From city rivers to farm fields:
The hidden risk of polluted water

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Water pollution in South Africa's urban rivers and dams is widely recognized as a growing environmental and public health concern. Yet its downstream impacts on farms and smallholdings, where these rivers often serve as lifelines for irrigation and livestock, receive far less attention. Rivers flowing out of urban centres can act as conduits of pollution, carrying contaminants into peri-urban and rural landscapes, placing the burden squarely on communities whose livelihoods depend on them.

South Africa's constitution guarantees the right to an environment that is not harmful to health or well-being. Communities along polluted rivers face declining water quality, reduced agricultural productivity, and heightened health risks - a disproportionate impact that undermines both livelihoods and food security.

Pollution doesn't travel alone

Urban water pollution is not a singular issue, but a combination of stressors moving through hydrologically interconnected systems. Wastewater discharges, storm water run-off, industrial effluent, legacy mining and poor waste management all contribute to declining water quality. Equally important is how these pollutants interact and compound one another. Plastic debris is a useful example. Because plastics are buoyant and durable, they can travel long distances through rivers and dams. Once in the water, they become coated with biofilms that may harbour harmful bacteria and pathogens. Thus, pollution is not only transported downstream but transformed along the way, with hazardous potential (Figure 1).

Impacts on crops and soil

For farmers, water quality directly affects productivity. High nutrient levels are common

Fiigure 1

Fiigure 2

in polluted systems receiving wastewater inputs. While nutrients are essential for plant growth, excessive concentrations can disrupt soil chemistry, affect crop health, and lead to imbalances that reduce yields *and crop quality* over time.

In eutrophic systems such as Hartbeespoort Dam, irrigation water can carry high nutrient loads and organic material *which accelerate soil degradation and complicate long-term management*. Elevated ammonia can become toxic to crops, while high salinity may burn plant tissues and disrupt the soil microbial communities that support fertility, ultimately raising input costs and eroding productivity over time.

Risks to livestock

Livestock are also vulnerable to poor water quality. Many smallholder, communal and commercial farmers rely on rivers and dams as primary water sources for animals. When these sources are contaminated, livestock may be exposed to pathogens and pollutants that cause illness, reduce productivity and trigger costly disease outbreaks. For smallholder farmers, the loss of even one animal can have serious economic and social consequences, affecting food security and household income (Figure 2).

Building resilience in agricultural landscapes

While addressing pollution at its source remains critical, farmers can also build resilience within affected landscapes. Wetlands and riparian zones filter pollutants, trap sediments and improve water quality. When protected or restored, they act as buffers that reduce the impacts of upstream pollution.

Farmers and landowners can also help reduce visible pollution before it moves further downstream. Where safe and appropriate, litter traps, floating capture nets, debris booms and regular clean-up points can intercept plastic waste in farm channels, drainage lines and small streams. These systems must be carefully placed and maintained *to avoid* worsening flooding, blocking natural flow, or releasing trapped material during high-flow events.

Applied research and advisory support are also important. Through the ARC-Natural Resources and Engineering, water quality-related research, assessment and advisory services, farmers can make practical decisions - from identifying water quality risks to choosing safer abstraction points and timing water use to minimise exposure.

Looking ahead

Water quality is not only an environmental issue, but an agricultural, economic and social one. Improving South Africa's rivers will require coordinated action across sectors, including better urban infrastructure management, stronger wastewater regulation, and investment in restoration and remediation. For farmers, practical steps such as protecting riparian buffers and wetlands, intercepting plastic debris where appropriate, and making informed decisions about when and where to abstract water, can reduce exposure to polluted water.

Ultimately, clean and reliable water is about more than ecosystem protection. It is about safeguarding agricultural productivity, rural livelihoods and the resilience of communities that depend on rivers and dams. Ensuring water quality is therefore central to sustaining South Africa's agricultural future.

For more information, visit the ARC-Natural Resources and Engineering services page on the ARC website: https://www.arc.agric.za/Pages/About%20Us/Natural-Resources-and-Engineering.aspx

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