

The complexity of plastics pollution

Plastics: Substitutes vs recycling
#plastics #recycling #plasticssubstitutes

Banning plastic straws has become a banner to highlight the issue of plastic pollution, particularly in the oceans. It is considered a 'hook', something that the public can focus on as an entry into understanding the larger issue of plastic pollution and the effect of pollution as a whole.

But it is just that – a hook. It's a dip of one's toe into the murky water as we discover the much larger issues and the complexities that lie within those issues. Eliminating all plastic straws won't prevent the issue of plastic pollution. Government, business, civil society, education, and the public need to be aware of the complexities. We all need to recognise that this isn't a 'plug and play' scenario where one action will fix all.

Most importantly, all stakeholders and, in particular, decision makers mustn't make the mistake of developing a solution to plastics pollution that brings its own problems and unintended consequences – ones that may pose a bigger problem than the problem it was trying to fix in the first place.

To investigate some of the issues around plastic pollution, the [National Science and Technology Forum](#) (NSTF) held an NSTF Seminar. Called 'Plastics: Substitutes vs recycling', the event was held on 15 November 2019 in Gauteng.

We use a lot of plastic

According to Plastic Europe 2018, 355 tons of plastic was produced globally in 2016. Compare that to 1.5 tons in 1950. But there's a reason for the increase.

Plastic is lightweight, easy to process, and used in many industries. Beyond packaging, it's used in building and construction, medical devices, vehicles, electronics and electronics, and agriculture, among other industries.

The NSTF provides neutral collaborative platforms where issues and sectors meet

- One of the National Science and Technology Forum (NSTF) functions is to hold [discussion forums](#), bringing the private and public sector together to address important issues and engage with government policy.
- Feedback from these [discussion forums](#) is given to stakeholders.
- Recommendations are put forward to government as part of the [SET community's](#) (science, engineering and technology) efforts to make input into SET-related policies and implementation.

Global plastics pollution crisis

Yes, we need plastic but we also face a global plastics pollution crisis. Standard plastic can take more than 100 years to degrade and never totally dissolves. While in the ecosystem, the plastics can cause a lot of harm.

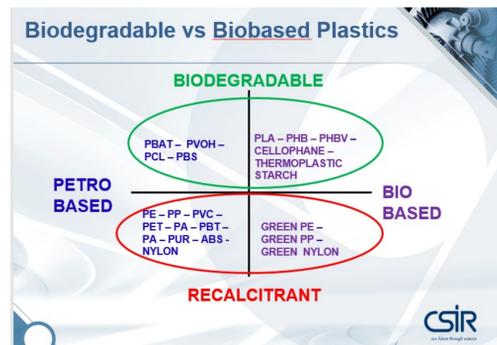
Globally, more than 8 million tons per year of single-use plastics are dumped in landfill sites or oceans. So explains Dr Sudhakar Muniyasamy, Senior Researcher and Technical Leader in Bioplastics and Biodegradable Products at the CSIR Chemical Cluster, Polymer and Composites Research Group. He was presenting on '[Sustainable biobased biodegradable plastics: An Alternative to Non-Biodegradable Plastic Products](#)'. (CSIR stands for Council for Scientific and Industrial Research.)

Muniyasamy noted that other countries, such as China, may be the main culprits when it comes to plastics pollution but the ocean doesn't recognise global boundaries. It's everyone's problem and we all need to take responsibility and action.

Bioplastics as an option

There is global drive to reduce using single-use plastics. Muniyasamy and his team are investigating the possibilities within bioplastics and biodegradable products.

A 'biobased' product refers to its carbon content coming from organic sources (such as plants and agricultural sources) rather than fossil sources (such as oil and coal). However, 'biobased' does not automatically mean it is biodegradable. The plastic needs to be processed in a way that makes it biodegradable. (See the graphic below.)



Slide from Dr Sudhakar Muniyasamy presentation on '[Sustainable biobased biodegradable plastics: An Alternative to Non-Biodegradable Plastic Products](#)'.

For Muniyasamy, it's essential to understand the different terminology and how it works. Terms include bioplastics, biodegradable plastics, and compostable plastics.

Another term to look out for is 'oxo-additives' technology or 'oxo-degradable' additives. In this case, some degradation occurs but microplastics remain. These move through the food chain and into the ocean. Issues with terminology point to the need for credible verification and certification.

Need for standards, certification, and labelling

Muniyasamy calls for legislation, as well as standards, verification, certification, and labelling. Part of all this is to educate the consumer. Labelling should indicate how long the product will take to degrade and where it is considered biodegradable – land, ocean, or both. While the plastic might be biodegradable is it compostable plastic?

International guidelines on biodegradable plastics exist. However, context is important so the CSIR is currently engaging with the South African Bureau of Standards (SABS) to develop standards around biodegradability.

Developing a bioplastics industry

In South Africa, there is no bioplastics industry. Muniyasamy believes there is a good environmental, social and business case for this to be developed. The case includes decreased use of non-renewable resources and the reduction of greenhouse gas emissions during biobased polymer production. There is also potential for job creation, rural development, and innovation.

According to European Bioplastics, Nova-Institute, the global bioplastics market totalled 2.11 million tons in 2018. Packaging being the largest application. Predictions see bioplastics accounting for 40% market share by 2030.

Muniyasamy says there are challenges around biodegradable bioplastics. Two key areas are:

- The potential threat to the South African recycling industry.
- The risk of contamination of recycling systems. You can't recycle biodegradable bioplastics with non-biodegradable plastics.

The case for plastics

We need to understand the wider use and impact of plastic as a whole to make effective decisions about plastic pollution, recycling, and the alternatives. Ms Annabe Pretorius, who was presenting on behalf of Plastics SA, spoke on '[Plastics recycling in SA. Substitutes versus recycling – will it solve our litter problems?](#)'.

Let's look at the case for plastic packaging in more detail. The plastic wrap reduces food waste by making food last longer and it allows for hygienic distribution. Completely removing the packaging has consequences.

If you consider the carbon footprint of plastic-wrapped food item, Pretorius says that about 94% of the carbon footprint is created by what happens before the fruit hits the shelves. The final 6% is in the last leg of distribution and getting it to the home. Part of this 6% is packaging.

Recycling of plastic

Pretorius presented data from Plastics SA showing that the use of recycled plastic in South Africa has increased by 58% from 2010 to 2018. Other data from 2018 showed that 352 000 tons of plastic were recycled into new materials. At the same time, more than 1 million tons were not recycled. Pretorius noted that most of the plastic bags in South Africa are recycled.

Flexible recycling ecosystem in SA

Because South Africa's plastics ecosystem involves people who are pickers, Pretorius says that we can recycle flexible and rigid plastic. In Europe, the machines are not built for this type of sorting. (Different types of plastic are treated differently at the waste management stage.)

The recycling model and value chain in South Africa is based on making money (rather than environmental principles). This includes the waste pickers who usually earn R150-R180 per day. Recycling is not an initiative subsidised by government, such as the model used in Italy. Pretorius noted that the South African value chain needs to be considered when developing other solutions to the plastics problem.

Recycling value chain



Graphic from Ms Annabe Pretorius presentation on '[Plastics recycling in SA. Substitutes versus recycling – will it solve our litter problems?](#)'.

What is industry doing?

When it comes to visible litter, the plastics industry has a [South African Plastics Pact](#) that was signed [8 October 2019](#). This sets specific targets:

- Identify unnecessary plastics
- 100% target for packaging to be re-usable, recyclable and compostable by 2025
- Create targets for recycled content

There is also the 'SA Initiative to end Plastics waste in the Environment'. The focus areas here are: developing infrastructure to collect, innovation and technology, bioplastics, and education and awareness.

Recycling only part of solution

Pretorius says that recycling is only part of the solution. Other components include waste management, education and awareness, litter prevention solutions (such as fines), and clean-up campaigns. There is also space for creating more markets for recycle (such as plastic 'timber' and building materials), as well as increasing recycling standards and reducing the cost of recycling.

Around waste management in particular, there are socio-economic issues where people don't have the infrastructure and services to even deal with waste management. Pretorius says that only 64% of South Africans have access to waste management. This means that 30% of 55 million people do not.

Pretorius sees solutions to eliminating plastics in the environment coming from collaboration – between government, industry, and consumers.

Speakers can be contacted through the spokesperson, [Ms Jansie Niehaus](#). [Video clips](#) with the [full presentations](#) can be found on the [NSTF website](#).

About the NSTF

The [National Science and Technology Forum \(NSTF\)](#) established in 1995, is a broadly-representative stakeholder body for all Science, Engineering, Technology (set) and innovation organisations in South Africa, which seeks to influence policy formulation and delivery.

The [NSTF Awards](#) are unique in SA, recognising the outstanding contributions of individuals and groups to SET and innovation.

The [science bursaries](#) page provides information on bursaries and bursary providers for science, engineering and related studies.

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