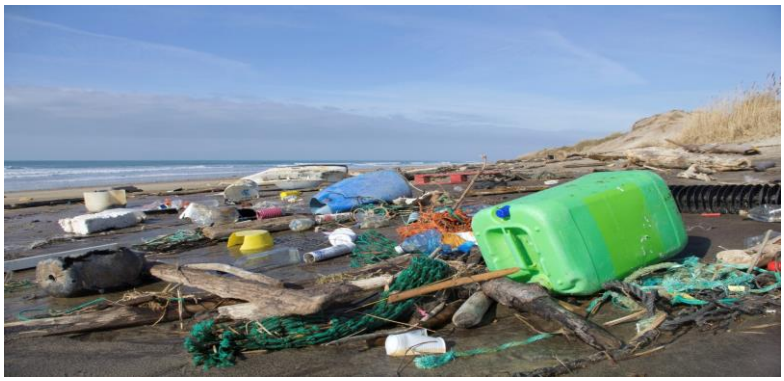
CONFERENCE PAPER ON PLASTICS IN THE MARINE ENVIRONMENT



Issue Paper to the International Conference on Plastics in the marine Environment held in Reykjavík on the 24th of September 2014, by the Environment Agency of Iceland in cooperation with the Nordic Council of Ministers as a part of Iceland's chairmanship Programme in 2014.

Acknowledgements

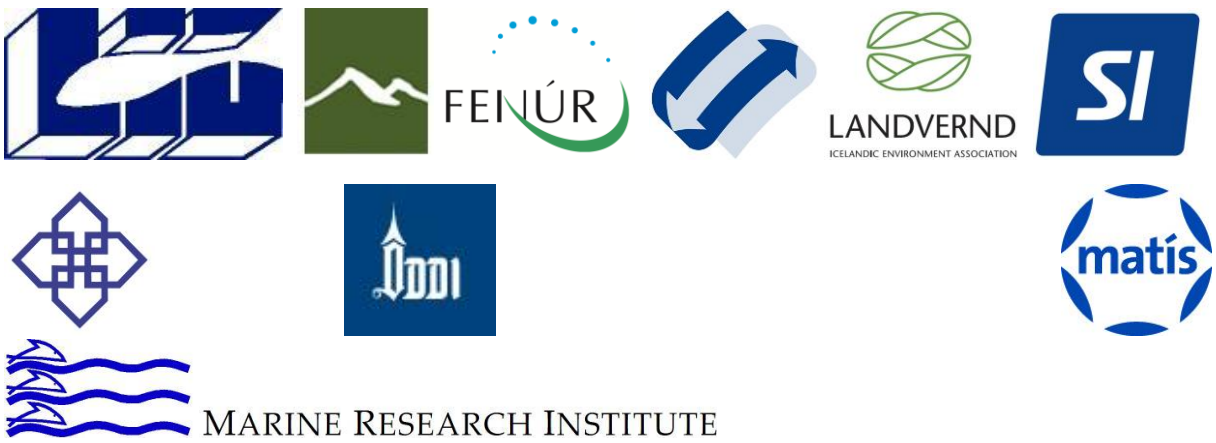
The Environment Agency of Iceland hosted a conference on plastics in the marine environment at Harpa in Reykjavík on the 24th of September 2014. The conference was aimed at giving an overview of existing knowledge on the issue, and identifying reasonable and effective measures to minimize plastic debris in the marine environment. Iceland holds the chairmanship of the Nordic Council of Ministers in 2014. The conference was a part of Iceland's chairmanship programme and was funded by the Nordic Council of Ministers.

The conference setup, agenda and content were developed by a project group consisting of representatives from the Environment Agency of Iceland, as well as the Marine Group of the Nordic Council of Ministers (HAV-gruppen). The following individuals were a part of the project group:

- Helgi Jensson, Environment Agency of Iceland
- Sigurrós Friðriksdóttir, Environment Agency of Iceland
- Sesselja Bjarnadóttir, Icelandic Ministry for the Environment and Natural Resources, Iceland
- Jóhannis Danielsen, Faroese Marine Research Institute, Faroe Islands / Biology Department, Lund University
- Runar Mathisen, Norwegian Environment Agency

The project group worked closely with a stakeholder panel, which met on several occasion and consulted the group for the conference. The panel included stakeholders from the plastic industry, associations of regional authorities, NGO's and waste management organisations. The following organisations and companies worked with the project group on the setup of the conference:

- The Federation of Icelandic Fishing Vessel Owners (LÍÚ)
- The Icelandic Tourist Industry Association (SAF)
- The Icelandic Waste Association (FENÚR)
- Landvernd, Icelandic Environment Association
- The Icelandic Recycling Fund (Úrvinnslusjóður)
- The Federation of Icelandic Industries (SI)
- The Icelandic Association of Local Authorities
- The Icelandic Harbour Association
- Oddi/Plastprent – Plastic production
- Matís ltd. - Icelandic Food and Biotech R&D
- The Marine Research Institute (HAFRÓ)



Environice environmental consultancy, was responsible for the organisation of all practicalities concerning the conference and worked closely with the project group and the stakeholder panel in the development of the setup, agenda and content of the conference. Environice, in cooperation with the The Environment Agency of Iceland, was responsible for putting together an introductory note and this conference paper.

The Environmental Agency of Iceland would like to thank all the participating individuals and organisations for their contributions during the preparation and the realisation of the conference.

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Executive summary

Plastic debris in the marine environment is known to have serious negative impacts on marine resources and fisheries, as well as on the use of coastal areas for tourism and the public. It is of the utmost importance to minimize these impacts. The plastic debris has different origins, from microplastics increasingly used in cosmetics and other products to large plastic items and ghost nets. Plastics can have direct impact on animals, both through entanglement and ingestion, which will alter the biological and ecological performance of individuals. It also affects biota through leakage of harmful chemicals often contained in plastics or attached to them. Plastic debris can further have negative impacts on the experience of tourists, through damaged fishermen's nets and equipment, and spoil catches.

The Environment Agency of Iceland hosted a conference on plastics in the marine environment in Reykjavík, Iceland on the 24th of September 2014. The conference aimed to give an overview of existing knowledge on the issue and to identify reasonable and effective measures to minimize plastic waste in the marine environment. Iceland holds the chairmanship of the Nordic Council of Ministers in 2014. The conference was a part of Iceland's chairmanship programme and was funded by the Nordic Council of Ministers. The Agenda of the conference consisted of a plenary session before lunch and two parallel sessions after lunch, *Fisheries and plastic wastes* and *Microplastics from consumer goods*, followed by a plenary session introducing the results from the parallel sessions and a panel discussion with participation of all the lecturers.

It is clear from the plenary session, the parallel sessions and the discussion that the lack of action cannot be blamed on lack of information or lack of available tools. Discussion points from the parallel sessions included "no more talking – time for action".

Additionally it was repeated throughout the discussion in both sessions and the panel discussion that the problem lies in the way plastics are consumed and the way consumers relate to plastics as the material has become less durable and seemingly less valuable. At the same time our single-use/throw-away culture is seen as contributing to the problem.

1. Main results – suggested solutions

The topic of plastic debris in the marine environment has already been on international, regional and national agendas for several years. In spite of all the agreements and action plans, plastic is still entering the world's oceans in huge amounts every year, both in the form of microplastics and much larger debris and wasted products. This conference served as an excellent venue for the exchange of knowledge and information about the issue.

The main conclusion from the conference is the common finding **that lack of research or lack of knowledge in general is no longer an acceptable excuse for inaction**. The next step should neither be to launch extensive research programmes nor to create new strategies or action plans, as this has already been done. **The next step should be to implement the existing plans based on the existing knowledge**.

An important question in this respect is who should do it. Should national governments take on the responsibilities for the next steps, should the industry do it or should NGO's and the public play the major role? The conference did not give any specific answer to this question, as this issue was not seen as the responsibility of any one actor, but a common responsibility of all of them. Taken together, it was concluded that:

- All actors have the responsibility to react
- Governments hold a key to a very important part of the solution as they can make decisions on bans, tariffs, taxes, etc.
- A preventative approach should be applied rather than focusing entirely on end-of-pipe solutions.

The following list contains the main solutions suggested by the participants in the parallel sessions and panel discussions:

What	Who	Why
Ban microplastics in consumer goods	Governments	Harmful impacts well known, substitutes available
Put taxes on single-use plastic items	Governments	Environmental and social costs need to be included in pricing
Consider deposit refund systems for specific items	Governments	Most likely an effective way to get back part of the plastic waste otherwise ending up in the marine environment
Educate people	Governments, NGO's, industries	Education and awareness is the base for action

2. Background

The Environment Agency of Iceland hosted a conference on plastics in the marine environment in Reykjavík, Iceland on the 24th of September 2014. The conference aimed to give an overview of existing knowledge on the issue and to identify reasonable and effective measures to minimize plastic waste in the marine environment. Iceland holds the chairmanship of the Nordic Council of Ministers in 2014. The conference was a part of Iceland's chairmanship programme and was funded by the Nordic Council of Ministers. The Agenda of the conference consisted of a plenary session before lunch and two parallel sessions after lunch, *Fisheries and plastic wastes* and *Microplastics from consumer goods*, followed by a plenary session introducing the results from the parallel sessions and a panel discussion with participation of all the lecturers. The conference had 150 participants from Europe and the US, representing the industry, NGO's, and governmental and international agencies, as well as interested citizens and students. A video of the morning sessions can be found at the conference homepage: http://www.ust.is/conference-on-plastics-in-the-marine-environment/ and on YouTube: https://www.youtube.com/watch?v=1o1ssD4Nc_0&list=UUtNX81uprd7OUBw5-2HkXWg&index=8

Plastics play a big role in our daily life and will continue to do so in the foreseeable future. However plastic debris in the marine environment is known to have serious negative impacts on marine resources and fisheries, as well as on the use of coastal areas for tourism and the public. It is of the utmost importance to minimize these impacts. The plastic debris has different origins, from microplastics increasingly used in cosmetics and other products to large plastic items and ghost nets. Plastics can have direct impact on animals, both through entanglement and ingestion, which will alter the biological and ecological performance of individuals. It also affects biota through leakage of harmful chemicals often contained in plastics or attached to them. Plastic debris can further have negative impacts on the experience of tourists, through damaged fishermen's nets and equipment and spoil catches. Thus, it is of high importance to increase public awareness on the issue and develop effective measures to reduce marine plastics.

Several actors have actively participated in a number of local, national, regional and global initiatives to address the problem of plastic marine debris and to seek realistic solutions. The main legal instruments are listed below.

IMO

IMO – the International Maritime Organization – is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships. IMO is the Administrative Secretariat of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)[1], an advisory body that advises the United Nations (UN) system on the scientific aspects of marine environmental protection. The potential problems of microplastics in the marine environment were brought to the attention of GESAMP in 2010.

A working group (WG-40) was formed under GESAMP to work on the issue of microplastics. The working group has completed a draft assessment report, covering the inputs of plastics and microplastics into the ocean: from land- and sea-based human activities; the mechanisms and rates of particle degradation and fragmentation; the processes controlling particle transport and accumulation; the interaction of microplastics with organisms and potential physical and chemical impacts; and public perceptions about marine litter in general and microplastics in particular. A final

[1] GESAMP. 2014. Joint group of experts on the scientific aspects of marine environmental protection.

global assessment report on microplastics in the ocean was presented at the 2nd International Ocean Research Conference[2] in Barcelona, Spain, in November 2014.[3]

UNEP's Honolulu strategy

The Honolulu strategy[4] is a framework developed by the United Nation Environmental Programme (UNEP) and the U.S. National Oceanic and Atmospheric Administration (NOAA). It provides nations with tools to work actively with reducing marine litter and its impact on ecology, human health and economy.

The Honolulu strategy is intended for use as a:

- Planning tool for developing or refining spatially or sector-specific marine debris programs and projects
- Common frame of reference for collaboration and sharing of best practices and lessons learned
- Monitoring tool to measure progress across multiple programs and projects.

The framework is not focused on one level of governance in particular but rather works as a provider of common language and focal points that stakeholders within municipalities, nations, and regions can work with to establish an action plan.

The Honolulu framework identifies nineteen strategies under the umbrella of the three main goals:

1. Reduced amount and impact of **land-based sources of marine debris** introduced into the sea,
2. Reduced amount and impact of **sea-based sources of marine debris**, including solid waste,; lost cargo,; abandoned lost, or otherwise discarded fishing gear (ALDFG); and abandoned vessels, introduced into the sea,
3. Reduced amount and impact of **accumulated marine debris** on shorelines, in benthic habitats, and in pelagic waters.

The strategies themselves are designed to be applicable all over the world regardless of specific conditions or challenges. Along with describing the purpose of the individual strategies, the Honolulu framework offers a set of indicators that can be used to monitor performance. By offering a set of measuring indicators, the framework provides globally applicable measurement tools, which allow for an easier comparison between regions and countries and in turn enhances and simplifies the global discussion.

EUs Marine Strategy Framework Directive

European Union's Marine Strategy Framework Directive was adopted on 17 June 2008, came into force on 15 June 2008, and was due to be transposed into national legislation by 15 July 2010. The aim of the directive is to protect more effectively the marine environment across Europe.[5]

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[2] UNESCO. 2005. 2nd International ocean research conference.
[3] IMO. 2013. Experts forge ahead in the global assessment of microplastics in the marine environment.
[4] NOAA and UNEP. The Honolulu strategy: A global framework for prevention and management of marine litter.
[5] European Commission Environment. Legislation: The Marine Directive.

According to Article 5 of the directive each member state shall develop a strategy for its marine waters.[6] Member states sharing a marine region or subregion shall cooperate to ensure that, within each marine region or subregion, the measures required to achieve the objectives of the directive are coherent and coordinated across the marine region or subregion concerned. Before 15 July 2012 the states were supposed to do an initial assessment of the current environmental status of the waters concerned and the environmental impact of human activities therein. Simultaneously, a determination for what good environmental status (GES) includes for the waters concerned should be determined and a series of environmental targets and associated indicators established with the aim to achieve GES by 2020. By 15 July 2014, the member states should have established and implemented a monitoring programme for on-going assessment and regular updating of targets, except where otherwise specified in the relevant Community legislation. And by 2015 at the latest, the states should develop a programme of measures designed to achieve or maintain good environmental status.

The Marine Strategy Framework Directive lists four European marine regions – the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black Sea – located within the geographical boundaries of the existing Regional Sea Conventions. Cooperation between the member states of one marine region and with neighbouring countries that share the same marine waters, is already taking place through these Regional Sea Conventions.

One of the findings of a report from the Commission on the first phase of implementation of the Marine Strategy Framework Directive, published in February 2014, was that marine litter, mostly plastic, is a growing issue in the EU. In the North Sea, over 90% of fulmar sea birds have plastic in their stomach and on average 712 items of litter are found on 100 m stretch of beach on the Atlantic Coast. The impacts of this increasing problem are manifold, according to the report, and their magnitude not yet fully known.[7]

The EU has initiated a number of activities related to the widespread problem of plastic debris in the ocean, in addition to the development of regional marine strategies.[8] As a first step of this, the Commission opened up a public consultation process in October 2013 to collect opinions from citizens and stakeholders on how this problem can best be addressed. The consultation was open until 18 December 2013. Based on the outcome and in conjunction with a review of the targets of the Waste Framework Directive, Packaging Directive and Landfill Directive, the Commission aims to develop an initial headline reduction target for marine litter. Such a target could be included in a wider Communication on waste, to be adopted in 2014.[9]

OSPAR

The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) noted in the Bergen statement[10] of 2010 that "*…quantities of litter in many areas of the North-East Atlantic are unacceptable, and therefore we will continue to develop reduction measures and targets, taking into consideration an ambitious target resulting in a reduction in 2020*". The commission has

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[6] European Commission. 2008. DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

[7] European Commission Environment. 2008. Legislation: The Marine Directive. REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT. The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC).

[8] European Commission Environment. Marine and Coast. Descriptor 10: Marine Litter.

[9] European Commission Environment. How can we reduce marine litter? Press release 18 October 2013.

[10] OSPAR Commission. 2010. Bergen statement.

therefore been working on a Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic[11]. The Regional Action Plan (RAP) includes the objectives, actions, measuring and monitoring methods, and implementation strategy that the commission will work with to minimize marine litter. As a regional, trans-boundary organisation, the OSPAR provides a good platform for countries in the North-East Atlantic to work with common solutions as marine litter is a global problem. Like the Honolulu framework, the RAP is a way to enhance cooperation throughout the region while providing a common language for further discussion.

After a list of actions were agreed upon in June 2014 OSPAR has been collecting information from contracting parties on persons that should act as task managers and contributors to these actions. It is foreseen that task managers will take initiatives to start work on developing these actions further, so as to make them more concrete and more operational.

NOAA

The National Oceanic and Atmospheric Administration (NOAA) in the United States works actively with the topic of marine litter through its Marine Debris Program[12]. The organisation has been in the forefront of multiple international and national efforts to reduce marine litter as well as supporting and leading research in the field. As already mentioned, NOAA cooperated with UNEP to develop the Honolulu strategy. They've additionally hosted two international research workshops on microplastics[13], the last one in 2011. The organisation has an active program on fishing gear with the aim of innovative development of gear that could minimize loss at sea and the impacts of derelict gear. In addition to their individual projects, the organisation also provides very good basic information about marine litter through the program's homepage.

Helsinki Commission

HELCOM (Baltic Marine Environment Protection Commission - Helsinki Commission) is the governing body of the Convention on the Protection of the Marine Environment of the Baltic Sea Area,[14] with Denmark, Estonia, the European Union, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden as contracting parties. The commission has numerous projects that directly or indirectly deal with measuring and mitigating plastic litter in the Baltic Sea. The work of HELCOM includes a study of Synthetic microfibers and particles at a municipal wastewater treatment plant[15], as well as the development of appropriate indicators[16] to monitor marine litter. Furthermore the commission works on the development and implementation of policy measures in the contracting countries in order to ensure the environmental quality of the Baltic Sea.

The Nordic Council of Ministers and the Nordic marine group

The Nordic Council of Ministers (NCM) is the official inter-governmental body for co-operation in the Nordic Region. Nine working groups are operated under the NC of environmental ministers, one of them being the marine group. The group[17] supports the Nordic countries with activities and seeks to fund projects that contribute to the build up of a scientific basis and create a foundation for joint efforts against pollution in the Nordic marine and coastal environments. This also, in principle,

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[11] OSPAR Commission. 2014. Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic: OSPAR Agreement 2014-1.
[12] NOAA. 2014. Marine debris.
[13] NOAA. 2011. Proceedings of the second research workshop on microplastic marine debris.
[14] HELCOM. 2014. Baltic Marine Environment Protection Commission.
[15] HELCOM Base-project. 2014. Synthetic microfibers and particles at a municipal waste water treatment plant.
[16] HELCOM Monas-group 2014. Marine Litter in the Baltic Sea: sources, monitoring approaches, possible common indicators and first lines of thinking on measures: MONAS 20-2014, 5-4.
[17] NMR. 2014. Havgruppen (HAV).

creates a basis for common Nordic initiatives within international work on marine and coastal areas, generates a common knowledge about the state and development of marine pollution in the Nordic countries and their neighbouring areas, and promotes Nordic cooperation within the marine environment.

Plastic waste found at Veiðileysufjörður in rural Iceland. (Picture: Birgitta Stefánsdóttir)

3. Plenary session

3.1. Welcome by the Minister for the Environment and Natural Resources

The plenary session started with a contribution from Sigurður Ingi Jóhannsson, the Icelandic Minister for the Environment (who is also the Minister for Fisheries). He emphasized the growing knowledge and worldwide concern about the negative influences of plastic wastes on our environment, beaches, life in the sea, the fishing industry and the economy. Although plastics are useful and used every day to ease our life, the environmental impact of their use cannot be ignored. The Minister stated how important healthy marine life and ecosystems are. He emphasized that Iceland's chairmanship programme in the Nordic Council of Ministers in 2014 especially focuses on bio-economy. To underline how important clean oceans are for the bio-economy, this conference was arranged as a part of the 2014 Iceland's chairmanship programme.

3.2. Hildur Knútsdóttir

Hildur Knútsdóttir, a young Icelandic writer, talked about the view and responsibility of the individual (citizen science). Hildur started by saying she was not going to discuss the facts and details of the plastic marine pollution – as other people at the conference were more qualified to do so – but rather focus on the feelings. Hildur stated that nothing makes you feel as small, insignificant and useless as a vast global problem. How do you find the energy and will to fight such enormous challenges, when your actions can only mean so little in the grand scheme of things? How can you carry on? This is not a practical question but a moral one. So the answer is: How can you not? It's a big world and the individuals are but a small part of it. Our individual actions are not very likely to have any significant impact. However, we feel it's our responsibility. The only way to live with ourselves is to take part in activism, speak up, limit our personal carbon footprint and recycle religiously. Perhaps this is fitting in a society where consumerism is almost a religion. In the view of politicians, increased consumerism is a good thing and they use it as a tool to measure how well we – as a society – are doing. Hildur's conclusion is that consumerism is basically the root of all that is wrong in the world. Consumer culture constantly tells us that we are incomplete human beings and that we have to buy things to become complete. So we spend our income on stuff we don't really need. A lot of that stuff ends up in our oceans. And it makes no sense because endless growth is not possible in a world with limited resources. Marine plastic pollution is a problem Hildur is not very likely to solve on her own – but she can take individual actions including buying less stuff. Plastic is useful, but we use too much plastic and take too little care of how we dispose of it. We have to make sure that the plastic we do use ends in the recycling bin rather than in the oceans, and maybe her individual actions will affect other individuals' actions – peer pressure is a powerful tool to change behaviour. The bottom line is: the only way forward is doing what we must do and doing what we can do, because the alternative is no alternative at all.

3.3. Stefanie Werner

Stefanie Werner, from the German Federal Environment Agency (UBA), Section Protection of the Marine Environment, presented the results from the 2013 International Conference on Prevention and Management of Marine Litter in European Seas, with an emphasis on the scope and nature of the problem. Marine litter is deeply rooted in our production and consumption patterns. In a recent paper in the journal Nature it was stated that in 1900 about 220 million people were living in urban areas producing less than 300,000 tonnes of daily wastes (at that time no plastics) and that in 2025 it is anticipated that 5.8 billion people will live in cities globally and produce around 6 million tonnes of wastes daily. Marine litter can be defined as any solid material that is intentionally discarded or lost into the marine environment. Of these, plastics cause the greatest worries.

According to OSPAR studies ¾ of all marine litter is plastic (83% in the Mediterranean Sea). The big problem with plastics and at the same time the very advantage of them, is the long degradation time, which ranges from 20 years for single use plastic bags up to 600 years for monofilament fishing line like nylon. These are rough estimates as plastics have only been produced since around 1950. Since then production has grown from about 1.5 million tonnes in the mid-1950s to about 280 million tonnes of plastics being produced worldwide every year in 2012. Producer responsibility is therefore important. In 2012, 57 million tonnes of plastics were produced in Europe and 22 million tonnes of plastic waste were disposed of. Around 60% of discarded plastics are going to energy recovery and recycling and the other 40% are thrown away, mainly in landfills. The plastic wastes disposed of in Europe therefore amount to 9.6 million tonnes per annum. The two main groups of plastics found in the oceans and at the beach are hand gear related plastics and packaging. The sources can be divided into sea-based sources and land-based sources. Of the plastics ending up in the marine environment about 70% sink to the bottom of the ocean, 15% end up at beaches and 15% remains at the surface and in the water column. The ecological impacts include ingestion, entanglement, transportation of non-endemic species into new habitats, hardening of benthic substrate and smothering of benthic symbiotic communities. Research done on fulmar in the North Sea area show that 95% of the birds have plastics in their stomach, on average 31 plastic pieces are found in dead birds (0.3 g). Even in Iceland 80% of the birds have plastics in their stomach, on average 0.15 g. The ecological quality objective for the Northeast Atlantic is that less than 10% of the birds have 0.1 g of plastics in their stomach.

Some additional risks come from microplastics, which are plastic particles smaller than 5 mm. These are ubiquitously distributed in the pelagic and benthic zones and readily bio-available for organisms at the base of the marine food web. Many polymers are inert but mechanical injuries in the digestive tract remains an issue, additives can be toxic or hormonally effective, persistent organic pollutants can absorb on the surface and potentially be ingested by marine organisms, and plastics are a potential vector for invasive species and pathogens.

Stefanie then announced that the internet site of the Berlin conference is still open. There the conference report, the “message of Berlin” and an Issue Paper from the conference can be found. Top 10 measures from the OSPAR breakout group were the following:

- Prevention: Improved waste management including increased recycling rates and phasing out landfilling (of plastic waste); Ban/tax on single use bags (or other items) – taxes into environmental fund; Elimination/Change of certain products on the market (sustainable production and extended producer responsibility); Lifecycle analysis for new materials/items/activities should include marine litter; Deposit refund systems for specific items, e.g. drink containers, nets; Education and outreach (all sectors); Increased knowledge (riverine litter, microplastics)
- Law/Enforcement: Harmonized fee system for Port Reception Facilities (e.g. compulsory implementation of no-special-fee-system); Incentives for responsible behaviour (land and sea based)/Disincentive for littering; Enforcement and control of international legislation (all sectors, shipping: Port State control, Coastguard)
- Removal: Fishing for litter.

3.4. Emily Corcoran

Emily Corcoran, a Deputy Secretary at OSPAR gave a presentation on the OSPAR Regional Action Plans on marine litter. The OSPAR area, reaching from the North Pole to the strait of Gibraltar is an enormous area. Marine litter was first put on the OSPAR Agenda by Sweden in 1994. The aim of this was to reach a common understanding on the scale of the problem and what could be done about it

in the context of OSPAR. Based on this marine litter was put within the programme of monitoring and assessment, which set the stage for cooperation between the OSPAR states for dealing with the issue. Monitoring within the OSPAR area shows that by material type 84.9% of the waste is plastic. Actions and measures are needed in order to achieve significant reduction. This was put into the *Northeast Atlantic environment strategy*, a roadmap for the OSPAR countries to help fulfil the OSPAR obligations between 2010 and 2020. A large number of projects were undertaken both at the national and collective level, including monitoring work on plastic in fulmars stomachs, the Fishing for litter initiative, etc. The fact that the oceans are dynamic and currents take what is contained within the water masses across borders means that the only way to deal with the problem is through cooperation between the countries. *A Regional Action Plan (RAP) for managing and prevention of marine litter in the OSPAR area* was agreed upon in June 2014. This was the outcome of a lot of work and a massive step forward. OSPAR works through consensus, which means that all the countries need to come to an agreement and by a lead country approach. In this case Germany was the lead country. The starting point for the RAP goes back to the agreement of the Honolulu strategy. The scale of the problem crosses all sectors of our community and our society. The sources are very broad and come from and affect various sectors, and also these sectors need to become a part of the solution of the problem. The RAP applies to the whole OSPAR area. Collective actions are needed to substantially reduce marine litter from both land-based and sea-based sources. Participation from a broad range of stakeholders is needed, including international organization, NGO's, industry and the general public. The RAP has four sections. Section 1 contains the objectives, scope, principles and approaches. Section 2 contains actions to be implemented. Section 3 contains the monitoring and assessment goals and section 4 presents the implementation plan. The RAP is a flexible tool and can be implemented at different levels. The RAP is available at OSPAR's homepage. At a workshop that was held in the Hague in October 2014, the task managers responsible for implementation of RAP in each state came together and discussed next steps.

3.5. Marcus Eriksen

Dr. Marcus Ericson from the 5 Gyres Institute gave a presentation on microplastics. The institute is named after the five plastic gyres that have been identified in the world oceans.

The 5 Gyres Research Team has sailed to all the 5 gyres in the world (about 40 thousand miles of sailing) and sailed in June 2014 from Bermuda to Iceland, which is 2,400 miles. On the way they did 31 surface tows. A fine mesh net was dragged across the ocean surface to determine how many particles there are per square kilometre by count, by weight, by type and by size. This project's aim was to see what is out there, how much and where. The team also looked at the vertical distribution, as one big gap in understanding microplastics worldwide is how the sea state might affect the vertical distribution. Marcus showed images from the expedition to illustrate what the research team did and what they have discovered about plastic pollution around the world. A fish caught in the middle of nowhere on an expedition 6 years ago contained microplastics that were full of persistent organic pollutants, chemicals that are known endocrine disrupters and human carcinogens. So where does it come from? The throw-away-culture started around 60 years ago. Plastics started replacing other materials, like metals, paper and glass, with the idea of just throwing it away after use. The worldwide plastic production has increased from being non-existent in the 1950s to 288 million tonnes in 2012. The result of the throw-away lifestyle is concentrated trash in rivers and seas. The trash gets stuck in the 5 gyres and degradation starts. Microplastic particles are found everywhere. In the 5 Gyres research tours few pieces of big plastic were found, but most of the particles were microplastics. All the data from the tours and from 6 other organizations that share data with 5 Gyres are put in a model which gives an idea of the standing stock by weight and count of plastic particles

in the world oceans. The first results of the model show that 269,000 tonnes of plastic are to be found in the world oceans, made up of 5.25 trillion particles.

The sources of the marine plastic waste are ineffective waste management – especially in some poor countries – microfibers, derelict fishing gear and catastrophic events. Then what happens? Photo-degradation happens very fast – some products like plastic bags brake down rapidly into thousands of pieces. Other break down factors are oxidation, chemical degradation and biodegradation. Fragmentation by grazing also exists when fish bite the plastic pieces. Shoreline and deep sea deposits are also sinks of ocean plastic pollution. The impacts of the plastics include: entanglement, ingestion by birds and by biota on land, and microplastic ingestion. The smallest microplastics enter organisms through the gut lining into the circulatory system. Then there is tropic level transfer, once the plastics are in the food chain they can migrate up to predatory organisms. Chemicals stick to plastics – oil drops, pesticides, and flame-retardants. More data is needed to fully understand this subject. Potential solutions include: improved waste management, anti-litter laws, and smarter products. On the issue of smarter products: the research team's tour around the Great Lakes in US found a lot of micro-particles. They were primarily small perfect spheres originating from cosmetic products, such as micro-beads from facial scrubs. This is where the industry has the responsibility to make smarter products. Knowing what we know today and where efficient recovery system and anti-litter law plastics do not exist, then plastics cannot be safely used – not with 7 billion customers. One tip for the industry is to look to waste pickers of the world (in the poorest countries) – what they leave is poorly designed packaging and plastic products.

3.6. Runar Mathisen

Runar Mathisen, chair of the NCM Marine group discussed the Nordic perspectives on plastics in the marine environment. The Marine group is represented by Finland, Åland, Sweden, Norway, Denmark, Faroe Islands, Iceland and Greenland. The group evaluates project applications annually, gives funds and follow up on projects. Marine litter is one of the hot topics within the group in 2014 and 2015. There are four on-going projects on marine litter:

1. Plastic loading in Northern fulmars

Research on plastic in stomachs of fulmars started in 1980. Northern fulmars are used as an indicator species for ingestion of marine litter. Regular measurements have been undertaken since 2004. It has been found that on average 95% of the fulmars in the North Sea contain plastics. The aim of the present study is to fill knowledge gaps and to assess pollution levels of fulmars from Faroe Islands, Iceland and Svalbard, but also to focus on harmful effects resulting from the possible uptake of chemicals from plastics. Preliminary results show that 87.5% of fulmars on Svalbard had ingested plastics, which is a 29% increase since the 1980s. The percentage of fulmars that have ingested plastics is above the OSAPR target for all regions.

2. The importance of sewage treatment plants as sources of marine microlitter

The aim of the project is to investigate wastewater treatment plants as a gateway for micro-litter to the environment, to investigate the presence of microliter in the recipient, and to gather knowledge for assessing impact on recipient biota. Finland, Sweden and Iceland participate in the project.

3. Marine litter and its sources in Nordic waters

This project was related to on-going clean-up activities in Finland, Sweden, Denmark and Norway. In a Swedish pilot study three cubic meters of beach litter were collected and 1,300 pieces analysed. Thereof 87% was plastics and 75% were single use products. Classified by source activity 66% were related to consumers/individuals and 34% to industry. Further 68% were related to packaging material (versus recreational items, raw materials or other consumable goods).

4. Marine litter in Nordic waters

The objective of the project is to collect and exchange common knowledge and experiences with relevance to the research, monitoring and assessment of marine litter in the Nordic waters as a basis for future actions. This will be done by establishing a Nordic network of experts, describing and publishing in a report a common knowledge status on marine litter in Nordic waters. This report will provide suggestions for methods and approaches that can be used to establish activities and prioritize actions, discuss relevant management actions and regional action plans and organize two workshops. Conclusions so far include e.g. that the results of different studies are not always comparable as different methodologies for sampling and analyses are employed, so there is a need to find out to what extent monitoring data can produce comparable data sets. The studies provide a basis for initiation of activities on marine litter indicators for the *EU Marine Strategy Framework Directive* monitoring and national management plans in the Nordic countries.

The NCM should be in the forefront in the work with marine litter and marine plastics and contribute positively to on-going international processes.

3.7. Jón Ómar Erlingsson

Jón Ómar Erlingsson, a Managing Director of Oddi (an eco-labelled (the Nordic Swan) packaging and printing material production company in Iceland) presented the view of plastic producers with a focus on possible solutions. Jón Ómar showed a video highlighting the importance of good packaging for preservation of goods, www.goodbadspudly.com. He also emphasized the importance of looking at the whole picture when taking action. Are there alternative materials to plastics? The total impact needs to be evaluated as well as the amount of resources used for producing different types of packaging. Today no magical material is known. Solutions should focus on stopping the plastic from reaching the ocean in the first place. Plastics enter the oceans mainly from land, which can be attributed to bad waste management.

3.8. Haukur Þór Hauksson

Haukur Þór Hauksson from the Federation of Icelandic Fishing Vessel Owners (LÍÚ) presented the view of the fisheries sector with focus on possible solutions and the way forward. Haukur stated that we can all agree that polluted a marine environment is undesirable. The Federation of Icelandic Fishing Vessel Owners takes these matters seriously and will continue to do so. It is important for the fishing industry to produce high quality food and the clean and fresh image needs to be kept. The fishing industry's policy is to treat marine resources with respect, put emphasis on sustainability and high value in the food production. The Icelandic quota system supports this policy. The industry also has a policy for social responsibility.

The Icelandic fishing vessel fleet has decreased over the last years due to the quota system. Fishing gear has higher quality than before and is therefore not as easily damaged. The technical equipment is also better, so the time the gear is in the water has decreased. The federation has an employee working on these issues full time. Since around 1980 awareness has been raised among seamen. Instructions on waste management on board are given and garbage record books are filled out in ships above a certain size. Instructions on how fishing gear waste should be categorized and disposed of have been given by the federation. If a ship loses its fishing gear it is obliged by law to record and report the GPS coordinates so it can be claimed. An agreement has been made with the Icelandic Recycling Fund and information on annual collection of fishing gear is recorded and published in a report. The loss of fishing gear is not a common problem though. Since 2004 all synthetic fishing gear waste has been collected and recycled abroad or domestically. The waste is collected in containers and shipped abroad. The target is that 78% of all the fishing gear waste is recycled. A contract has been made with a recycling firm in Lithuania. The federation has also supported various projects

through the years, projects like volunteers cleaning the coastline etc. The way forward is to create economic incentives (get rid of waste for free or even get paid), increase the number of waste collection points to make it easier to collect the waste and to further increase awareness.

4. Parallel sessions

The participants of the conference were split into two parallel sessions chosen by individuals upon registration. The two sessions were *Fisheries and plastic waste* and *Microplastics from consumer goods*. Each session had a moderator that introduced the set-up for the session as well as summarized the results and presented them to the participants after the session. The moderator for the Fisheries session was Haukur Þór Hauksson from the Federation of Icelandic Fishing Vessel Owners and the moderator for the session on Microplastics was Brynhildur Pétursdóttir, a member of the Icelandic parliament and a former board member of The Consumers' Association of Iceland (Neytendasamtökin).

Each session started with two introductory lectures which were followed by discussion in smaller groups, applying the World Café method. Introductory lectures in the "Fisheries" session were held by Guðlaugur Gylfi Sverrisson, Chief operating officer of product groups at The Icelandic Recycling Fund, who introduced the Icelandic system for fishing nets; and Karl Gunnarsson from the Icelandic Marine Research Institute, who discussed plastics in the sea around Iceland. Introductory lectures at the "Microplastics" sessions were held by Marcus Eriksen at 5 Gyres Institute, who discussed the monitoring of plastic marine impact; and Hrönn Ó. Jörundsdóttir at Matís – Icelandic Food and Biotech R&D, who discussed the results of the Nordic project "Sewage as a gateway for microplastics to the environment".

The discussion at the parallel sessions took place in groups of around 10 people exchanging ideas at a round table. The following points were discussed in each group:

- **Where are the biggest problems/loopholes in the current system?**
- **What can be done to minimize the amount of plastics in the marine environment**
    - **What can the industry do?**
      (Plastic producers, the fisheries sector, waste management companies, etc.).
    - **What can consumers do? (Professional consumers and private citizens).**
    - **What can authorities do?**
    - **What role can NGO's play?**
    - **How can regional/international cooperation play a role?**

Ideas from the participants in the World Café can be found in Annex I and II.

4.1. Fisheries and plastic waste

Summarizing the discussion at the parallel session on fisheries and plastic waste, it is clear that lack of responsibility is a central part of the problem, or in other words that there is no system in place to make consumers and industries responsible for the fate of plastics.

List of ideas and items from the participants in the World Café on Fisheries and plastic waste can be found in Annex I

4.1.1. General comments

Summarizing the discussion at the parallel session on fisheries and plastic waste, the following general items were put forward:

- Lack of responsibility is a central part of the problem.
    - no system in place to make consumers and industries responsible for the final deposition of plastic
- The existing international and regional initiatives address both the monitoring needed and the methods that should be used.

  - The loophole might lie within national governments as a monitoring scheme perhaps has not been implemented.
  - Better monitoring of the flow of plastics within the fishing industry is somewhat missing and could be improved for a more efficient consumption by the industry.
- Bullet-points like "*no common strategy*"
  - The tools are already existing but have not been presented or implemented

4.1.2. International and regional cooperation

In discussions about the role of regional/international cooperation it was mentioned that the actions already taken by existing organizations may be sufficient but are not effectively communicated. The organisations were encouraged to continue to communicate and exchange information and solutions between areas as the global scope of the problem calls for continuous cooperation between countries and regions. It was pointed out that:

- Regional assessment plans need to be created and that international areas need to be monitored.

4.1.3. The loopholes and governmental actions

Discussing loopholes and action of governments, it repeatedly came up that:

- There is a need for financial incentives and/or some kind of a Polluter-Pays system.
- Financial incentives to buy more environmentally friendly fishing gear should be created.
- A take-back system or a deposit-refund system was advised especially to tackle waste from fisheries (but also a take-back system of plastics in general).

The last one might help to minimize derelict fishing gear etc. as well as create incentives for both fisheries, small fishing boats and for NGO's to work on ocean and beach clean-up

4.1.4. Role of authorities and NGO's

Under the discussion points about the actions of authorities it was suggested that a binding agreement to tackle marine litter based on UNCLOS (United Nations Convention on the Law of the Sea) should be made, followed by a change of national legislation. Taxes were often mentioned without specifying the kind of taxes would best address the issue.
The role of the authorities is to act:

- As an informant as there is a lack of public awareness, which is the basis for changed consumer behaviour.
- To support and recognise the important role NGO's play in information sharing and awareness raising as well as to put pressure on governments and industries.

Some suggestion was aimed directly at the fishing gear.

- The industry should support R&D on environmentally friendly fishing gear solutions.
- The industry should push suppliers (or supply chain) to focus on designing for recycling, green design and increased durability.

Plastic producers, as well as other industries that heavily rely on plastics could:

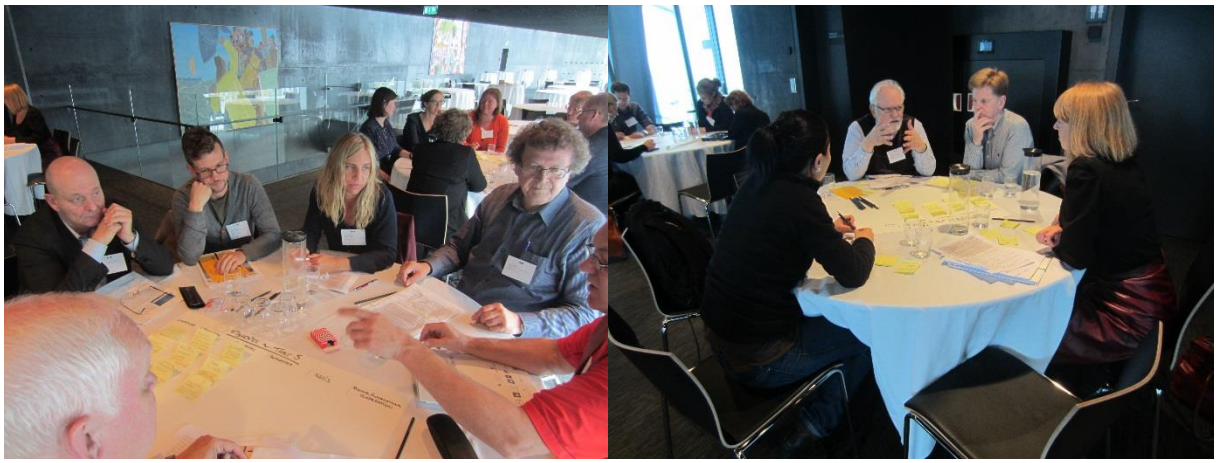
- Support NGO initiatives that focus on beach clean-up.

A no-plastic-guarantee label was suggested for cruise ships.

4.1.5. Role of consumers

Solutions aimed at consumers were mostly related to following items;

- consumption pattern with focus on consumers choosing durable materials over single-use,
- avoiding non-durable and single-use plastics all together,
- putting pressure on governments
- taking action as well as to practice sustainable waste management.



Discussion at the parallel session on Fisheries and plastic waste. (Pictures: Birgitta Stefánsdóttir)

4.2. Microplastics from consumer goods

A general point mentioned in the discussion was that legislation would perhaps be the best way to control discharge and use of micro-beads.

List of ideas and items from the participants in the World Café on *Microplastics from consumer goods* can be found in Annex II

4.1.1. General

It was widely accepted and discussed throughout the conference that microplastics in consumer goods should be banned.

- Micro-beads are not picked up by sewage treatment plants and thus there is no system in place to avoid those ending up in the oceans.
- Micro-beads in consumer goods are often unnecessary as well as the fact that natural substitutes do already exist so the phasing out should not be complicated.

There was some discussion on improving the filters in sewage treatment plants and home appliances, but as it is defined as an end-of-the-pipe solution, preventing the material to be used in the first place should be prioritized.

Questions were raised concerning how to avoid unwanted materials (like micro-beads) and chemicals finding their way into consumer products. The following suggestions were mentioned as possible ways:

- Stricter legislation that focuses on putting the burden of proof in the hands of producers (applying the precautionary principle).
- Improve risk assessment of microplastics, it should be based on material types (polymers), size of fractions and structure of particles.

4.1.2. The loopholes

In discussions of loopholes concerning microplastics the following items were repeatedly mentioned:

- Consumerism.
- Lack of consumer awareness.
- The consumer does not pay for the environmental cost of products containing microplastics (Polluters Pays Principle).
- The anticipated need to have new “techniques” or products out on the market was also questioned.
- The microplastic problem was thought to get less attention as it is a “tiny” problem and it is hard for the average consumer to grasp the impacts of their action.

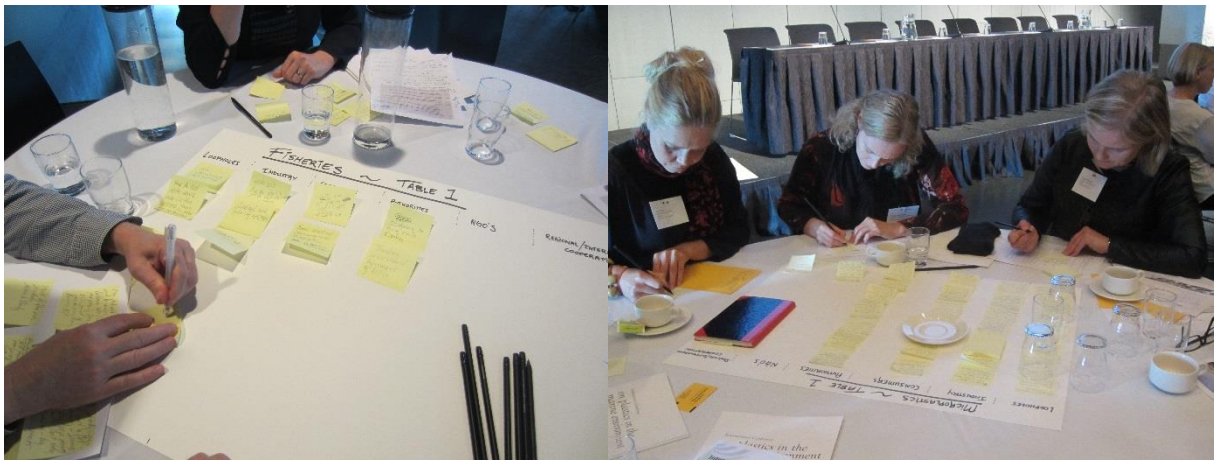
4.1.3. Role of authorities and NGO’s

The authorities were defined as a very important actor in raising awareness and providing consumers with information. They were encouraged to:

- Engage in activities beyond legislation such as increasing the monitoring of the use of microplastics by the industry and setting limits (if not a ban).
- Ban or use taxation of non-durable plastics such as plastic bags.
- Effectively address the national waste management strategy and regulations to ensure a high recycling rate of plastic through sufficient infrastructures.
- Use health inspection and effective monitoring of operation licenses to minimize the negative impact of industry.

In general terms, it was noted that NGO’s are influential as they can be honest in their discussion, being independent and not influenced or controlled by political movements, but they need funding from authorities, industry etc. to continue as:

- Providers of information and instruments to mobilize the general public and get them interested.
- An important link between industries, consumers and authorities.



Participants at work at the World Café on Microplastics in consumer goods. (Pictures: Birgitta Stefánsdóttir)

5. Panel discussions

The panel discussion included the lecturers from the plenary session as well as the moderators from the parallel sessions. The panel discussion was led by Bogi Ágústsson, reporter at the Icelandic National Broadcasting Service. The panel discussion started with questions brought to the table by Bogi, followed by questions from participants.

The discussion started off on the notion that the lack of evidence can no longer be blamed for lack of action. Extended research has been done on the scope of the problem and regional and global plans such as the OSPAR Regional-Action-Plan, the HELCOM and the Honolulu strategy are based upon knowledge on the subject. There was a discussion considering if there is a lack of action where it was pointed out that there is some action, like the coordinating actions of the RAP's, but perhaps the national implementation and engagement is falling behind.

The panel mostly agreed that there was no reason not to ban micro-beads in consumer goods as the material is far from essential and less harmful substitutes exist. If the environmental cost of micro-beads is included in a Cost-Benefit-Analysis, there is no argument for focusing on recycling or collecting microplastics after they've reached the ocean. Furthermore, Marcus Eriksen brought up the point that the ban on single-use plastic bags was often driven by economic evaluation as the clean-up cost and the environmental cost is very high (San Francisco taken as an example), but the clean-up cost and post-consumption cost was rarely included in LCA's. Stefanie Werner added that prevention, rather than end-of-pipe solutions, were beneficial both for the economy and the environment.

The responsibility lies too much on the individual consumer in the current system, Hildur Knútsdóttir noted, followed by a comment by Marcus that plastic products should not be sold if there was not a recovery system in place. Runar Mathisen and Emily Corcoran pointed out that there are both global and regional frameworks that could and should be used to tackle the problem and to move the burden from consumers to governments.

Financial incentives were discussed as Brynhildur Pétursdóttir pointed out that banning would probably be lobbied against by industry, but authorities should consider taxing or creating financial incentives within the system. Asked if he would lobby against bans or limitations on use, Jón Ómar Erlingsson answered that Oddi would not lobby against materials that were proven to be harmful, and the industry was always open to looking into alternatives. However, plastics had proven to be a good material and useful in many applications and although there is no doubt we need to rethink our consumption of plastics, there is no need to ban it in applications where it is beneficial. Thus the question concerns the single use throw-away culture, i.e. if there is a system in place to get the product back? If not ban it! Marcus added that single-use items like straws and plastic bags are not being recovered and thus these products should be banned. Additionally these products have been on the market for 40 years and the awareness of their persistence in the environment after use has been there for 15 years. Fifteen years should be enough time, so we can say that these products simply failed recovery.

More effective waste management was discussed, as increased recycling rates would minimize the amount of plastics ending up in the ocean. Stefanie pointed out that around 70% of plastic wastes are landfilled in the UK. However, additives used in the production of different products would need to be taken into account and listed in order to make recycling possible.

One of the participants brought up the question if we could clean the mess up. Marcus pointed out that the Icelandic fishing industry has created a deposit-refund system on fishing gear which has

decreased derelict fishing gear – this is a system that has been proven effective globally, why not apply it to plastics in general? A fee, like 1 € per 10 kg or something would bring the big things to recycling. Emily mentioned initiatives like "fishing for litter" as well as numerous projects by NGO's around the world. Stefanie pointed out that those initiatives mainly raised awareness but didn't result in big amounts of plastics being removed from the ocean. At the same time, huge amount of plankton would be fished up with the litter.

Bogi asked the question of how high marine plastic pollution was on the NCM priority list and Runar answered that plastic pollution was seen as a very important issue. Especially as the biota is ingesting plastics and other toxics that get attached to the plastic which then move up the food-chain, and in an already polluted ocean (like the Baltic Sea) this is a very important issue. Marcus added that more and more information is coming out on the bio-accumulative effects of the plastics and toxic chemicals on the biota.

5.1. Summary of the Panel discussions

- The Icelandic fishing industry has created a deposit-refund system on fishing gear which has decreased derelict fishing gear – this is a system that has been proven effective globally, why not apply it to plastics in general?
  - A fee, such as 1 € per 10 kg would bring the big things to recycling.
- Initiatives like "fishing for litter" as well as numerous projects by NGO's are already in place around the world.
  - initiatives mainly raise awareness but don't result in big amounts of plastics being removed from the ocean. At the same time, huge amount of plankton would be fished up with the litter.
- There is no reason not to ban micro-beads in consumer goods as the material is far from essential and less harmful substitutes exist.
  - If the environmental cost of micro-beads is included in a Cost-Benefit-Analysis there is no argument for focusing on recycling or collecting microplastics after they've reached the ocean.
- Ban on single-use plastic bags is often driven by economic evaluation as the clean-up cost and the environmental cost is very high, however the clean-up cost and post-consumption cost were rarely included in LCA's.
  - prevention, rather than end-of-pipe solutions, were beneficial both for the economy and the environment.
- More effective waste management
  - increased recycling rates would minimize the amount of plastics ending up in the ocean
- Biota is ingesting plastics and other toxics that get attached to the plastic which then move up the food-chain.
  - more and more information is coming out on the bio-accumulative effects of the plastics and toxic chemicals on the biota.
- The topic of plastic debris in the marine environment has already been on international, regional and national agendas for several years, without the problem being solved.
- In spite of all the agreements and action plans plastic is still entering the world's oceans in huge amounts every year, both in the form of microplastics and much larger debris and waste products.

The panel consisted of (from left to right) Jón Ómar Erlingsson, Emily Corcoran, Marcus Eriksen, Haukur Þór Hauksson, Hildur Knútsdóttir, Runar Mathisen, Stefanie Werner and Brynhildur Pétursdóttir.
(Picture: Birgitta Stefánsdóttir)

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Annex I – Fisheries World Café

The following points were discussed at the roundtables at the sessions *Fisheries and plastic waste*:

Loopholes:

- how to deal with the waste that is now in the ocean, fishing for litter, infrastructure needed;
- getting small fishing boats in the system;
- more monitoring to have reliable comparable data - must be on regional level;
- exporting the problem to another area;
- planning without proper solutions;
- producers responsibility; no realistic view;
- by-product value;
- single use vs circular economy;
- lack of awareness (education);
- there is no economic incentive for individuals or consumers to recycle plastics;
- an economic incentive should be financed – either by tax – unpopular, or import tax – not allowed in free-trade agreement;
- life cycle of plastic, oil producer, food industry, consumer [ends up in nature];
- pick up volunteers/garbage industry/local government → recycle/reuse;
- financial model for clean-up;
- too many conferences and workshops too little action;
- awareness of problem;
- not the production and use;
- health risk/pollution;
- no common strategy, national strategy on the way
- lack of knowledge of amount and compositions of plastic waste in Icelandic waters;
- no system to control fishing gear in [Europe];
- waste water treatment plants;
- lack of top management commitment [Iceland, Europe];
- 50 years ago, quality products, now less quality more waste -> change this;
- fish farming: impregnated copper in the net;
- coordinate supply/use/disposal/reuse, who is responsible at which point;
- recreational fishing;
- policy coherence;

Industry:

- who will pay for plastic waste from the ocean - polluter should pay (PPP);
- "Garbage record book" publicly accessible;
- better classification of products – what is what?
- Global standardized system for plastic (making product not waste),
- financial incentive for buying fishing gear that is easily recyclable;
- partnership within industry and authorities for green innovation - % of growth;
- increase numbers of collection points for fishing gear;
- different solutions for different types of fishing gear: trawlers, longlines, …;
- fishing for litter;
- raise awareness;
- increase durability;
- design with regard to recycling;
- raise awareness among employees, captains and crew;

- less packaging,
- like Iceland look at the gear;
- negotiation incentives based management of raw materials = tax on raw materials, repaid at delivery for recycling and paying recycling cost;
- sponsorship for NGOs/clean up;
- holistic approach: industry, consumers, authorities, NGOs, regional/international authorities;
- include environmental thinking during operation;
- biodegradable product certification;
- input in research and monitoring of plastics in the ocean;
- encourage green annual account from private companies;
- make plastics traceable: fish boxes, fishing nets, etc;
- industry can develop a deposit-fee system;
- insurance companies can play a role – bonus system;
- cruise ships: no plastic to sea guarantee;
- next decades: fish industry decline in polluted areas -> secure high quality in the fishing sector;
- environmental technology methods;
- produce less! Better products;

Consumer:

- GPS on all fishing gear bigger than a certain size;
- some kind of voluntary environmental certification (for product/handling/packaging);
- private consumers: require less packaging;
- resistant reusable packaging;
- recycle packaging/ecofriendly;
- select fish from “green” fishing boat,
- demand solutions with less packaging/favour these;
- waste management plans/recycling;
- participating in national/regional projects;
- beach cleanup,
- use the toilet correctly, don’t throw plastics in it;
- receive money for return of plastic garbage;
- mutual awareness on behavior in relation to garbage disposal;
- avoiding plastic bags;
- education;
- boycott;
- public procurement;
- more explicit labelling;
- stop blending different waste fractions;
- demand of the fish products quality;

Authorities:

- binding international agreement on litter based on UNCLOS;
- national legislation;
- support to NGOs;
- NGOs in the board of recycling board, more incentive driven;
- financial incentives - financial structure, legislation, funding;
- educate general public/industry etc – raise awareness;
- recycle tax on fishing gear;

- exporting the fishing gear is not responsible -> exporting the problem;
- anti-litter law;
- be a model;
- establish framework for recycling and waste management;
- implement stronger initiatives;
- produce management plan based on result-based management system and increase knowledge in the society to change perspectives and raise awareness;
- mapping and monitoring, data collection;
- advertisement/education campaign;
- encourage is better than sticks;
- punishment system (fines);
- make recycle systems that work;
- extended producers responsibility;
- refund system;
- regulations and supervision – on fishing gear fate/loss, recycling, discard, etc.;
- coherence;
- political prioritization;
- experience sharing;

NGOs:

- improve public and political awareness;
- networking across borders;
- free work force!
- education, collaboration;
- realistic goals;
- enforce problem solution;
- put pressure on industry and the authorities;
- support/publish research;
- specific projects both locally and regionally;
- beach cleanup campaign, raise awareness;
- finance research;
- partnership with industry;
- independent critics of the system;
- lobby with politicians;

Regional/international cooperation:

- regional assessment,
- unified code system for plastic monitoring
- international law or agreement;
- force other;
- resist “illegal” trade of plastic waste;
- share information or possible solutions/problems;
- adopt solutions to different conditions;
- ocean has no boundaries -> international cooperation very important;
- share responsibility to make sure regions/countries with weaker infrastructure can also deal with this mutual problem;
- systematic approach to the problem;

- monitoring and assessment -> comparable results;
- data bases;
- finding a financial structure for cleaning up;
- EU-directives;
- producer pay for waste;
- development aid;
- cooperation with IMO;
- important to work on RAPs;
- NEAFC: better cooperation with OSPAR etc;
- pricing has to be right in the harbour – internationally coordinated;
- increase policy coherence;
- create benchmarks;
- technology transfer;
- bring people together;

Annex II – Microplastics World Café

The following points were discussed at the roundtables at the session *Microplastics in consumer goods*

Loopholes:

- a “need” call for an another “need” - is our “needs” still a “need” or did it increase so much and so far that we lost the concept of “need”?;
- consumerism, our whole system builds on consumerism, we are constantly trying to enhance growth - how do we measure wellbeing;
- responsibility; control;
- Price – consumer is not paying the true cost of goods – PPP;
- waste disposal; recycling – standardized guidelines and more readily available info, reuse – what other available potential opportunities;
- more awareness: directed at the individual, “foster a beach”;
- easier recycling: home, public areas; too much work too complicated today;
- lack of knowledge on material flows -> difficult to manage globally and locally;
- preventing the entry of microliter into sewage system;
- too much plastic being used in the global economic system – plastic should be used very exclusive;
- science and legislation lag behind the market -> research on hazard and risk management is done in the hind-sight, long after the market has begun using said plastic;
- no easy or required ways put forward for consumers to recycle or cut down on plastics -> consumers need more info about microparticles;
- incentives for fishermen to cut down on wastes, such as nets, since most of the plastic come from fisheries waste;
- more political action and legislation is needed;
- decisions are made at a high level, slowing the process as well as politicizing issues;
- system lacking “circle of life” design;
- problem is that many companies are allowed to do what they want (lack of rules, lack of implementing and follow up on rules, lack of research, lack of info to consumers);
- should be higher prices of plastic packaging than environmentally friendly packaging;
- lack of awareness among decision makers;
- lack of funding, lack of political focus and courage, lack of general awareness;
- waste management currently non existing in many areas;
- technology not sufficient (filters);
- industry is making materials and not taking responsibility where it ends up;
- uniformity: eg England – regional differences in recycling;
- inadequate risk assessment of microplastics – should be based on material types (polymers), size fractions and structure of particles;
- sewage plants not sufficient;
- should be easier for the fishery sector to bring litter to ports;
- ignorance of big stakeholders;
- knowledge gap between science and politics;
- difficulties in recycling;
- information about hidden plastics;
- school system is not informative;

Industry:

- develop new consumer models;
- use recycled plastics in their products, create reuse products and industries;
- labelling for consumers to know if product recycled material and what percentage;
- more research needed, more funds, industry takes part in funding, their best interest to have the best info;
- innovate; make renting schemes instead of producing things;
- more mitigation;
- fisheries: personal employee action, boat/company action to encourage non-littering,
- waste management: encourage research into waste management methods at source;
- fishing sector: be super good at handling their own waste/nets, be very loud advocates for consumer awareness -> clean fish = their money;
- waste management: municipalities must be willing to pay for plastic being collect and properly recycled, inform the public that not all plastic/products can be recycled, so consumers shouldn't choose them;
- plastic producers: be environment pioneers by finding alternative solutions for packaging, grocery bags and so on;
- sewage industry: filters, where the water goes;
- fishing industry: fines for littering, use more sustainable gear, economic incentives;
- fishing industry: invest in less waste of nets+packaging;
- industry: invest in recycling for plastic, stop using microplastic in cosmetics;
- waste management: organize recycling system ´filtering for effluent;
- comply to legislation – be responsible;
- provide info and knowledge;
- cradle to cradle approach;
- implement strong environmental standards;
- LCA, alternative material;
- effective waste water cleaning system;
- grocery sector -> sell non-packaged food;
- corporate social responsibility, incentives for recycling, incentives for technical improvement needed;
- cross-sectoral extended producer responsibility;
- refund system in line with companies profit -> no refund – no profit;
- reuse of plastic bottles, eg Norway large soda bottles used multiple times;
- replace microbeads with natural chemicals;
- fishing: copy Iceland's system for fishing gear recycling;
- Join "fishing for litter";
- fewer types of plastics;
- get an "award" for developing a better product;
- how can money be used in a reimbursement system;
- safer transport: raw material like micropellets are found too much on shores;
- fishing sector: report lost fishing gear;
- quality system;
- business opportunities in environmental policy;
- filters in washing machines;
- to use more natural polymers in plastics, that are in our nature;

Consumers:

- be responsible in every-day life, use less plastic, recycle, reuse;
- use consumer power - demand ecofriendly; shout louder?;
- be aware;
- buy recycled goods;
- buy local production;
- reduce extra packaging for long-term travel;
- vote with the wallet;
- take proudness in quality and durability -> more happiness;
- value other things than stuff more;
- stop exploiting of “green”;
- professional consumers – regulations, employee incentives;
- professional consumers – follow clear purchasing policies that minimize plastic use, buy less and buy things that last, choose well and buy eco-labelled;
- private consumers – be aware, buy less plastics (use other materials), buy eco-labelled, recycle, put pressure on politicians, peer-peer education is very persuasive (boycott products, avoid over packaged, avoid waste, demand labelling);
- read labels, speak up to producers, demand alternatives;
- be innovative;
- be a role model;
- pressure on local authorities for better recycling;
- bring their litter to the trash bin;
- boycott, activism;
- the toilet is not a garbage bin;
- demand better and more informative media;
- more apps with info of dangerous chemicals;

Authorities:

- monitor use of microplastics in various industries;
- implement and follow up implementation of rules;
- put environmental issues high on their agenda, create predictability;
- waste management regulations,
- user pay concept; honour the PPP;
- ban things like microplastic in sanitary products and some kinds of plastic bags,
- use monetary incentives (taxes, revenues);
- set rules based on comprehensive understanding; cooperate across borders;
- information accessibility - ensure right information;
- prioritize environmental issues linked to plastics;
- massive public awareness campaigns + research to help consumers protect themselves and the environment;
- establish guidelines for plastic consumption based on knowledge and guidelines for disposal and recycling;
- establish tax/fund to clean up plastic that is already in the environment;
- infrastructure: separate sources of microlitter, investigate central methods, upgrade to Nordic/developed world standards;
- put pressure to those responsible e.g. “best” plastics for recycling;
- make change within authority (consumer, schools etc);
- legislation, awareness, education, setting examples as consumers that are also an authority figure,

- allocate more funding to both scientific and societal research (natural and social sciences),
- inspection of work places guidelines as to how they can reduce litter,
- an early outreach -> get the new generations to be thinking more sustainably from the beginning,
- making specific campaigns that aim at specific issues, thereby making it easier and more accessible and available;
- improve recycling – follow up with education/information for the public/companies regarding importance of recycling;
- take responsibility;
- start small with big long term goals;
- international binding treaties; taxes and tariffs;
- recycle funds like úrvinnslusjóður;
- action plan: what, how by whom should be done;
- think beyond 4 years;
- clear and concise regulation;
- don't be afraid to take complicated and unpopular decisions;
- more supervision with waste from companies;
- cleaning beaches;
- collect waste at source;
- define specific product standards for different product groups so more can be expected to be reused and recycled;
- apply taxation to promote good behaviour from industry and consumers;
- forbid dangerous chemicals;
- powerful surveillance control;
- can microplastics be used to clean up POPs?;
- not use growth as indicator of prosperity;
- financial benefits of environmental friendly policy;
- stricter environmental permits;
- implement laws like no smoking law;
- enforce legislation eg illegal dumping: collect people together to work on solutions;

NGOs:

- raise awareness to the general public and key stakeholders;
- put pressure on authorities;
- lead by good example;
- link between industry, consumers, authorities;
- clearinghouse of information;
- increase public stewardship as well as corporate stewardship;
- graphic information for the public;
- be loud and get public discussion going;
- collect research conclusion and create consensus;
- create benchmark (compacts, eco-labels);
- don't have any political interest that divest and they have to balance, they can work more intensely without being afraid to step on someone's toes;
- take action -> direct and indirect, from campaigns and flyers to demonstrations and chaining themselves to a tree;
- go through policies and new legislation and make complaints and comments;
- lobby and mobilize the general public;

- speak for the public, can have huge influence;
- support innovative business models in plastic producing countries to bring down international global environment footprint;
- independent research projects;
- cleanup activities – awareness building;
- also important to lobby in EU;
- work abroad to educate individuals from countries with less established programs;
- motivate society;
- use their volunteer network to reach to many people;

Regional/international cooperation:

- standards, laws and regulation to follow;
- policy documents;
- raise awareness - can be more creative in informing people;
- help launch campaigns to tackle issues;
- exchange of information - drawing on each other's experiences;
- lead and finance transboundary research/actions;
- cooperate on transboundary issues;
- common responsibility – transboundary pollution;
- common goals and standards;
- exchange programs;
- make ties to NGOs,
- make joint legislation to make sure that everyone is pitching in;
- more brains more good ideas;
- areas where borders meet can be governed more effectively;
- prevent inter-regional passing of blame;
- technology/expertise transfer;
- suitable geographical scale measures,
- coastal cleanup;
- OSPAR/EU legislation is clearly making plans, however action can help peer pressure between countries;
- cooperation with indicators/monitoring methods available;
- intercalibration of methods -> enable comparison of data on a regional/international scale;
- possibility for Nordic countries to work together -> put pressure on EU level and internationally – together we are strong;
- financial support for poorer countries;
- point out what is being done/what is going well – bring attention to the problem;
- increase networking and exchange of info between rural and urban regions worldwide;
- database;
- work on EU level, IMO level, OSPAR level, UN level;