



# Commonwealth Litter Programme

**CSIR – DSI – Cefas**

**Marine Plastic Litter Workshop**

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## Executive Summary

Cefas (Centre for Environment, Fisheries and Aquaculture Science), CSIR (Council for Scientific and Industrial Research) and DSI (Department for Science and Innovation) co-delivered a Marine Plastic Litter Workshop in Cape Town on 2<sup>nd</sup> October 2019. The agenda included both plenary sessions and working groups. Current gaps in policy and scientific knowledge in South Africa were discussed along with strategies to addressing them.

During the morning, three presentations covered: the marine litter work conducted by Cefas in the past decades, which included its involvement in the Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR convention); a summary of the achievements and gaps in scientific knowledge in South Africa; and the current legislative framework for the waste management and environmental protection in South Africa. After this plenary session, four working groups discussed:

- gaps in policy and solutions: the group spoke about the need for more enforcement, the ownership of litter in freshwater system and several projects (Operation Phakisa, Khawuleza District Coordination Service Delivery Model, Good Greed Deeds Programme);
- barriers caused by policy and solutions: the groups discussed the possible problems deriving by current EIA legislation, by the conflict between the aim of different governmental departments, and by the current situation in informal areas;
- behavioural change: how to promote best practices: participants agreed that communications has to be done at community, industry and governmental level and that more effort is needed to transform awareness in practical behavioural change;
- data needed to support policy: the group discussed about collecting new type of data to understand the plastic flows in the country (import volumes, commercial data) and possible way of collecting marine litter data expanding monitoring programmes that already exist.

The afternoon was dedicated to discussing micro- and macroplastics monitoring strategies. In a plenary session, the strategies adopted at the international and regional level to coordinate and standardise monitoring strategies were presented. New studies carried out nationally and the approach followed by non-government organisations (NGOs) involved in citizen science were also showcased. Following this introduction, two working groups were created:

- Macroplastic monitoring: the group listed a series of information that are currently missing (data on litter accumulated in the terrestrial environment, litter buried in beaches, and litter released in episodic events). They also spoke about the importance of storing data in a central database was discussed, as well as, the use of drones in monitoring, and creating baselines to assess mitigation success;
- Microplastics monitoring: the group agreed that studies have to be carried out to analyse the accumulation in biota and the effects on the food web. However, since monitoring and baseline studies for microplastics are too expensive and not reliable, effort should rather be focused on macroplastics.

There was then a final discussion about possible solutions to marine plastic pollution, including alternative materials, the implementation of a circular economy, financial mechanisms such as EPR and the need for awareness raising and international cooperation.

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## 1 Opening and welcome

Dr Umberto Binetti (Centre for Environment Fisheries and Aquaculture Science [Cefas], Figure 1-1) greeted the attendees on behalf of Cefas, the CSIR (Council for Scientific and Industrial Research) and DSI (Department for Science and Innovation) that co-delivered the workshop. The audience included attendees returning after day 1 and new ones that were asked to join for the discussion of the second day. The agenda of the day was introduced, consisting of both plenary sessions and working groups. The aim of the day was to listen to what the gaps are in scientific knowledge and policy, understand what data are needed to fill these gaps and identify the preferred monitoring solutions for South Africa to ensure a constant stream of these data.



Figure 1-1 Dr Umberto Binetti's introduction

## 2 Plenary session: gaps in science and politics

Thomas Maes (Cefas) gave a keynote presentation speaking about monitoring of macroplastics and microplastics from the European and Cefas perspective. He spoke about the OSPAR convention (Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic) in Europe and the process through which the convention was created. OSPAR is based on protocols used in clean-ups and studies around the North Sea; OSPAR methodologies were discussed and finalised to provide operators with guidelines to produce comparable data. Mr Maes spoke also about the work that Cefas carried since 1992 to study marine litter on seafloor and to assess the statistical power of marine litter clean-ups studies. Speaking about microplastics, he showed a series of studies he conducted with Cefas to survey coastal waters and sediments around the UK to measure the release of microplastics through sewage systems and assess the efficiency of their removal at the different stages of sewage system. He also showed the method he developed for Cefas to detect microplastics and highlighted how it was able to speed up and ease the identification and counting of particles in sediment, water and several different biota samples.

After the keynote speech, two presentations showed the current achievement and outstanding gaps in both science and policy within South Africa.

Professor Peter Ryan (University of Cape Town, [UCT]), giving a review summary, spoke about the scientific achievements and gaps in marine litter scientific knowledge within South Africa. He summarised the state-of-art science of marine plastic and microplastics in South Africa, showing achievements and gaps in knowledge, as well as the sources and pathways of marine plastic litter (both inland and marine), transport and fate of marine plastic litter, ecological impacts of marine plastic litter (biota and human health), ecosystem service and economic impacts of marine plastic litter, and marine plastic litter monitoring and methods.

Mr Kgauta Mokoena (Department of Environment Forestry and Fisheries, DEFF, Figure 2-1) presented the current legislative framework in South Africa and its gaps. Mr Mokoena quoted several pieces of legislation regarding waste management based on the Section 24 of the South African Constitution, as well as the high-level regional dialogue on Marine Litter and waste management. He spoke about several acts and the three strategies that the department responsible for the environment has developed over the years to promote reducing, re-using and recycling. He also showed how the latest goal had shifted, towards prevention of waste through design and preparation for re-use. Mr Mokoena spoke about the CSIR State of Waste Report, as well as, the adoption of Extended Producer Responsibility (EPR) with plans to apply it to paper and packaging, e-waste and lighting. He touched on the circular economy concept and economic policy incentives. He spoke on Compulsory Specifications on plastic carrier bags that were introduced in South Africa and the recent review on their effectiveness. There is no policy on banning any plastic material currently in South Africa, unlike in Botswana (which is at an advance stage of bans) and Rwanda (who's human rights issues around bans was noted), but work is underway to investigate various controls and measures to be put in place. DEFF also recently received the mandate for prevention of marine pollution due to integration of the previous Department of Forestry and Fisheries (DAFF) into the previously known Department of Environmental Affairs (DEA). The need for an Integrated Marine Pollution Prevention Strategy was also expressed.



Figure 2-1 Mr Mokoena delivering a presentation highlighting the current South African policy relating to waste

### 3 Working groups: gaps and solutions

After the three plenary sessions, the workshop proceeded dividing the room in four different groups discussing each of the following topics:

1. Gaps in policy and solutions
2. Barriers caused by policy and solutions
3. Behavioural change: how to promote best practices
4. Data needed to support policy

Attendees were given the possibility of joining one of the four groups out of their choice, according to their interests and expertise. The groups indicated a Chair who reported on the group's discussions after 50 minutes. At the end of the discussion, the Chairs had 10 minutes each to present a summary of what had been discussed in their group. The main points of these discussions are captured below.

#### 3.1 (1) Gaps in policy and solutions

The group (Figure 3-1) focused on new policies related to waste management and on assessing whether existing policies are working efficiently. The group addressed other major developments happening in South Africa at the moment such as the body of research that is carried out and how it feeds into the policy-making processes. The group identified four main gaps in policy. The clean-ups initiatives organised by the public sector were also considered.

It was noted that South African policies are mostly looking at processes happening on land rather than in the ocean. The group listed a few topics that should be prioritised in South Africa, which were waste minimization; improvement of waste disposal; addressing the unregular clean-ups done by municipalities; and developing the research and actions linked to alternative materials.

The discussion identified that assessing whether the Integrated Waste Management Plans (IWMP) are working is a key topic.

The plastic bag levy review (2019) results were discussed. The review, recognising the long-term inefficiency of the levy, suggests moving to the adoption of a bag that could be utilised in a circular economy, thus reducing waste and boosting the recycling sector.

An upcoming review focusing on the use of single use plastics, and the extent of their use in South Africa, was also highlighted. It was agreed that the development of legislation about alternatives materials is needed, and a better understanding of alternatives is required to inform such legislation. The need to assess the viability of the different alternatives compared to other products was also discussed.

Operation Phakisa, which aims at fast tracking circular economy, was also brought up during the conversation. One of the key elements of Operation Phakisa is the separation of waste at source, which needs to be mandatory to work efficiently. Appropriate laws need to be implemented and enforceable at municipal level, the current bylaws are under review as appropriate bylaws across South Africa have been identified as a gap regarding effective separation at source policies. Operation Phakisa also introduces a system of plastic pellet plants to support the growth of recycling plants in each province. The collection of low value items was also considered as an issue to be solved to reduce the leak of materials in the environment.

The 'District model' is a new South African policy been piloted as a system to improve waste management and other services. The system is based on the Khawuleza District Coordination Service Delivery Model, a project currently running focused on a single district. The idea is that, rather than addressing the problem a national scale, all the effort of the administration is focused on reviewing and upgrading the local services of a single district through different approaches (clean-ups, resource recovery etc.). The final goal is synchronising all levels of the government to have a waste management system that operates correctly within that specific district, which is then used as a pilot to develop other areas. This is a top-down approach, with action started by the President himself.

Another new project discussed by the group was the Good Green Deeds Programme, launched in March 2019 and based on the top-down model used in Rwanda. The Good Green Deeds Programme encourages clean-ups, discourages illegal dumping and promote sustainable waste management practices. It aims at galvanising the South African society to change behaviours and prevent pollution while reducing waste.

Though some gaps in policy were highlighted in the discussion and captured here, it was acknowledged that implementation, rather than gaps, is an issue in South Africa. The compliance and enforcement are not optimal across government and need to be substantially improved, in particular in fields such as the local service delivery, and in the informal areas, where no rates are collected to support service delivery. However, gaps in policy were highlighted such as the lack of local bylaws preventing pollution and marine litter; and the need to make technological solutions for marine litter mandatory for both local government and national government (collection and prevention through technology round stormwater drains was discussed as an example here).



A major gap in policy identified was the uncertainty about who is responsible for the litter entering the rivers. The lack of clarity prevents a clear mandate of responsibility and enforcement. The Department of Water and Sanitation views this as the responsibility of DEFF or local government. However, DEFF holds the view that it should be the Department of Water and Sanitation’s mandate, with local authorities responsible for implementation. Data is needed (knowledge or review gap) to show the impact of litter on freshwater systems since an impact of litter on freshwater systems would deliver the mandate to the Department of Water and Sanitation.

The utilisation of the Green Scorpions in a targeted and concentrated intervention focused on local level for a concentrated time period was also suggested.

Another solution that came out in the discussion was the development of education campaign and operations around the country to promote waste reduction.



Figure 3-1 Groups 1 and 2 during their discussion

### 3.2 (2) Barriers caused by policy and solutions

The group (Figure 3-2) noted that current legislation is standing in the way of the recycling industry by imposing lengthy and expensive environmental impact assessment (EIA) procedures for new facilities. Before applying for an EIA, companies need to have an already existing facility. This system is not efficient, especially if EIA is not successful and leads to the need to create another new facility. According to the group, small businesses are particularly affected by the current legislation and there should be subsidies and incentives for new activities. However, it was noted that rules vary according to the volume of waste processed and that below a certain threshold some permits are not required.

There was also discussion on the fact that most waste is collected by informal workers. There is the need to improve the regulation of this process or at least to make it safer by providing essential services (such as ensuring safety with appropriate PPE, transport to recycling centres etc.). Dealing correctly with this informal sector was seen by the group as a fundamental step

because its disruption could collapse the entire collection system since the work of the informal sector has a direct link with the work of the official recyclers.

One of the institutional barriers lies in the uncertainty of roles between the DEFF and DTI (Department of Trade and Industry). The goal of the two departments is also conflicting: the increase use of plastic is seen positively by the DTI because of the increased business; however, DEFF aims at reducing plastic use to decrease the amount of waste produced. The definition of waste and its consequences must therefore be agreed by the different departments. In defining waste, the departments should also consider how to identify what material has still value and potential to create a circular economy.

During the discussion a few laws were mentioned, such as the 'National Environmental Management Act (1998)' that includes an integrated pollution and waste management, the plastic ban, the process for non-compliance offended; and the 'National Environmental Management: Waste Act 2008' that defines national domestic waste standards, national waste management strategy and had a few amendments.

The discussion about the collection of waste done by Municipalities showed potential problems. The administration is affected by the fact that the service is given to private companies with short-term contracts (3 years). There is already a backlog to deliver the service and the local authorities are under-resourced to catch up with new policies; the implementation will differ according to the economic situation of the Municipalities, also considering that separation might not be profitable and lead to losses. The group therefore expressed the need to identify best practices and apply them to the entire system.

The lack of implementation was also discussed as a problem in the country. There is low public awareness and a negative attitude. In facts, despite a progressive attitude by the politics towards implementing the circular economy, disposal at landfills is still the main fate of most of the waste. It was then discussed whether more implementation is needed, rather than new policies. As an example, the table discussed the plastic bag levy and the current low compliance and enforcement at a national level, as evident with the production of bags that are substandard.



Figure 3-2 Group 2 discussing barriers caused by policy and their solutions

### 3.3 (3) Behavioural change: how to promote best practices

The group discussed whether individuals or companies (or both) need to lead the change in behaviour. It was agreed that there is the need for a stratified behavioural change, using different strategies for different sectors to obtain change at a legislative, governmental and personal level.

Regarding education, the group discussed creating an attitude of “care” for the environment starting from children. The group suggested to include the topic of marine litter in school curricula and it was noted that EcoSchools (currently run by school clubs), already have modules that could be used. Another suggestion was the use of ‘Waste Diaries’ (Expenditure Diaries), in which school children take datasheets home to note down, along with their parents, what they are throwing into their rubbish bins. The American National Oceanic and Atmosphere Administration (NOAA) has done this in USA and the concept is currently being tested by StatsSA in South Africa.

Awareness at national level should also be created to make people aware of damages to the environment. Recycling could be advertised on TV. This could be a collaboration with well-known companies (e.g. Nando’s) to make funny and catchy adverts, and with influencers on social media. It should also be obligatory for brand owners to push recycling. These campaigns should aim at changing behaviours at all levels of the socially complex South African society (communities, industry and government).

#### Community

Outreach is already done by various organisations that are going out to communities to educate and conduct surveys through questionnaires. There is the need for more awareness campaigns in order to teach communities that their actions can harm the environment. Higher awareness would be useful to tackle the problem of low compliance, considering that there are no consequences when laws are broken (people dumping next to the signs saying ‘No dumping’).

There is the problem that municipal workers are afraid to go into certain communities; there is therefore a need for good relations between communities and municipalities.

Possible constant messaging about behaviour people should be adopted (behaviour nudges, e.g. “save water campaign” in Cape Town that caused many people to change their behaviour). There is also the option of giving people incentives to change behaviour, such as incentives to collect recyclable items.

### Industry

The groups suggested that industry should be able to provide alternatives to plastics, items designed for easy recycling and items made to last. All these actions would help circularity and should fit in a system that include all stakeholders in the production and distribution chain, from the raw materials to converters, brand owners and retailers. Educating the retailers would also be a way of creating agents of change to educate and inform people that can then put pressure on government to change policies. This was seen as a possible way forward considering that environmental pressure made industries change in the past.

Another mechanism is the Extended Producer Responsibility (EPR), a system that can change industries mindsets and actions. EPR is voluntary but this should change and become compulsory by law.

### Government

The role of the government was also discussed. Government needs to have the goal to reduce litter as they did for saving water. Industry should be involved to build infrastructure and facilities and the government should subsidise virtuous industries and create drives to the end market through incentives. Government has also to address the widespread lawlessness.

## 3.4 (4) Data needed to support policy

The group (Figure 3-3) discussed about the paper by Jambeck et al. (2015) which listed South Africa as 11<sup>th</sup> worst land-based litter producer in world. Doubts were expressed about this ranking because in the paper the amount of waste was estimated based on GDP, population density, and mismanaged waste instead of using empirical data. This is probably because there is a lack of data, which is also a major issue to start any action that would eventually feed into policy.

Speaking about financing, the group suggested that investments in Africa should be focused on solving problems on land to prevent plastics getting into environment in first place. When speaking about mitigation policies, environmental monitoring is key because it can show if these strategies are working. In order to carry out this monitoring, there is no need to reinvent the wheel and projects that are already in place can be used (e.g. Dirty Dozen). South Africa have ongoing water quality testing such as the River Health Program, in which a monitoring plastics component could be added. Fisheries boats could also be obliged to report any litter found in their nets.

The group was aware that there are many calls for banning single use plastics, but that evidence is needed to support its effectiveness. In fact, data on how many items enter the environment and measurements of the abundance of single use plastics in the environment before the ban are missing. Data on the impacts of plastics on the environment are also missing, especially on benthic ecosystems. Particular attention should be given to the survey of point sources (e.g. stormwater drains and waste water treatment plants) when evaluating the efficiency of mitigation strategies.

The presence of compliance monitoring is also important because implementation of policies is pointless if no one complies to them.

The communication of monitoring data to the government and the public should be done with care. One way to do this is to write annual reports (IPCC report could be template). Also, the dissemination of any data and information to the consumers requires for their production to be transparent.

Another possible action is based on data about specific brands found as litter in the environment, which can be used to highlight main producers of plastics that should implement EPR.

#### Operational monitoring

The group asked what should be monitored due to differences in the catchment areas (for example, rivers) and accumulation/turnover dynamics.

Apart from the litter in the environment, there are also other types of data that can be monitored: what comes into the country, what is being produced in the country, what is happening to the plastics, what is economically recyclable and what is actually being recycled. Checking what products and materials are imported in the country is useful to implement policies that manage what is imported in South Africa. Data on the amount of plastic that is not recyclable is also important and retailers should be held responsible for using recyclable plastics and to additional actions such as moving away from colourants. Looking at the private ownership of this type of data in Europe, the group also noted the need to increase transparency.

#### Economic data

The working groups highlighted the need for data on the socio-economical side of the problem. Economic means are a real issue to tackle marine litter in South Africa when compared to a more emotional approach that leads to tackling actions in Europe. Therefore, changing the focus from the environment to the economic impacts might make actions more viable in South Africa.

Environmental awareness is helpful but needs waste minimisation at the product level, for example looking at product design and imposing recycling targets on producers. These issues must be discussed with stakeholders, which leads again to the need for data on the social aspects and the economic impacts of the issue and of the incentives. An example would be to assess the economics of blue flag beaches: reducing trash on beaches increases tourism and leads to an increase of income to the area, which makes it worthwhile for people to pick up the litter and to establish economic enterprises.



Figure 3-3 Group 4 discussing data needed to support policy

## 4 Plenary session: monitoring

The goal of this plenary session was to present monitoring strategies at different geographical scale. These presentations showed how coordination in monitoring activities is ongoing in order to standardise methods and facilitate knowledge and data sharing. These presentations provided a framework for the discussion about the monitoring of microplastics and marine litter that followed at the end of the plenary session.

Dr Binetti (Cefas) presented the international aspects of monitoring. He showed how the United Nations (UN) is dealing with marine litter with specific targets in the Sustainable Goal 14 (Life Below Water). He presented also other initiatives such as the UN Environmental Assembly (UNEA) and the UN Environment Programme (UNEP) that try to coordinate the monitoring effort for marine plastics and microplastics sponsoring initiatives such as the Global Partnership on Marine Litter, which aims to develop national and regional Action Plans. He also showed that protocols to standardise data gathering at a global scale are also published through GESAMP. Monitoring carried out by citizen scientists is also coordinated through several international initiatives such as the International Coastal Cleanup by Ocean Conservancy.

Scaling down to regional effort, Toshka Barnardo (Sustainable Seas Trust, [SST]) presented the monitoring activities that the SST is carrying out for the African Marine Waste Network (AMWN). This project involves research, education, enterprise development and communication/networking. SST is carrying out the marine litter monitoring for the Western Indian Ocean Marine Science Association (WIOMSA), working for three years in seven African countries that face the Indian Ocean, monitoring macro-litter, meso-litter, rivers and stormwater canals. This work involves studying litter standing stock and accumulation rates (flux) using a standardised protocol, and a manual of this protocol is currently been developed. They also use innovative systems such as: apps, remote sensing with drones and international workshops to ensure that protocols are understood and followed by all operators.

Professor Peter Ryan (UCT) presented an example of a new monitoring area - that he developed in the last years to analyse plastic bottles found on beaches. The research has shown an increase in the number of bottles of Asian brands being stranded on South African beaches. Modelling the debris dispersion patterns and looking at the very low presence of these Asian brands among litter in the city waste, he concluded that the majority of marine litter found on beach in South Africa is originated at sea, which challenges the current view of marine litter originating principally (80%) on land rather than at sea.

Maria Honig presented the work of the Beach Co-op, a NGO devoted to clean South African beaches while empowering coastal communities and to reduce the use of single use plastics. She presented the approach of citizen science to beach litter monitoring and she introduced the concept of the Dirty Dozen, a group of twelve single use items found commonly on South African Beaches. The Dirty Dozen became the main focus of clean-ups carried out by the Beach Co-op, which were more and more successful over the years. The Beach Co-op saw in the past few years a significant increase in the number of people involved, number of clean-ups, length of coastline cleaned and in the amount of litter removed.

## 5 Working groups: monitoring

After the presentations, two new working groups were established to discuss macroplastic monitoring and microplastic monitoring. The goal of the working groups was to identify parameters, protocols and any other details that could be useful to implement or improve monitoring programmes in South Africa. Following what had been done for the working groups during the morning sessions, attendees were given freedom to choose which one of the two groups they wanted to join. Each group nominated a Chair whom, after one hour, gave a brief summary of the discussion.

### 5.1 Macroplastics monitoring

The group focused on the monitoring of macroplastics started the discussion pointing at the importance of defining what scientific question is asked when monitoring plans are designed. It was suggested that funding of the research should be connected to pilot studies and policy changes to measure change. The group also asked who is responsible for funding and planning monitoring and who can make sure that it happens in the best way. It was suggested that there should be connection between government/ policy and academics.

Several gaps in knowledge were identified as focus areas for future research. The scientific and regulatory community needs data about the accumulation of terrestrial litter, the paths of litter on land (including in storm drains and on roads), about the release of marine litter during episodic events, and about buried litter linked to the sea level rise and to landfills close to the sea.

It was suggested that all the data should be stored in a database where data can be accessible to everyone and protected for posterity. The database should be managed by the South Africa Environmental Observation Network (SAEON) or DEFF and should also include an embargo on

the use/access of data to allow for scientific articles to be published without interference. The database would help with harmonising protocols, since depositing data in a shared database would require the adoption of standardised methodologies and categories. Basic form-sheets should be available and should be the base for any complexity added to the surveys.

Using drones was suggested to collect more data and to ground truth estimates. Drones would be also useful to collect data in informal settlements or areas where it may be difficult to survey. Data from drones could also be used in measuring the impact of education campaigns. This technology could also be used to study episodic events.

The group also spoke about the creation of baseline datasets to understand effectiveness of mitigation policies. These baselines could be acquired either through specific and separate monitoring programmes or be included in other data collection programmes. It was also agreed that any signal in the record deriving from the effects of mitigation policies should be strong (such as half or double).

## 5.2 Microplastics monitoring

During the discussion, the group raised the question on why microplastics should be monitored in Africa. It was suggested that microplastics monitoring is not necessary in Africa, since establishing baselines of microplastics abundance and characteristics can be difficult and expensive, and funding in Africa is limited. However, research should be carried out to assess the impact of microplastic on the food-web.

It was also noted that a few monitoring schemes are already in place and could be used to collect additional data with limited costs. For example, DEFF is carrying out surveys at sea twice a year, which could be used to collect water and/or sediment samples at relevant locations. In particular, sediment samples were indicated as the most relevant to assess the presence of microplastics in the environment, as they act as sinks for microplastics. However, the costs of analysing the data remains an issue.

In addition, interest was expressed for the assessment of microplastics presence in the food web, and their potential bioaccumulation and impacts on the physiology of individuals, the survival of species and other effects. The group suggested to focus on invertebrates because many are filter-feeders (bivalves, see Nel et al. [2018]<sup>1</sup> study in rivers), but small pelagic fish are also good candidates since retention times are known.

During the discussion it was also said that it would be important to study pollutants/toxins associated with plastic, especially considering that longer-term exposure effect on fish will increase toxicity. This would be important in aquaculture and in freshwater fisheries because many people depend on rivers and a lot of waste-water treatment end up in rivers. However, there are no facilities in South Africa to conduct such analyses. However, it was noted that many studies looked at the impact of plastic-associated pollutants and found very little evidences of negative impact.

<sup>1</sup>Nel, H.A., Dalu, T. and Wasserman, R.J., 2018. Sinks and sources: Assessing microplastic abundance in river sediment and deposit feeders in an Austral temperate urban river system. *Science of the Total Environment*, 612, pp.950-956.



The group concluded that while studying microplastics in Africa may be of interest, it will not contribute to solve the issue of plastic pollution in the oceans, so emphasize should remain on macroplastics.

## 6 Open discussion: solutions identified by science

The last session of the day was a plenary discussion about possible solutions to tackle marine litter in South Africa in the next future, based on the expertise and educated opinions of the attendees.

The first suggestion was to focus on stopping illegal dumping. However, a clear solution to this problem was not identified and it was recognised that this is a complex topic. Furthermore, that some aspects such as the formalisation of the informal sector are of particular concern in South Africa due to their social and economic impact.

The industrial sector has already started initiatives that aim at decreasing the amount of marine litter amount in South Africa. These actions include education activities and material, clean ups and other initiatives for improving waste management. Public and sectorial discussions on maintaining the value of material in the loop are also organised.

Alternatives to plastics such as bioplastics were also discussed. It was agreed that a better understanding is needed on how they work and what their impact is. The alternatives should be certified, and standards should be created. It was also suggested that definitions (for biodegradability for example) should be agreed, standardised and clearly stated on products. The Council for Scientific and Industrial Research (CSIR) is funding a project looking at biodegradable plastics and recycling contamination. Some of these plastics seems to be recyclable, but some are of lower quality, and the risks to the recycling industry need to be considered. Life cycle assessments of alternatives, the viability of production within South, and fate at the end of life of the alternatives are all important considerations. It was strongly indicated that business does not support OXO-biodegradable.

Examples of projects that explore alternatives performing life-cycle-assessments were discussed. These studies aim at understanding the overall impact of the alternative materials and inform policy about best solutions to implement. Some of these studies are funded by South Africa, in particular by CSIR, in collaboration with Kenya and Japan government. The programmes involve academics, governmental agencies and industry.

Reuse and recycling were both discussed. Moving towards reusable items would mean distributing goods in an alternative way than the current business as usual, for example implementing a system of refill stations for the products. This was seen also as an opportunity for small business development and innovation challenges. In order to boost recycling, specific design is needed. DEFF could also put in place targets for waste diversion from landfill (to recycling), which would force industry to respond and comply – a 90% diversion in 6 years was given as an example of a diversion target. The current targets are considered to be too low. This would need to be a mandatory target. This would be an easy way to keep material into the

service chain and out of the environment. However, it was recognised that this system needs adequate infrastructure in place.

The World Wildlife Fund (WWF) is developing a South African Plastics Pact that has several aims including increased recyclability and reduced use of single use plastics and packaging. The Pact goal is to set national targets to be followed by brand owners, producers, retailers and any other member that would sign up.

The importance of behaviour change and education in tackling marine litter was recognised. SST is developing educational material for school curricula and other resources to be used in schools. The DEFF Good Green Deeds is outreach based. The IWMP plans have education built into them – these however are dependent on government approval. Big investments are required for awareness campaigns. It was suggested that in order to help outreach campaigns, industry may reinvest money gathered through EPR - this would be an industry managed mandatory EPR. However, it was argued that even when campaigns are there, the message is not able to lead to positive behavioural change. Understanding the effectiveness of outreach campaigns is key for implementing increasingly effective campaigns.

The group of attendees also recognised that scientists have the responsibility to share with the general public research findings and data in a format that could be easy to digest. At the moment there are not many science journalists, and this should be improved. There are international programmes (e.g. UNEP) that offer training for scientific/environmental journalists and South Africa should look into this opportunity. NGOs such as WWF plastics programme have communication strategies with robust science behind it, showing an example of a possible channel between scientists and the general public.

Education was however not considered enough to solve the problem of lack of service delivery. The lack of waste collection in informal settlements and the resulting illegal dumping have to be solved. Dumping is uncontrolled because alternatives are lacking, and infrastructures are insufficient (citizens have nowhere to put waste). This situation can change if tackled by local government. Waste needs to be collected, but municipalities have the problem of finding a system to safely collect and dispose waste that can be financially sustainable. The attendees agreed that, before improving education, there should be an effort to force South African municipalities to fulfil their constitutional responsibility to collect and dispose of waste.

Another aspect that was discussed was the need to give people a choice and an alternative about how to dispose waste. Sorting at source has in fact limited value if all the waste is delivered to landfill anyway. Even during beach collection volunteers might think that collected waste is recycled, while it goes to landfill instead, and this might frustrate their effort and willingness.

The sorting and access to infrastructures is also a problem because many municipalities don't meet or don't have resources or capacity (infrastructure, human power, money) to comply to the law standards. However, in 2015 local authorities had access to 9 billion ZAR to carry out collection, transport and dumping and therefore the problem might be the governance, which is locked in the current system of collect and dump, rather than lack of funding. The situation is also aggravated by low enforcement of municipal bylaws, with low frequency of punishment

and fining/ticketing. It has also to be considered that large informal settlements might require 80+ years to be solved according to planning permission authorities.

EPR was also mentioned following the discussion presented by Mr Kgauta Mokoena at the beginning of the day. There is however the problem that EPR could be used improperly: it is implemented as a tax, but revenue is not used for waste management. The industry would be supportive of the system if correctly implemented and has a current scheme that is voluntary but needs to be mandatory; however, EPR should be carefully planned not to become a tax which goes to consumers.

At last, it was stated that tackling marine litter should be an international action since this problem is of global scale. In order to achieve a global action, everyone needs to play following with same rules. A framework was therefore suggested (an International Panel for Marine Litter) which could be potentially be part of the Basel or the Stockholm conventions or other similar conventions covering trade in plastic waste.

## Appendix 1: List of attendees

Peter Ryan	University of Cape Town
Coleen Moloney	University of Cape Town
Eleanor Weideman	University of Cape Town
Mark Graham	GroundTruth
Lorien Pichegru	Nelson Mandela University
David Glassom	University of KwaZulu-Natal
Olusola Olaitan Ayeleru	University of Johannesburg
Zaynab Sadan	WWF
Lucienne Human	South Africa Environmental Observation Network
Fiona Piller	WWF
Sumaiya Arabi	Council of Scientific and Industrial Research
Trishan Naidoo	University of the Western Cape
Stephen Lamberth	Dept Environment Forestry and Fisheries
Henk Bouwman	Northwest University
Tony Ribbink	Sustainable Seas Trust
Carina Verster	Northwest University
Toshka Barnardo	Sustainable Seas Trust
Danica Marlin	Sustainable Seas Trust
Carl Van Der Lingen	Dept Environment Forestry and Fisheries
Takunda Chitaka	University of Cape Town
Kgauta Mokoena	Dept Environment Forestry and Fisheries
Anton Nahman	Council of Scientific and Industrial Research
Juliet Hermes	South Africa Environmental Observation Network
Yazeed Peterson	Dept Environment Forestry and Fisheries
Pamela Nxumalo	Dept Environment Forestry and Fisheries
Mark Gordon	Dept Environment Forestry and Fisheries
Maria Honig	The Beach Cooperative
Anusha Raykaran	University of the Western Cape
Douw Steyn	Plastic SA
Linda Godfrey	Council of Scientific and Industrial Research
Thomas Maes	Centre for Environment, Fisheries and Aquaculture (Cefas)
Fiona Preston-Whyte	Centre for Environment, Fisheries and Aquaculture (Cefas)
Adil Bakir	Centre for Environment, Fisheries and Aquaculture (Cefas)
Umberto Binetti	Centre for Environment, Fisheries and Aquaculture (Cefas)
Josie Russell	Centre for Environment, Fisheries and Aquaculture (Cefas)

## Appendix 2: Agenda and group picture

Table II-1 Agenda of the day

8.30 – 9:10	Registration and coffee
9.10 – 9:40	Plenary session Welcome and keynote speaker
9:40 – 10:10	Plastic marine litter in South Africa, known knowns and known unknowns
10:10 – 10:40	Policy overview and gaps
10:40-12:30	Workshop – Four groups to discuss: <ul style="list-style-type: none"> <li>• Gaps in policy and solutions</li> <li>• Barriers caused by policy and solutions</li> <li>• Behavioural change: how to promote best practices</li> <li>• Data needed to support policy</li> </ul>
12:30 – 13.30	LUNCH and group picture (Figure II-1)
13.30 – 14:15	Background on monitoring methods – focus on global, national, regional and citizen science
14:15-15:45	Workshop – Two groups to discuss: <ul style="list-style-type: none"> <li>• Marine litter monitoring</li> <li>• Microplastics monitoring</li> </ul>
15.45 – 16.15	TEA BREAK
16:15 – 17.00	Open discussion: solutions identified by science



Figure II-1 Group picture with all attendees of the workshop



Centre for Environment  
Fisheries & Aquaculture  
Science



## About us

We are the Government's marine and freshwater science experts. We help keep our seas, oceans and rivers healthy and productive and our seafood safe and sustainable by providing data and advice to the UK Government and our overseas partners.

We are passionate about what we do because our work helps tackle the serious global problems of climate change, marine litter, over-fishing and pollution in support of the UK's commitments to a better future (for example the UN Sustainable Development Goals and Defra's 25 year Environment Plan).

We work in partnership with our colleagues in Defra and across UK government, and with international governments, business, maritime and fishing industry, non-governmental organisations, research institutes, universities, civil society and schools to collate and share knowledge.

Together we can understand and value our seas to secure a sustainable blue future for us all, and help create a greater place for living.

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Innovative, world-class science is central to our mission. Our scientists use a breadth of surveying, mapping and sampling technologies to collect and analyse data that are reliable and valuable. We use our state-of-the-art Research Vessel Cefas Endeavour, autonomous marine vehicles, remotely piloted aircraft and utilise satellites to monitor and assess the health of our waters.

In our laboratories in Lowestoft and Weymouth we:

- safeguard human and animal health
- enable food security
- support marine economies.

This is supported by monitoring risks and disease in water and seafood; using our data in advanced computer models to advise on how best to manage fish stocks and seafood farming; to reduce the environmental impact of man-made developments; and to respond to serious emergencies such as fish disease outbreaks, and to respond to oil or chemical spills, and radioactivity leaks.

Overseas, our scientists currently work in Commonwealth countries, United Kingdom Overseas Territories, South East Asia and the Middle East.

Our customer base and partnerships are broad, spanning Government, public and private sectors, academia, non-governmental organisations (NGOs), at home and internationally.



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