

WASTE NO MORE

Study on plastic soup

Position paper Van Gansewinkel Groep
June 2010

Summary

Van Gansewinkel Groep and Royal Boskalis Westminster have carried out a study into the contamination of the oceans with plastic. A voyage across the Indian Ocean has led to the initial conclusion that cleaning up and processing the 'plastic soup' in the oceans is not yet financially or environmentally viable.



The makers (VPRO) of the Dutch television programme 'Beagle: In the wake of Darwin' invited Boskalis and Van Gansewinkel Groep to sail with the clipper Stad Amsterdam in the spring of 2010 to map potential cleaning and processing methods for the plastic soup. They were on board for three weeks. Boskalis specialises in solutions for complex marine problems. Van Gansewinkel Groep was asked to participate because of the company's extensive knowledge of products, raw materials and recycling.

Our vision of Waste no more made it our social duty to contribute to the study on plastic soup. Arend Bolt, project manager business development, joined Stad Amsterdam on behalf of Van Gansewinkel Groep. He was supported from head office by a team of seven experts in the field of materials and material flows. This think tank was lead by European contract manager Peter Vingerhoeds.

When taking the plastic samples, sea life, such as small fish, jellyfish and algae, was also brought to the surface. These were caught in far larger quantities than the plastic. The unintentional by-catch of sea organisms would do more harm than good during cleaning up the plastic soup.



Van Gansewinkel Groep believes that absolute priority must be given to preventing more non-degradable waste ending up in the seas and oceans through effective and efficient collection and processing systems and education in countries where the plastic waste is still being dumped in the environment unrestricted. It is estimated that 80 to 90% of the plastic waste in the oceans originates on land and 10 to 20% from shipping.

We are also convinced that solutions for preventing the harmful effects of this plastic soup should be sought at the product design stage. Smarter design and better material composition have the potential to drastically reduce the negative ecological effects of materials that end up in the sea. This also fits in well with the Cradle to Cradle principle.

Van Gansewinkel Groep wants to actively deploy its knowledge of materials, logistic systems and Cradle to Cradle philosophy to contribute to the fight against and prevention of the harmful effects of the plastic soup:

- by initiating subsequent studies in cooperation with scientific institutes and making its knowledge available;
- by developing Cradle to Cradle solutions together with partners and customers;
- by providing education in the area of prevention on various levels.

Arend Bolt (l) of Van Gansewinkel Groep and Haico Wevers of Boskalis investigate the plastic out of the Indian Ocean.



Arend Bolt working on board of the clipper 'Stad Amsterdam'.

The journey of discovery

Synthetic materials have endless applications and are being used in an increasing range of products. This versatile plastic, however, is mostly non-biodegradable and could have an unpredictable impact on ecosystems. That is why we are drawing attention to the plastic soup, the accumulation of plastic in the centre of the oceans' currents. Since the discovery of the plastic soup in the Pacific Ocean in 1997, this phenomenon has been studied by various disciplines and has become internationally known. As these studies are in their infancy, knowledge about the causes and consequences of the plastic soup is scarce and unstructured. This also applies to possible cleaning up methods and strategies for involving the international community in the problem.

The VPRO programme 'Beagle, in the wake of Darwin' is used to graphically draw attention to various topics, including plastic soup. For this purpose several scientists went aboard the Stad Amsterdam, the clipper renamed the Beagle for the re-enactment of Darwin's historic journey. Between 14 March and 7 April, Arend Bolt of Van Gansewinkel Groep and Haico Wevers of Boskalis were on board to study the problem of pollution by plastic waste. Arend and Haico are not scientists, but were asked by the VPRO to use the practical knowledge of their companies to explore realistic solutions.

With the collaboration of researchers from Algalita, the American 'discoverers' of the plastic soup, and NIOZ (Royal Netherlands Institute for Sea Research), samples of the plastic waste in the Indian Ocean between Australia and Mauritius were brought to the surface and analysed. Their findings were extensively reported, discussed with other scientists on board and regularly debated with colleagues in the Netherlands, who closely followed Arend and Haico's progress giving advice and assistance. Plastics Europe, the branch association of European plastics manufacturers, supported the journey and the study by providing information and critical input to the

discussions. Also several student groups, including from the University of Wageningen, made an active and valuable contribution to the study during the journey. The findings, questions and responses are also detailed on the weblog, which was kept during their journey:

www.beagleplasticsoep.wordpress.com

www.beagle.vpro.nl/#/blog/item/3354/comments

Findings

During the journey 15 samples were collected using a driftnet with a mesh size of 0.5mm of the material that drifts in the top 10-20 centimetres of the ocean. Pieces of plastic were found in all samples taken. The amount of plastic in the catches varied and increased the closer the samples were taken to the centre of the current or gyre. However, besides plastic, sea life, such as small fish, jelly-fish and algae, was also brought to the surface. In some cases the fish caught had small particles of plastic in their stomachs. On average the plastic particles ranged from a few millimetres to several centimetres. The plastic pollution in the ocean is so diffused that it is scarcely immediately visible anywhere. The maximum quantity found during the journey was 200 grams per square kilometre. It must be noted, however, that the Beagle has not yet sailed through the theoretical centre of the Indian Ocean Gyre. The plastic waste appears to consist mainly of polyethylene and polypropylene, widely-used plastics that are lighter than water. For obvious reasons heavier plastics were not found in the samples. These types of materials, such as PVC, PET, nylon and polyester quickly sink to the bottom and are therefore found mainly on the seabed of coastal waters.

The study started on board of the Stad Amsterdam has not yet been concluded and the consequences of plastic pollution on the ecosystem are not yet fully understood. Charles Moore's Algalita organisation will study the samples in more detail in its laboratory. Some of the samples taken still need to be analysed by DSM Resolve to see whether they contain any toxic organic components. It is assumed that such contaminants (POPs) accumulate on the plastic and so cause widespread damage to the food chain and ultimately to humans.

Clean up?

Although the nature of the companies - dredging and waste management - would lead you to expect otherwise, Boskalis and Van Gansewinkel employees came to the conclusion that cleaning up and processing the plastic soup from the ocean's gyres is not the right decision. The amount of money and energy required for this is disproportionate to the immediate improvements one could expect. Furthermore, the environmental damage caused by the unintentional by-catch of sea organisms would outweigh the benefits. This does not, however, mean that nothing should be done - on the contrary. It is vitally important to draw attention to ocean pollution and to work together as a global community to ensure that the level of ocean pollution does not increase. If nothing is done now, there may come a time when the plastic will have to be cleaned up from the gyres. It must not be allowed to come to that.



Follow up

Although ocean clean-up campaigns currently do not appear to be feasible, it does not mean that no action can be taken to clean up plastic waste from beaches, rivers, coastal waters and harbours. Waste, including plastic waste, is often more concentrated in these areas, making any clean-up campaign more efficient. Van Gansewinkel Groep is more than happy to provide expertise where needed. This type of pollution is found in Europe, but is most prevalent in Asia, Africa and America. It demands a global approach as well as international cooperation and agreements.

In addition, researchers are strongly in favour of regularly taking and analysing samples in order to accumulate more reliable information on the scope and consequences of the pollution problem. Ideally, samples should be taken by existing international merchant shipping during regular voyages. If further research were to indicate that the ecological damage is or has become much greater than currently assumed, an expensive clean-up operation might still be justifiable.

No dumping!

The public debate on plastic soup is leading to appeals to drastically reduce or eliminate the amount of plastic used. Careful use of scarce materials is absolutely vital, but the way plastics are being manufactured and used is not the reason why oceans are polluted. Pollution is caused by careless dumping of plastic and other waste. Absolute priority must, therefore, be given to preventing even more non-degradable waste ending up in the seas and oceans, through effective and efficient collection and processing systems. Of course such systems have already existed for decades and are being successfully applied in the western world to various products and materials. In countries where plastic waste is still being dumped carelessly into the environment it is not only the systems that are missing, but also the awareness of the damage that dumping causes to the marine environment. Far-reaching education programmes, knowledge sharing and international legislation and enforcement will be necessary to change this. The problem of finance will be a difficult obstacle. Experiences with CFCs and electronics, however, would indicate that success is possible, subject to international cooperation and the requisite sense of urgency. Awareness of the problem is a prerequisite for the success of

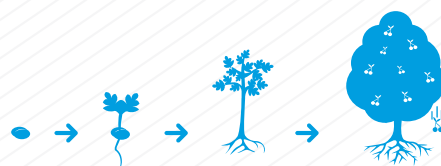
such a campaign and the publicity accompanying the Beagle study will contribute to this. Additional scientific research into the effects of plastic on the ecosystem, and in particular its accumulation in the food chain, could be an important motive for funding and legislation.

Recycling

It is general policy that recycling waste is preferable to dumping or burning. To prevent environmental pollution initial focus must be on leak-proof waste collection. Recycling mixed post-consumer plastic waste is certainly not easy, as experienced during the recent 'Plastic Hero' campaign in the Netherlands. Despite generous funding, only a small fraction of the plastic collected can actually be re-used in the form of plastic. Energy recovery is the most feasible form of processing for most of it, and that barely justifies the costly separate collection and processing steps. Where scarce international funds are necessary to prevent pollution of the oceans, they will have to be used as effectively as possible, and not in the first instance for apparently ineffective recycling activities for mixed and contaminated plastic.

Cradle to Cradle

Last but not least, solutions to prevent the harmful effects of the plastic soup should also be sought at the product design stage. Despite all of the educational and preventive initiatives advocated above, materials, including plastic, will end up in the ocean as wind-blown and drift waste. Smarter and therefore better design and material composition will be required to drastically reduce the effects on the ecosystem of materials that end up in the sea.



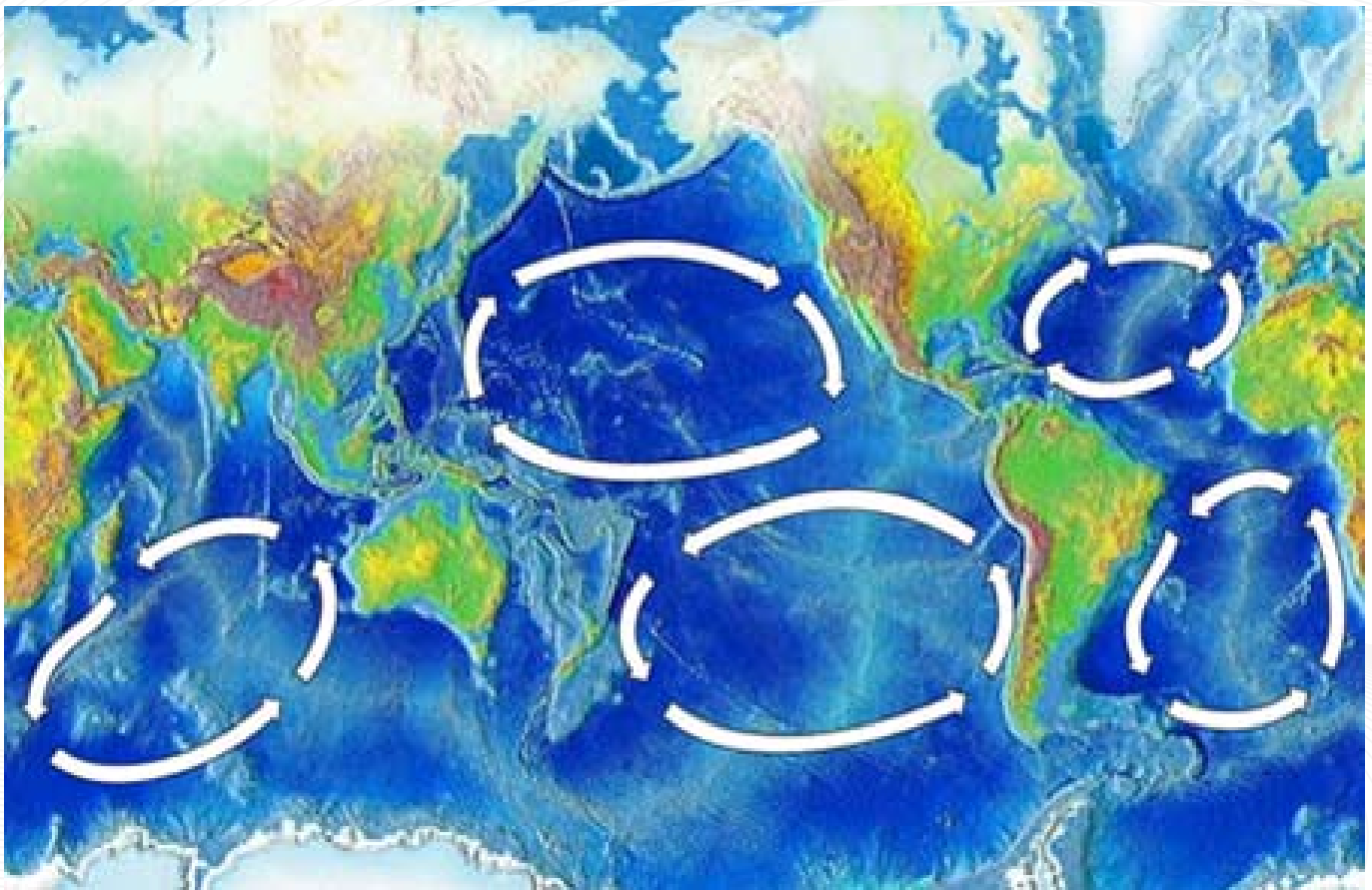
Such improvements will subsequently also have to lead to products retaining their raw material value after use, so ensuring that users have an interest in recouping their value. Van Gansewinkel Groep is already collaborating on such Cradle to Cradle solutions with companies in the sector.

Cooperation

Cooperation between trade and industry (including the plastics industry and the retail sector), research institutes, NGOs, governments and consumers is the key to arriving at a feasible approach to the plastic soup. Everyone in the chain must take responsibility and share knowledge. At present Boskalis does not see dredging as a realistic solution for the plastic soup, but does recognise the added value of making its maritime knowledge available. Van Gansewinkel Groep is closer to the plastics problem and any solution, because of its operational activities, in particular collection and recycling. That is why we took the initiative to consult with the plastics industry on better product design. We would also like to help other parties, such as government authorities and industry, set up collection and

processing systems. Furthermore, both companies want to set the example by processing waste, especially plastics, in an environmentally-friendly way.

Outside our sphere of influence the emphasis should lie on further research and creating awareness in order to collect funds for an effective approach and/or to help lay the foundations for legislation. Van Gansewinkel Groep and Boskalis would like to see any further initiatives for such an approach to the plastic soup being taken by an organisation that could do so effectively. We would of course be prepared to share our 'Beagle knowledge' and, where necessary, the knowledge and experience we have in our own field.



Plastic contamination characterizes several areas of the oceans. The plastic soup arise on spots where sea flows converge.

For more information:

Arend Bolt: arend.bolt@vangansewinkel.com

Peter Vingerhoeds: peter.vingerhoeds@vangansewinkel.com

WASTE NO MORE

van Gansewinkel Groep 

Van Gansewinkel ■ Coolrec ■ Maltha ■ AVR