United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea

Seventeenth meeting

13 to 17 June 2016
(United Nations Headquarters)

Panel discussion
"Marine debris, plastics and microplastics"

Biographies and abstracts of panellists

Segment 1

The environmental, social and economic dimensions of marine debris, plastics and microplastics and progress made in preventing, reducing and controlling pollution from marine debris, plastics and microplastics

Mr. Peter Kershaw

Bio

I am a independent consultant, based in the UK, offering advice on various aspects of marine environmental protection, mainly for United Nations Agencies. This follows 35 years of research experience in marine environmental science, focussing on the footprint and impact of human activities, at national, European and international scales. This was based at the Centre for Environment, Fisheries and Aquaculture Science, Lowestoft UK. I became a Member of GESAMP (The Joint Group of Experts on Scientific Aspects of Marine Environmental Protection, an inter-agency body of the United Nations) in 2008, and have been Chairman since 2013, working on a pro bono basis. GESAMP considered microplastics as an emerging issue in 2009 and in 2012 formed a working group on 'Sources, fate and effects of microplastics in the marine environment – a global assessment', which I co-chair. Other activities involving marine plastics and microplastics include: the EU FP7 MARLISCO programme (Marine Litter in European Seas – Social Awareness and Co-Responsibility); invited expert at events organised by NOWPAP (Northwest Pacific Action Plan), EU FP7 DeFishGear project (derelict fishing gear in the Mediterranean), the Royal Society of Chemistry, HELCOM (the Baltic Marine Environment Protection Commission) and the Norwegian Government; improving the evidence base for the implementation of the Global Partnership on Marine Litter, including writing a UNEP report on biodegradable plastics; and, most recently, preparing the report on marine plastics and microplastics for consideration at the 2nd United Nations Environment Assembly in May 2016.

Abstract

"Overview of the problem, with a focus on microplastics - insights from the GESAMP report on microplastics"

Microplastics are generally defined as small particles or fragments of synthetic polymer less than 5mm in diameter. The actual size range covers several orders of magnitude. Some microplastics have been manufactured for specific purposes and are termed 'primary' microplastics. Others have resulted from the fragmentation of larger items and are termed 'secondary' microplastics. Examples of both types of particle were first observed in the marine environment in the 1960s and 1970s. However, it is only in the past decade that the scientific community has really started to pay attention to the scale and possible effects of microplastics in the ocean.

The topic was raised as an emerging issue within GESAMP (The Joint Group of Experts on Scientific Aspects of Marine Environmental Protection, an inter-agency body of the United Nations) in 2008, leading to a number of scoping activities culminating in an international conference in 2010, hosted by IOC-UNESCO and supported by the EU. Subsequently, a GESAMP Working Group was formed, led by IOC-UNESCO with funding provided by two industry associations: Plastics Europe and the American Chemistry Council. This began work in 2012 and reported in April 20151. The Terms of Reference were revised and a second phase began in 2015, with additional support from UNEP (Norwegian Government funding), to provide a second GESAMP report2 to feed into the major study on marine plastics and microplastics,

requested at the United Nations Environment Assembly (UNEA) in 2014. The UNEA report was published during UNEA-23.

Examples of primary microplastics include resin pellets (used within the plastics industry for transporting the raw material), industrial abrasives and abrasives in personal care products (PCPs), such as toothpaste. 'Microbeads' in PCPs have received a lot of media attention, and can be substituted by alternatives relatively easily, but they only represent a small component of the total quantities of plastics reaching the ocean. Examples of secondary microplastics include fibres from synthetic textiles, dust from vehicle tyres and fragments from the wide variety of plastic objects in everyday use, including fishing nets, containers and packaging. Plastics designed for durable applications, such as in construction or electronics, often contain additive chemicals to provide desirable properties (e.g. UV-resistance, fire retardation). Such chemicals can leach out and some have toxic properties. In addition, plastics in the ocean tend to absorb organic contaminants which are already present. There is concern that such chemicals may be transferred into an organism once ingested. Microplastics have been observed inside many types of marine organisms, including commercial species of fish and shellfish. However, outside of the laboratory it has been difficult to establish whether the effects of microplastics on organisms are significant. At current concentrations microplastics, and their associated chemicals, do not appear to represent a food safety concern. But, there remains a high level of uncertainty, especially as to the presence and possible effects of nano-scale plastic particles.

Ms. Lorna Inniss

Bio

Dr Lorna Inniss is the Coordinator of UNEP's Caribbean Environment Programme and Secretariat for the Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region. She recently joined UNEP after more than 20 years working with the Coastal Zone Management Unit in Barbados, and following completion of her work on the first integrated World Ocean Assessment in 2014. Dr Inniss has worked extensively on coastal issues affecting small island developing states, and has provided technical assistance to other coastal states experiencing the devastating effects of climate change, including coastal hazards.

Abstract

"Overview of the Problem and Knowledge Gaps – Insights from the World Oceans Assessment"

Chapter 25 of the World Ocean Assessment addresses the issue of marine debris, and identifies the scale of the problem, the types and sources of marine debris, as well as the worst affected areas of the ocean. The environmental impacts include entanglement and ingestion by marine biota, transport of chemicals and introduction of alien invasive species. Socioeconomic impacts were a challenge to quantify, mainly because of insufficient data and information. However, the assessment presents impacts on beaches, nearby communities and tourism, impacts on commercial fishing, and from invasive species. The assessment of the status of marine litter covers the volume and types of floating and benthic marine debris, and beach debris. Details are presented on major gaps in adequate scientific research, assessment and monitoring of marine litter globally. The impacts of marine debris on coastal and marine species, habitats, economic health, human health and safety, and social values are not yet fully understood.

Ms. Jenna Jambeck

Bio
Dr. Jenna Jambeck is an Associate Professor in the College of Engineering at the University of Georgia. She has been conducting research on solid waste issues for nearly 20 years with related projects on marine debris since 2001, especially projects related to global waste management and ocean plastic inputs, location and spatial analysis of debris, debris quantification and characterization, and technology/mobile device usage for mapping and citizen science. She has presented at several international venues including a G7 Workshop and the Our Ocean conference and she serves on an advisory committee for the UNEP Global Partnership on Marine Litter.

Abstract
"Overview of land-based sources of marine debris"

Dr. Jambeck will give and overview of land-based sources of marine debris. Plastic debris and its impacts in the marine environment have been widely documented, but the quantity entering the ocean from land was unknown. By linking worldwide data on solid waste, population density, and economic status, we estimated the mass of land-based plastic waste entering the ocean. We calculate that 275 million metric tons (MT) of plastic waste was generated in 192 coastal countries in 2010, with 4.8 to 12.7 million MT entering the ocean. Population size and the quality of waste management systems largely determine which countries contribute the greatest mass of uncaptured waste available to become plastic marine debris. Without waste management infrastructure improvements and other changes, the quantity of plastic waste available to enter the ocean from land is predicted to double by 2025 for a cumulative input of up to 155 million metric tons. Dr. Jambeck will discuss this research, as well as potential solutions.

Ms. Kelsey Richardson

Bio

Kelsey Richardson worked as a consultant for the Secretariat of the Pacific Regional Environment Programme (SPREP), where she developed collaborative marine debris research, source reduction and awareness raising projects across the Pacific region. She has a master's degree in International Environmental Policy with a concentration in Ocean and Coastal Resource Management from the Middlebury Institute of International Studies at Monterey, and a Bachelor's of Science from the University of California, Berkeley. Kelsey is currently working with Dr Hardesty and Dr Wilcox from Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) on research surrounding Abandoned, Lost or Discarded Fishing Gear (ALDFG), with plans to continue this research through a PhD with the University of Tasmania, in collaboration with CSIRO, the Global Ghost Gear Initiative and SPREP.

Abstract

"Marine pollution originating from purse seine and longline fishing vessel operations in the Western and Central Pacific Ocean"

The Secretariat of the Pacific Regional Environment Programme (SPREP) analysed fisheries observer data documenting illegal pollution incidents from purse seine and longline fishing vessels operating in the Western and Central Pacific Ocean between 2003-2015. Data analysis revealed more than 10,000 pollution incidents within the Exclusive Economic Zones of 25 Pacific countries and territories, and in international waters. A majority of the reported pollution incidents related to dumping of plastic waste, with other common pollution incidents related to abandoned or discarded fishing gear.

While the reported number, types and scope of pollution incidents are cause for concern, given the limited observer coverage for the longline fishery, the data examination likely represents only a snapshot of a larger problem of fishing vessel sourced marine debris in the Pacific region. Action is needed to curb this behaviour. Following its data review, SPREP highlighted the needs for increased monitoring, reporting, and enforcement of pollution violations by all types of fishing vessels operating in the Pacific region; a regional outreach and compliance assistance programme on marine pollution prevention; and improvements in Pacific port waste reception facilities.

Peter Van den Dries

Bio

Peter Van den Dries is a biochemist, with postgraduates in Environmental Sciences and Port Management. He started his professional career in 1991 in the chemical and pharmaceutical industry, but in 1994 he joined the Waste Agency (OVAM) of the Flemish Environmental Administration in Belgium, as policy advisor for maritime and port related issues. In 2009 he joined the European Maritime Safety Agency (EMSA) in Lisbon, as Project Officer responsible for ship recycling and port reception facilities for ship-generated waste and cargo residues. He participated in the EMSA audit teams inspecting the implementation of the port reception facilities Directive in several EU Member States, and as ship recycling expert he was a member of the European Commission's delegation to IMO (Marine Environment Protection Committee MEPC). In July 2011 Peter joined the Antwerp Port Authority, where he worked as Technical Environmental Manager. His main responsibilities were within the field of maritime shipping (reception facilities for ship-generated waste and cargo residues, ballast water, bunker fuel quality, onshore power supply, etc.) and inland navigation (ship's waste and cargo residues, onshore power supply, degassing, etc.). In August 2013 he returned to the Flemish Waste Agency (OVAM), where he took up his position as deputy of the director and policy advisor for maritime and port related issues. Peter is also the project leader for the action programme on marine litter, and participates in the implementation of the OSPAR Regional Action Plan on Marine Litter.

Abstract

"The collection of ship's waste in Belgian seaports"

Introduction:

Illegal discharges at sea of solid wastes from ships are a relevant source of marine litter worldwide. Several studies have indicated that marine debris has a substantial impact on the environment (incl. human health), but also leads to social and economical damage. In addition the discharge of valuable materials into our oceans prevents that these materials are being recycled and reused. Therefore an efficient collection of all types of ship's waste in ports is important.

Approach:

Taking into account the content of ships' garbage (plastic, metals, glass, etc.), this type of waste might be a relevant source for reusing or recycling. More delivery of ship's waste to reception facilities therefore would increase its potential for turning it into a valuable resource and accelerate the transition towards a circular economy.

The international convention on pollution prevention from ships (MARPOL) requires that port states provide adequate port reception facilities (PRF). In addition, in Europe the EU directive 2000/59 requires ports to develop plans for the management of ship's waste, including fee schemes that should incentivize ships to deliver their waste to PRF.

Ports are very different, each with their own characteristics regarding geographic location, types of traffic, types of ships, etc. Therefore there are currently many different practices being applied in ports, focusing on different aspects (financial, service level, enforcement, etc.).

In Belgium the management of ship's waste focuses on the port type and the ships calling these ports, and a tailor-made approach has been developed in order to ensure the availability of adequate PRF and to incentivize the delivery of waste. Distinction is being made between:

- large commercial ports;
- fishing ports;

- marina's; and
- inland terminals.

Conclusions:

- illegal discharges of ship-generated waste have a substantial environmental and socio-economic impact, incl. a risk for human health
- ship's garbage has a potential for reusing/recycling, supporting the transition towards a circular economy
- a tailor made approach taking into account the specific characteristics of the ports facilitates the provision of adequate PRF and ensures an efficient waste delivery

Mr. Stefan Micallef

Bio

Dr. Micallef graduated with a Ph.D. in marine toxicology from the University of Wales, UK, starting his UN career in 1990 as Programme officer at the UNEP/IMO REMPEC based in Malta. In 2000, he joined UNEP's Division of Environmental Policy Implementation, as Chief of the Disaster Management Branch. In 2004, he moved to the IMO as Head of the Chemical & Air Pollution Prevention Section in the Marine Environment Division. In 2007, he became Deputy Director of the Sub-Division for Pollution Response and Technical Co-operation within the Division, and is since January 2012 its Director. As such, he is responsible for the Secretariat functions behind all regulatory and capacity-building matters relating to the protection of the marine and atmospheric environment from ship-source pollution as well as the prevention of air pollution and control of GHG emissions from ships. He also serves as Secretary to the Marine Environment Protection Committee (MEPC) and Administrative Secretary of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP).

Abstract

"IMO's work to address marine debris, plastics and microplastics"

The presentation will provide an overview of IMO's work in relation to marine debris, plastics and microplastics, the most important of being the regulations on prevention of pollution by garbage from ships, as contained in Annex V to the International Convention for the Prevention of Pollution from Ships (MARPOL). In addition to the environmental and health problem posed by marine litter, garbage and plastics pose a costly and dangerous problem for shipping, as a navigational hazard and from entanglement in propellers, rudders etc.

The revised MARPOL Annex V was adopted in 2011 and entered into force on 1 January 2013. The revised Annex V prohibits the discharge of all types of garbage into the sea from ships except in the cases explicitly permitted under the Annex (such as food waste and other organic matter that are not harmful to the marine environment).

Some sea areas which require higher degrees of protection, can be designated as Special Areas under MARPOL. Currently, there are eight MARPOL Annex V Special Areas: the Mediterranean Sea, the Baltic Sea, the Black Sea, the Red Sea, the "Gulfs" area, the North Sea, the Wider Caribbean region including the Gulf of Mexico and the Caribbean Sea, and the Antarctic area. All of these have entered into effect, except the Black Sea and the Red Sea.

Other instruments of relevance in this context are the 1972 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its 1996 Protocol, which regulate the dumping of various types of wastes at sea. Recently, the Contracting Parties completed a review of the state of knowledge with respect to how these wastes may contribute to the presence of debris, in particular plastics, in the marine environment, noting that dredged material and sewage sludge are the most likely of the waste streams to contribute to the presence of marine litter.

IMO is the Secretariat for the Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP), which in 2012 established a working group on 'Sources, fate and effects of microplastics in the marine environment: a global assessment' (Working Group 40). In 2015, the working group published its first report, and has recently provided input to the second session of the United Nations Environment Assembly. The second report of the working group is currently being prepared for publication in July/August 2016.

Finally, IMO is one of the partners in the UNEP-managed Global Partnership on Marine Litter (GPML), co-leading on sea-based sources of marine litter together with FAO. Under this partnership, several activities have been undertaken, including the development of a training package on MARPOL Annex V and port reception facilities, a review of plastics in the waste streams under the London Convention and Protocol, and the development of a kids' website for promoting awareness of shipping in relation to marine pollution.

Mr. Andrew Booth

Bio

Dr Andy Booth is a Senior Researcher in Environmental Chemistry at the Environmental Technology Department at SINTEF Materials and Chemistry. He also teaches at the Norwegian University of Science and Technology and is a council member of the Norwegian Board of Technology. He received his PhD from the University of Plymouth, UK for work investigating the fate and effects of complex mixtures of petroleum-derived compounds in the marine environment. His research work focuses on the environmental fate and effects of anthropogenic pollutants in natural systems, with a focus on nanomaterials and microplastics. He has coordinated and participated in many national and international level research projects, including coordination of the EU JPI Oceans project 'PLASTOX'. He is author of more than 25 publications in peer-reviewed scientific journals.

Abstract

"Ecotoxicological impacts of microplastics on marine organisms, including species providing a source of food"

There is no doubt that wildlife is contaminated with microplastic (MP) debris. Several research papers demonstrate this in a wide range of marine species from most trophic levels (pelagic and benthic). Still, there is much less scientific evidence regarding effects from this contamination, especially in organisms relevant to the seafood industry and human consumption. Whilst laboratory experiments have provided some evidence of sub-organismal impacts from microplastic debris, there are still relatively limited studies and even fewer that can be considered ecologically relevant. Moreover, studies regarding impacts to species relevant to the seafood industry are especially limited and have typically focused on benthic invertebrates (e.g. shellfish). Some recent studies have shown MPs are ingested and can elicit negative effects in marine mussels (Mytilus edulis), marine oysters (Crassostrea gigas) and in the freshwater fish (Oryzias latipes). The role of MPs as vectors for transporting known environmental pollutants (e.g. persistent organic pollutants (POPs) and metals) has also been shown to be of significance in fish.

Due to the current weight of evidence, there remains a need to address a number of knowledge gaps concerning effects from MP including (i) potential effects of MPs on aquatic (marine and freshwater) species at different life stages, including those providing a food source for humans, (ii) determination of MP uptake and internalisation (e.g. across the gut wall) and potential for trophic transfer, (iii) understanding the role of MPs as vectors for exposure and bioaccumulation of sorbed persistent organic pollutants and metals already present in the environment, (iv) the role of associated additive chemicals on the potential effects of MPs to aquatic species, and (v) identification of specific modes of toxic action for MPs and their relationship to those of conventional marine pollutants.

A small number of projects recently funded under the European Union Joint Programming Initiative on Oceans (JPIO) are attempting to address some of these knowledge gaps and a project recently funded by the Norwegian Research Council is specifically looking at the impact of MPs and POPs associated with MPs on the commercially important Atlantic cod (Gadhus morhua). However, these ongoing studies will not answer all the necessary questions, and therefore it will be important to align international activities and further support research to address these knowledge gaps.

Mr. Diego Alejandro Albareda

Bio

Diego Alejandro Albareda was born in Buenos Aires in December 1967. He graduated from Veterinary at the University of Buenos Aires and completed his postgraduate studies in Environmental Management at the National University of San Martin. He has worked at the Zoological Garden of the City of Buenos Aires since 1998 as a specialist in marine life and he is currently within the Department of Conservation. He is also a member of the Marine Turtle Specialist Group of the IUCN. In 2012 he was appointed Argentinean delegate to the Scientific Committee of the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) and he currently serves as Chair of the Committee. His main challenge nowadays is to bring both to the political arena and the society the problems affecting the marine environment and its biodiversity, with the ultimate aim of finding mutually acceptable solutions.

Abstract

"Sea turtles and plastic debris in South America"

The waters and coasts of South America represent an area of great importance for nesting, feeding, migration, and growth of five species of sea turtles: the loggerhead turtle (Carettacaretta), the green turtle (Chelonia mydas), the leatherback turtle (Dermochelys coriacea), the hawksbill turtle (Eretmochelys imbricata), and the olive ridley turtle (Lepidochelys olivacea). Through population genetics and satellite telemetry it was found that South America shares some species of sea turtles with Central and North America, Oceania and Africa. The evidence of ingestion of plastic by sea turtles is registered in at least 8 of the 11 coastal countries of the South American Continent (Colombia, Venezuela, Brazil, Uruguay, Argentina, Chile, Peru, and Ecuador). Both lethal (complete intestinal blockage, internal injuries, lacerations and septicemia) and sublethal (dietary dilution) effects are registered with several levels of impact as a consequence of the ingestion of plastics in these reptiles. There are very few studies regarding direct impact of microplastics in sea turtles in the region. Moreover, the habitat degradation in nesting areas, resulting from the accumulation of plastic on beaches, has consequences both on spawning and incubation and hatchling. Through international conventions such as Inter-American Convention for the Protection and Conservation of Sea Turtles, Convention Biological Diversity, and Convention Migratory Species, among others, that address the issue of sea turtles, these problems are trying to be installed on government agendas of member countries. However, since competence of waste management rests with city governments in the majority of countries, it is often difficult to implement mitigation or remediation due to lack of intergovernmental coordination and financial and human resources.

Ms. Tamara Galloway

Bio
Tamara is Professor of Ecotoxicology at the University of Exeter and also holds an honorary Chair at University of Exeter Medical School.

Tamara's research focus is in understanding how organisms adapt and survive in polluted environments and she studies the health effects of some of the most pressing priority and emerging pollutants: including complex organics, plastics additives, metals and nanoparticles. She receives funding from a wide range of competitive sources including research councils, medical charities and industry groups both in the UK and internationally. She is an expert member of several (inter)/national committees charged with environmental protection and the promotion of translational research, including the UK government's Hazardous Substances Advisory Committee.

In relation to marine microscopic debris, Tamara has been studying the ecotoxicology of marine microplastics debris for over 10 years, publishing some of the first papers to report on bioaccumulation and biological effects in different marine organisms. She has also published highly cited papers on associations between plastics associated chemicals and human health.

Abstract
"The risks posed by marine micro- and nano-plastic debris to human health"

There is no doubt that plastics provide many societal benefits, offering inexpensive, lightweight and durable items for consumer products, food packaging and construction. Multi- million tonne production rates, coupled with indiscriminate disposal have allowed plastic wastes to infiltrate ecosystems on a global scale, posing uncertain risks to ecosystems and to human health. Of particular concern is the reported presence of microscopic plastic debris (<1mm in diameter and with no lower size limit = micro- and nano-plastic) in aquatic terrestrial and marine habitats.

Microplastics present a risk to health because their small size overlaps with prey items ingested by many marine organisms, with the potential for entry into the marine food web. Once ingested, microplastics may cause harm through particle toxicity or by releasing persistent, bioaccumulating or toxic contaminants absorbed to their surface from surrounding waters, or leached from within the plastic polymer itself. In addition, microplastics may act as vectors for the uptake of pathogenic organisms.

In this presentation, the routes of exposure and risks presented by plastics polymers found in marine debris will be discussed. The contribution of microplastics as a vector for human contamination compared with other routes of exposure to contaminants will be considered. Finally, the potential for green chemistry approaches to formulate safer, more sustainable polymers will be considered as an avenue for reducing the ecological and public health impacts of plastic waste.

Mr. Nishan Degnarain

Bio

Nishan Degnarain Chairs the World Economic Forum's Global Agenda Council on Oceans. This is an invite-only network of 20 of the world's leading thinkers on the future of oceans, comprising representatives from all industrial sectors, scientific communities, Government and civil society. Nishan Degnarain is an Economist, with degrees in Economics and Geography from the University of Cambridge and Harvard's Kennedy School of Government. He was formerly with the UK Prime Minister's Strategy Unit, then a management consultant with McKinsey and Company. He later returned to Mauritius as an economic adviser to the Government of Mauritius, sitting on the Monetary Policy Committee of the Central Bank of Mauritius as well as on the National Ocean Taskforce of Mauritius. In 2013, he was recognised as a Young Global Leader by the World Economic Forum.

Abstract

"The Fourth Industrial Revolution and the New Plastics Economy'

The presentation covers recent work by the World Economic Forum and its industry partners that looks at the economic aspects and need for a new Plastics Economy, in the context of a Fourth Industrial Revolution

Mr. Hideshige Takada

Bio

Shige Takada received Ph.D. in the field of Environmental Organic Geochemistry in 1989. He has been working in Tokyo University of Agriculture and Technology for 29 years. His speciality is trace analysis of organic micropollutants. The target compounds include POPs, endocrine disrupting chemicals, pharmaceuticals as well as molecular markers. His research field encompasses from Tokyo Bay to Southeast Asia to Africa. In 2005, Shige Takada initiated International Pellet Watch, global monitoring of POPs by using beached plastic resin pellets (http://www.pelletwatch.org/). He has been working with ~ 100 NGO and individuals who have concern about marine plastic pollution. Shige Takada is the authors more than 150 peer-reviewed papers in international journals with H-index of 41 and more than 25 invited speeches on international conferences.

Abstract

"Monitoring of microplastics and hazardous chemicals in water, sediment and biota: Historical trend in microplastic pollution and their chemical impact on marine ecosystem"

Huge amounts of microplastics (fragments, fibers, resin pellets, and microbeads) are globally distributed in the oceans. They enter food web through direct ingestion by lower-trophic-level organisms and trophic transfer (i.e., indirect ingestion). We detected microplastics in the digestive tracts of 77 % of anchovy sampled in Tokyo Bay. Most of the pieces were fragments (86.0%), but 7.3% were microbeads. These microplastics in fish may provide chemical threat to the fish and human when they would be eaten, because microplastics contain toxic chemicals which are originated both from additives and through sorption from seawater. International Pellet Watch (IPW), monitoring of persistent organic pollutants (POPs) by using beached plastic resin pellets, demonstrated that sorption of POPs to microplastics occurs ubiquitously and POPs in resin pellets showed reasonable spatial pattern reflecting general pollution status of world ocean. Similar magnitude of POPs were observed in floating microplastics in surface waters in the Pacific (coast and offshore) and the Atlantic. IPW also evidenced that microplastics carry POPs to remote ecosystem. Furthermore, we observed transfer and accumulation of POPs derived from ingested plastics to tissue of seabirds in remote area (Bering Sea). Similar accumulation of POPs may occur with the other species in the other areas, if the amounts of microplastics would increase. Actually, microplastic pollution in aquatic environments has been getting serious globally. We studied historical trend in microplastic pollution in Asia and Africa by using sediment cores which store microplastics and record the pollution history. We observed increasing trend in number of microplastics during last ~50 years in sediment cores collected from Japan (Tokyo), Malaysia (Straits of Johor), Vietnam (Tonkin Bay), Thailand (Gulf of Thailand), and South Africa (Durban Bay). Though we have to study the temporal trend in microplastic pollution and toxicological effects of microplastic-associated chemicals in more detail, we should take action against plastic pollution according to precautionary principle.

Ms. Britta Denise Hardesty

Bio

Dr. Hardesty is a senior research scientist for Australia's federal research institution, the Commonwealth Scientific Industry and Research Organization where she has been leading a portfolio of projects focused on understanding plastic pollution sources, drivers, movement and impacts. Her team takes a risk-based approach to addressing biodiversity impacts resulting from ingestion and entanglement, combining empirical evidence with model-based approaches. Her marine debris work also focuses on gear loss from fisheries, drivers for litter losses into the environment, waste policy effectiveness, and non-point source reduction. As recognition of the plastic pollution issue grows, she is increasingly asked to provide expert opinion on marine debris related matters at national and international workshops with government, industry, fisheries and other stakeholders aiming to reduce this transboundary issue.

Abstract

"Risk-based approaches to evaluating the environmental impacts of marine plastic pollution at local, national and global levels and cost-effective opportunities to reduce inputs to the environment"

Relating marine plastic pollution to environmental impacts remains a significant challenge, in spite of numerous studies demonstrating harm to individual marine species, losses in tourism revenue at particular sites and societal costs from coastal and marine litter. Here, I review current progress on risk assessments for impacts to major marine taxa from plastic pollution as well as point to on- ground solutions to reduce loss rates into the environment and reduce ecological and environmental harm. The analyses reviewed range from expert elicitation to integrated statistical and physical models. They range widely in scope, from estimates at the individual level to whole taxa analysis. Some of the analyses reach only to exposure to the pressure, while others carry through to estimate demographic impacts and even mortality due to ingestion of or entanglement in plastic debris in the ocean. I summarize results of recent studies, and provide a roadmap for future contributions toward estimating the actual ecological impact of plastic pollution and discuss progress made to reduce litter inputs to the marine environment.

Segment 2

Challenges, lessons learned, best practices and way forward to prevent, reduce and control pollution from marine debris, plastics and microplastics

H.E. Mr. Arif Havas Oegroseno

Bio
(forthcoming)

Abstract
(forthcoming)

Mr. Anthony Glenroy McKenzie

Bio

Mr. McKenzie has in excess of twenty five years experience in environmental management in Jamaica. He is currently the Director of Environmental Management and Conservation at the National Environment and Planning Agency (NEPA). Anthony has a Masters Degree in wastewater treatment and process technology and a Masters in Business Administration (MBA) with specialization in strategic planning. His current research interest is in the area of coastal zone management, specifically the impacts of climate change. He is the national focal point for sustainable consumption and production (SCP) as part of UNEP's 10YFP for SCP and the national representative on UNESCO-IOCARIBE regional seas programme. He is a past member of the Jamaica Defense Force.

Abstract

"Challenges, lessons learned, best practices and way forward to prevent, reduce and control pollution from marine debris, plastics and microplastics – The Jamaican Experience"

Marine litter, including plastics and microplastics, is a major concern for Jamaica and the region. Yearly data for Jamaica derived from International Coastal Clean-up Day (ICCD) activities point to the serious problem of marine debris accumulation on the Island's shores and in the marine environment.

This presentation outlines the challenges the country is facing with respect to the management of solid waste with specific reference to plastics and plastic packaging material. Best practice recommendations being pursued by the Government of Jamaica and being implemented on a phased basis are described. The presentation also outlines as a specific case reference, the measures being implemented by the Government of Jamaica to handle ship generated waste in the absence of a physical waste reception facility.

Challenges the country will need to overcome include; limited enforcement concerning littering, the need for updated legislation related to solid waste management and an effective collection and disposal system. Short and medium term strategies including regulatory measures are being implemented by the Government to reduce the quantity of plastics and plastic packaging waste that end up in the waste stream and ultimately in the marine environment. These include; the expansion of resources recovery programme, measures related to single use packaging bags and the promulgation of regulations related to waste containerization, collection and haulage and a 'take back' scheme.

Honorable Mayor Ms. Belen Fernandez

Bio

Mayor Belen Fernandez of Dagupan, Philippines, is a local environmental champion who is presently leading her city in a community-wide campaign to cleanse all its waterways and creeks, and completely removed all illegal fishing structures to allow new life to teem again across its 7 river systems.

Her sheer resolve to cleanse the river of microplastics and keep the oceans clean has been providing inspiration to many of the country's local government leaders.

She has been working closely to alleviate the plight of local fishermen and waste pickers by building core shelters, livelihood centers, education facilities, providing their children with scholarships as well as insurance and welfare benefits, teaching them to care and protect the seas which has brought the city unlimited bounty.

Abstract

"Importance of local government unit's ownership of the 2030 agenda for sustainable development particularly Goal 14 on oceans: challenges, lessons learned, best practices"

Dagupan City is committed to ending a 50 year old garbage problem by partnering with Proctor & Gamble Philippines to install an $8M WASTE 2 WORTH Facility near the existing dumpsite. The facility will convert plastic trash to diesel and organic trash to methane. The end products will in turn be used by local vehicle operators.

By closing the largest open dumpsite along LINGAYEN GULF and rehabilitating the same for the next six years, Dagupan's beach front will be relatively free of leacheate and plastic fugitives. Leading by example, Dagupan will be able to enjoin no less than 6 LGUS along, the Lingayen Gulf and 5 others along the West Philippine Sea to actively clean and protect their Ocean.

A package of social services has been prepared by the City to assist affected families at the dumpsite including more than a thousand informal settlers living along esteros and river banks cut off their waste stream from the source.

After the UNCLOS consultation, Mayor Belen shall convene all LGU's along the Western Sea Board to present, our Waste 2 Worth technology and social amelioration programs as a model so that jointly all 11 LGU's can permanently keep our Ocean clean, spur marine bio-diversity and attract the high-end tourist market in this part of the Philippines for all generations to come.

Ms. Nancy Wallace

Bio

Nancy Wallace is the Director of the National Oceanic and Atmospheric Administration's Marine Debris Program. The Marine Debris Program is the federal lead for researching, preventing, and reducing the impacts of marine debris in the United States. Nancy is the Chair of the Interagency Marine Debris Coordinating Committee, Chair of the United Nation's Global Partnership on Marine Litter, and the Co-Chair of the Asia Pacific Economic Cooperation's Marine Debris Working Group. Nancy has worked on ocean policy-related issues for the past 15 years. Her work includes resource conservation with the National Park Service, developing sustainable catch limits for fisheries off the east coast of the United States, and efforts to improve water quality in the Gulf of Mexico.

Abstract

"Marine debris: challenges and solutions"

Our ocean is filled with items that do not belong there. Huge amounts of consumer plastics, metals, rubber, paper, textiles, derelict fishing gear, abandoned or derelict vessels, and other lost or discarded items enter the marine environment every day, making marine debris one of the most widespread pollution problems facing the world's ocean and waterways. There is no part of the world left untouched by debris and its impacts. Marine debris is a threat to our environment, navigation safety, the economy, and human health. The NOAA Marine Debris Program is leading efforts in the United States to research, prevent, and reduce the impacts of marine debris. The Program supports marine debris removal projects with partners around the country and spearheads national research efforts to better understand the issue and its impacts. While research and removal are important components of reducing impacts to marine debris, the long-term solution will be preventing the introduction of debris into the coastal and ocean environment. The Program is actively working with partners to implement prevention projects around the country and building innovative solutions to this ever-growing problem.

Ms. Nilufer Oral

Bio

Nilufer Oral is a member of the Law Faculty at Istanbul Bilgi University. She is a legal advisor to the Turkish Foreign Ministry on law of the sea and climate change. She is a member of IUCN Council for Western Europe (2012-2106); Chair of the IUCN Academy on Environmental Law and is co-chair of the Specialist Group on Oceans, Coasts and Coral Reefs for the IUCN World Commission on Environmental Law. Dr. Oral represented the IUCN before ITLOS in Case #21 Advisory Opinion regarding IUU fishing in West Africa. Nilufer Oral is a Distinguished Fellow of the Law of the Sea Institute, UC Berkeley School of Law. She has also lectured at the Rhodes Academy for the Law of the Sea. She has published extensively on the protection of the marine environment. Dr. Oral is Turkey's candidate for the International Law Commission at the United Nations.

Abstract

"A Regional Seas approach to prevent, reduce and control pollution from marine debris, plastics and microplastics: Lessons learned and opportunities for the future"

Marine debris, plastics and microplastics are major threats to the marine environment extending from the coastal areas to areas beyond national jurisdiction, accumulating in ocean gyres as well as on the seabed. Studies have shown the deleterious impact of marine litter on ecosystems, habitats and biodiversity threatening some 650 species and in particular species listed on the IUCN Red List (IUCN 2014). The sources of marine debris are primarily land-based but also an estimated 20% come from sea-based activities – fishing and shipping.

The UNEP Regional Seas programme (RSP), with a total of thirteen regional seas and more than 143 countries involved, was established in 1974 as a cooperative mechanisms at the regional level to address pollution of the marine environment. It remains as one of the key international mechanisms to provide the coordinated framework for collective action to address threats to the marine environment, including marine litter. In recent years the UNEP RSP together with the Global Programme of Action undertook the "global action on marine litter" initiative, and also has instituted actions at the regional level in different regional seas. The principal role of land-based sources of marine debris, plastics and microplastics places the RSP in a particularly strategic position to provide significant contribution to addressing the problem from the source. Moreover, the RSP have an extensive experience, both positive and negative in dealing with different sources of pollution.

The presentation will provide a critical assessment of the applicable legal framework of the RSP, in particular those dealing with land-based pollution, and other actions undertaken related to marine debris, plastics and microplastics. The assessment will identify gaps, strengths, lessons learned and unique opportunities provided by the RSP to meet the challenge of marine debris, plastics and microplastics through strengthening governance at the regional level.

Ms. Judith Neumann

Bio

Dr. Judith Neumann works for the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Division Marine Protection and is dealing with questions related to human induced environmental impacts on the marine environment. Currently, her thematic focus is on marine litter. She has been the focal point for the G7 work on marine litter during the German G7-presidency in 2015. In the same year she was appointed GPML steering committee member. Former responsibilities in the Ministry included also fisheries and aquaculture both on national and European level. Dr. Judith Neumann is trained marine ecologist and zoologist, her studies also included environmental law - during her PhD she thematically specialized on the deep-sea environment.

Abstract

"International and national implementation processes of the G7 Action Plan to combat Marine Litter and the EU - Marine Strategy Framework Directive"

Challenges posed by transboundary issues and problems are known to almost all those processes that involve multiple parties. Challenges thereby may encompass the recognition of national circumstances, as well as the integration and application of already existing structures and projects. With the protection of the marine environment the EU – Marine Strategy Framework Directive and recent G7 activities face such tasks. The quantity of litter entering the oceans has caused, and since a reduction in the near future is not expected will remain causing, serious problems for ecosystem functioning and the socio-economic environment, respectively. Transformation towards healthier oceans as requested through SDG 14 can only be achieved by promoting cooperation through participatory multi-stakeholder processes. Therefore, finding common grounds to enhance acceptance and progress is indispensable and precondition.

The G7 summit 2015 in Germany has demonstrated that the major advanced economies mark a new path and mindset beyond their classical issues of world economy, foreign-, security-, and development policy, that is environmental policy and as part of it the protection of the marine environment. During the German presidency in 2015, new focus themes were marine litter, deep-sea mining, and the protection of the high seas. In the G7 Leaders' Declaration they "acknowledge that marine litter, in particular plastic litter, poses a global challenge, directly affecting marine and coastal life and ecosystems […]". Based on priority actions defined in the annex to the Leaders' Declaration, termed the G7 Action Plan to combat Marine Litter (G7APML), in fact a novelty to the otherwise rather restrained political statements, the German Presidency aimed at further defining and specifying actions that are listed in the G7APML. Timelines and actors have been defined and identified for five specific measures in the last of the three workshops in 2015. These measures are to be adopted under the Japanese G7-presidency in 2016 in order to receive the political blessing by the Heads of State and Government of the G7.

In 2008 the EU- Marine Strategy Framework Directive (EU MSFD) has come into force. This Directive establishes a framework within which European Member States shall take the necessary measures to achieve or maintain good environmental status (GES) in the marine environment, reducing emissions and inputs of microplastic particles by the year 2020 at the latest. The MSFD shall apply to all European marine waters. Each Member State shall, in respect of each marine region or sub region concerned, develop a marine strategy for its marine waters. After having elaborated an initial assessment, determined good environmental status and established environmental targets, national Programmes of Measures (PoM) need to be elaborated. Eleven descriptors, one of them relating to marine litter ("Properties and quantities of marine litter do not cause harm to the coastal and marine environment."), shall help to define GES. Based on detailed criteria and indicators, Germany has –in time- developed a national

program of measures (PoM) covering all descriptors, i.e. marine Litter as well. The focus is on pressure sources at sea and includes, i.a., the reduction of inputs of litter through a combination of measures relating to product design, waste management, aftercare and public awareness raising.
In detail, related measures cover the following issues:

- "marine litter" in learning goals, teaching plans and materials
- Modification/substitution of products in a comprehensive life-cycle approach
- Avoiding the use of primary microplastic particles
- Reducing inputs of plastic litter e.g. plastic packaging, into the marine environment
- Measures relating to lost and abandoned fishing nets and gear
- Establishing the fishing for litter approach
- Removing existing marine litter
- Reducing amounts of plastic litter through local regulatory provisions
- Reducing emissions and inputs of microplastic particles

The process of developing the PoM included and involved all kinds of different stakeholders. The PoM needs to be operationalized by the end of 2016.

Ms. Johanna Eriksson

Bio
Ms. Johanna Eriksson is a Senior Adviser at the Swedish Agency for Marine and Water Management. She participates in several national and regional policy processes with the aim to prevent and reduce marine litter in our oceans. One such example is the development and implementation of Marine Litter Regional Action Plans in the North-East Atlantic and the Baltic Sea. Ms. Eriksson has, within the frame of the EU Marine Strategy Framework Directive, developed a national monitoring programme and a programme of measures for marine litter. For more than 10 years Ms. Eriksson has worked in public administration gaining extensive experience in fisheries management, national regulations, international cooperation and policy work concerning marine litter. Ms. Eriksson holds an MSc. in Environmental Science from the Linköping University, Sweden.

Abstract
"Regional action plans - a way to prevent and reduce marine debris, plastics and microplastics"

Large amounts of marine litter floats ashore every year on the northern part of the Swedish West Coast, with economic, social and environmental consequences. Sweden cannot solve the problem solely by national measures. From a Swedish point of view, this stresses the need for regional and international actions. Therefore Sweden prioritizes the work against marine litter within the Regional Sea Conventions (RSCs) for the North-East Atlantic (OSPAR) and the Baltic Sea (HELCOM) and the EUs Marine Strategy Framework Directive (MSFD).

The MSFD is to be implemented nationally and regionally coordinated. Thus, there are strong synergies between the MSFD and the work of RSCs in form of Regional Action Plans on Marine Litter (RAP ML) recently adopted by OSPAR and HELCOM.
OSPAR and HELCOM have developed Regional Action Plans as a way to prevent and reduce marine litter. The plans identify measures with focus on specific sources and types of marine litter that are of most concern within the region. The actions are divided into regional and voluntarily national actions. The regional actions are intended to address problems requiring cross-scale reinforcement and collective action by Contracting Parties. The voluntary national actions are primarily addressing problems of national concern.

A wide range of actors from both the private and the public sector including non-governmental organizations have been engaged in the process. The development of the plans has, together with the implementation of the MSFD, led to a lot of activites, both at national and regional level. This presentation will elaborate on the challenges and lessons learnt so far, for example: are the plans too comprehensive? Is the present path of implementation sufficient?

For further information on the Regional Actions Plans see www.ospar.org/work-areas/eiha/marine-litter/regional-action-plan and www.helcom.fi/action-areas/waste-water-litter/marine-litter/marine-litter-action-plan
For further information on the MSFD see http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

Ms. Heidi Savelli

Bio
Heidi coordinates UNEP's marine litter activities within the framework of the Global Partnership on Marine Litter which is hosted by the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). She is an ecotoxicologist by training with an MSc in Biology from Lund University in Sweden.

Abstract
(forthcoming)

Mr. Georg Caspary

Bio
Dr Georg Caspary has been at the World Bank Group for over ten years in the energy and environment sector in various regions, and currently helps manage the Bank's new Pollution Management and Environmental Health (PMEH) fund. He was previously with the OECD; and helped launch two start-up companies. He has collaborated with various think tanks and universities, and holds a current adjunct professorship at Georgetown University. He has published widely on environment and resources issues including in 'Global Governance', 'Impact Assessment and Project Appraisal', 'Energy Economics'.

Georg is a recipient of various prizes, including e.g. his recent inclusion in the German '40 under 40' list of public policy influencers. He holds degrees from Oxford University, Sciences-Po Paris and the London School of Economics.

Abstract
(forthcoming)

Mr. Richard Northcote

Bio
Richard Northcote has a wealth of experience in the chemical and construction industries. He has worked as a journalist, corporate communications and government affairs executive and latterly as head of Sustainable Development. He has lived and worked in a variety of European countries, the Middle East and Asia. He entered the chemical industry in 1996 with ICI and joined Covestro AG (formerly Bayer MaterialScience) in 2009, where he now serves as Chief Sustainability Officer.

Richard sits on the Steering Committee of the Oxford University
Business Economics Programme (OUBEP); is an advisor to the Board of the European Institute for Industrial Leadership (EIIL) and a member of both the European Chemical Association's (CEFIC) Sustainability Council and the Editorial Board of Reed Business International's chemical magazine ICIS.

Abstract
"Together, we can stop the flow"

Marine Litter is one of the major global challenges our society faces today.
Only a comprehensive approach, through different measures to be taken at a global, regional and State level, can ensure that no more plastic waste ends up in the oceans. Since land-based sources account for up to 80% of the world's marine litter, adopting environmentally sound waste management practices is crucial to contain all waste effectively. And given the sheer volume of unmanaged waste coming from developing countries, it is essential to share knowledge and best practices on sustainable waste management, while raising awareness and encouraging behaviour change through education and information. .

The presentation by Richard Northcote on behalf of the World Plastics Council will focus on present commitments by plastic makers from around the globe to prevent marine litter, including through the industry's Declaration of the Global Plastics Associations for Solutions on Marine Litter (Declaration). The Declaration, first launched at UNEP's 5th International Marine Debris Conference in 2011, has since been signed by over 65 associations from 34 countries. Around 260 projects are underway, planned or completed.

The speaker will describe how plastic makers are working with their value chains and creating public-private partnerships, such as the Trash Free Seas Alliance, which brings together NGOs, academics, plastic makers and consumer goods companies to bring about the introduction of waste management systems in developing countries or Operation Clean Sweep® which unite the value chain to stop the loss of plastics granulate.

Mr. Rob Kaplan

Bio
Rob Kaplan is co-founder and Managing Director of the Closed Loop Fund, an innovative platform for impact investing, sustainability, and the circular economy. The Fund aims to scale recycling through zero interest loans to cities and investments in waste companies. Prior to joining the Fund, Rob served as Director of Sustainability for Walmart Stores and helped lead corporate responsibility and brand strategy for Brown-Forman Corporation. Rob received his MBA from the Haas School of Business at UC Berkeley and his undergraduate degree in political communication from the George Washington University. He lives in Brooklyn with his wife and two children.

Abstract
"Scaling recycling through zero-interest loans to cities and investments in waste companies"

Closed Loop Fund is a $100m social impact fund that invests in building municipal recycling infrastructure and in sustainable materials and packaging. The investors include the world's largest retailer, Walmart, and leading consumer goods companies including P&G, Unilever, J&J, Coke, Pepsi, and 3M. To date, CLF has deployed about $25M across 10 projects, attracting an additional 3-4X in co-investment leverage. The presentation will describe the factors that led to the creation of the Fund, the structures and terms, examples of projects and success stories, and opportunities to expand internationally to help reduce marine debris.

Ms. Elizabeth Hogan

Bio

Elizabeth Hogan is the Program Manager for Oceans and Wildlife with World Animal Protection, where she specializes in marine wildlife entanglement in addition to work on marine debris, illegal wildlife trade, whaling policy, and wildlife in captivity. For the last four years she has researched the impact of derelict fishing gear on marine mammals and worked on establishing rescue networks and protocols for entangled animals. She has previously worked with the International Fund for Animal Welfare (IFAW) on protective policies and fishing gear modification for the conservation of North Atlantic Right Whales. Prior to working in the animal welfare sector, Elizabeth developed fifteen years of experience with government, corporate, and non-profit organizations, including four years as a consultant on climate change, deforestation policy, and sea level rise. She has also worked in ecotourism development in Ecuador and with the Camara de Industrias of Costa Rica to assist Central American businesses in adopting environmentally sustainable business practices.

Elizabeth is a contributing author to two books on corporate social responsibility. She has a degree in Foreign Service from Georgetown University and a dual Master of Science in Marine & Coastal Natural Resources and a Master of Science in Sustainable Development from the University for Peace in Costa Rica and American University in Washington, DC.

Abstract

"Market-based and design change solutions to address the impact of lost and discarded fishing gear"

640,000 tons of fishing gear is lost or discarded in the oceans every year, and is found throughout the oceans. This 'ghost' gear has a devastating effect on marine animals, injuring and killing millions of whales, dolphins, sea turtles, seals, and seabirds. It also costs governments, marine industries, and fishermen millions of dollars in clean-up expenses and lost revenue each year. Ghost gear often travels long distances from its point of origin and accumulates in hotspots around ocean currents. Gilnet fragments, rope, and monofilament line entangle approximately 136,000 whales, seals, and sea lions each year (as well as an inestimable number of sea turtles, birds, and fish). As well as causing needless animal suffering and death, ghost fishing gear causes large-scale damage to marine ecosystems and compromises yields and income in fisheries, which translates into higher costs for companies sourcing these goods. Collaboration between the private seafood sector, regulatory agencies, and the fishing industry to establish best practices in gear management and to identify gear loss hotspots (locations prone to high levels of loss that overlap with migratory routes) is essential to address this problem.

The Global Ghost Gear Initiative was established in 2014 to establish the science surrounding ghost gear and create sustainable solutions, via a combined effort of governments, scientists, fishermen, the seafood corporate industry, and civil society. In addition to looking at the role of ghost gear in harming our oceans, marine life, and food security, the efforts of the GGGI and other businesses are turning ghost gear from trash into a commodity, which benefits the world economy and keeps harmful plastics out of our oceans, preventing the destruction of our ocean food source and marine wildlife.

Mr. Jeff Wooster

Bio

Jeff Wooster is the global sustainability director for Dow Packaging and Specialty Plastics. In this role, he collaborates with the entire value chain to promote and improve the sustainability value of plastic packaging. He serves on the Board of Directors and as the president of AMERIPEN, and is on the Board of Directors for GreenBlue. Wooster previously served as a member of the Executive Committee of the Sustainable Packaging Coalition. Additionally, Wooster serves as chair for American Chemistry Council's Plastics Division Packaging Team and is a member of the Flexible Packaging Association's Sustainability Task Force.

Wooster joined Dow in 1988, where he spent five years in polyolefins product research. In this role he developed new polyethylene resins and worked to understand fundamental materials science and polymer processing. In 1993 he transferred to the Plastics Technical Service & Development team, where he has held technical responsibility for many of the Company's key polyethylene customers. He has developed and implemented new technology for various application areas such as stretch film, heavy duty shipping sacks and fresh-cut produce packaging. In 2007 he moved to Marketing & Sales where he assumed responsibility for sustainability for Dow's North American plastics business and was named to his present position in 2011.

Wooster holds 45 U.S. and foreign patents and has published more than 50 technical papers and presentations. He is a frequently invited guest speaker on the subjects of sustainability and sustainable packaging at events such as the 2015 Green Biz Forum. Wooster has also been recognized for his many efforts to advance sustainability practices including the American Chemistry Council Responsible Care 2015 Employee of the Year and an inaugural Trashie Award. He lives in Houston, Texas, but enjoys traveling beyond Texas boundaries to enjoy his favorite hobbies, including snow skiing and contributing to the economic development of the world's top tourist destinations.

Wooster received a Bachelor of Science degree in chemical engineering from Iowa State University of Science and Technology.

Abstract

"Market-focused sustainable packaging initiatives"

The Dow Chemical Company (Dow) combines the power of science and technology to passionately innovate what is essential to human progress. Dow is driving innovations that help address many of the world's most challenging problems. Dow has been an industry leader for many years with its initiatives to address the issue of marine debris, including being a founding member of the Ocean Conservancy's Trash Free Seas Alliance, its implementation of Operation Clean Sweep to prevent pellet loss to the environment, and through its support of efforts in the Global Declaration for Solutions on Marine Debris. Using its materials science and design expertise, Dow's Packaging & Specialty Plastics business is driving implementation of technologies that improve sustainability performance for the entire packaging value chain. The presentation will include examples of several recent packaging innovations including technologies that allow for increased use of recycled content materials in liquid packaging, replacement of non-recyclable stand-up pouches with pouches made from polyethylene that can be recycled in existing film and bag recycling systems, and compatabilizer technology to facilitate the recycling of multi-material barrier film structures in the existing polyethylene film and bag recycling infrastructure. Collectively these new technologies can help keep plastics out of the ocean by offering more options for recycling of post-use consumer packaging.

Mr. Arturo Alfaro Medina

Bio

Presidente de la ONG VIDA – Instituto para la Protección del Medio Ambiente, ecologista con 25 años de trabajo en gestión ambiental, consultor de organizaciones públicas y privadas del Perú y el extranjero. Promotor de la participación ciudadana en la conservación ambiental. Desde 1999 lidera en Perú la campaña Limpieza Internacional de Costas y Riveras y promueve la realización de actividades para reducir y eliminar la basura marina en el mar peruano y del mundo. Consultor sobre basura marina para la Comisión Permanente del Pacífico Sur y es Coordinador del Programa Regional de Capacitación sobre el Problema de la Basura Marina en el Pacífico Sur que se realiza en Chile, Perú, Ecuador y Colombia con apoyo del Departamento de Estado de los Estados Unidos de Norteamérica.

President of the NGO VIDA – Instituto para la Protección del Medio Ambiente, environmentalist with 25 years of work in environmental management, consultant to public and private organizations in the Peru and abroad. Promoter of citizen participation in environmental conservation. Since 1999 leading in Peru campaign International Coastal Cleanup and promotes activities to reduce and eliminate marine debris in the Peruvian sea and the world. Consultant on marine waste for the Permanent Commission for the South Pacific and is coordinator of the Regional Programme of Training on the Problem of Marine Debris in the South Pacific that is carried out in Chile, Peru, Ecuador and Colombia with support of the Department of State of the United States of America.

Abstract

"Characterization of marine debris in Peru"

The problem of marine debris affect the Peruvian coast. The pollution of the sea takes place throughout the year, having as a main source waste coming through the rivers and the debris from construction that are dumped directly on beaches and different activities developed in the sea.

Since 1999 the NGO VIDA has organized the International Coastal Cleanup Campaign in Peru. This campaign includes the characterization of the marine debris found in beaches along the country considering the different types of waste found, through the use of a data sheet.

It has been 17 years of data registered which constitutes an important source of information for decision making. The most common items found in this annual campaign were different kinds of plastics and wood from the construction industry. Besides, we have identified the sources of this kind of marine pollution and have developed proposals to address the solution of this problems.

This presentation presents a summary of the characterization of marine debris in Peru, the relationship found between recycling and the presence of certain marine debris in marine ecosystems and the identification of the sources of marine debris.

Mr. Andreas Merkl

Bio

Andreas Merkl is the CEO of Ocean Conservancy, which educates and empowers citizens to take action on behalf of the ocean.

Prior to taking the helm at Ocean Conservancy, Andreas served as a principal at California Environmental Associates, a San Francisco-based think tank and consultancy that works on the management of the natural resource commons, ranging from fisheries to freshwater, forests, air and biodiversity. He has worked with the major U.S. foundations, multi-laterals and corporations on developing market-based incentive systems for responsible resource stewardship, ranging from catch-share systems for commercial fisheries to green growth development mechanisms for developing countries. Earlier in his career, Andreas was a founding member of McKinsey & Company's Environmental Practice and served as Vice President and co-founder of the CH2M HILL Strategy Group, a leading provider of environmental management consulting services worldwide.

Andreas holds an MBA with distinction from Harvard University, a master's degree in Regional Planning and Natural Resource Analysis from the University of California at Berkeley and a bachelor's degree in Environmental Studies from the University of California at Santa Cruz.

Abstract

"Challenges, lessons learned, best practices and way forward to prevent, reduce and control pollution from marine debris, plastics and microplastics"

Ocean Conservancy has over 30 years' experience in the field of marine debris. After leading the world's largest volunteer cleanup effort on behalf of the ocean, and using that data to help shape the scientific community's body of work on marine debris, we are focused on stopping plastic and trash from ever reaching the ocean. This is not just an ocean issue. By 2050, there will be 4 billion tons of waste on the planet. Billions of people around the world—usually the most vulnerable communities—are exposed to disease and contamination from uncontrolled dumping and open burning of waste. Close to 2 billion people don't have access to waste collection services and roughly 3 billion don't have access to controlled waste disposal facilities.

Ocean Conservancy's report Stemming the Tide: Land-based Strategies for a Plastic Free Ocean, charts a path forward to manage, minimize and mitigate pollution in order to reduce the flow of plastic into the ocean. By focusing on waste management in China, Indonesia, the Philippines, Vietnam and Thailand, we can reduce the flow of plastic into the ocean by 45%. Andreas Merkl, CEO of Ocean Conservancy, will explore the opportunities and challenges that exist to create economic incentives for waste management and collection in these target countries. This presentation will also highlight on-the-ground success stories, and include a preview of emerging trends in the field of marine debris science.

Ms. Julia Reisser

Bio
Julia Reisser (1984) leads the oceanographic team and the ocean plastic research expeditions of The Ocean Cleanup Foundation. She is responsible for increasing the knowledge on mass, distribution, and impacts of plastics across the world's oceans. She started her academic career in Brazil, where she founded and led a project dealing with sea turtles in a marine protected area. She then moved across the world to do her PhD in Oceanography at the University of Western Australia. Her research focuses on understanding how ocean physical processes influence plastic pollution and marine life. Julia has led many research cruises and diving expeditions in the Atlantic, Pacific, Indian and Southern Oceans, resulting in 16 peer-reviewed articles on plastic pollution and biology topics to date.

Abstract
"The Ocean Cleanup"

The Ocean Cleanup Foundation is a Dutch not-for-profit organization founded in 2013 by Boyan Slat (http://www.theoceancleanup.com/). It now has more than 40 staff and 100 volunteers actively working on its projects. The main mission is to develop technologies to extract, prevent, and intercept marine plastic pollution. The target cleanup area is the so-called 'Great Pacific Garbage Patch', which is the largest oceanic plastic pollution hotspot in the world's ocean. The engineering team is currently focused on executing a series of model tests and pilot deployments in coastal and oceanic waters. The organization is also conducting research to better quantify loads and environmental impacts of ocean plastics. This presentation will provide an overview of The Ocean Cleanup initiative, including an introduction to the core activities being executed by the foundation's team.

Mr. Camden Howitt

Bio
Camden Howitt is General Manager and Communications Director of multi-award winning New Zealand charity Sustainable Coastlines. Inspired by a life on, under and beside the sea, he is a passionate advocate for our oceans.

After a career in advertising Camden left the for-profit sector to launch and build Sustainable Coastlines, achieving significant impacts in community education, waterway restoration and litter abatement since establishment in 2009.

An expert communicator, skilled creative and passionate educator; the campaigns, messages and education programs he has crafted have brought litter awareness messaging to millions around New Zealand and the Pacific and received major national and international awards. Camden also advises other non-profits through his design consultancy Whale Shark Creative and sits on the Board of the International Environmental Communication Association.

Abstract
"Creative solutions for Pacific plastic pollution"

New Zealand-based charity Sustainable Coastlines has developed a range of creative solutions to address the widespread issues of marine debris, plastics and microplastics in the Pacific. Through its collaborative, grass-roots approach, the charity has expanded its impacts across the region, establishing sister organisations in Hawaii and Papua New Guinea, and completing projects in the Cook Islands, Fiji, Tonga, Vanuatu, Guam, Wallis and Futuna and New Caledonia.

Geographic isolation, limited waste infrastructure, lack of economies of scale and other developmental constraints make addressing global environmental problems even more challenging when working in the context of the Pacific. Having launched in New Zealand in the middle of the Global Financial Crisis, creative solutions and collaboration have always played significant roles in Sustainable Coastlines' strategy for addressing plastic pollution, raising community awareness and inspiring change.

By focusing on positive, enjoyable activities and employing savvy media and communications tactics, the charity has made engagement with the cause accessible to mainstream audiences. A recent partnership with Samsung has facilitated a deep integration of digital technology and increased capacity for large-scale data gathering. Their focus on collecting and displaying detailed data has proved a huge success, giving policy-makers and decision-makers the tools and ammunition to target high-risk products, materials and behaviors that contribute to plastic pollution.

To raise community awareness, Sustainable Coastlines has developed a simple and effective presentation style that employs almost no written words - capitalizing on the power of story telling while allowing the presentation to be easily tailored to new contexts, audiences and languages. This is a crucial tool for a region where local language and culture are so diverse and has proven to be highly engaging, memorable and simple to teach to others.
The charity takes a detailed approach to monitoring and evaluation of these educational interventions, working alongside behavioral psychology experts to develop an innovative framework for studying their own work. This study has provided invaluable insights on its educational outcomes and has allowed the charity to iteratively test and refine outreach activity.

Strategic partnerships have been crucial to the widespread reach of Sustainable Coastlines' impacts. Since 2011 the charity has worked closely with the Oceania National Olympic Committee's "Voices of the Athletes" Program to deliver litter awareness education to tens of

thousands of Pacific athlete ambassadors during games around the region. The charity has also created long-term partnerships with correctional facilities and authorities. In doing so, they facilitate restorative social service through offender education/training while creating significant efficiencies for labor-intensive clean-up and data collection activities.

Sustainable Coastlines has even extended its creative approach to funding, focusing on raising revenue through true social enterprise rather than traditional grant writing and donation gathering models. This sees corporate groups and international volunteers paying a premium for activities that deliver direct impacts on plastic pollution, provide adventurous team building experiences, and generate funding to provide these services to those that cannot afford it.

All resources, methodologies and processes developed by Sustainable Coastlines are open-sourced, creating huge efficiencies for organisations working on the same objectives, breaking down barriers to entry, and facilitating true collaboration. Through these innovative projects and methodologies, Sustainable Coastlines has earned national and international recognition, including the International Olympic Committee (IOC) Sport and the Environment Award for Oceania at the IOC/UNEP conference in Sochi, 2013.

This panel presentation details the challenges, lessons learned and best practices developed by Sustainable Coastlines to prevent, reduce and control pollution from marine debris, plastics and microplastics in the Pacific.

Ms. Debby Lee Cohen

Bio

Debby Lee Cohen, Executive Director and Founder of Cafeteria Culture, is a multi-disciplinary artist, teacher, and zero waste activist. She has designed scenery, giant puppets, and animation for theater, film, and television, including HBO. In 2009, she decided to apply her design, teaching, and collaboration skills to achieve zero waste school cafeterias and to eliminate the 860,000 polystyrene (aka, styrofoam) lunch trays used per day in NYC schools - a victory that was achieved in 2015.

Cohen and Atsuko Quirk, Cafeteria Culture Media Director, have been collaboratively piloting hands-on, interdisciplinary cafeteria and classroom curricula to support zero waste culture. Their SORT2save Kit, a multimedia resource for schools to achieve zero waste, will be available online for free this summer. Their Youth and Arts Media for Trash Free Waters School Program empowers middle school youth with marine pollution education and media production skills, giving youth knowledge and tools to create peer-to-peer videos on the topic.

Cohen is a member of the Manhattan Citizen's Solid Waste Advisory Board (SWAB) and the US EPA Region 2 Trash Free Waters Partnership. She received the Eco-Hero Award from the United Federation of Teachers (UFT) Green Schools Committee in 2010. Under her leadership, Cafeteria Culture was honored to be one of 5 organizations in North America to receive the 2015 UL Innovative Education Award for advancing K-12 E-STEM education. The award is hosted by UL, the global independent safety science company, and the North American Association for Environmental Education (NAAEE).

Abstract

"Partnering with urban youth on upstream solutions, civic action, media and messaging to reduce plastic marine debris and microplastics"

Engaging New York City (NYC) urban youth, who are typically avid users of single-use plastic food containers and bags, as creative and collaborative partners to advocate for street litter reduction, is a strategy that Cafeteria Culture has been employing to combat the plastic pollution problem and as outreach to local NYC school and online communities.

Background

Founded in 2009 as Styrofoam out of Schools, Cafeteria Culture catalyzed the complete elimination of polystyrene (aka styrofoam) trays from all NYC schools and the 5 other largest US urban school districts, resulting in the elimination of half a BILLION styrofoam trays per year from U.S. landfills, incinerators, and student meals. Public school students played a key role in winning this victory. Central to our work is the piloting of innovative, hands-on environmental education with focus on student leadership, civic action, arts and media. To date, we have primarily led our school programs in low-income NYC communities of color.

The following are examples of our school programs, where we have merged plastic reduction education and initiatives with civic participation, arts, and video production.

• Giant Styrofoam Data Puppets – student creation of visual data in a theatrical format for "edu-tainment" and civic participation - 5th graders (PS 221 K- primarily Caribbean population and PS 34 M primarily Hispanic population). Program components included a Socratic Discussion, constructing large puppets; crafting a play on styrofoam and oceans; participation in a NY City Hall rally.

• "5th Grade Change-Makers Take Action on NYC Bag Bill" (1 minute video clip) – PS/MS 34, 5th grade students (primarily Hispanic population, living in NYC public housing, receiving free lunch). Program components included a Socratic Discussion; a Roundtable Meeting with a NYC

Council Member; interviewing neighbors; constructing large puppets; and participating in a rally at NY City Hall and speaking to the press.

• The Power of Peer-to-peer Storytelling -Youth Arts + Media for Trash Free Waters – MS 246, 8th graders, primarily Caribbean population). Leveraging the talent of media savvy youth to communicate plastic marine debris issues with their peers and community by giving them the necessary knowledge, teaching them video production skills, and allowing them the opportunity to produce their own videos. Program components included a Socratic discussion on NYC's plastic bag fee bill; video chats with experts; beach litter survey and street litter surveying; and student production of 6 documentary videos in a variety of styles.

Youth-driven plastic litter reduction solutions, which are hands-on, and media and arts centric, have enormous potential to empower youth as leaders within their communities, fostering a long-lasting interest in protecting our waterways and marine wildlife for future generations.

Ms. Karen Raubenheimer

Bio

Karen Raubenheimer recently submitted a thesis in fulfilment of a Doctor of Philosophy (PhD) award at the Australian National Centre for Ocean Resources and Security, University of Wollongong, Australia. Her research analysed the policy response at the international and regional level for the prevention of marine plastic debris. The feasibility of a new binding international agreement to prevent land-based sources of marine plastic debris and a funding mechanism was also examined.

Karen holds a Masters of Environmental Management and has consulted as an IT Systems Engineer and Project Manager for 15 years. For more than a decade she has conducted beach and underwater clean-ups with volunteers and the private sector, contributing collection statistics to online databases. Karen has also campaigned nationally for behavioural change.

Abstract

"Towards an improved framework to prevent marine plastic debris"

A range of multilateral agreements exists to prevent pollution of the oceans from various sources. Yet it would seem this framework has failed to prevent the continuing flow of plastic waste entering the marine environment. The various rights afforded States by Law of the Sea Convention is constrained by broad duties to protect and preserve the marine environment.

A clear duty to prevent ocean-based sources of marine plastic debris has been established through MARPOL Annex V and the London Dumping Convention and the Protocol thereto. Compliance with these instruments leads to ocean-based sources of marine plastic debris requiring a land-based solution. No global policy exists for land-based sources, now accepted as the largest source of plastic waste affecting our marine environment. The global community has agreed to develop a new binding international agreement to protect biodiversity in areas beyond national jurisdiction. It is therefore appropriate to raise the feasibility of a new binding international agreement to prevent land-based sources of marine plastic debris.

The international and regional policy response has mostly regarded marine plastic debris as a failure of municipal solid waste management. Domestically, States are beginning to hold industry accountable for plastic waste. Is it possible to extend this to all plastics at a global level? Policy elements of existing international environmental agreements may be applicable to the plastics industry on a global scale. Analogies can be drawn with the Montreal Protocol on Substances that Deplete the Ozone Layer and applied to the global production of plastic resins.

Applying this model within the limitations of current technology will go some way to solving the problem short- to medium-term. Further research is required to move plastics from a linear lifecycle to a circular lifecycle, moving towards a long-term solution.