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Heading: **Microplastics in freshwater environments; an emerging concern**

In one of the first studies of its kind in South Africa, the Water Research Commission (WRC) undertook research to investigate the presence of microplastics in South African freshwater, the areas of focus included rivers of the North West, Gauteng and Free State, as well as drinking and groundwater sources.

The additional benefit of this study is that it enables a baseline to be set for South Africa for the first time as well as developed and tested laboratory methods for detection and quantification of microplastics in freshwater sources. This study further emphasizes the need for a more coordinated approach for addressing plastic pollution from source to sea.

While plastic pollution in the marine environment is well documented, there are few studies on the extent of pollution in freshwater and treated water sources. The scoping study attempted to characterise the presence, levels and potential implications of microplastics in freshwaters as well as provide recommendations on areas of concern, as well as research gaps and future priorities for South Africa.

Environmental pollution is occurring on a vast and unprecedented scale around the globe. This is largely due to the increasing manufacture, use and release of toxic substances to the environment, significantly altering the natural systems on a global scale. This surge in the use of plastic has led to their massive release into the environment resulting in one of *the biggest global environmental concerns*.

To address some of these serious legacy pollution challenges, countries have ratified a number of global conventions and agreements, such as the Stockholm Convention which deals with persistent organic pollutants (POPs), the Minamata Convention dealing with mercury, and so forth.

However, there are emerging and new pollutant issues, which are currently not covered where there is a clear concern. Plastic and microplastic pollution, along with related nanoparticles, is one such 'emerging' concern and as evidenced in the study, low to medium amounts of plastic particles in surface, tap, and groundwater sources in South Africa were demonstrated in some of the areas of focus. However, and in turn higher microplastic levels have been reported in developed countries, such as China, US and in some European states.

Microplastics (particles less than 5 mm in size) have two main sources: primary sources which are the manufactured microplastics (such as microbeads found in beauty products) and secondary microplastics, which are the fragments that result from the degradation of larger plastic pieces. The major groups of microplastics based on origin and shape are primary particles, secondary fragments and fibres.



Findings from this study have provided insights on some of the hot spot areas and potential threats of plastics to environmental health. In addition, the scoping study has highlighted gaps where action is required.

As follow-up actions, the following is recommended;

- Review and tighten South Africa's response to plastic pollution. Implementation of the waste research development and innovation roadmap needs to be strengthened in order to provide much needed guidance on plastic waste management in the South African environment.
- Efforts for addressing plastic pollution using the source-to-sea concept should be stepped up to fill the knowledge gaps of the various risks associated with environmental exposure to plastics, and better manage the flow of plastic material from various sources.
- There is a need to increase awareness on plastic pollution. The Consumer Protection Act and other related legislation, such as The Foodstuffs Cosmetics and Disinfectants Act and its Regulations, the Food Labelling Regulations (R146), Agricultural Products and Standards Act and its regulations, and the various South African Bureau of Standards (SABS) product packaging and labelling standards, should be strengthened in order to enforce declaration of the presence of plastic ingredients, and also inform the consumer on the recyclability and re-usability of the product.
- Plastic packaging seems to be the most obvious and visible component of inland plastics pollution. Given market forces and few regulations, meaningful voluntary reduction of the plastic components of packaging, or promoting the use of recyclable or reusable plastics (which are more expensive), seems remote. However, even 'remote' opportunities can be advanced, and these opportunities should be investigated.

The issue of microplastics and their impact on the environment is an emergent one that requires more research. The WRC and its partners have committed to a follow-up study to the scoping study on microplastics in freshwater and in partnership with the Department of Environmental Affairs and the Department of Water and Sanitation will be focus on a body

For further information on this report, please contact the WRC or visit the WRC website.

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Microplastics in freshwater environments - A scoping study (Project no. K5/2610). For content-related queries please go to; www.wrc.org or contact Research Manager, Dr Nonhlanhla Kalebaila | nonhlanhlak@wrc.org.za | Tel: (012) 761-9300 ; Ms Khosi Jonas | khosij@wrc.org