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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

The status of wastewater as an untapped resource in South Africa

A recently published Water Research Commission (WRC) study has reviewed municipal wastewater management in South Africa, focusing on wastewater as an untapped resource. The study further assessed the country's progress toward the Sustainable Development Goal 6 (SDG 6), specifically SDG Target 6.3, which defines indicators for sustainable management of wastewater and ambient water quality. Among others, the study confirmed the need to view wastewater as a resource that still needs to be tapped into in support of achieving SDG 6 by 2030.

Background

South Africa currently ranks very low (123rd out of 187) in terms of the Human Development Index, which includes a consideration of access to clean water and safe sanitation. According to the 2011 Statistics South Africa Census, only 57% of the country's population was connected to sewerage systems. A large number of municipalities in the country provided only limited water supply and solid waste removal services.

More recent data from the Department of Water and Sanitation (DWS) shows some improvement in domestic wastewater management, with 59% connected to sewerage systems. However over 20 million people, one-third of the population, use pit, chemical or bucket latrines, while more than 2 million people, over 4% of the population, still have no formal sanitation. Furthermore, more than 40% of surface water bodies and more than half of the rivers in South Africa do not have good ambient water quality. Much of this deterioration can be largely attributed to the discharge of poor-quality municipal and industrial wastewater, as well as runoff from agricultural areas.

There have been numerous reports of failures in municipal wastewater management systems over the past 20 years, and associated public health and environmental crises. The root causes of these failures lie in poor planning, management and inadequate investment in maintenance and new infrastructure to meet changing demands.

The United Nation's 2017 World Water Development Report entitled ***Wastewater: The Untapped Resource*** highlighted

the vital importance of improving the management of wastewater globally for humanity's common future. The report reports that over 80% of wastewater worldwide is released into the environment without treatment, and over 800 000 deaths reported globally in 2012 have been caused by contaminated drinking water, inadequate handwashing facilities or inappropriate sanitation services.



Around 60% of South Africans are connected to sewerage systems.

The report concluded that the challenge of achieving sustainable water and sanitation for all is significant, and strong political will and commitment are required, with no standard approach that suits all countries available. Finding sustainable development pathways is therefore challenging for water-insecure countries, especially for least developed countries.

This is because many of these countries have limited water

supplies, as well as inadequate professional and institutional capacity. It is often poor countries that are victims of droughts and floods, and to provide reliable and safe water and sanitation under extreme conditions typically requires costly infrastructure.

However, there has been growing consensus that these challenges could be met by adopting a more integrated approach to the management and allocation of water resources for different purposes, including the protection of ecosystems upon which societies and economies depend. The concept of integrated water resources management (IWRM) as reflected in the 2030 Agenda and required governments to consider how water resources link different parts of society, and how decisions in one sector may affect water users in other sectors.

In line with sustainable development goal 6 (SDG6), the 2017 World Water Development Report recommended global response actions for sustainable wastewater treatment, and management based on reducing pollution at source, removing contaminants from wastewater flows, reusing reclaimed water and recycling useful by-products.

Study approach

This study reviewed and compiled published research and news reports, the proceedings of the 2019 conference of the Academy of Science of South Africa, the Inter Academy Partnership Sustainable Development (SDG 6) Workshop, and interviews and correspondence with stakeholders in the wastewater sector. The most recent municipal wastewater services data from the DWS has also been reviewed and summarised.

Main findings

South Africa currently faces serious wastewater and sanitation challenges. While access to sanitation services has improved, more still need to be done considering that 60% of the population that have access to sewerage sanitation are mostly residing in urban areas. There is little spare treatment capacity in the metros, and this poses a threat of exceeding capacity, as on-going urbanisation increases the load on the wastewater treatment plants.

According to the DWS, 52% of sewage is treated safely while 59% of surface water bodies have good ambient water quality. However, a 2014 study showed that 62% of the 50 major water bodies were hypertrophic – having very high nutrient concentrations – and more than 50% suffered from cyanobacterial blooms, while the Vaal, Crocodile and

Olifants river catchments suffer from on-going increases in salinity and sulfate levels. There are also numerous local surface and groundwater pollution problems attributed to poor quality wastewater discharge from both municipal and industrial operations, while the quality of surface water across the country is currently deteriorating, due to poor quality municipal effluent and discharges from industry and agriculture.

Coupled with persistent water shortages and droughts in many parts of South Africa, it is clear that there is need to address the challenges in the wastewater sector and also begin to view wastewater as a resource and make better use of wastewater. In this regard, there are many opportunities to improve wastewater management and move towards meeting SDG Target 6.3.

Generally, the water sector can benefit from more integrated thinking, such as the Circular Economy or Cleaner Production frameworks. Wastewater plants in South Africa should be managed and maintained so that they consistently meet the DWS's minimum discharge requirements, and this will allow for additional reuse opportunities. Greywater recycling, especially in un-sewered communities, must be a key area of attention.

There are opportunities for wastewater treatment plants to produce biogas for on-site electricity generation, and to recover nutrients from wastewater in support of SDG 1, 3 and 7. The expected impacts of climate change on wastewater systems must be considered, with adaptation strategies put in place to develop resilience of the sector against climate change impacts. To ensure sustainable water management funding must be improved through the implementation of wastewater charges and using the Municipal Infrastructure Grant.

The institutional and social barriers against wastewater reuse include gaps in infrastructure, governance, data gathering and monitoring, wastewater charges not being applied, and economic barriers, such as high costs for new or modified infrastructure. There are also social barriers, such as the perception of wastewater as 'pollution', and public health concerns about emerging contaminants such as pharmaceuticals and endocrine disruptors.

Implications and recommendations

In order to achieve sustainable wastewater management in South Africa, a comprehensive overhaul of the entire municipal wastewater system is needed, including renewed commitment to acceptable basic sanitation by politicians,

improved governance, improved skills levels, investment in repairs, maintenance and new infrastructure and improved monitoring and enforcement. The re-introduction of the Drop Certification Programme is critical as it will be useful in ensuring continuous improvements in municipalities' performance.

The local Government should review and implement wastewater charges, and other financial arrangements, including the Municipal Infrastructure Grant, to help fund sustainable wastewater management, including beneficiation. There is a need to provide awareness to policy makers and the public about the benefits of re-using and recycling wastewater to address negative perceptions. Given the current poor reliability of Eskom power, and structural weaknesses in electricity supply that are likely to persist for the foreseeable future, new WWTPs and upgrades to existing plants should incorporate energy efficient technology and also include biogas-based energy recovery and on-site power generation. With regard to the Sustainable Development Goals, for example, SDG 6, the DWS should set clearly publish targets, and resource the monitoring effort accordingly, in partnership with civil society and researchers, and report on progress annually. In the light of the findings of this report, the following topics are considered to be important research priorities.

Conclusions

The DWS currently reports that South Africa is working towards SDG 6, and there has been good progress towards Target 6.3. However, with 52% of wastewater treated and discharged safely, and 59% of surface water bodies having

good quality water and 47% of rivers having good water quality, the country is still a long way to achieving SDG 6. In this regard, the country is unlikely to achieve SDG 6 by 2030. With regard to surface water quality, other studies show a different picture as 62% of 50 major water bodies were hypertrophic.

Overall, South Africa has a comprehensive legal framework for managing water and wastewater. The DWS recognises the need for an integrated water management approach, and to 'improve the water mix', and move away from the current over-reliance on surface water, through recycling and reuse. However, the lack of progress in realising constitutional rights of access to clean water and sanitation, due, in essence, to an institutional incapacity to fully implement this aspect remains a challenge. The failures on numerous fronts have been to the detriment of ongoing cases of untreated sewage spilling into the environment, causing major public health and environmental emergencies that require urgent attention.

Related project:

The status of wastewater as an untapped resource in South Africa (WRC project no. K5/2912). For more information, contact WRC Research Manager, Dr John Zvimba, at Email: johnz@wrc.org.za