

“Improvements in Marine Water Quality through enhanced Estuarine Management in South Africa: Buffalo and Swartkops estuaries.

**SIXTH WIOSAP PSC
NOSY BE, MADAGASCAR**

***“Department of Forestry, Fisheries and Environment”
Mr Ayanda Matoti
Directorate: Oceans and Coasts Monitoring***

Project Background

- The Buffalo River and its tributaries are considered to be a small system of 125 km in length, with a catchment area of 1,276 km²
- Changes in water flow and pollution due to urban activities which affect the ecological functioning of the estuary
- DWS; Transnet National Port Authority (TNPA) Buffalo City Metro Municipality ; Walter Sisulu University; DEDEAT; SAIAB; SANBI; WESSA



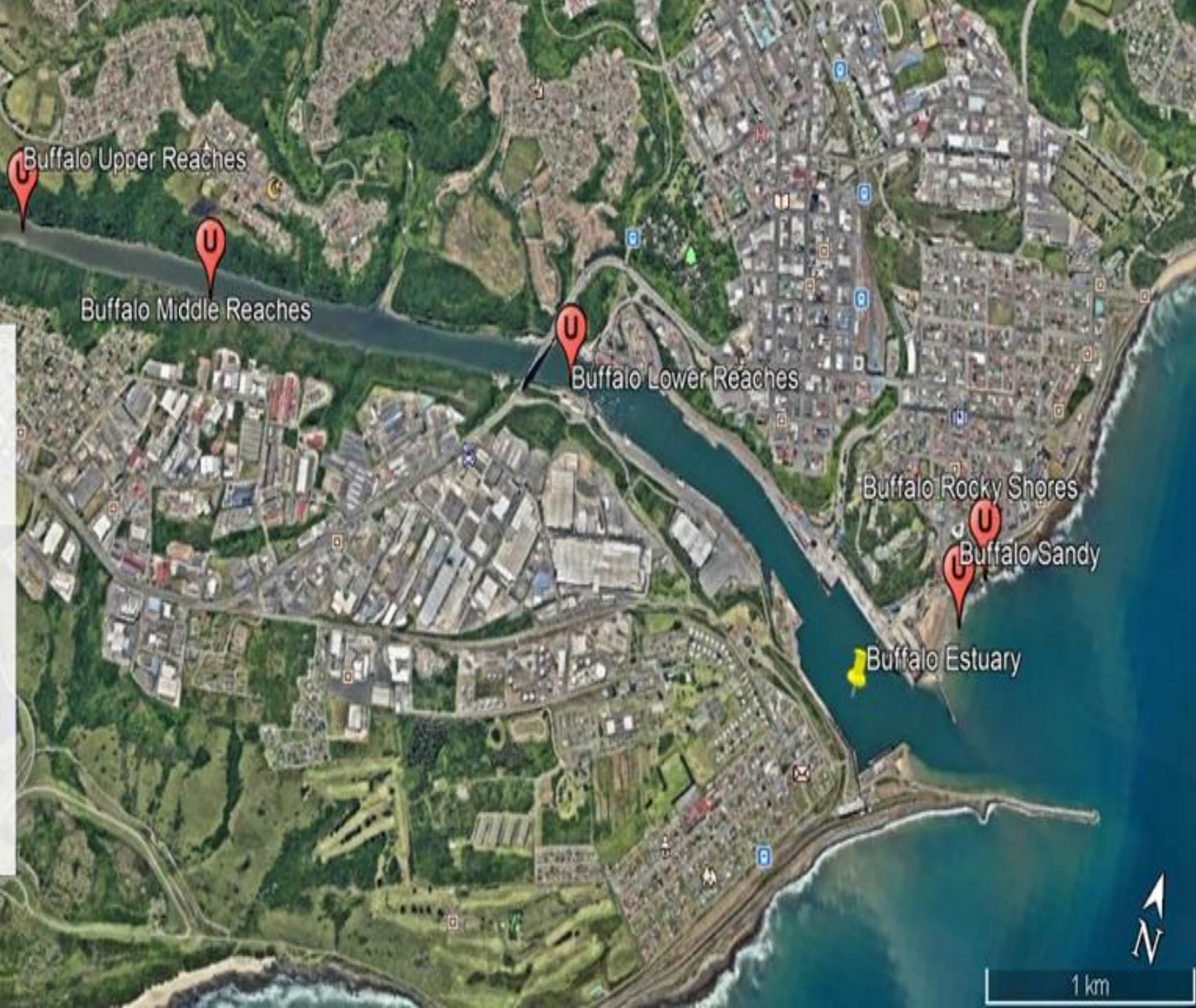
Buffalo Estuary

Sampling Areas:

- Upper Reaches (3 Samples)
- Middle Reaches (3 Samples)
- Lower Reaches (3 Samples)
- Sandy (1 Sample)
- Rocky (1 Sample)

Legend

- Buffalo City Municipal Library
- Buffalo Sample Areas
- East London Private Hospital
- Feature 1
- Feature 3
- King David Hotel
- Montessori Minds
- Post Office - West Bank
- Queens Park
- Saps -
- U Rent
- West Bank



Google Earth



Project Background

- The estuary is 16.4 km long, total length of the river from the mouth to its origin (Baird ET. Al., 1986) .
- Swartkops estuary is ranked 11th out of over 280 estuaries nationwide as a result of its size, habitats and biodiversity (Turpie et. al., 2002).
- The Swartkops anthropogenic activities include Waste Water Treatment Works (WWTWs), saltpans, sand/clay mining, brickworks, tanneries, motor industry,

Partners: DEDEAT); DWS; (NMBM); The Nelson Mandela University; Water Sisulu University; Swartkops Conservancy and the Benguela Current Commission

Project Background

- Heavy metal pollutants that include Manganese – 3300 times over accepted limits.
- Origin in the Northern Cape transported by trucks and rail for export in the Port of Port Elizabeth and Port of Ngqurha
- Can cause Hypoxia



Heavy metal pollution pouring into Swartkops

Guy Rogers
rogersg@theherald.co.za

A new study of the stormwater flowing off a street in Markman — and then into the Swartkops Estuary and Algoa Bay — shows it contains a range of heavy metal pollutants including manganese 3300 times over the accepted limit.

Besides the manganese, a dozen other heavy metals and associated processes are on average over the allowable limit by a factor of 100.

The figures are contained in a report by environmental chemist Ronelle Friend after a study done by her company, Enviro-Quest, which was contracted by Markman-based Algoa Cement Industries.

The results have emerged at the height of the row over the manganese industry in which ore mined in the Northern Cape is brought down by truck and rail to Nelson Mandela Bay to be exported through the ports of Port Elizabeth and Ngqurha.

Critics have slammed the pollution, damage to roads and increased risk of accidents caused by the continuous truck traffic and stockpiling

especially in Markman. The Swartkops Conservancy and Nelson Mandela University research has for years been pointing to excess heavy metals in the Swartkops Estuary.

According to the Enviro-Quest report, the sample was analysed by Talbot Laboratories in May during heavy rain from a stormwater drain in Chrysler Street.

"This stormwater collects in the stormwater drainage system, then it runs into the Markman Canal and into the Swartkops."

The boron, copper, iron, manganese, zinc and suspended solids concentration of the stormwater sample exceeded the standard legislative limit for discharge to a natural environment.

"Most of the metal concentrations exceeded the limit by more than a factor of 100," the report says.

Copper and manganese results indicated concentrations in the stormwater of, respectively, 4,400 and 3,330 times higher than the allowable limit.

"Particularly these copper and manganese concentrations result in pollution of water re-

sources, notably the Swartkops River."

Friend, who is also spokesperson for Algoa Bay Conservation, said the heavy metal pollution was of great concern.

"This pollution will move from the stormwater drain to the Swartkops Estuary and exit into the sea," she said.

"The current could carry the heavy metals into the Addo Marine Protected Area."

"Manganese can damage immune response in marine animals."

"As it accumulates on the bottom it can also cause hypoxia, where the oxygen level in the surrounding water drops, forcing mobile species to move and harming and killing the ones that can't."

"It will definitely negatively affect the quality of the water and influence the functioning of the marine ecosystem."

"Copper can cause acidification of the water in the area where it is found."

"It is highly toxic to invertebrates and can be toxic to some fish."

She said the recent statement by the metro that the manganese industry had a year to rectify problems was unacceptable.

"In a year's time the metro will be devastated."

NMU estuarine scientist Prof Janine Adams said heavy metal pollution in the estuary



TOXIC SAMPLE
Environmental chemist Ronelle Friend shows how she used a bucket to lift water out of this Chrysler Street stormwater drain in Markman and then decanted it into a bottle to take for laboratory analysis.
Picture: EUGENE COETZEE

Nadine Strydom said accumulation of heavy metals at the upper end of the food chain could cause multiple problems.

"It could result in neurological or kidney disease in people who eat lots of contaminated fish and in falling reproduction success in different wild species."

"We desperately need more data but there is less and less money being made available for research."

"We have good legislation that should prevent these problems, but it's not being enforced."

"If we do not stop it we're going to cause an environmental catastrophe."

Questions were put to metro spokesperson Athubanzu Mniksi but no response had been received by the time of going to print.

A role-player close to the matter said while the metro took cognisance of the number of people employed in the manganese industry, the statement in May that the industry was being given a year to get its house in order was not intended to let operators off the hook.

The intention was rather that companies that lacked environmental authorisation should immediately start the process of acquiring it and if it could not be furnished in a year's time they would then be penalised heavily.

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and the bay were of great concern.
"There has been a continuing problem in the Swartkops

with the accumulation of these pollutants and previous NMU studies have shown how they move up through the food

chain into plankton, plants, crustaceans and fish to humans where they can cause cancer."
NMU marine biologist Prof

Project Background

- **Overall Objective**
 - To mitigate or remove adverse effects that impacts on water quality through concrete stress reduction activities through enhanced integrated monitoring programme/plan
- **Specific Objectives**
 - To improve the conditions of the two systems in the manner that supports the coastal ecological goods and services;
 - To advance adaptive management activities/actions in the context for use of coastal waters; and
 - To develop a long-term monitoring programme to evaluate the effectiveness of the identified management activities/actions.



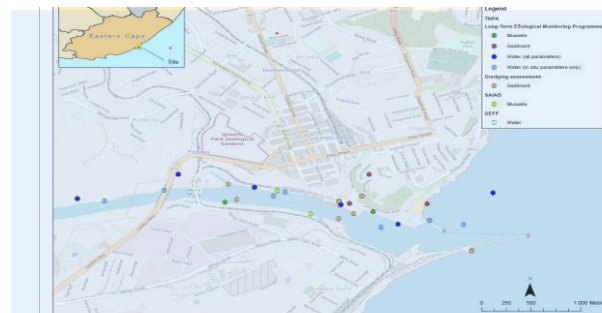
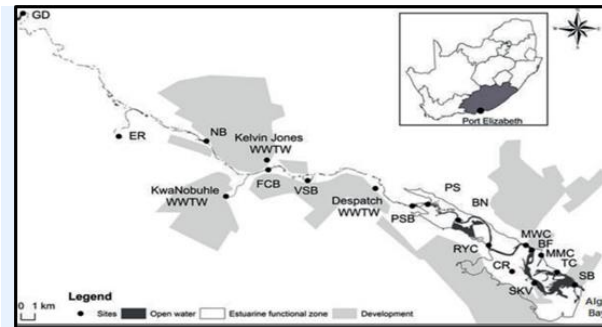
Key Planned Activities / Achievements

- Development (refining) of situational assessment reports: **water quality** ✓
- Establishment of the Project Steering Committee : Buffalo Estuary Forum and PSC for Swartkops estuary : ✓
- Development of common water quality monitoring Programme: ✓
- Real time in situ monitoring: ✓
- Adaptive management plans/ actions : **more needs to be done for reprioritizations of activitie: Buffalo estuary**
- Training of government, community in various skills : Estuarine Management and Monitoring courses. ✓ **Community monitoring together with residence scientist still to explored.**
- Development of communication strategy that facilitates information sharing : **Proper strategy together with the target groups needs to be developed**
- Improvement of compliance and enforcement relevant legislation : ✓
Continuous linked to Operation Phakisa – reactive approach?

Key Achievements: Coordinated Monitoring

- **Swartkops Estuary:** Identified pollution hotspots to be monitored by NPL, DWS and NMM - **Integrated Monitoring (data loggers)**

- **Buffalo Estuary:** Different Department monitoring different parameters at different frequencies; however the results will be shared : **Co-ordinated Monitoring**



Integrated/coordinated monitoring



- National Pollution Laboratory : Walter Sisulu University under Operation Phakisa – monitoring that the two systems for physio-chemical properties, Nutrients ; Microbial and Heavy Metals
- National Pollution Laboratory also do the test, yet to be SANAS accredited

Integrated/coordinated monitoring

Improving access to the upper reaches of the estuary – Swartkops Conservancy



Key Achievements: Adaptive Management Action



- Treatment train comprises of the following cells: Bypass of the stormwater from the canal into the treatment train : Sedimentation cell ; Filtration cell;
- 3 more pollution hot spot sites identified for SUDs
- EIA process underway

Key Achievements: Adaptive Management Action



Deployment of floating wetlands

Key Challenges and Recommendations

- Delayed in assessing the funding from the National Treasury :
- Ownership of the project at municipal level due to organization and political **challenges** in the Metros
- Non-compliance by Industries : Carrot rather than stick to be part of process
- Vandalism of the infrastructure by communities : Involvement of community leaders on the importance of the project in improving the system for community benefit
- Overflow from the Waste Water Treatment Works floods the current treatment train : retention pond to be constructed to store overflow

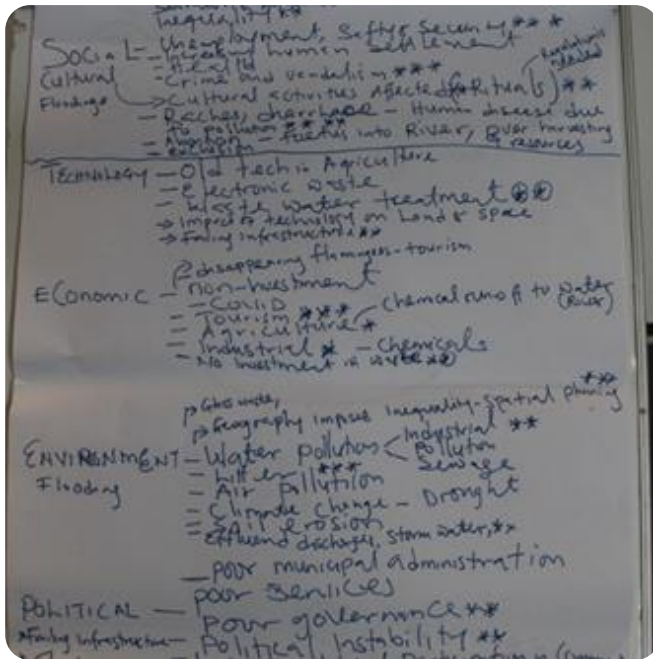


Partnership Opportunities Towards Sustainability

- The Nelson Mandela Bay area is currently confronted by complex sustainability challenges. The Metro faces the prospect of “**Day Zero**” a day where taps may cease to flow due to the water insecurity challenges
- The IWR at Rhodes University and the DWS (Port Elizabeth office) are proposing the establishment of the **Swartkops Catchment Living Lab** as a forum that brings together all actors and knowledge systems for the purpose of collective actions to address some of the **pressing sustainability challenges in the Nelson Mandela Bay Area**.
- First workshop for Swartkops held on January 2022, with the aim of
 - **introducing the SDG-pathfinding project,**
 - **undertake collective exploration of current sustainability challenges in the catchment, and**
 - **co-develop a vision for the catchment in relation to the sustainable development goals.**
- **Sustainable development goals** for the Swartkops catchment on **21 July 2022** in Port Elizabeth.
- This would then be followed by the **first Living Lab session on 22 July 2022**



Partner
Towards Sustainability (Odume,
2022 : First Swartkops
catchment workshop Report
SDG Path funding).



- **Technological challenges:** catchment, failing infrastructure and poor maintenance of existing infrastructure .
- **The economy challenges :** Breeding grounds for migratory and local birds that attract tourists to the catchment. Decline in population of the migratory birds, and thus reduction in the tourism potential of the estuary. The Spar water race was an annual swimming event held on the Swartkops system – moved to Sundays River.
- **Environment/ecological:** Climate change, biodiversity loss, water and air pollution
- **Political:** Governance failure and political instability within the Nelson Mandela Bay Metro are the primary political challenges
- **Historical:** The catchment is still confronted by the legacies of historical apartheid spatial planning.



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*Thank
you!*