensure that development serves present and future generations. Amongst other factors, the NEMA requires that the use of non-renewable resources is responsible and equitable and takes into account the consequences of the depletion of the resource.

Sustainable development is not an easy principle to apply to mining because mining results in the depletion of non-renewable resources. Nevertheless, Pring *et al.* (1999) claim that sustainability can be applied to mining insofar as it encourages the rational use of non-renewable resources and results in an improvement of a country's social, cultural, economic and environmental capital.

Pring *et al.* (1999) list over two-dozen interrelated international trends that are pushing the minerals industry into this new regulatory era. Some of the most relevant that could apply to urban sand mining in developing countries are: (1) mining is losing its status as both a preferred land use and a preferred economic activity; (2) national laws and definitions of 'industry standards', reasonableness, best practices, best available technologies etc., are evolving from international laws and standards; (3) minimum water, air and other quality standards are becoming more uniform worldwide; (4) the public participation of NGOs and individuals is expanding worldwide, often providing a force for policy and regulatory reform and monitoring; (5) increasing recognition of the rights of local communities is resulting in their greater participation in the mineral project decision process and in the distribution of fiscal and other benefits; (6) consumer environmental awareness is growing worldwide and will increasingly play a role in the demand for end products and legal controls; and (7) the spectre of 'retroactive liability' means the minerals industry may not safely rely on current non-stringent national environmental laws, but should plan now to avoid the moving target of future 'international standards'.

However, some of the international trends noted by Pring *et al.* (1999) will have little impact on sand mining. Sand mining is not capital intensive nor is it a highly profitable business and is an activity of little interest to multinational mining corporations. Sand is not a commodity that is traded internationally. Typically, sand mining is carried out by local operators or construction companies for district or regional markets. Consequently, sand mining companies do not depend on international financial organisations for loans and so escape pressure for environmentally responsible mining practices. The minerals industry itself is expanding international environmental law by adopting self-governing codes of conduct, guidelines, best practices and intra-company rules. Again, this is a trend that is influencing the multinational mining corporations, but could by-pass smaller operators (including sand miners).

With the above in mind a description of the Macassar Dunes area as well as the legal and administrative requirements for sand mining is provided below.

The physical setting of the Macassar Dunes area

The Macassar Dunes are the tallest and most extensive dune system remaining on the False Bay coast (Figure 1). The Macassar Dunes consist of two northwest-southeast (parallel to the prevailing wind direction) trending sets of hairpin parabolic dunes totalling 4.8 km² in areal extent, which are separated by calcretized dunes. The parabolic dunes are partly vegetated and are up to 3 km long, 0.6 km wide and 83 m high. Narrow dune valleys and wider slacks separate the dunes; the latter become moist during the winter rainy season.

Maze and Rebelo (1999) have identified the Macassar Dunes as a core flora conservation area due to its unique habitat diversity and quality. As stated, the area is located within the Cape Floral Kingdom, the smallest and richest of the six floral kingdoms of the world. The vegetation on the dunes is a mosaic of Strandveld (dune thicket), dune fynbos on calcareous sand and dwarf fynbos on calcrete. There have been some 179 indigenous plant species recorded from the dunes.

There are many ecological and social reasons, aside from pure plant conservation, for managing and protecting the core flora conservation areas, such as: (1) environmental education; (2) recreation and spiritual use; (3) ecological services such as erosion control, water purification and water conservation; (4) medicinal and food plants; (5) potential harvestable plant material for the cut flower and medicinal plant trade; and (6) habitat for many different animal species (Maze and Rebelo, 1999). The Botanical Society of South Africa and the City of Cape Town have committed themselves to the conservation of the core flora sites (Chittenden Nicks de Villiers, 2001).

Threats to the Macassar Dunes

Alien vegetation (*Acacia cyclops* and *Acacia saligna*) has encroached into much of the dune system. However, the resilience of indigenous dune scrub is such that even after fairly heavy infestations have been cleared, re-colonisation by the natural vegetation occurs within 2 to 3 years (Chittenden Nicks de Villiers, 2000).

Numerous four-wheel drive vehicle and trail-bike tracks occur throughout the area. Locally these have caused extensive damage, such as the destruction of vegetation and the exposure of sand resulting in erosion blowouts. Furthermore, there is evidence of woodcutting, but this appears to be confined to the *Acacia cyclops* (a popular fuel wood). Controlled woodcutting is an effective form of alien eradication (Chittenden Nicks de Villiers, 2000).

Apartheid planning and massive urban development since the 1970s has resulted in a rapid reduction of natural habitat on the Cape Flats, and a demand for sand for construction purposes. Low-income residential areas cover large parts of the Cape Flats, with Khayelitsha, Sandvliet and Macassar near to the Macassar Dunes.

Four sand mines occur in the Macassar area, one of which has been exploited and three are still currently or intermittently working. The sand is used for mortar and to a lesser extent, fill, plaster and concrete (Cole and Viljoen, 1999). The sand contains comminuted shell fragments as indicated by the calcium carbonate contents averaging 60% in some samples. Approximately 4.7 million tonnes of building sand has been exploited from the Macassar area and a measured resource of approximately 40 million tonnes remains with an average thickness of 11.62 m. This is 40 % of an estimated resource of 102 million tonnes of building sand for the Cape Metropolitan Area (Cole and Viljoen, 1999). The Macassar Dunes are therefore an important source of sand for the city.

The metropolitan location of the Macassar Dunes results in a range of land-uses and competing interests. In the interests of sustainable development it is important to provide for effective environmental governance of sand mining in the Macassar Dunes area. The legal

requirements for the preparation of Environmental Management Programmes and obtaining a mining licence in South Africa are described in the following section.

Environmental management programmes and mining licences

South Africa's new Constitution (Act 108 of 1996) encourages and provides for co-operative governance between all spheres of government. The environment has been designated as a functional area of national and provincial competence, however the national Department of Minerals and Energy (DME) is responsible for the administration of all mineral and energy matters.

The Minerals Act (50 of 1991) divides South Africa into nine regions. The Act provides for a Director: Mineral Development in each region. The discretionary powers of these regional directors are extensive and include the power to approve prospecting and mining authorisations (Glazewski, 2000).

The Act considers three stages in the mining process i.e.: prospecting, mining and closure (including rehabilitation). Prior to the authorisation of a mining licence, the applicant is required to submit a mining layout plan and a rehabilitation programme. The DME, after consultation with the Departments of Agriculture and Environment, will then grant or refuse such authorisation. The Minerals Act states that the rehabilitation of the surface of the land shall be carried out: (1) in accordance with the approved rehabilitation programme; (2) as an integral part of the mining operations; (3) simultaneously with the mining operations; and (4) to the satisfaction of the Regional Director.

The document that is submitted by the applicant is known as the Environmental Management Programme Report (EMPR). The "Aide-Mémoire for the Preparation of Environmental Management Programme Reports for Prospecting and Mining" (DME, 1992) sets out the contents of an EMPR. An EMPR consists of the following six parts: (1) a brief project description; (2) a description of the pre-mining environment; (3) the project motivation; (4) a detailed description of the proposed project; (5) an Environmental Impact Assessment (EIA); and (6) an Environmental Management Programme (EMP). The EMP contains details of the construction, operational and decommissioning / closure phases of a mine and includes a proposed timetable and financial provisions for rehabilitation. The EMP is the only part of the EMPR document that is legally binding on the developer.

The Regional Director may issue directives and determine conditions in relation to the use of the land within a mining licence area in order to limit any damage to, or disturbance of, the surface, vegetation, environment or water sources, to the minimum that is necessary for the mining operations. The intended process leading up to the approval of the EMP by the Director: Mineral Development is illustrated in Figure 3.

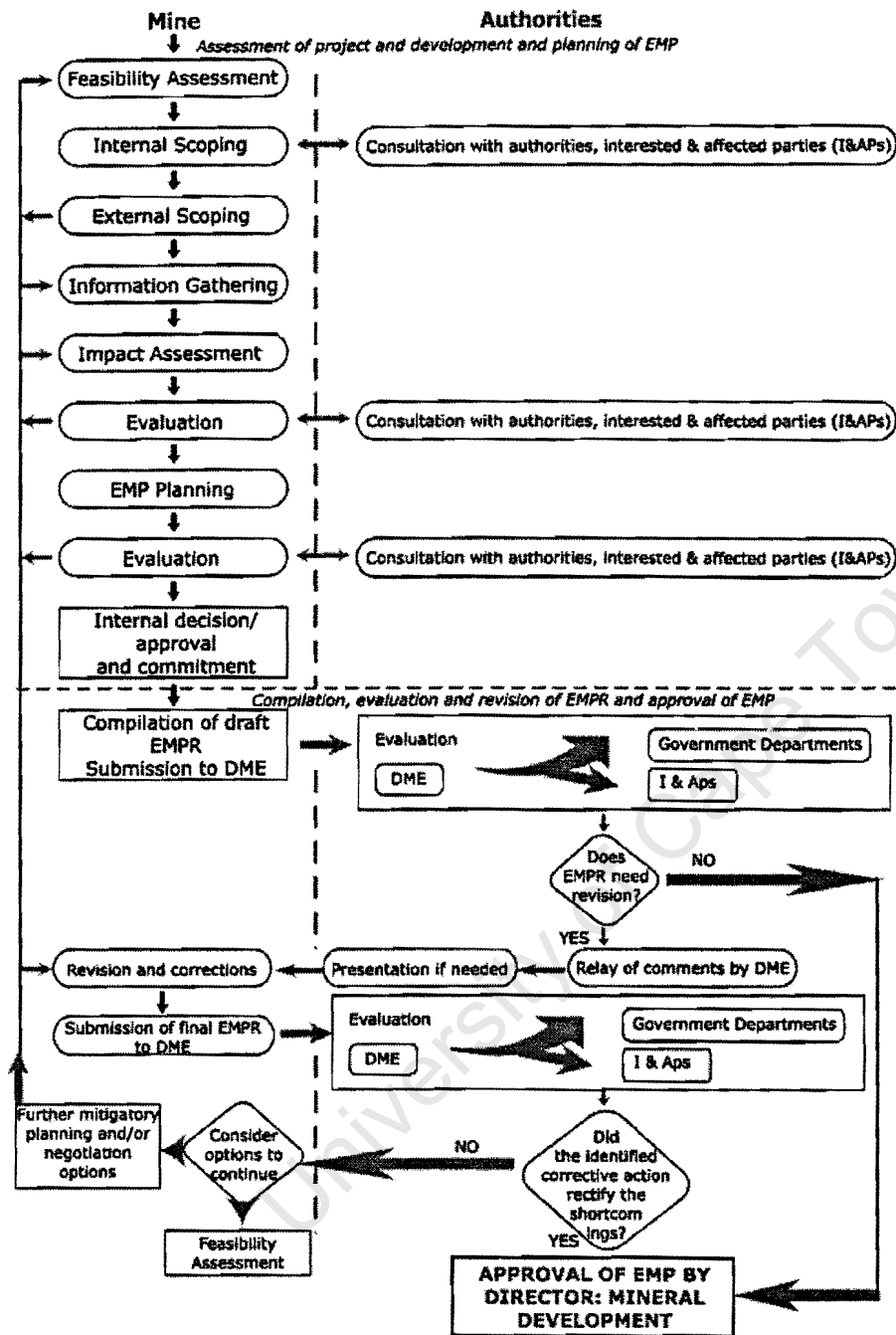


Figure 3. The intended process leading to the approval of an EMP by the Director: Mineral Development (After DME, 2001).

Additional regulations (DME, 1999) provide for compliance with the EMP by requiring ongoing monitoring and performance assessments. If there is reason to believe that the holder of the mining licence cannot conduct the performance assessment of the EMP satisfactorily, the Director General may appoint an independent team to conduct that assessment.

The question as to whether rehabilitation is satisfactory is dependent on the administrative discretion of the Director: Mineral Development (Glazewski, 2000). A closure certificate will only be granted by the DME when it has been shown that the holder of the mining licence has complied with the requisite EMP procedure and that all residual environmental impacts resulting from the mining operations have been identified and quantified and arrangements for the management of those risks have been finalised.

The White Paper: A minerals and mining policy for South Africa (DME, 1998) demonstrated the government's commitment to sustainable development in the mining industry. Some of the most important acknowledgments were: (1) the role of the Department of Environmental Affairs and Tourism as *lead agent* to comply with a single environmental policy; (2) the process of granting a mining licence and the approval of an environmental management plan would run concurrently; (3) the application of the *precautionary principle* (including the 'no-go' option) and the *polluter pays principle* in the regulation and enforcement of environmental management; and (4) to commit to equitable and effective *public participation*. The intention appeared to be to harmonise the Minerals Act with other recent progressive legislation (such as the National Environmental Management Act (NEMA), the National Water Act and the National Heritage Resources Act) that has been passed since 1994, in South Africa.

The Mineral Development Draft Bill (DME, 2000) does not explicitly mention the role of the Department of Environment Affairs and Tourism as the lead agent for compliance of environmental policy, however it does state that the development of mineral resources will take place within the framework of sustainable development and environmental management will be regulated in accordance with national environmental policy, norms and standards. In terms of the Draft Bill the Director: Mineral Development has the responsibility to:

(1) approve or refuse to approve an EMP; (2) issue directives to the owner of a mine and may determine conditions in order to limit or prevent any detrimental environmental effects; (3) issue clearance certificates when mining activity has ceased. It is therefore clear that, although the DME will consult with other government departments, it intends to retain all decision-making functions, including those that relate to the environment, strictly within the department.

A key debate applicable to the Macassar Dunes area is the interrelationship between planning law and mining law (Chittenden Nicks de Villiers, 2001). The point of departure is based on the premise that mining law cannot override planning and environmental law. Local authorities are responsible for land-use planning and administration within cities. The City of Cape Town (2000) has prepared a structure plan that is intended to act as a decision support document for mining in the Cape Metropolitan Area. This structure plan provides land-use policy recommendations as well as management guidelines. Digital mapping supports the structure plan, by providing quality detailed information to assist decision-makers. In terms of governing authority, it is therefore clear that tensions exist between the Department of Minerals and Energy and the local authorities with respect to mining licences granted within the City of Cape Town.

A study of environmental management and practice of the sand mines in the Macassar Dunes area is provided in the following section.

Environmental management and practice of the sand mines at Macassar

The sand mining process is described and six Environmental Management Programme Reports are reviewed. This section is concluded with a brief discussion of existing mining practice and environmental management in the Macassar Dunes area.

In terms of the mining plans, the companies generally divide the ground into blocks. The intention is to simultaneously rehabilitate the previously mined block, mine the current operational block and clear the bush and topsoil from the next block that is to be mined. If the block sizes were one hectare each, theoretically this would mean that at any one time only two hectares would be cleared of vegetation. The Minerals Act (50 of 1991) requires that surface rehabilitation should be carried out as an integral part of the mining operation and that the rehabilitation shall be carried out simultaneously with the mining operation.

Six Environmental Management Programme Reports have been submitted and approved by the Director: Mineral Development of the Western Cape Region for sand mining in the Macassar Dunes area. Mining licences have been issued for all six of these properties.

The "Aide-Mémoire" (DME, 1992) provides a checklist of items that the mining company should use in order to describe in the Environmental Management Programme (EMP) how each significant impact will be managed. Checklists are provided for the construction phase, operational phase and the decommissioning phase and closure. Once approved, the EMP is legally binding in terms of the Minerals Act and its Regulations.

These six unpublished EMPs were reviewed. Comparative tables of the EMPs for the operational phase, the decommissioning phase and closure are provided in Appendices 1 to 3. There is considerable variation in terms of the content, detail and quality of the reports. Comprehensive and professionally prepared reports were submitted by two of the companies. Two of the companies submitted pro-forma EMPs that had been filled in by hand and two companies submitted simplified and abbreviated typed reports.

Salient features extracted from these reports are described in more detail:

- Soils – All of the companies stated that they would separate and stockpile "topsoil" so that it could be used to rehabilitate mined out areas.
- Future land-use – Three of the companies compiled their mine plans on the basis that the post-mining land-use would be for the construction of housing for residential suburbs. Two of the companies considered that the post-mining land-use would be for animal grazing.
- Natural vegetation – One company contracted an independent scientific survey and agreed to reduce the area to be mined in order to conserve important Strandveld vegetation. This company stated that it would distribute topsoil over mined-out areas and all exposed surfaces would be mulched with straw and fixed with a soil stabiliser. Grassland would be established in areas zoned for future housing development and a hydroseed mixture of indigenous seeds, fertilizer, mulch and stabilising agents would be applied to disturbed areas that would form a buffer zone adjacent to undisturbed indigenous vegetation.

- Operational rehabilitation – All the other companies described how they proposed to carry out operational rehabilitation of the vegetation.
- Air quality – Five of the companies committed themselves to limiting dust by wetting the roads, limiting the area of bush to be cleared at any one time and rehabilitating mined out areas as soon as possible.
- Interested and Affected Parties (I&APs) – One company committed to constant liaison between the operators and the authorities. Three companies did not mention I&APs, whilst one company committed itself to a social investment programme for the local community.
- Financial Provision for Rehabilitation – The companies have made provisions of US\$500 to US\$625 in order to rehabilitate the final one to two hectares of mined out land.

During fieldwork undertaken in the Macassar sand mining area in May 2001, it was found that one mine was operating at full production, one mine had just started operations, one mine had closed, one had temporarily suspended operations and in two areas mining had not started yet.

At the operating mine, sand was being mined from the working face by two front-end loaders. The sand was loaded directly into waiting trucks that transported the sand away. Typically, the only staff present were the two front-end loader operators, the truck drivers and one person at the site office who was noting down the details of each truckload of sand that was leaving the mine site. The mining sequence at the operating mine was from north to south i.e. against the direction of the prevailing southeaster winds. No dust control measures were in place in the mine or on the access route. Little to no evidence of operational rehabilitation was noted anywhere. This is in agreement with the findings of the Macassar Dunes Management Plan (Chittenden Nicks de Villiers, 2001).

Discussion

Legislation is in place that should ensure responsible environmental governance of mining in South Africa. This study has shown however, that the implementation of this legislation has not been effective with respect to the sand mining in the Macassar Dunes area.

The main problems that were identified are: (1) the formulation of the EMPR is intended to be an interactive process, equivalent to the integrated environmental management approach required by state environmental departments, however in actual practice it appears to be orientated towards the submission of a form as a bureaucratic obstacle required in order to obtain a mining licence; (2) the DME does not appear to require a consistent standard of EMPR, this is an indication of the discretionary powers assigned to the Regional Director: Mineral Development; (3) interested and affected parties are considered to be other government departments rather than the public at large; (4) there is a lack of monitoring and policing of the sand mining operations in respect of rehabilitation; (5) the financial provision for rehabilitation is insufficient; and (6) the Department of Minerals and Energy, which is responsible for promoting mining, is also meant to monitor environmental compliance and this amounts to self-policing, which is not a sound principle (City of Cape Town, 2000).

Several overlapping potential opportunities to improve the situation at the Macassar sand mines have been identified and are discussed in turn below. Some of these opportunities could also apply to urban sand mining in other developing countries.

Co-operative governance

Mining in an urban context is increasingly being seen as a local issue and not only a matter of national concern. In the Macassar Dunes Management Plan, (Chittenden Nicks de Villiers, 2001) prepared for the City of Cape Town, the Western Cape Province and the Department of Minerals and Energy, the interrelationship between planning law and mining law is extensively discussed. The Macassar Dunes Management Plan (MDMP) will be submitted to the City of Cape Town and to the Western Cape Provincial Government for endorsement. Although mining is defined by the Constitution as an area of exclusive national competence, the point of departure in the MDMP is based on the premise that mining law cannot override planning and environmental law and that mining licences do not create land use rights. One of the purposes of the MDMP is to provide the policy and spatial framework for land-use approvals.

The preparation of the MDMP has been characterised, throughout the development process (1998-2001), by an intense and comprehensive process of participation with key stakeholders and interest groups. The Macassar Dunes area is characterised by a wide variety of land uses (Figure 2). The following key goals are expressed in the MDMP: (1) the Macassar Dune system should be treated in a holistic manner and be seen as a metropolitan asset, recognising the area as a core botanical site; (2) the sustainable and appropriate economic use of the area's non-renewable and renewable resources should be encouraged; (3) the long term recreational and 'eco-tourism' potential of the area should be optimised; (4) ongoing, coordinated and holistic management of the area to achieve the above goals should be ensured; (5) the conservation worthy areas should be effectively managed as a multiple-use conservation and community resource area by a dedicated body; (6) a consultative body should be formed to assist in guiding future development and the allocation of resources in the area; and (7) to optimise the area allocated to sand mining giving due consideration to all interests and subject to ongoing review based on performance and future land use decisions.

With respect to sand mining, the MDMP recommends that the final mining extent and levels should be established. It proposes that short-term uses could be considered on the areas set aside for mining, prior to mining. These could include controlled firewood collection, plant harvesting, livestock grazing and off road vehicle recreation.

The MDMP recommends that all EMPs should be reviewed by the DME in order to: (1) address restoration and rehabilitation; (2) insist on a mining sequence from south to north in order to assist vegetation rehabilitation by working with the prevailing wind direction; (3) define the area to be mined; and (4) define the final mining levels. The report emphasises that in order to maintain a viable ecological corridor along the coast it is vital that the southern (or coastal) extent of mining is limited. The MDMP also proposes that the DME and local authority environmental officers should actively monitor rehabilitation. The rehabilitation funds should be reviewed annually in order to ensure that sufficient provision has been made for rehabilitation in the event of mine closure. In addition, planning to evaluate the long-term sequential land-use options for the future use of mining areas is

advocated. Future land-use possibilities could include sports facilities, horticultural activities, market gardening and residential or commercial development.

A 'Mining Environmental Forum' (meeting every second month) was established in an attempt to resolve the apparent lack of consensus amongst the various authorities concerned as to a common vision or goal for mining in the Cape Metropolitan Area. This forum consists of representatives of the Department of Minerals and Energy, the City of Cape Town, the Provincial Administration of the Western Cape, the Department of Agriculture, the Department of Water Affairs and Forestry, the Botanical Society and the Wildlife and Environmental Society of Southern Africa (City of Cape Town, 2000).

The Macassar Dunes Co-management Demonstration Project (EEU, 2001) has also focused attention on the area. This project forms part of a poverty focused coastal development project and is managed in partnership with three other organisations by the City of Cape Town. The project has several components, all of which strive to move towards sustainable coastal use and development of the dunes area. An alien vegetation clearing component is currently underway providing employment for 60 local community residents. A study concerning the feasibility of the development of eco-trails and associated infrastructure has also been commissioned and several awareness-raising workshops on the subject of integrated coastal management have been undertaken. The capacity building component of the project aims towards the development of co-management arrangements for the area. The project aims to involve all stakeholders (resource users, as well as community, government and private sector organisations) in the development of a management strategy, which will ensure the long-term sustainable use and development of the Macassar dunes area.

Environmental supervision

Strong control over the environmental impacts associated with surface mining activities is provided for in the United States of America, Australia and New Zealand (City of Cape Town, 2000). These countries place the control of environmental issues in the hands of a strong public agency with considerable executive power. Omalu and Zamora (1999) refer to this as an integral approach, where environmental management is entirely in the hands of a central Environmental Ministry. However, they also state that many developing countries cannot afford to implement the comprehensive and administratively expensive regulatory systems in place in countries such as the United States of America and Canada.

The sectoral approach refers to a situation where each economic sector has an environmental office of its own (e.g. the mining industry in South Africa). In Chile, (Omalu and Zamora, 1999), environmental supervision is carried out by a number of sectoral and regional institutions coordinated by a central environmental agency. This is an arrangement that helps to maintain environmental standards across all of the different economic sectors.

A similar situation could be developed in South Africa if the Department of Environmental Affairs and Tourism were to be delegated as the lead agent responsible for the control of environmental issues surrounding mining. This could go a long way towards raising the level of South Africa's environmental governance of mining. This could be done in the spirit of co-operative governance together with the Department of Minerals and Energy and ensure

genuine monitoring, auditing and policing of compliance with Environmental Management Programmes.

Miao and Marrs (2000), in a paper describing ecological restoration of open-cast mines in China, state that in order to make ecological restoration successful, emphasis must be placed on the use of fiscal policies (both rewards and penalties) through a legally binding system with strict enforcement.

Mining industry codes

Apart from government legislation, the mining industry itself has been expanding the body of international environmental law concerning mining by adopting codes of conduct, standards and best practices. An early example of an industry code is the 'Berlin Guidelines' that emerged from a 1991 conference convened by the United Nations in Berlin (Pring *et al.*, 1999). The Berlin Guidelines state that sustainable mining activities require good environmental stewardship in all activities, from exploration and processing to decommissioning and reclamation and called for: (1) environmental impact assessments, pollution control, monitoring and auditing activities and emergency response procedures; (2) environmental accountability; (3) participation of affected communities; (4) best practices even in the absence of specific environmental regulations; and (5) additional environmental funding at existing operations. The International Council on Metals and the Environment (ICME), an NGO of major metal and mining companies, adopted the 'ICME Environmental Charter' that supports many of the same principles and practices as the Berlin Guidelines (Pring *et al.*, 1999).

At a country level, the Australian Minerals Industry launched the 'Code for Environmental Management' in 1996 (revised in 2000). This was a significant step taken by the industry to address its environmental performance and public accountability. Signatories to the Code commit to: (1) integration of environmental, social and economic considerations into decision-making and management, consistent with the objectives of sustainable development; (2) openness, transparency and improved accountability through public environmental reporting and engagement with the community; (3) compliance with all statutory requirements, as a minimum; and (4) a continually-improving standard of environmental performance and, through leadership, the pursuit of environmental excellence throughout the Australian minerals industry. Signatory companies are required to progressively implement the code, produce an annual public environmental report within two years of registration, complete an annual code implementation survey and verify survey results, by an accredited auditor, at least once every three years (Minerals Council of Australia, 2001).

Codes of Conduct, however, are voluntary. Commitment to a code of conduct may be seen to be beneficial (through improved corporate images and better public relations) to large public companies or multinational mining corporations, however small private companies may not perceive there to be any benefits at all. The Aggregate and Sand Producers' Association of South Africa (ASPASA) does not have an environmental code of conduct (ASPASA, 2001).

In 1998 ten of the world's biggest companies established the Global Mining Initiative (GMI) to explore how the industry could contribute to the global transition to sustainable

development. A year later these companies, and 20 others, commissioned the International Institute for Environment and Development (IIED) in London, through the World Business Council for Sustainable Development (WBCSD), to conduct an independent two-year project of participatory analysis seeking to understand how this sector as a whole could make this transition (IIED, 2001). This project is known as the Mining, Minerals and Sustainable Development Project (MMSD).

The Mining, Minerals and Sustainable Development Project (MMSD)

The IIED is an independent NGO based in London that has no mining links and will not be involved in the sector after the completion of the project. The characteristics of the MMSD project are that it is: (1) independent; (2) consultative; (3) transparent; and (4) regional (each regional centre has its own governance structure and consultative process). The objective of the regional centre, MMSD Southern Africa (MMSDsa, 2001), is to determine how the mining and minerals sector can best contribute to the region's transition to sustainable development. It is intended to achieve this through wide stakeholder engagement and research. Priority research issues that have been identified by stakeholders include small-scale mining, social issues, HIV/AIDS, the bio-physical environment and managing mineral wealth in Southern Africa. In a discussion document, MMSDsa has identified the following conditions for sustainable development in the mining and minerals sector in Southern Africa: (1) operating within ecological limits; (2) ensuring fair and responsible access to resources by both current and future generations; (3) minimising risk and abandoning and/or rejecting policies and practices that could have unacceptable negative impacts; (4) engaging transparently to promote participation and form partnerships; and (5) being accountable for actions and decisions through good governance. It is intended that the MMSD reports and recommendations will be completed by March 2002. The MMSD project is an appropriate forum that could address issues associated with environmental governance of small-scale mining in urban settings.

ISO 14000 Standards

An influential player in the development of international mining standards is the International Standards Organisation (ISO), a NGO based in Geneva (Pring *et al.*, 1999). In recent years, it has introduced its ISO 14000 series environmental management standards. ISO 14001 is an international standard for environmental management systems. The cornerstones of the ISO 14001 standard are: (1) compliance with relevant legislation; (2) prevention of pollution; and (3) continual improvement of the system, and thus of environmental performance. The ISO standards, however, are voluntary and non-regulatory. They do not provide international, measurable, performance standards for impacts and only require certified organisations to satisfy 'applicable laws', which vary from country to country (European Environmental Bureau, 1996). Companies may be pressured to adopt ISO 14000 standards to promote a positive image or to keep up with competition.

In South Africa, Pretoria Portland Cement (2000) considers that the assurance of continual improvement is a business asset and that certification to ISO 14001 provides peace of mind for directors, who are personally liable for failures in legal compliance.

The adoption of ISO 14000 standards is expensive and requires dedicated staff to manage and implement. Small, private companies probably would not see many advantages to attaining ISO certification.

Conclusions

New international codes of conduct, standards and research are promoting sustainable development in the minerals industry. Larger public companies and multinational mining corporations are reacting pro-actively to the changing circumstances in order to promote a positive image of the industry and to keep up with competition.

This study, however, has shown that the environmental governance of sand mining at the Macassar Dunes and the monitoring of the associated Environmental Management Programmes, in particular, is not satisfactory. The main problems that were identified are: (1) the formulation of the EMPR is mainly seen as a bureaucratic obstacle required to be overcome in order to obtain a mining licence; (2) the DME does not appear to require a consistent standard of EMPR, this is an indication of the discretionary powers assigned to the Regional Director: Mineral Development; (3) interested and affected parties are considered to be other government departments rather than the public at large; (4) there is a lack of monitoring and policing of the sand mining operations in respect of rehabilitation; (5) the actual financial provisions made are insufficient to provide for final mine rehabilitation; (6) environmental supervision of mining is undertaken sectorally by the Department of Minerals and Energy and not through a lead environmental agency or in partnership with the lead agency; and (7) there are insufficient incentives for small mining companies to subscribe to a voluntary environmental code of conduct or apply for ISO 14001 certification.

Even though the administration of mining in South Africa is deemed to be an activity of exclusive national competence, local authorities and communities are becoming increasingly concerned that sand mining is an activity that should be responsibly managed. The Macassar Dunes Management Plan and the Macassar Dunes Co-management project have focussed attention on the area and have encouraged full public participation. It is positive that the Department of Minerals and Energy has participated in these projects. These processes support the principles of co-operative governance and will encourage transparent and informed decision making as well as pro-active monitoring of EMPs at the sand mines in the future.

Nevertheless, despite encouraging local and international initiatives, the main body of mineral-sector regulation will continue to be national law. South Africa's Minerals Act is to be replaced in the near future. To give effect to the government's commitment to sustainable development it is hoped that the new legislation will shift the responsibility of environmental governance of the minerals industry away from a narrow sectoral style to a more integrated and co-operative approach as intended in the White Paper.

Acknowledgements

The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the National Research Foundation.

The author thanks Dr. Peter Holmes for supervising this paper. Lynette Kruger, Barry Low, Gerhard Gerber, Nigel Titus, Joanne Jackson, Helen Davies, Professor Jan Glazewski, Paul Hardcastle, Richard Hill, Janet Bodenstein, Ian Turner, Stephen Mitchell, Charl de Villiers, Leo Quayle and Barry Wiesner are all thanked for assistance, helpful discussions and suggestions.

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Appendix 1. Comparative Table of Environmental Management Plans at Macassar Sand Mines – Operational Phase.

COMPANY	A	B	C	D	E	F
Post-mining topography	even slopes 1:150	slope 1:50 perimeter 1:5	slope to safe angle	site lowered to 10m above sea level perimeter 1:5	1:3 slopes	slope 1:20
Soils	200-300 mm of topsoil to be stockpiled	stockpile topsoil	stockpile topsoil	use topsoil immediately or stockpile in 1.5m berms	topsoil stored for not more than 6 months in heaps (<2m high)	300mm topsoil removed and stored in heaps (<2m high) for not more than 6 months
Future Land use	housing	-	grazing	residential	residential	grazing
Natural vegetation and rehabilitation	agreed not to mine a flora conservation area. planned to eradicate alien vegetation, planned to stabilise sand with straw and brushwood, plant grass, hydroseed.	planned to stabilise sand with wood chips, compost, straw and brushwood. sew grass seeds, plant shrubs.	dunes covered with "brush and <i>Acacia saligna</i> ". the establishment of vegetation endemic to the area will be encouraged (sic).	planned to revegetate using grass seed mix. claimed that there was no purpose to rehabilitate to Strandveld.	planned to stabilise sand with straw and wood chips, sew grass seeds, plant shrubs.	planned to plant annuals to bind ground so that it can be used for farming.
Animal life	no impacts	-	-	will move away	-	-
Surface water						
storm-water	no surface flow	-	-	not required, permeable sand	-	rehabilitation planned to avoid storm water erosion
surface rehabilitation	surface water unaffected	-	-	-	-	rehabilitation planned to avoid storm water erosion
Ground-water						
surface rehabilitation	unaffected	-	-	-	-	meet requirements of Water Act
ground-water quality	not applicable	-	-	no mining below water table	-	

Appendix 2. Comparative Table of Environmental Management Plans at Macassar Sand Mines – Operational Phase.

COMPANY	A	B	C	D	E	F
Air quality	sand stabilisation to reduce wind blown dust	continuous dust control	-	pre-wetting of topsoil water cart for roadways revegetate mined areas	road wetting –water truck, water from river	limit dust by limiting bush cleared area to one ha at a time. revegetate mined areas
Noise	no significant impact	-	-	none envisaged but: fit effective silencers avoid after hours work monitor noise levels	muffle mechanical equipment. a ridge provides a barrier between the road and the mine. working hours Monday to Friday.	effective silencers
Visual aspects	No impact provided rehabilitation occurs as mining progresses	-	-	no measures proposed, temporary small scale of visual impact	denuded areas kept to a maximum of one ha at a time. revegetate immediately.	bush clearance limited to one ha. the mining block next to the road will be the last to be mined.
I&APs	constant liaison between operators and authorities to be maintained	-	-	-	social investment programme for Macassar and Sandvlei community	-
Maintenance			-			
rehabilitated land	monitor plant growth	-	-	-	-	rehabilitation planned to avoid erosion. any erosion will be immediately repaired
water pollution control	not applicable	-	-	-	-	-

Appendix 3. Comparative Table of Environmental Management Plans at Macassar Sand Mines – Decommissioning Phase and Closure.

COMPANY	A	B	C	D	E	F
Closure objectives	conserve flora conservation area, resultant mine landform to accommodate housing	rehabilitate last two ha, ensure slopes are within parameters	mine site suitable for grazing	-	-	-
Infrastructure	to be removed	-	-	-	-	-
Rehabilitate dangerous excavations	not applicable	-	backfill	-	-	-
Rehabilitate ramps, roads and voids	roads levelled and rehabilitated	-	rip and plough	-	-	-
Maintenance till closure	conducted by the company	maintain for 1 year	-	-	-	-
Financial provision	Company Trust Fund	US\$500	-	US\$625	US\$500	-

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