



The functionality of wetlands to improve water quality in South Africa

KEY POLICY MESSAGES

- Agriculture employs 70% of the rural economy in South Africa, making it a sector of vital importance to the economy.
- South Africa has not yet successfully addressed the optimal treatment of wastewater coming from agricultural practices.
- There needs to be a move to the use of more eco-friendly fertilisers in farming, coupled with the use of wetlands on farms.
- Proactive measures, aimed at maintaining clean and healthy waterways between the point of the land-based pollution source and coastal areas, are urgently needed.
- An Operation and Maintenance Plan (OPM) is needed that includes the progressive use of wetlands in farming areas.
- South Africa's quality of water forms part of the sustainable development goals (SDGs) – SDGs 2.4, 6.1 to 6.6.
- Farmers need to be made aware of existing legislation and practices pertaining to conservation and ecologically sustainable farming.
- Better management of agricultural wastewater will lead to better conservation, a cleaner environment, and enhanced livelihoods.
- Successful wastewater management of agricultural practices is to invest in the people and their institutions at all local levels.

Measures
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Policy Brief Summary

The pesticides and herbicides currently used in farming in South Africa are polluting the waters that issue from farms as run-off. These waters, which eventually make their way to coastal areas, are damaging the local environment and habitats and are having an impact on the quality of life for people affected by this type of pollution. But a viable remedy is available, namely, the use of wetlands as natural buffers that can absorb harmful pollutants from farm water, before these waters make their way to coastal areas. This, combined with a switch by farmers to more eco-friendly pesticides and herbicides will significantly reduce land-based pollution of water due to farming.

Many countries around the world have long since banned the use of certain pesticides and herbicides that are still currently used in South Africa, because of the impact that they have on water and the environment generally. Meanwhile, South Africa's regulations on pesticides and herbicides are way outdated; they date back to 1947. Though at present there are no finalized policies on sustainable agriculture, several working documents and draft policies do exist that relate to sustainable farming.

Being such a scarce commodity, the sensible management of water and its protection from pollutants is of critical importance. Steps must be taken to eliminate, or at least minimize, the pollution of water arising from the use of herbicides and pesticides that pollute water and are damaging to the environment. There needs to be a move to the use of more eco-friendly pesticides and herbicides in farming. But this needs to be coupled with the use of wetlands on farms because of their capability of absorbing pollutants present in water.

This policy brief sets out the impact of land-based pollution of water from farms, and the measures needed to tackle it over the next ten years so that significant improvement can be made in this area by the year 2060.

Environmental & Socio-Economic Importance

South Africa has very diverse agriculture sectors, consisting of various crop productions. This is arguably the most important sector in the country, as it is fostering economic growth, reducing poverty, and improving food security.

Around 70% of the rural population depends on agriculture for their livelihoods. It is the well-developed commercial farming sector that contributes to the country's agricultural economy, with a 13.1% growth rate in 2020.

In 2019, 5.3% of employees in South Africa were in the agricultural sector; in 2020, agriculture contributed around 2.5% to the country's Gross Domestic Product (GDP). South Africa is currently in its rebuilding phase from the economic shocks of COVID-19.

Agriculture is the one sector of the economy that maintained positive growth momentum in 2020 and into 2021, which policymakers identified as part of the sectors to drive economic recovery and job creation.

Water Management Practices

- In hydrological terms, South Africa is categorized as water-scarce, with more than 60% of the country receiving less than 500 mm of rainfall per annum. Although agriculture uses almost 60% of available water, farmers have been warned that the priority of water supply would be for developing cities. Farmers started to use the water they have more efficiently.
- During dry periods, farmers must rely on groundwater reserves to see them through the rainless season.
- Due to unregulated water reserves, farmers need to start practising more sustainable water usage techniques to conserve for the future.
- While usually relying on municipal water or boreholes, many farmers have started



building their storage dams to capture rainfall for use throughout dry seasons.

- During the rainy season, the storage dam becomes full and can then be relied on during periods of drought. Well-managed storage dams can also become a water resource for livestock or local wildlife. The usage of storage dams creates greater water sustainability and minimises the impact on shared water resources.

Sustainability & Farming

- Farmers use chemicals to control pests and other diseases, called pesticides or herbicides, which allow for much bigger crop yields during harvesting and contribute to food security and the country's GDP.
- However, these chemicals can contaminate soil, water, turf, and other vegetation. In addition to killing insects or weeds, pesticides can be toxic to a host of other organisms including birds and fish.
- The United Nation is currently pushing for more sustainable and eco-friendly farming practices, which farmers must juggle with a growing population, to ensure food security.
- The concept of agroecosystems is a massive move towards eco-friendly farming in South Africa. However, due to its high cost, there are still many harmful pesticides being used around the country.
- South Africa's regulations on pesticides (Fertilizers, Farm Feeds, Seeds and Remedies Act (FFFAR)), have failed to keep up with modern times, dating back to 1947.
- Numerous ingredients used in pesticides today have already been banned by many countries because of the danger they pose to the environment. A study was concluded on the contamination of rural surface and ground water by pesticides in three intensive agricultural areas in the Western

Cape: Hex River Valley, Grabouw and Piketberg. The quantification limit for endosulfan (a type of insecticide) was 0.1 µg/L and was found to be present in groundwater, surface water and drinking water. Mostly, the contamination was found at low levels, however, sometimes exceeded the European Drinking Water Standard of 0.1 µg/L. Other pesticides were also detected. With this study, there is a clear need for regular monitoring of pesticide contamination in surface and groundwater, and the development of drinking water quality standards for specific pesticides in South Africa.

- Currently, there are no final or approved policies on sustainable agriculture in South Africa. However, there is a working document on agriculture in sustainable development and several draft policies and guideline documents delineating South Africa's intentions regarding sustainable agriculture. These policies seek to promote sustainable agricultural practices throughout the nine provinces of the country.

Related Challenges still to Address

- Reducing pollution, eliminating dumping and minimising the release of hazardous chemicals and materials.
- Efficient water use can lead to the overall reduction of total water consumption, greater economic productivity or other benefits (e.g. household consumption, job creation and international relations).
- Developing, adapting and disseminating innovative technologies (cooling systems; drip irrigation).
- Encouraging changes in management practices and behaviours that lead to increased efficiency (e.g. leak monitoring; drought-tolerant landscaping).



- Collecting and sharing data on water use can inform organisations' and people's water use decisions.
- Creating pathways for increased dialogue and stakeholders' participation in water governance processes.
- Protect and restore water-related ecosystems, including wetlands, rivers, forests and mountains.
- Construction of wetlands that absorb nutrients like a sponge and combat eutrophication.

Potential Attributes to Sustainable Agricultural Practices

Sustainable agriculture integrates three main goals environmental health, economic and social:

1. Environmental Health

- Protection of natural resources
- Protection of ecosystem services such as wetlands and marshes
- Control of erosion
- Strategies of flood abatement (soaking and storing floodwater)
- Habitat enhancement for game and non-game species

2. Economic

- Boosting labour productivity
- Increasing agricultural surplus accumulating capital
- Increasing foreign exchange via exports

3. Social

- Create partnerships allowing communities, individuals, businesses, and organisations to protect activities and provide access to data and resources previously unavailable.
- Promotes human health and well-being
- Promote public education that focuses on wetland sciences and protection.

Approaches, Findings & Monitoring

Those directly or indirectly involved in agricultural practices have to be better informed about the Conservation of Agricultural Resources Act of 1984, the 'duty of care' enshrined in section 28 of the National Environmental Management Act of 1998 and the National Water Act of 1998.

These legal instruments will effectively promote conservation, and ecologically sustainable farming and reduce or completely prevent land-based pollution that will consequently significantly improve water quality and the future management of wastewater from agricultural activities.

Knowledge generation and sharing will be critical for the success of any related policy framework. Therefore, all water governance policy engagement should thoroughly consider the lessons learned by experienced locals and continue to implement effective knowledge management as a feedback loop between projects to further sustainable agriculture practices.

When considering the interlinkages between the sustainable development goals (SDGs) and meeting the 30 by 30 targets for improved water quality from agricultural practices, SDG 2.4 (sustainable agriculture) and SDGs 6.1 to 6.6 (increase access to water, sanitation, hygiene; improve water quality; efficient water use; protect and restore ecosystems) should be reinstated for more productive and sustainable agricultural water management and monitoring.

Hence, the government must prioritise strengthening in extending support systems and collaborating with training institutes, ensuring the provision of more holistic and integrated relationships that encourages sustainable and improved agricultural practices.

Implementation framework for capacity building

The South African government policy recognises that truly effective legislative frameworks for improved water quality and wetland conservation must include a combination of proactive measures that



maintain healthy, clean waterways between the point of the land-based pollution source and coastal areas.

It will be of utmost importance to prepare and implement an Operation and Maintenance (O&M) plan for the site or wetland operator. Some requirements to be addressed in the O&M plan include:

Regular inspection of the installed wetland and immediately affected areas, especially after significant rainfall or drought events.

Prompt clean-up of other land-based pollution such as plastics, oil and sediment build-up and if necessary, replacement of damaged vegetation or oversaturated components in the system.

Periodic water quality checks within and around the wetlands and farm, including the removal of accumulated sediment and debris in settling basins and trash guards.

Recover or reverse past degraded wetlands around agriculture-rich areas.

Proactive actions such as integrating wetland rehabilitation projects and community outreach projects with more sustainable or mindful farming will contribute to capacity building in the following ways:

- Livelihoods will improve
- More job opportunities will become available
- Agricultural resources will be better protected
- Biodiversity will enhance
- Higher-quality water will result in waterways
- The base flow in rivers will be sustained
- Erosion and eutrophication implications will reduce
- Other land-based pollution due to farming practices will decline.

Resultantly, programmes and learnership initiatives will be prompted that will contribute to developing South Africa's human resource capacity and create a work environment to further people-intensive programmes imparting invaluable vocational-, life-, and management skills.

The key to successful wastewater management of agricultural practices is to invest in the people

and their institutions at local level, whether they require short- or long-term strategic commitment and even invest in more complex relationship-building.

Steps to take to achieve the stated goals

As per the established national wetland rehabilitation programme, Working for Wetlands 2002, a reinstated incentive by the South African government to the state of affairs is required to bring focus to the importance of wetlands and their function in improving water quality.

A site-based assessment of the downstream area will be essential to determine the pollution levels of land-based runoff wastewater, which will indicate the level of urgency to construct artificial wetlands or recover natural wetlands in the vicinity of the agriculture practices.

If not already present, biofilters and vegetated filtration areas related to wetland systems should be "installed" or be readily accessible to the runoff source to ensure cleaner wastewater end products.

Where applicable, wetland instigation should fit into visual landscapes, incorporating native vegetation and consider other aquatic environments in the area. Accordingly, food and habitats will be created for wildlife and pollinators, as well as cleaner runoff to coastal areas.

Certain developments must be reconsidered in the construction process. We need to include wetlands in future developments and implement improved monitoring programmes and officials.

Financing and Support of the Policy Brief

South Africa must apply for financial support or as a member country to the Organisation for Economic Co-operation and Development (OECD) forum to work together to address the economic, social and environmental challenges of agricultural wastewater management.

Further funding opportunities can come from:



- AgriBEE fund
- Community Involvement Projects
- Department of Environmental Affairs
- GreenAgri
- THRIP flagship research and development programme of DTI and the National Research Foundation.

International Legislative Framework

The United Nations Convention on the Law of the Sea (1982) defined pollution as “the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, a hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of the seawater and reduction of amenities”.

- The law of the sea addresses a range of harm, including pollution from land-based sources, pollution from ships, pollution from dumping, pollution from seabed activities, and pollution from or through the air.
- In June 1992, at the Earth Summit in Rio de Janeiro, more than 178 countries adopted Agenda 21, a comprehensive plan of action to build a global partnership towards more sustainable development to improve human lives and protect the environment.
- Sustainable Development Goal 2: End hunger, achieve food security and improve nutrition and promote sustainable agriculture.
- Approximately 80% of the pollution entering the marine environment comes from sources and activities taking place on land.

National Legislative Framework

- In 2008, the Minister of Environmental Affairs signed into the law of the National Environmental Management: Integrated Coastal Management Act, Act 24 of 2008

(hereafter referred to as “ICM Act”). The ICM Act addresses a variety of issues relating to coastal pollution including the discharge of effluent into coastal waters.

- In 2014, the DEA published National Guidelines for the Discharge of Effluent from Land-based Sources into the Coastal Environment.
- The ICM Act led to the development of a National Coastal Management Programme (NCMP) that is a policy directive for the management of the coastal zone, inclusive of strategies, and plans and also bring together different spheres and sectors of government and communities on the coast for effective implementation of the ICM Act.
- The international legal architecture to manage freshwater and ocean ecosystems does not adequately provide for the interconnected nature of these ecosystems or the transboundary harm flowing between them.
- Waste and wastewater, fish factories, coastal development, shipping, agriculture and forestry as sources and contributors to coastal pollution in South Africa. Emissions and discharges of pollutants are derived from human settlements, resource uses and interventions, including infrastructural development, construction, agricultural activities, industrial developments, urbanization, tourism, etc.
- The sources of pollutants can be land-based or sea-derived and include litter and marine debris, sewage, oil, chemical waste, fertilisers, animal waste and pesticides
- The land-based sources contribute approximately eighty per cent (80%) of all marine pollution in the world.

Creating a Network for Local Institutions

Ensuring the agriculture and water quality and other related policies determines the expected impact of policy changes. Increase the



coherence of their policies with agriculture as friendly for the environment. Several measures for the management of the different pesticides are required by the leading actor to monitor the effectiveness of the regulations, as many articles are not always easy to match with specific information on agriculture and water policies.

Taking account of different stakeholders involved in Agriculture, such as Farmer Associations, Agricultural Departments, Civil Society, NGOs, Municipality, traditional councils Local Farmers, and the Public, tracking all these groups and revitalizing or creating a wetland agriculture forum to monitor the water waste from agriculture, to ensure the water quality and responding to the 2030 Agenda for SDGs.

Those institutions, and the government as a legal entity, must be involved actively in the forum of water quality thought out managing the wetland. As an incentive the forum would ensure that the agriculture company will also make all biological crops more accessible to smallholder farmers that are practising sustainable agriculture.

Delivering, Implementing, Managing and Monitoring Improved Practices

This holistic approach focuses the sustainable and improved water quality and wetland conservation requires attention to other factors, including inter alia, climate change and variability, crop selection, animal nutrition, maintaining ecosystem goods and services, and soil quality as Agricultural Products Standards Act of 1990.

The monitoring group have to be formed with a multisectoral group with most of the capacity for analyzing the water quality responding (Baseline assessment and long-term monitoring with definite and clear objectives) to address the effective Operation and Maintenance (O&M) plan, national legislations with the supervision of Agricultural Research Council (ARC) was established by the Agricultural Research Act of 1990.

Action Plan

Verification by the council forum of all sites with industrial agriculture using chemical fertilizers to develop and follow the operational and maintenance (O&M) plan and facilities in the cattle corridor of agriculture pollution:

- The farmer must provide a semesterly report at the forum of all Chemical fertilisation used in their land and wetlands, providing a water management/mitigation protocol;
- Law enforcement protocol of the wetland approved by the forum;
- Full involvement of local small farmers in discussion as they also are affected by the loss of the soil quality/contamination caused by the use of pesticides;
- Working with a multisectoral team to monitor sanitary inspection
- Creating farmer networking and capacity building as an incentive to farmers doing eco-friendly agriculture by enforcing the government on providing facility on credit and financial assistance as bank investment, protecting land from illegal occupants and providing appropriate spatial planning for integrated development.

After creating or revitalizing and recognising the agriculture forum all different members and emerging farmers in the country will be recommended the adoption of a “Theory of Change” to train farmers in the management of wetland and soil recovery in an inclusive manner.

This will be achieved through increasing capacity for research and development, expanding South Africa’s biosecurity measures to improve safety and the quality of agricultural products, and working with the Agricultural Research Council (ARC) and Onderstepoort Biological Products (OBP) to strengthen the policy and legislative framework.

A system only works as well as it is managed.



References

Journals:

- Bannerman, Roger, and E. Considine, 2003. Rain Gardens: A How-to Manual for Homeowners. University of Wisconsin Extension Publication GWQ037 or Wisconsin Department of Natural Resources Publication PUB-WT-776 2003. Madison, WI
- Dr Sarah Roffe, August 2022, AgriAbout, South Africa's winter rainfall zone and its future outlook. Available at: <https://www.arc.agric.za/Agricultural%20Sector%20News/South%20Africa%20winter%20rainfall%20zone%20and%20its%20future%20outlook.pdf>
- Sigurjonsson, K. 2012. International and Regional Legal Instruments on the Prevention and Elimination of Marine Pollution from Land-based Sources.
- U. S. Environmental Protection Agency. 2007. Developing Your Stormwater Pollution Prevention Plan. Washington, DC United States Environmental Protection Agency. 1999. Stormwater Technology Fact Sheet: Bioretention. Publ. EPA-832-F-99-012.
- United Nations Convention on the Law of the Sea, 1982 Department of Environmental Affairs. 2014. National Guideline for the Discharge of Effluent from Land-based Sources into the Coastal Environment. Pretoria, South Africa.

Websites:

- Agricultural Products Standard Act 119 of 1990 Available at: https://www.gov.za/sites/default/files/gcis_document/201503/act-119-1990.pdf
- AGRIFOODSA, November 2018, 4 Ways farmers are saving water. Available at: <https://www.agrifoodsa.info/news/4-ways-farmers-are-saving-water>
- C Chikozho , R Managa, T Dabata, April 2020, SciELO South Africa, Ensuring access to water for food production by emerging farmers in South Africa: What are the missing ingredients, Available at: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S1816-79502020000200007
- CABI, July 2022, PHYSORG, Study checks progress towards ecofriendly pest management in South Africa, Available at: <https://phys.org/news/2022-07-eco-friendly-pest-south-africa.html>
- Food and Agriculture Organization of the United Nations, (n.d.), Agriculture: cause and victim of water pollution , but change is possible, Available from: <https://www.fao.org/land-water/news-archive/news-detail/en/c/1032702/>
- GreenAgri, (n.d.), Funding Opportunities, Available from: <https://www.greenagri.org.za/funding-and-incentives/government-and-developmental-institutes-financing/>
- Liezl Human, July 2022, Daily Maverick, South Africa's pesticides in spotlight over human and environmental safety concerns, Available at: <https://www.dailymaverick.co.za/article/2022-07-04-south-africas-pesticides-in-spotlight-over-human-and-environmental-safety-concerns/>
- Mary Scholes, April 2022, WITS, Both big and small farms are important for food security, Available at: <https://www.wits.ac.za/news/latest-news/opinion/2022/2022-04/both-big-and-small-farms-are-important-for-food-security.html>
- Mike Muller, June 2016, The Conversation, South Africa's farmers can benefit by reducing their water use, Available at: <https://theconversation.com/south-africas-farmers-can-benefit-by-reducing-their-water-use-60651#:~:text=In%20South%20Africa%2C%20agriculture%20uses%20almost%2060%25%20of%20available%20water>
- Mohammed Essay, September 2021, International Trade Administration, South Africa Country Commercial Guide, Agriculture Sector, Available at: <https://www.trade.gov/country-commercial-guides/south-africa-agricultural-sector>
- National Environmental Management: Integrated Coastal Management Act, Act 24 of 2008, Available at: www.environment.gov.za
- Wandile Sihlobo, October 2021, Wilson Center, Agriculture is key to boosting wealth in South Africa, Available at: <https://www.wilsoncenter.org/blog-post/south-africa-agriculture>