



MEDIA BACKGROUNDER

Coal and Water Futures in South Africa: A case for conserving headwaters in the Enkangala grasslands

1. Overview

WWF-SA has produced a report on our coal and water futures with an urgent call to government and the mining sector to change our approach to coal mining. The report, compiled in collaboration with the Council for Scientific and Industrial Research, is based on research and engagement with the South African mining and water sectors. It describes the current costs and impacts on water quality in the Olifants catchment – where coal mining has happened over the last 100 years. It also examines how prospecting is unfolding in the relatively pristine headwaters of the Upper Vaal, Thukela and Pongola, where critical water source areas are threatened by new mining.

WWF calls on government to act urgently to **mitigate**, **manage**, and **monitor** the impacts of the mining sector in order to protect our valuable water resources.

The South African government has committed itself to reducing greenhouse gas emissions and to a new path of Green Growth. This will improve our energy security with more renewable energy and less coal-fired power. The energy sector is expected to change dramatically in the next 15 years.

At the same time we will start facing the consequences of climate change, most directly through water. Our already stressed water resources will come under increasing pressure as temperatures rise and rainfall becomes more volatile. The frequency of floods and droughts will increase and the load of pollutants reaching our rivers will increase with these extreme events. Many of our catchments are already heavily polluted by mining (e.g. Upper Vaal and Olifants catchments), and six out of 19 of our water management areas (WMAs) will not have enough water to meet demands by 2030. We ask government to plan strategically and in an integrated manner to ensure our future water security.

Twelve per cent of South Africa's land area generates 50% of our river flow. We need to plan the development of our landscapes to protect the country's most important water, soil and biodiversity resources. Headwater catchments, such as the Enkangala grasslands - source of the Vaal, Thukela and Pongola - should not be exposed to new coal mining.

South Africa has extensive coal reserves, and we can meet our future fossil fuel needs by planning mining in less vulnerable areas. Coordinated strategic planning is needed now to prevent a repeat of the acid mine drainage (AMD) crisis facing the Witwatersrand. Sustainable economic development and our water and food security require intervention at the highest levels

to define where we will mine coal and where we will prioritise water and food (provisioning) in our landscape.

WWF-SA calls for no new prospecting and coal mining in catchments which are source areas for water supplies, and important conservation areas (National Freshwater Ecosystem Priority Areas – NFEPA's).

2. The energy – water nexus: what does it mean for water and energy security in South Africa?

Whilst many South Africans presently survive without access to energy, none can survive without water. This fact should always guide Government thinking in terms of strategic location of coal mines when confronted with potential impacts on water supplies.

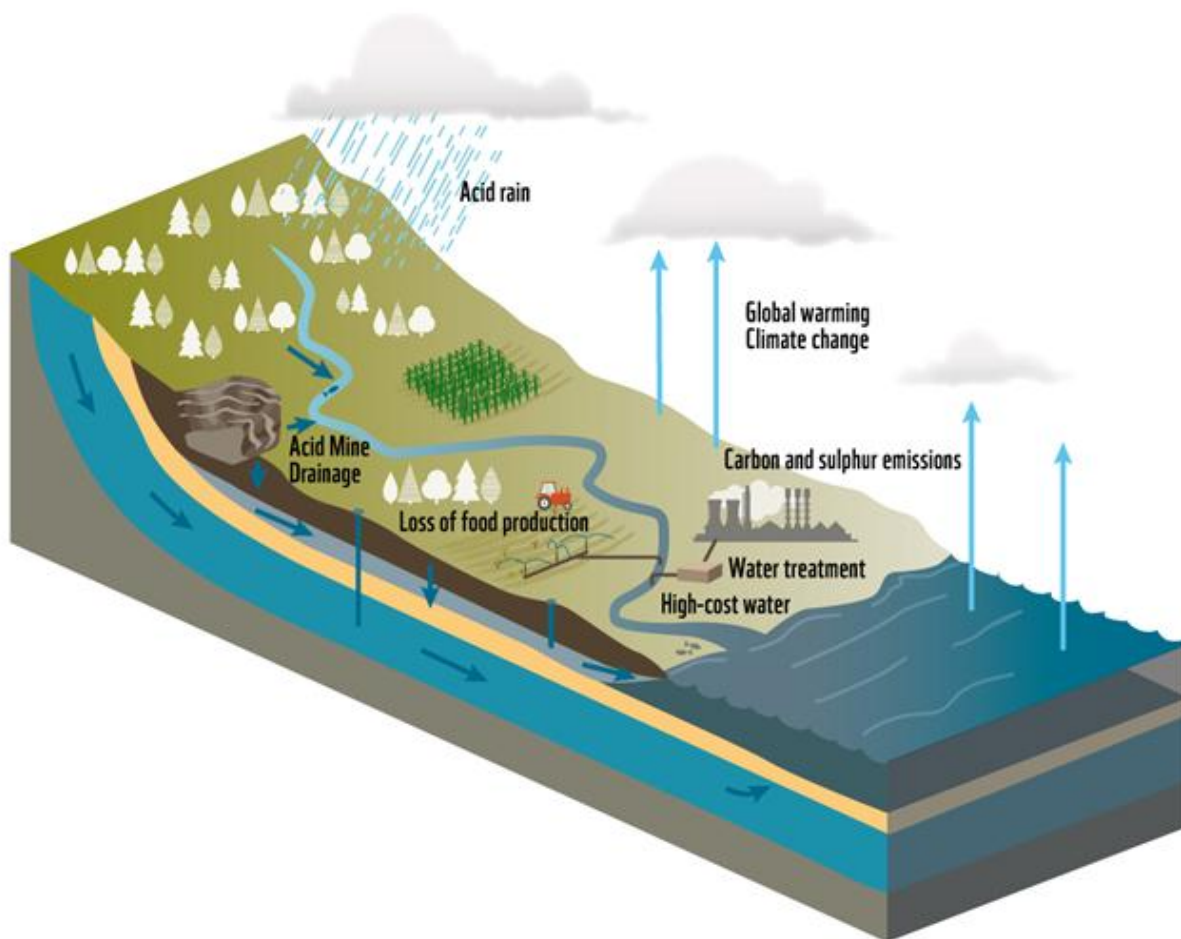


Fig 1. The coal and water nexus

The precautionary principle is never more relevant in such a context and given the climate change issues facing South Africa, the need for security of our water resources is of paramount importance. Decisions that could in any way threaten such resources should never be made and better planning needs to be implemented with regard to viable coal reserves located in less sensitive areas.

Reliance on coal-fired power has resulted in South Africa's greenhouse gas (GHG) emissions being double the global average per capita and per GDP¹. Airborne pollution from coal-fired power stations emits carbon dioxide, causes acid rain and soil acidification. In addition, acid mine drainage (AMD) from coal mining areas has had devastating impacts on water resources, with acidification of rivers and streams, elevated metal levels and consequent fish die-offs.

Eskom is the only 'strategic' water user under the National Water Act. Water is required at the highest levels of assurance to provide steam for the turbines, to cool and clean machinery and to scrub pollutants. In the Olifants catchment, coal mining has contaminated rivers and streams to the extent that it cannot be used in the coal-fired power stations. Eskom's water either needs to be treated – costing money and more energy – or it must be supplied from another river system that has not been polluted by mining. Camden power station requires inter-basin transfers from the unimpacted Usutu river system (that originates in Enkangala) to provide water that is clean enough for them to use.

This paradox is part of what is known as the 'water-energy' nexus, the negative feedbacks between water and energy cycles in our current carbon-economy. Energy production that relies on fossil fuels consumes water and has a negative impact on water resources as a result of pollution during the mining process and as well as burning fossil fuels (e.g. acid rain caused by atmospheric pollution from their emissions). Together this direct consumption and pollution, and indirect consumption and pollution embedded in the supply chain to the energy sector, results in a significant water footprint. We need to move away from energy production with high carbon and water footprints to break the cycle.

2. The costs of coal are more than carbon: Case Studies

(a) Water resources in the Olifants pay the price for coal mining

In 2009, South Africa was the fourth largest exporter of thermal coal (65 Mt) after Indonesia (233 Mt), Australia (109 Mt) and Russia (82 Mt), producing three times China's output (18 Mt). In 2009, coal sales amounted to R65 billion, the highest value commodity for that year (platinum R58 billion, gold R49 billion). Approximately 64% of the coal sold domestically is bought by Eskom for energy production.

The Olifants river catchment is known to be one of South Africa's most degraded rivers because of impacts primarily from coal mines, compounded with impacts from agriculture, industry and sewage pollution. Coal mining in this catchment started in the 1890's and by 2004 an estimated 50 000 m³ of mine water was discharged into the Olifants river daily, as well as 64 000 m³/day from closed and abandoned mines. In 2001, mine water use in the catchment amounted to an average 4.6 %, but it contributed around 78% to the total sulphate load. Such pollution levels affect farmers, people living in the catchment as well as tourists and wildlife of the Kruger National Park.

Increased pollution

The Witbank and Middelburg Dams in the Olifants started showing an increase in sulphate and TDS concentrations from as early as 1986, mainly as a result of coal mining activities. Sulphate

concentrations of 120 – 160 mg/l are still commonly measured in the dams, whereas it is estimated that these levels would have been much lower at 20 – 40 mg/l if mining activities were not present.

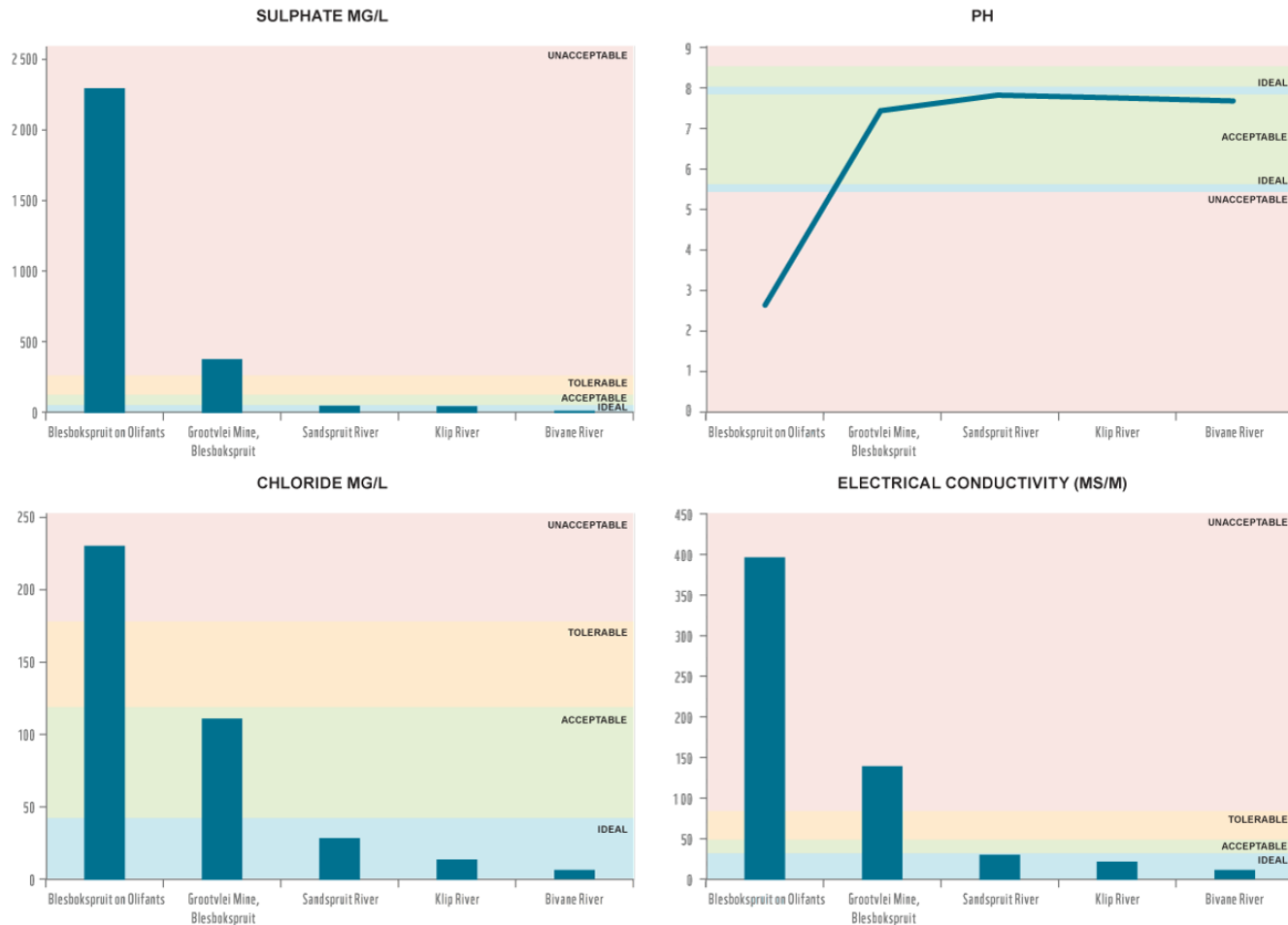


Fig 2: Types and levels of pollution in the Olifants

The Department of Water Affairs has taken responsibility for the abandoned mine in the Brugspruit area and a Water Pollution Control Works was constructed in 1997 at a cost of R 26.5 million with a capacity of 10 000m³/day, in order to protect Loskop Dam from AMD. When fully functioning, the treatment works has the capacity to improve metal concentrations, but the sulphate concentrations remain unaddressed.

The plant has experienced cable theft and insufficient maintenance, during which the untreated decant flowed into the Brugspruit. Further downstream in the Olifants catchment lies, the Loskop Dam which receives the full flow from the upper catchment. Similar to Witbank and Middelburg dams, Loskop Dam also has sulphate concentrations that exceed target drinking water standards around its inflow areas. The Loskop Dam provides water to the second-largest irrigation scheme in South Africa, irrigating about 16 000 hectares of crops that include sunflowers, soya, wheat, vegetables, tobacco, peanuts, cotton and citrus fruitⁱⁱ. Farmers here depend on reasonable water

quality in order to comply with crop production and export standards. Of the commonly grown crops in the area, citrus, most vegetables, sunflowers and peanuts are all moderately sensitive to salinisation. The dam itself is located in a proclaimed nature reserve and it used to contain a thriving population of fish and Nile crocodiles.

Over the last 18 years several incidents of fish mortality have occurred, culminating in a massive fish die-off in 2007 and the crash of the crocodile population from 30 animals to a total of six in 2008. Now it's believed that no crocodiles survive today. The diagnosed cause of death for both fish and crocodiles is pansteatitis, a hardening of the fatty tissue that leads to immobility and death. The cause of pansteatitis is suspected to be linked to heavy metal pollution and acidification of the system through pollution sources like AMD and acid rain.

Eskom requires good-quality water to operate their coal-fired power stations near Witbank and they import clean water from the eastern escarpment rather than carrying the costs associated with the purification of Witbank Dam water.

(b) Enkangala grasslands: coal mining vs. water conflict in South Africa's headwaters

WWF's Enkangala Grassland Project (EGP) is located in the high altitude (>1700m amsl) grasslands that straddle the boundaries between the Free State, KwaZulu Natal and Mpumalanga on the Drakensberg escarpment. The EGP covers an area of 1.6 million hectares and is nested within the broader grassland biome which covers approximately 339 237 km² and receives more than double the rainfall of the rest of the country.

The bulk of coal reserves are located within the broader grassland biome. Pressure for prospecting and mining rights is extreme in South Africa's coal hub, Mpumalanga province (over 50% of the province has come under various rights applications since 2005). There is also an ever increasing pressure for prospecting/mining rights within the EGP section of the grassland biome (almost 25% of the 1.6 million hectare project domain is under threat).

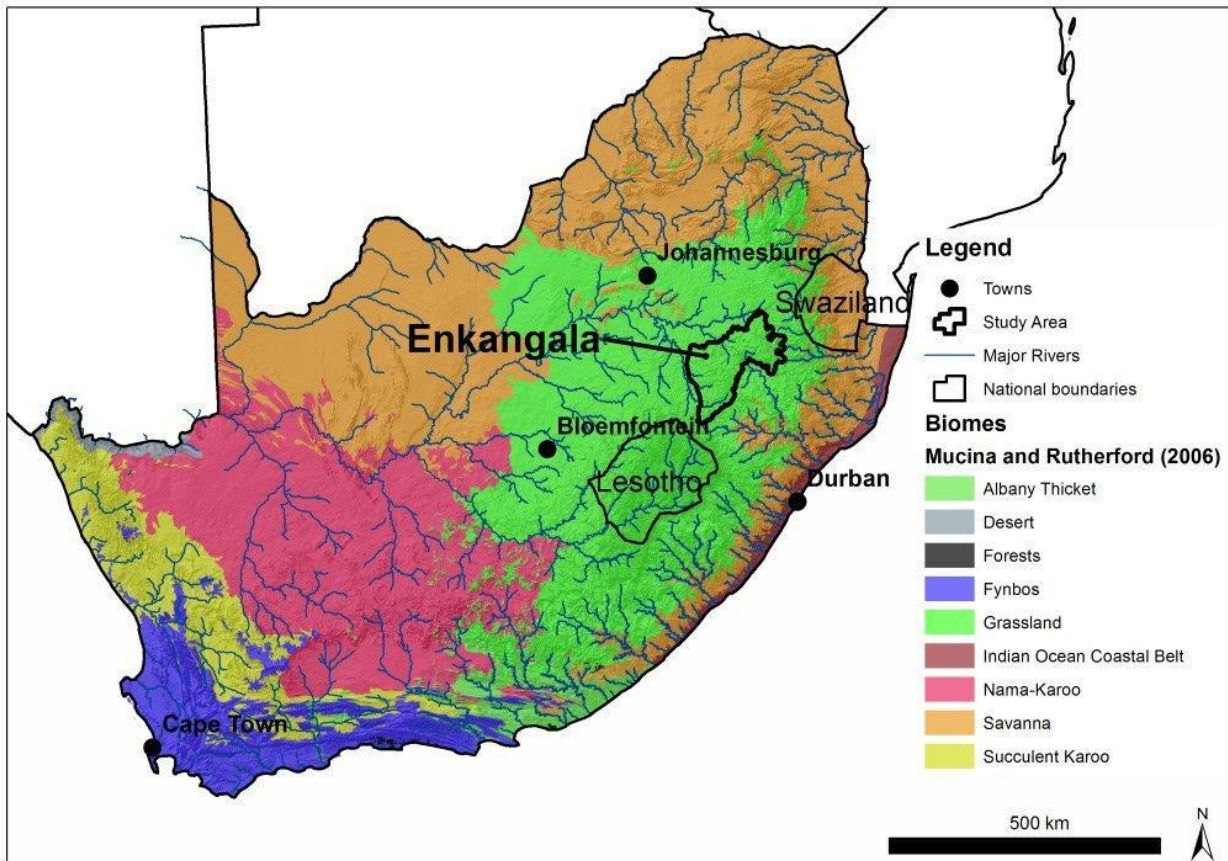


Fig 3: Location of the Enkagala Grasslands area

Only four percent of South Africa's area comprises high water yield areas. In the Enkangala, 23% of the area is high water-yielding. The headwaters of some of our most economically important river systems are fed from this area: the Wilge and Klip feed the Vaal River; the Buffalo and Klip feed into the Thukela and the Pongola and Usutu rivers feed into the Usutu-Mhlathuze basin. These rivers supply the Midmar, Zaaihoek, Heyshope and the Vaal dams – which are vital to the water security for Gauteng and Durban.

In addition to producing nearly three times the national average of river run-off across the whole area, the Enkangala grasslands area is a conservation priority. The National Strategy for the expansion of protected areas includes 27% of this area, indicating that biodiversity conservation is a nationally important issue for this region. Recent studies on aquatic biodiversity conservation have delineated a staggering 70% of the total area to be considered as National Freshwater Ecosystem Priority Areas (NFEPAs).

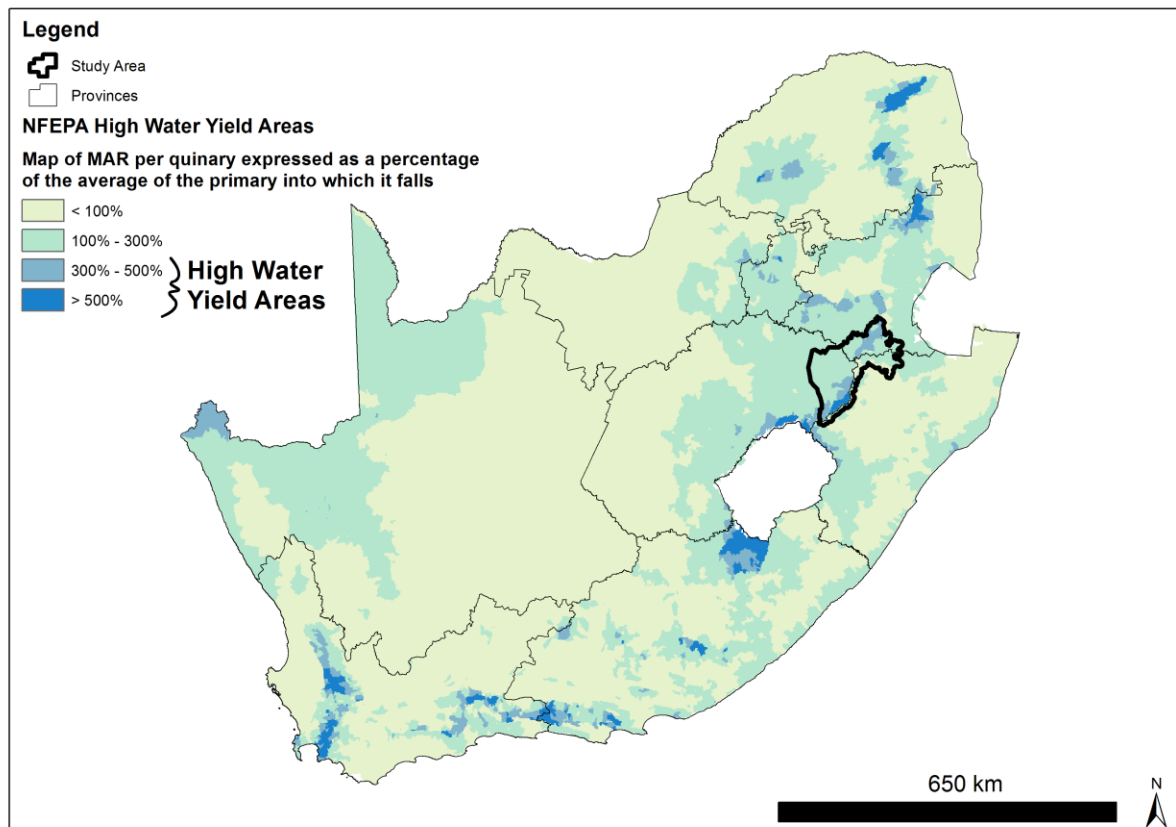


Fig 4: Map of high water yield areas in South Africa

We have seen the consequences of abandoned mines and AMD in the gold mining areas of the Witwatersrand basin and the coal mining areas of the Olifants catchment. At a national level we have established policies and strategies to avoid a repeat of the past. However, on the ground, prospecting rights for coal mining are being issued in some of our most precious and sensitive catchments.

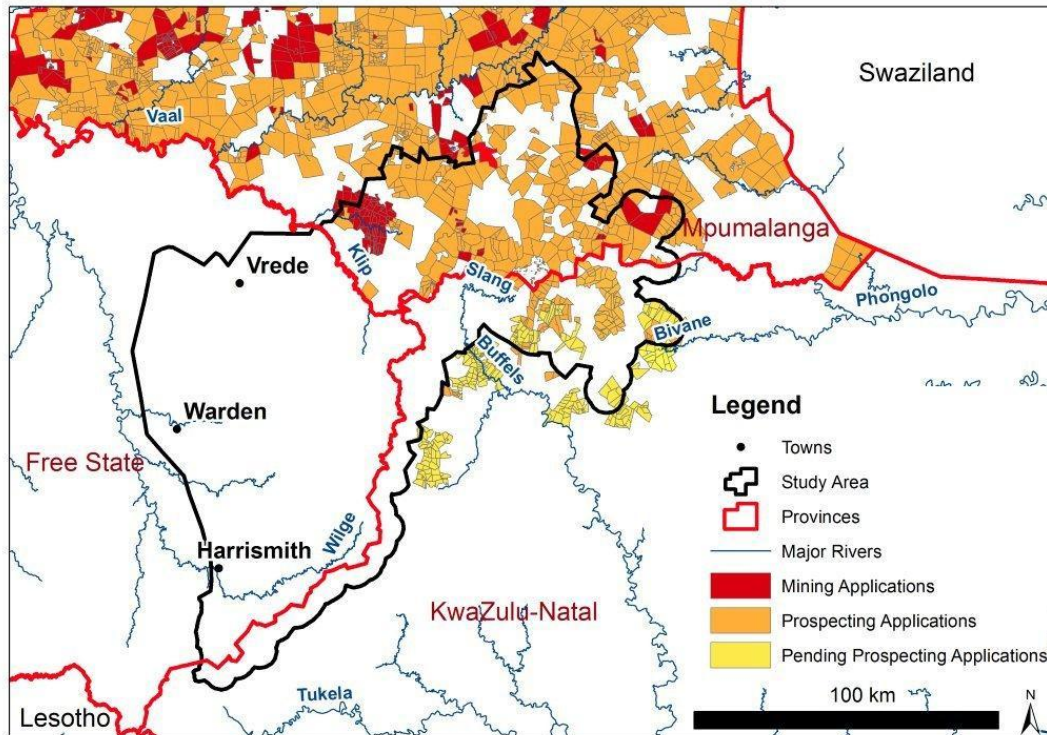


Fig 5: Map of prospecting licences in Mpumalanga

Despite the seemingly obvious importance of catchments in the Enkangala grasslands in supporting biodiversity and economic development down-stream, prospecting licenses have been granted over vast portions of the area in recent years (almost 25% of the Enkangala Grassland Project Domain and more than 50% of the Mpumalanga province). Agricultural grazing and fodder production has been the dominant land-use in the grasslands for many generations. If these prospecting rights are realised, the local landscape and economy will be dramatically altered.

As a water scarce country, South Africa should be prioritising catchment conservation – particularly for these river systems which feed the Durban and Gauteng metropolises. Instead we are still allowing prospecting to threaten water security and food production and agricultural jobs.

Agriculture is the largest sector and employer in the Enkangala area, with a total value of over R3 billion. Furthermore, the agricultural sector in the Enkangala study area has significant multiplier impacts on the rural economy and job security. The total employment impact in the area linked to agriculture is estimated to be 164,059 jobs. Many of the labourers employed in this area have been here for over five generations, making agriculture a very stable employer in Enkangala. The total impact of agriculture on GVA, including downstream and induced impacts, amounts to an estimated R2.7 billion. Agricultural productivity and jobs in this area rely on good quality water and healthy catchments.

3. Key challenges

Our water resources are under threat from a variety of pollution sources and from stress as demand increases and supply become more uncertain under climate change. Acid Mine Drainage is one of the most hazardous threats facing our water resources.

AMD from both coal and gold mining has already brought devastating consequences to impacted areas, such as the Witwatersrand and the Witbank. South Africans live with a legacy of nearly 6000 abandoned and ownerless mines. Our government departments are currently not able to ensure that proper licencing provisions are met by active mines and that due diligence is followed to prevent pollution from active and dormant mines. Impact monitoring enforcement is completely inadequate and under resourced, in a sector which generates significant revenues. No account is taken of the importance of water resources, soil resources and the potential impact on food and job security in areas where prospecting rights are issued.

Mining applications are considered in a piece-meal manner and no government department is currently assessing the predictable cumulative impacts of mining in sensitive areas. DMR does not take account of important natural assets such as biodiversity and the water provided by headwater catchments to agriculture and urban areas when issuing licences. At the same time, DMR cannot afford its present liability of more than R30 billion to clean-up abandoned mines and does not have a plan in place for treating AMD from coal mines. The cost of cleaning up our catchments after coal mining could continue for the next century or more.

4. Recommendations for better mining in South Africa

Our water resources are under threat and stressed. Acid Mine Drainage is one of the most hazardous threats facing our water resources.

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Given this current state of affairs, and the South African government's stated aim to move towards a new Green Growth path and invest in creating jobs, WWF-SA calls on government and the mining sector to implement far reaching improvements immediately. Better coal mining in South Africa must aim to **mitigate** against, **manage** and **monitor** the impacts of mining in order to protect water resources, agricultural jobs and down-stream users in our urban hubs.

4.1 Mitigate: strategic planning for a sustainable future for all.

The National Planning Commission and Departments of Water Affairs (DWA), Environmental Affairs (DEA) and Mineral Resources (DMR) must agree at the highest level to restrict mining in critical water source areas in order to mitigate the impacts of water pollution. Spatially explicit development plans are needed at a provincial level that take account of high yield catchment areas, critical biodiversity areas and high value agricultural areas. The water, jobs and food provided by these areas need strategic level protection from mining applications. If we can't afford to clean up our current environmental liability, we must prevent impacts in critical areas.

- **RE-balance the power and responsibility among government departments, to enable co-operative governance (as contemplated in Section 41 of the Constitution of South Africa).** DMR is the Department with full control of mining operations. DWA in comparison does not hold the same power in this sector, yet is held responsible for water matters. Often DWA only becomes involved after operations have begun, leading to reactive solutions, rather than sound proactive ones. For example, a response delay by DWA for a mining application is assumed to be a go-ahead for DMR. This is often not correct as DWA may be incapable of processing the applications in time for institutional reasons.
- **The impact of mining needs to be measured and assessed according to cumulative impact, and not individual impacts.** Water quality impacts from mines extend beyond the spatial and temporal boundaries of the actual mining operations. Evaluating mining impacts at an individual level, with site-specific boundaries and for up to 30 years fails to address the full liability that coal mining creates. This issue is addressed under the Mineral and Petroleum Resources Development Amendment Act (MPRDAA), but it is still unclear if government departments will find the ability to co-operate sufficiently to successfully mitigate cumulative effects. The current rate of license handouts seems to suggest the opposite.
- **The cumulative risks of smaller or so-called ‘bakkie-mining’ companies need to be urgently accounted for.** Given their numbers and preference to operate in marginal areas, they have a cumulative impact that is as profound as that of large mines. It needs to be kept in mind that smaller companies are more likely than well-established companies to have insufficient rehabilitation funds and, thus, of abandoning mines. Abandoned mines create a particularly high risk of polluting water resources **Error! Bookmark not defined..**
- **The national AMD discussion needs to include both gold and coal mines.** At the moment the South African AMD discussion is focused on gold mines and the imminent dangers of gold mines decanting AMD water into high-risk areas such as the inner city of Gauteng. However, it is essential to begin looking at the cumulative impacts that are occurring in the coal sector and the future risks of AMD from coal mines. Differences in mining techniques between gold and coal mines make AMD from coal mines more difficult to manage because it often involves extensive surface disturbances and the destruction of regolith layers that naturally regulate the surface-groundwater interface. Timely consideration of all AMD may help to address the large-scale consequences South Africa will face from coal mining in the future.
- **South Africa will have to decide on tradeoffs between financial capital made from mining, versus environmental costs.** Foreign exchange is very important and money earned from exports allows the government to afford social support, which represents reinvestments in the economy. Thus decisions about tradeoffs are not simple matters. Still, the government should not allow the high revenues generated by mining to drive unsustainable planning.
- **South Africa has to strike an important balance between the necessity of coal mining and the need to protect the environment and social well-being.** For that, both sides need to have sound arguments, good organization and a strong voice. Coal mines already have the resources and capacity to broadcast their aims and benefits, however the opposition voice needs organization, volume and the right platforms to state their case. The debate needs to address the risks, losses and burdens that befall the poorest of the poor, who often depend on natural resources (e.g. fish from impacted water sources, subsistence farming or polluted drinking water) for survival.

- **It should be of the utmost national importance to determine the water (quantity and quality) requirements for food security, human provision and dilution in order to know how much further SA can continue to trade and transfer water.** DWA to date has not yet stipulated which water sources are more important than others from a social point of view or from the concept of the National Water Resource Classification system. The NWA requires the Minister to set a management class and Reserve determination for each significant resource. This would guide spatial development planning and should influence where licences are issued. Where scientific evidence is lacking, a strong argument should be made for the **precautionary principle**, until such time as science has provided the necessary evidence. South Africa only has few remaining pristine and clean water sources (e.g. Heyshope Dam, Mpumalanga) that play a crucial role in diluting the pollution entering rivers further downstream. These key water source areas should be nationally recognized and remain untouched by mining or other high risk developments.

4.2 Manage: improve management of the licensing and mining processes.

Whilst our legislation currently aims to protect water resources, ensure the 'polluter pays' principle and enable sound environmental management – implementation is not coordinated between the necessary government departments. A strategic implementation rethink is required to enable our legislation to become more effective. The Department of Water Affairs licensing process must be properly accommodated within mining licensing and capacity within the Department should be strengthened urgently to enable this.

Water management in South Africa needs to be prioritised. Processes which have almost stalled – such as the formation of Water User Associations, Catchment Management Agencies, and the implementation of the National Water Resource Classification system – must be invigorated and accelerated.

Management of financing for decommissioning within DMR needs to be reviewed and improved. We cannot continue to issue new licences to an increasing number of junior operators when rehabilitation funding mechanisms are so inadequate.

- **The prospecting application process should include an environmental/social sensitivity screening process**, whereby applications get ranked, (e.g.: 1. = no go; 2 = considered; 3 = free for mining). The criteria for such areas need to be backed up by proper science that can convince role players about 'no go' areas or additional costs. Proper valuation of alternatives is essential and should be included in the application processes (e.g. agricultural value of area, water in area).
- **Use of existing data to inform license handouts.** Ultimately the decision to mine is based on the presence of a resource and its economic viability - yet prospecting rights are granted for areas without economically viable deposits. If the prospecting licence issuing was based on existing shared data, it would save resources and conflict and reduce environmental damage from prospecting. Data from the Council for Geosciences could be used to streamline the prospecting license processes. More reliable reserve audits from DMR are needed as well as the strengthening of the role of information from DEA, DWA and other IAPs about protecting sensitive or non-economic areas. WWF for example, already has spatial data for sensitive areas in Enkangala.
- **The prospecting license application process should be consolidated and streamlined into a single process**, requiring the same timelines and the equal engagement of all responsible departments. One way would be to handle this process via

an intergovernmental committee, which meets at regular intervals to jointly process approvals and reach decisions. Such a process would reduce frustration and confusion among all applicants, it would honour intergovernmental co-operation appropriately. Another option would be to align the process in a way that all developments with potential environmental consequences were to be processed under the NEMA regulations, placing the DEA as the single authority to issue an environmental authorisation for all development applications (including mining-related applications). Such environmental authorisation would have to be in place before DRM could issue a mining-related right or permit.

- **Environmental practitioners responsible for Environmental Management Plans need to be held responsible for their quality of work.** This can be achieved by either peer reviewing via external sources, or the EMP should be completed by external experts. Such practices should ensure that the assessment is done rigorously and correctly. Any false representation should hold consequences. Currently EMPs are rife with 'cut and paste' examples. In the past, DEA used to disqualify applicants who were found guilty of 'copy and paste' jobs. Similarly, mining company directors should be held personally liable for the liabilities they create. The National Scientific Professions Act (1993) should be applied in order to ensure appropriate standards of EMPs. Current EMPs have been simplified to tick box format, enabling a layperson to complete it. However, this allows for erroneous decision making and an EMP process during prospecting should be completed with more diligence, as it can save the mining company a lot of conflict later when an area is found to be sensitive.
- **There is a shortcoming around the implementation of EIAs as part of the Environmental Authorisation process.** EIAs are conducted briefly at the beginning of an operation and are not able to take into account all the developments and challenges that the mining process may encounter during its entire lifetime. It is also unable to take into account seasonal environmental issues because of the timeline for completion. EIAs are also site-specific and do not address impacts beyond the mining site, or what impacts may be happening close-by. EIAs therefore fail to address cumulative impacts at present. Government officials reviewing these documents often lack the experience to assess cumulative impacts. Lastly, EIAs lack focus on technologies that could adequately mitigate negative mining impacts.
- **Strengthen policing of mining, environmental and water legislation.** The most blatant disregard of South Africa's sound laws around mining, water and the environment is shown by several cases in which mining takes place without the required permits and licenses. Government is responsible for dealing with transgressors who mine illegally, but this obligation is not honoured in a predictable way.
- **The lack of synergy between the different departments, policies, implementation and information transparency creates stumbling blocks for smaller mining companies.** Junior mining companies report being frustrated by the difficulty experienced in accessing information that is supposedly available but is difficult and costly to get hold of in reality. Small companies have to be experienced and astute to operate in an aggressive industry where bigger players have more experience and resources.
- **The continued lack of information sharing in the mining industry comes at a cost.** The entire mining sector has a historical legacy of withholding information from the public domain. From a business perspective, it is valid to withhold strategically important information, but information sharing for research purposes and best practices should be encouraged. Equally, government has the responsibility to collect, collate and make

available mining information and the conditions of mining licences. This is currently not practiced at DMR and the auditor general found that databases do not meet the required standards. The Council for Geoscience has limited access to data, but it is sold at a price, making it costly to access. Improved information sharing would vastly aid co-operation, save time and costs, prevent repetition of research efforts and level the playing field for junior miners.

4.3 Monitor and enforce: we need to grow jobs in the environmental sector.

The number and competence of environmental enforcement practitioners must be strengthened and expanded within DME, DWA and DEA. This will enable the effective harmonisation of licensing procedures within and between departments and strengthen government's ability to monitor and enforce compliance. Monitoring of mining activities and water resources in general is inadequate. There is significant scope for growing a new generation of graduate and matric level environmental officers and placing them in effective systems of cooperative governance. EMPs and EIAs must be completed by trained environmental practitioners, even during the prospecting phase. EMP scores for the prospecting phase must take provincial and national conservation plans into account.

- **The DMR is in need of institutional improvements.** This Department is often understaffed and in need of capacity support. Communication between regional and head offices is often insufficient. The channeling of requests and complaints through the system needs improvement, as well the capture and storage of information on databases. Staff turnover could be addressed by introducing contractually enforceable term limits for government personnel, or by establishing benefit structures that could encourage individuals to stay in government for longer (e.g. delayed bonuses, salary increases, and better health coverage with seniority of service).
- **Best practices need to be mainstreamed and enforceable beyond their current role as guidelines.** Both small and big mines should be held accountable to comply with best practices.
- **We need to research the effectiveness of best practices – are they really achieving what they are meant to achieve?** There is insufficient research in this field. A useful approach could be to take an example of a mine that has done everything by the book, from cradle to grave in terms of costs involved. This would assess best practice guidelines and provide an example to smaller companies of what could be involved in taking full responsibility of liabilities. It also guides all coal mining companies in terms of realistic provisions for decommissioning.
- **There is a disconnect between the interpretation of rehabilitation and sustainability of the mining industry and other IAPs.** This needs to be addressed, as rehabilitation efforts by mines are typically regarded as insufficient by other IAPs. Realistic lifetime cost-benefit analyses of mines **are essential**, including the scale of time in the equation (longer than 30 years) and the scale of impact (beyond the actual mining site).
- **Monitoring good practice in coal mining should influence consumers in procurement decisions** – currently some European consumers may require minimum environmental standards from their mining suppliers. If Eskom and Sasol, as major consumers in the domestic market, also required best practice in terms of environmental management and funding for rehabilitation from their coal suppliers, this could have far reaching effects in the

sector. It could also reinforce the professional standards of jobs created to ensure environmental compliance.

About WWF

WWF is one of the world's largest and most respected independent conservation organisations, with almost 5 million supporters and a global network active in over 100 countries. WWF's mission is to stop the degradation of the earth's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption. Ultimately our aim is to inspire all South Africans to live in harmony with nature for the well-being of our country and its people.

See www.wwf.org.za for more information on the organisation's activities in South Africa.

WWF stands for the World Wide Fund for Nature. The organization prefers to be referred to just by the acronym.

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ⁱ South African Renewables Initiative (SARi) Update
Briefing, No.3 May 1, 2011

ⁱⁱ Loskop Irrigation Board, 2011.
[http://www.loskopbesproeiingsraad.co.za/index.php?page=loskopdam-waterskema&hl=en_US; accessed 7 September 2011].