



Innovation. Collaboration. Action.

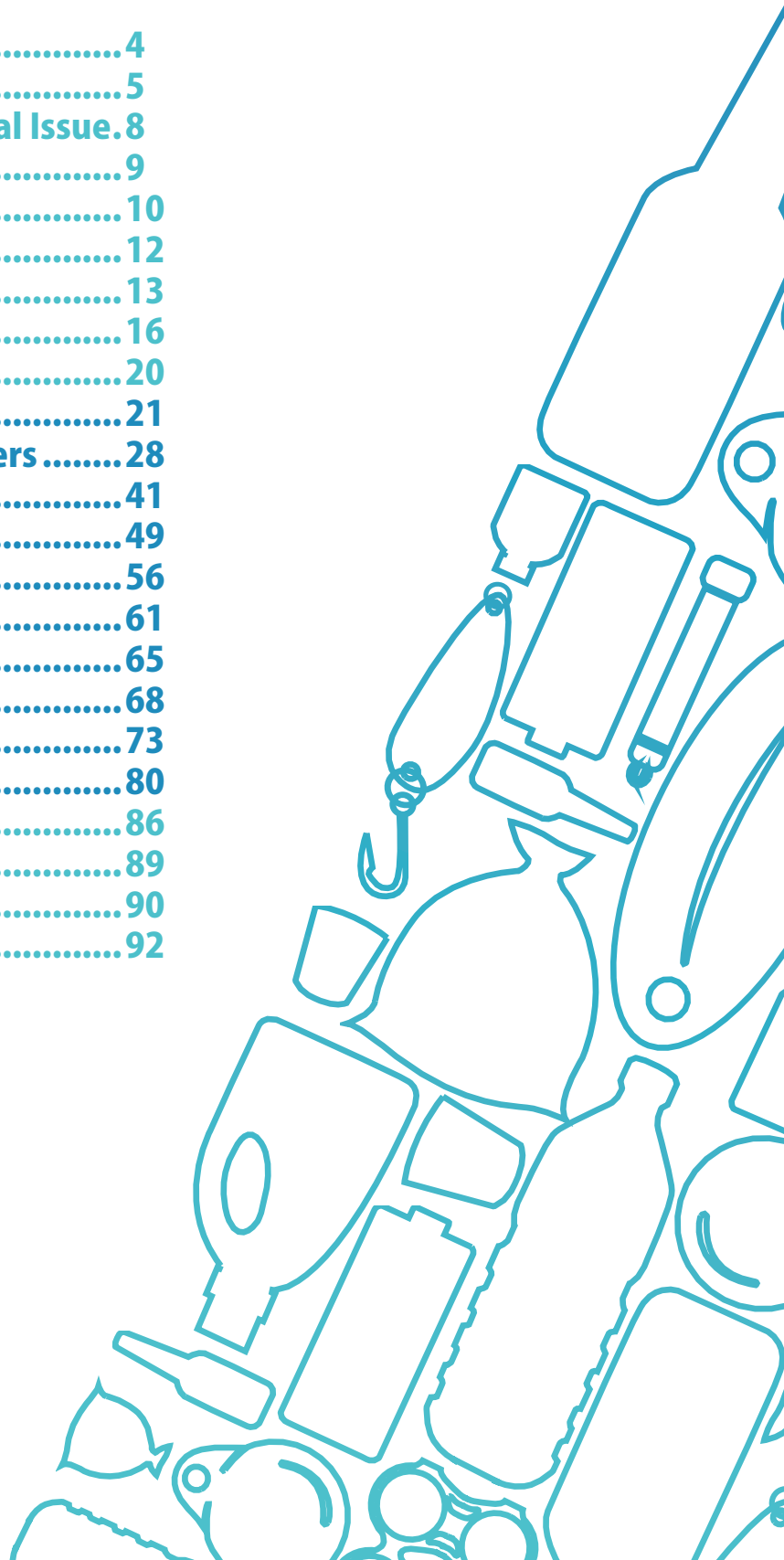
Sixth International Marine Debris Conference

March 12-16, 2018
San Diego, California, USA
Hilton San Diego
1775 East Mission Bay Drive
San Diego, CA 92109

Acknowledgment: The 6IMDC would not have been possible without the hard work of the National Oceanic and Atmospheric Administration (NOAA), United Nations Environment, the Coastal Response and Research Center (CRRC) at the University of New Hampshire, and the Gulf and Caribbean Fisheries Institute (GCFI).

Table of Contents

Sponsors	4
Executive Summary	5
Marine Pollution Bulletin Virtual Special Issue.	8
6IMDC Fast Facts.....	9
Zero Waste Initiative	10
Youth Engagement.....	12
Schedule At-a-Glance	13
Keynote & Plenaries	16
Technical Sessions	20
Monitoring & Citizen Science	21
Research & Microplastics/Microfibers	28
Prevention	41
Private Sector Collaboration.....	49
Education & Communication	56
Implementing Effective Law	61
Removal.....	65
Single-Use Product Policies	68
Derelict Fishing Gear	73
Innovative Case Studies.....	80
Special Events.....	86
Media Coverage.....	89
Acknowledgements.....	90
Appendices.....	92



Sponsors



Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

Platinum | \$50,000



WORLD
PLASTICS
COUNCIL

Gold | \$25,000



Silver | \$10,000



Bronze | \$5,000



Contributor



Innovation. Collaboration. Action.

Executive Summary

Marine debris is a global problem that requires collaborative solutions on both a global and local scale. There is no part of the world left untouched by marine debris and its impacts. Huge amounts of consumer plastics, metals, rubber, paper, textiles, derelict fishing gear, 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. Convening the international marine debris community in person to share ideas, build connections, and fuel collaboration is crucial to solving the marine debris issue and improving the health of our oceans.

Set along the Pacific Ocean and San Diego's Mission Bay, the Sixth International Marine Debris Conference (6IMDC) brought together a global community dedicated to working towards a marine debris-free ocean. Organized and hosted by the National Oceanic and Atmospheric Administration (NOAA) and the United Nations Environment Programme (UN Environment), the conference aimed to celebrate and encourage further innovation, collaboration, and action around this far-reaching topic. The conference highlighted innovative marine debris solutions, research, and technological advances since the last international marine debris conference held in 2011, and facilitated discussions around strategies to minimize the impacts and occurrence of marine debris. A major strength of the conference was its diversity of disciplines and expertise, including science, art, outreach, and education from individuals representing government, academia, private industry, community groups, and many more. The conference included a zero waste initiative that incorporated limiting single-use items, composting and donating excess food, and recycling remaining conference materials.



A Complex Issue

The week was grounded in acknowledging both the great work that has been done to address the marine debris issue and the extreme complexity of it. “Our throw away model of consumption and production is destroying our natural resources, impacting our health, and compromising our economy,” shared Dr. Barbara Hendrie, North American Director of UN Environment. Participants were urged to consider the current problem of design, production, and consumption of single-use products. Dr. Habib N. El-Habr, UN Environment’s Coordinator of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities, encouraged attendees to stop and think about how many products are designed to be thrown away immediately after use. He further emphasized that our inability to properly manage plastic means that much more will go into the ocean.

It was broadly recognized at the 6IMDC that the complexity of the marine debris problem is further complicated by significant research gaps. Though marine debris practitioners know much more than they did seven years ago at the Fifth International Marine Debris Conference (5IMDC), there is still so much to learn and explore. New and innovative research is needed to deepen our understanding of the sources, fate, and impacts of marine debris.

Innovation, Collaboration, Action

Since the 5IMDC, great strides have been made to understand, remove, and prevent marine debris. Participants celebrated these accomplishments while also passionately working to harness the 6IMDC’s growing momentum to further address and understand the issue.

Technical sessions and a poster night allowed attendees the chance to learn about innovative work being done across various sectors. Technical session tracks included: Monitoring & Citizen Science; Research & Microplastics/Microfibers; Prevention; Private Sector Collaboration, Technology & Innovation; Education & Communication; Implementing Effective Law, Regulations & Policy; Removal; Single-Use Product Policies, Regulations & Laws; Derelict Fishing Gear; and Innovative Case Studies From Around the World. These sessions allowed for over 400 oral presentations from around the world to be shared throughout the week. Poster night provided an alternative, more relaxed platform for over 170 posters to be presented and discussed among attendees in a casual setting. This informal event facilitated networking, socializing, and thoughtful dialogue. Participants had opportunities to continue discussions around areas of interest during a networking lunch, opening reception, and a movie & art night.

Several plenary speakers throughout the week shared diverse, passionate, and inspiring messages around international leadership, the state of science, corporate and social responsibility, forward action in combating marine debris, and youth engagement. Melati Wijsen, the 17-year old Co-Founder of Bye Bye Plastic Bags, reminded the audience that youth are the future: “Allow youth to be the motivation for the decisions you are making today.” Panelists, presenters, and participants united around the importance of continued and strengthened collaboration for future marine debris reduction and prevention efforts.



Marine Pollution Bulletin Virtual Special Issue

A Virtual Special Issue in Marine Pollution Bulletin, a peer-reviewed scientific journal, will feature highlights from the 6IMDC. This Special Issue will present data on marine debris ranging from nanoplastics to derelict fishing gear and abandoned and derelict vessels, found in freshwater bodies, coastal zones, and the open ocean. We welcome original papers on topics including monitoring and citizen science, economics of marine debris, research on impacts to wildlife, the chemistry of marine debris, fate and transport, and implementing effective policy, as well as the dialogue on innovative solutions for prevention, removal, and education. The target audience includes members of the academic community, policy-makers, conservation groups, industry, educators, concerned citizens, and local, state, federal, and tribal entities.

All articles will be submitted, reviewed, and accepted online via the Elsevier Editorial System. Special Issue content will be published in regular issues of Marine Pollution Bulletin as they are received and approved. Accepted submissions will also be compiled in a [Virtual Special Issue](#), easily accessible and navigable on ScienceDirect.

Overseeing Editor Francois Galgani, French Institute for Exploration of the Sea, France

Managing Guest Editor Amy V. Uhrin, NOAA Marine Debris Program, USA

Guest Editor Sue Kinsey, Marine Conservation Society, UK

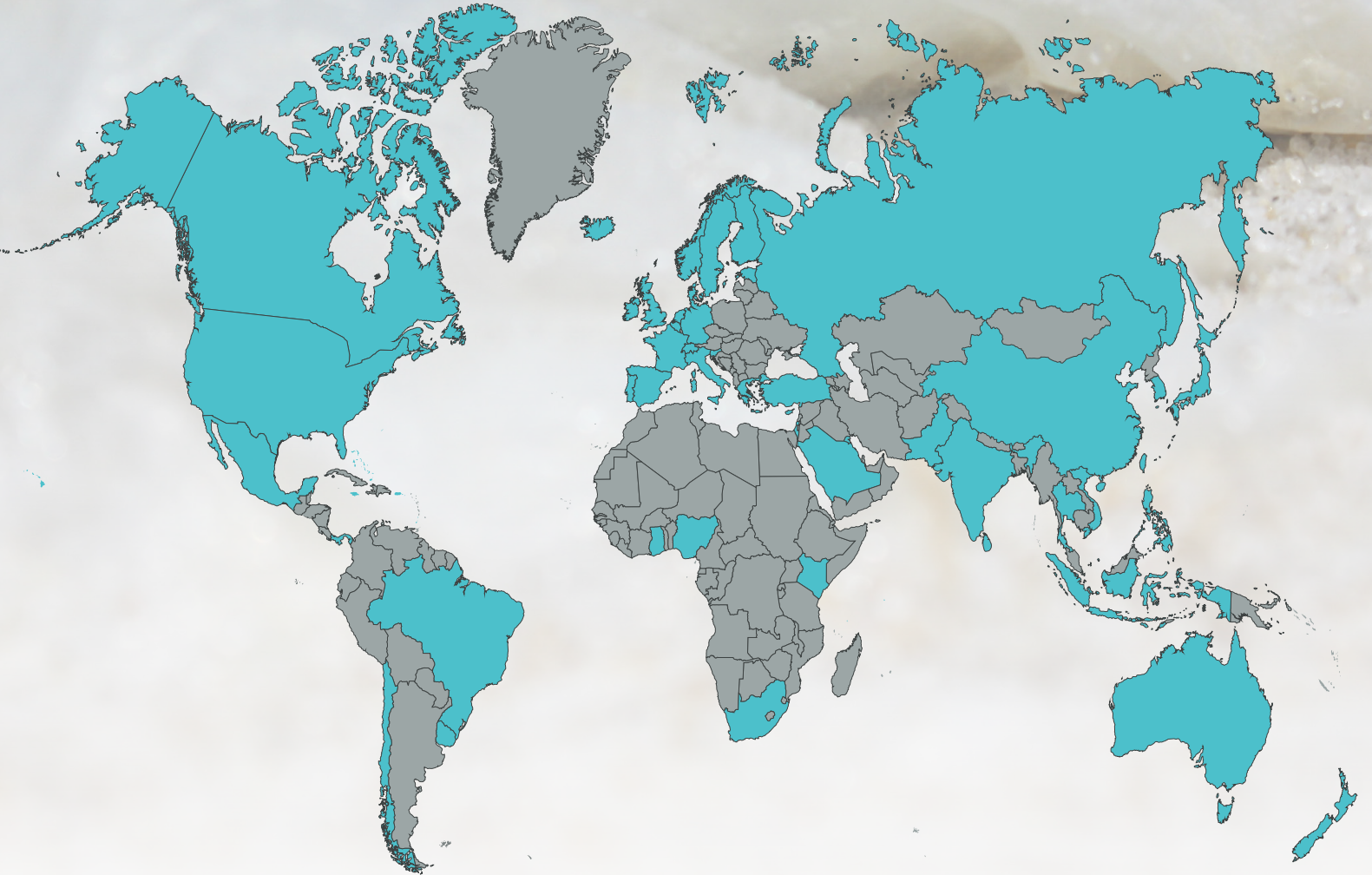
Guest Editor Sunwook (Sunny) Hong, Our Sea of East Asia Network, South Korea

Submission Dates March 26 - June 26, 2018

Notification of Acceptance By December 25, 2018



6IMDC Fast Facts



700+
Participants

50+
Countries
Represented

74
Technical
Sessions

400+
Oral
Presentations

170+
Poster
Presentations

Zero Waste Initiative

Thank you for helping us successfully carry out our zero waste initiatives during the 6IMDC! These efforts were no small feat for a conference of this size spanning several days. With your assistance and the Hilton San Diego's diligent work, we made progress towards our zero waste goals for the 6IMDC by:

- Limiting single-use items,
- Composting and donating excess food, and
- Recycling remaining materials.

We limited single-use items by providing reusable cups, plates, utensils, and more. With help from [Resource Management Group](#), we composted over 6,900 pounds (3,130 kg) of food waste, marking the first-ever large-scale composting effort at the Hilton San Diego. A portion of the compost material was dedicated as feed for livestock. Additionally, 300 uneaten meals were donated to [Chefs to End Hunger](#). Approximately 530 pounds (240 kg) of materials were recycled – doubling the hotel's weekly average. With all these accomplishments, the Hilton San Diego halved its typical weekly landfilled waste and has been inspired by the conference to conduct regular staff-led cleanups of Mission Bay, promote reusable items on-site, and highlight waste reduction activities in future hotel promotions.

Interested in learning how to make your next event zero waste? Check out our [Zero Waste Guide](#) for more information. Just think: if all 6IMDC attendees continue to use their stainless steel cups at least once a day for a year, we will eliminate 264,625 disposable cups from entering the landfill!



Zero Waste By-the-Numbers

Note: These numbers are based on 725 attendees. You can examine the specific zero waste initiatives and how these numbers were derived in [Appendix A](#). We understand that some of our zero waste results below do not account for energy, water (e.g. opting out of room services), and transportation (e.g. carpooling to the Gaslamp District) savings. However, for the purpose of this report, the focus is solely on zero waste efforts from a marine debris standpoint.

Reduced



74,008+

single use bottles, cups, straws, dishes, utensils, papers, and more

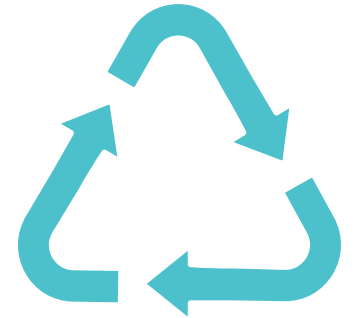
Reused



2,358+

name tags, cotton lunch bags, stainless steel cups, fishing nets/lobster traps, art gallery construction materials

Recycled



530 lbs/240 kg

beverage bottles, paper posters and signs, lunch bag wrappers, and more

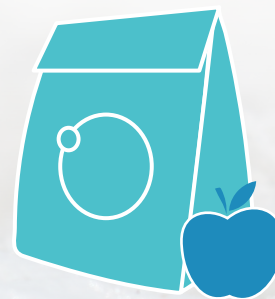
Rotted



6900 lbs/3130 kg

food preparation waste and attendees' scraps

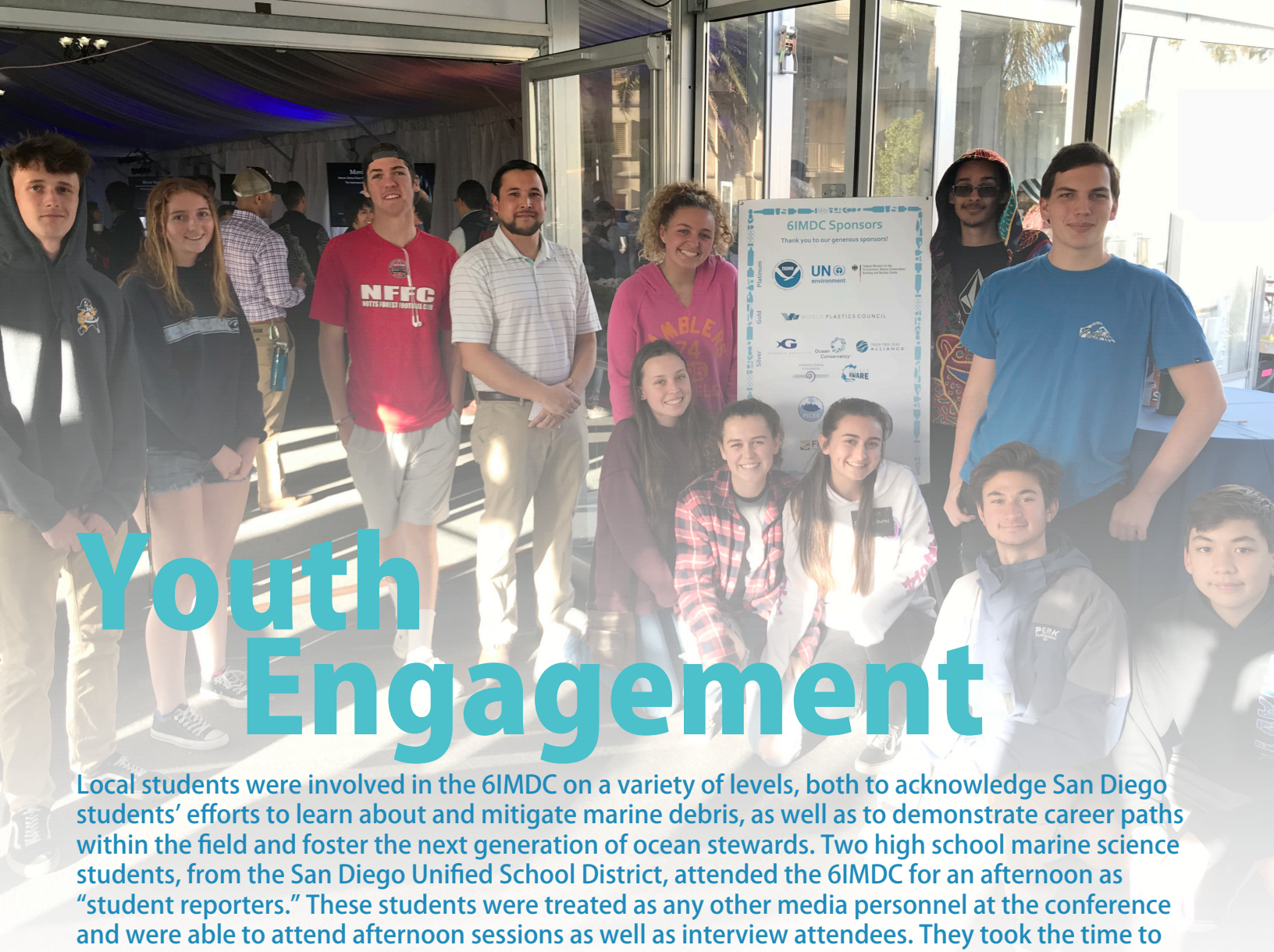
Donated



300+

surplus meals to Chefs to End Hunger

**80,572+ items &
7,430 lbs/3.37 metric tons
of waste was diverted from the landfill**



Youth Engagement

Local students were involved in the 6IMDC on a variety of levels, both to acknowledge San Diego students' efforts to learn about and mitigate marine debris, as well as to demonstrate career paths within the field and foster the next generation of ocean stewards. Two high school marine science students, from the San Diego Unified School District, attended the 6IMDC for an afternoon as "student reporters." These students were treated as any other media personnel at the conference and were able to attend afternoon sessions as well as interview attendees. They took the time to speak to Melati Wijssen of Bye Bye Plastic Bags, as well as middle school representatives from Heirs to Our Oceans. Following their afternoon as reporters, they were joined at the 6IMDC's Movie Night by their fellow classmates from their Advanced Placement Environmental Science and International Baccalaureate Marine Science classes. The night started with a few words from teacher Alex Cannon and continued with the students enjoying seven films about debris and its solutions.

The work of other local students was also recognized with a "Thank You" video from several conference participants. Students at the Ocean Discovery Institute, a local nonprofit marine science education organization, were spending the week of the 6IMDC working to clean their local shores. A video of thanks and appreciation from representatives of the 6IMDC's co-hosts, NOAA and UN Environment, as well as conference speakers Melati Wijssen and Jack Johnson, was sent to these students in acknowledgment and encouragement of their efforts.

Youth engagement emerged as a theme of the conference, with many speakers and participants remarking how important engaging the next generation is in marine debris prevention and mitigation. Student artwork was featured throughout the conference space—from drawings from the NOAA Marine Debris Program's national annual art contest, to the student artwork created from collected debris from High Tech High, a local high school, which was featured just outside the 6IMDC Matters of the Ocean Art Gallery. Continuing to engage with and empower the younger generation was overwhelmingly agreed upon as a crucial next step in the fight against marine debris.

Schedule At-a-Glance

Sunday, March 11, 2018

4:00 PM - 7:00 PM	Registration Opens
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Monday, March 12, 2018

7:00 AM - 9:00 AM	Registration Opens
9:00 AM - 9:30 AM	Coffee Break
9:30 AM - 12:00 PM	Welcome Ceremony & Opening Plenary
12:00 PM - 1:30 PM	Lunch Break
1:30 PM - 3:00 PM	Technical Session
3:00 PM - 3:30 PM	Coffee Break
3:30 PM - 5:00 PM	Technical Session
5:30 PM - 7:30 PM	Opening Night Reception

Schedule At-a-Glance

Tuesday, March 13, 2018

7:30 AM - 8:30 AM	Registration Opens
8:00 AM - 8:30 AM	Coffee Break
8:30 AM - 10:00 AM	Technical Session
10:00 AM - 10:30 AM	Coffee Break
10:30 AM - 12:00 PM	Technical Session
12:00 PM - 1:30 PM	Lunch Break
1:30 PM - 3:00 PM	Technical Session
3:00 PM - 3:30 PM	Coffee Break
3:30 PM - 5:00 PM	Technical Session
5:15 PM - 7:30 PM	Poster Night

Wednesday, March 14, 2018

8:00 AM - 8:30 AM	Coffee Break
8:30 AM - 10:00 AM	Plenary
10:00 AM - 10:30 AM	Coffee Break
10:30 AM - 12:00 PM	Technical Session
12:00 PM - 1:00 PM	Networking Lunch
1:00 PM - 3:00 PM	Technical Session
4:00 PM - 7:30 PM	Field Learning Activities

Thursday, March 15, 2018

8:00 AM - 8:30 AM	Coffee Break
8:30 AM - 10:00 AM	Technical Session
10:00 AM - 10:30 AM	Coffee Break
10:30 AM - 12:00 PM	Technical Session
12:00 PM - 1:30 PM	Corporate and Social Responsibility Panel Lunch
1:30 PM - 3:00 PM	Technical Session
3:00 PM - 3:30 PM	Coffee Break
3:30 PM - 5:00 PM	Technical Session
5:30 PM - 7:30 PM	Movie & Arts Night

Friday, March 16, 2018

8:00 AM - 8:30 AM	Coffee Break
8:30 AM - 10:00 AM	Technical Session
10:00 AM - 10:30 AM	Coffee Break
10:30 AM - 12:00 PM	Closing Ceremony

Schedule At-a-Glance

Keynote & Plenaries

Welcome Ceremony & Plenary | Monday, March 12

The Sixth International Marine Debris Conference kicked off Monday morning with a special video message from Sir David Attenborough, followed by a warm welcome from Councilman David Alvarez of the City of San Diego. The energy in the room rose as participants were introduced to the conference theme: Innovation, Collaboration, Action. Speakers from the 6IMDC's two hosting organizations, UN Environment and NOAA, provided overviews of their work and addressed the importance of collaboration and action at a local level. Keynote speaker, Afroz Shah from Mumbai, India, took the stage next and invoked passion as he encouraged participants to connect to the problem individually by going on a date with our ocean – get to know it, and treat it well. The opening plenary wrapped up with an International Leadership Panel with speakers representing five countries, as well as UN Environment. Moderated by Chever Voltmer from the US State Department, the panel included a video message from Mr. Ola Elvestuen from Norway, and panelists Dr. Stephen Lucas from Canada, Dr. Safri Burhanuddin from Indonesia, Mr. Alain de Comarmond from Seychelles, and Dr. Habib N. El-Habr with UN Environment. The discussion highlighted that marine debris has no political boundaries, affecting communities, economies, and the marine life and systems on which we all depend.

The opening session addressed the importance and magnitude of the marine debris problem on a global scale, with a focus on the growing concern over single-use plastics. Two themes emerged during the talks. The first: the most passionate work is being done by local citizens and grassroots organizations, and therefore it is imperative that connections are made at this level. The second: marine debris is everyone's problem and solutions must engage all levels of government and a diversity of sectors. When people are connected to the ocean on a personal level, it is easier to elicit changes in behavior.



Councilman David Alvarez welcomes 6IMDC participants to the City of San Diego (Photo courtesy of the National Oceanic and Atmospheric Administration).

Keynote Afroz Shah speaks to the 6IMDC participants on going on a date with our ocean (Photo courtesy of the National Oceanic and Atmospheric Administration).



Ms. Chever Voltmer, Mr. Ola Elvestuen, Dr. Stephen Lucas, Dr. Safri Burhanuddin, Mr. Alain de Comarmond, and Dr. Habib N. El-Habr participate in the International Leadership Panel (Photo courtesy of the National Oceanic and Atmospheric Administration).

Plenary | Wednesday, March 14

Wednesday's plenary session opened with a video message from United States Senator Sheldon Whitehouse, who discussed the efforts of the Senate Ocean Caucus and emphasized that there is much still to be learned about the effects of marine debris on our ocean. Youth speaker and activist Melati Wijsen took the stage next to share lessons learned on how to change behavior, empower youth, and work with government officials to say "no" to plastic bags in her island home of Bali, Indonesia. In speaking about her efforts to engage youth in the marine debris issue, she inspired the audience by highlighting the fact that youth "only make up 25 percent of the world's population, but are 100 percent of the future." The plenary then transitioned to a State of the Science panel with moderator Matthew Cole, as well as panelists Dr. Jenna Jambeck, Dr. Kara Lavender Law, and Dr. Chelsea Rochman, each presenting on their current research before answering questions from the audience. The conversation brought together leading researchers on marine debris sources, fate, and effects to discuss the state of science—what we know, future research needs, and how the field of marine debris has expanded since the 2011 conference. A key theme from the discussion was that there is still much to learn, despite the exponential growth in the science.



Melati Wijsen (left), co-Founder of Bye Bye Plastic Bags, speaks to the 6IMDC participants on empowering youth.

Dr. Jenna Jambeck, Dr. Kara Lavender Law, and Dr. Chelsea Rochman answer questions during the State of the Science panel. (Photos courtesy of the National Oceanic and Atmospheric Administration).



Matthew Cole (left) explains how far the science of marine debris and plastics has come before moderating the State of the Science panel (Photo courtesy of the National Oceanic and Atmospheric Administration).



Nicholas Mallos (right), introduces the panel on Corporate and Social Responsibility.

Kim Johnson, Stephen Sikra, Elissa Foster, and Conrad Mackerron discuss the power of public perception during the panel on Corporate and Social Responsibility (Photos courtesy of the National Oceanic and Atmospheric Administration).



Panel on Corporate and Social Responsibility: Reducing Ocean Plastics Across Value Chains | Thursday, March 15

The panel on Corporate and Social Responsibility was moderated by Nicholas Mallos, Director of the Ocean Conservancy's Trash Free Seas Program. Panelists included Elissa Foster of Patagonia, Kim Johnson with the Kōkua Hawai'i Foundation, Conrad Mackerron with As You Sow, and Stephen Sikra of Procter & Gamble. The conversation brought together leaders to share their stories of corporate and private sector progress in addressing plastic waste and included questions from the audience.

Corporations and industry leaders are striving to become less impactful on the environment and more environmentally safe, while still producing quality products that consumers demand. For example, Stephen from Procter & Gamble discussed their goals to reduce packaging, increase recycled content and ensure products are recyclable. Conrad from As You Sow explained the power of public perception and the influence of shareholders to institute change within large corporations like McDonald's. Elissa from Patagonia discussed how the company performs in-house experimentation to test fiber shedding in their clothing to determine how to reduce this marine debris type through better design. Kim Johnson discussed the ways she and her husband, Jack Johnson, try to evoke behavior change of concert goers and influence the music/entertainment industry by reducing plastic waste and providing reusable cups at large music events. Collaboration between scientists, educators, and industry is key to moving forward in finding solutions to the marine debris problem.

Panel on a Multi-Sector Perspective: Next Steps in Combating Marine Debris | Friday, March 16

The closing plenary session featured a multi-sector panel and focused on next steps to combat marine debris. The session started with closing remarks and a positive message from Habib N. El-Habr with UN Environment stating, “We are now at a turning point-- there is a global grasp of the scale of the problem.” The panel was moderated by Anna Cummins from 5 Gyres and featured sector representatives from the South Carolina Aquarium’s Albert George, Break Free From Plastic Movement’s Von Hernandez, the American Chemistry Council’s Steve Russell, Food and Agriculture Organisation of the United Nations’ Joanna Toole, Bye Bye Plastic Bags’ Melati Wijsen, Full Cycle Bioplastics’ Andrew Falcon, and musician Jack Johnson.

During the panel session, participants reflected back to themes from early on in the week that included the shared responsibility of not only individuals, but also of the manufacturers creating products that may end up as debris. Panelists highlighted that the choices we make in our daily lives make a difference, and we need options in the marketplace that allow for more recycling and reuse. They also emphasized that marine debris is everyone’s problem, but not all communities have access to the resources needed to address the issue. Other takeaways included the importance of engaging industry without inspiring defensiveness, tackling the issue of abandoned, lost, or otherwise discarded fishing gear, and getting more of the youth sector involved. The plenary ended with a sense of hope and motivation for action that was apparent throughout members of the audience.

From left to right, Anna Cummins, Albert George, Steve Russell, Andrew Falcon, Von Hernandez, Joanna Toole, Melati Wijsen, and Jack Johnson share their perspectives on the next steps to combat marine debris (Photos courtesy of the National Oceanic and Atmospheric Administration).



Technical Sessions

Bringing together the international marine debris community at the 6IMDC was essential to addressing the pressing need to reduce the impacts of marine debris on vital and natural resources, human health and safety, and the economy. The conference convened this group to share lessons learned and best practices to reduce and prevent marine debris and its impacts, promoting international co-learning, exchanging innovative ideas, and sharing the latest research findings. Over 400 abstracts for oral presentations were included, supporting the 6IMDC goal of prioritizing diversity and inclusion. Presentation session tracks included: Monitoring & Citizen Science; Research & Microplastics/Microfibers; Prevention, Private Sector Collaboration; Technology & Innovation; Education & Communication; Implementing Effective Law, Regulations & Policy; Removal; Single-Use Product Policies, Regulations & Laws; Derelict Fishing Gear; and Innovative Case Studies From Around the World.

Please note that the following oral presentations list are based on original 6IMDC program content and schedule. This may differ slightly to presentations given at the conference.

10 Tracks

74 Technical Sessions

400+ Abstracts





Monitoring & Citizen Science

Monitoring By The People For The People: Citizen Science And Marine Debris Solutions | Parts 1 & 2

Monday, March 12 | 1:30 PM - 3:00 PM, 3:30 PM - 5:00 PM

Session Chairs: Hillary K Burgess, University of Washington | Sherry Lippiatt, National Oceanic and Atmospheric Administration, Marine Debris Program/IMSG

Description

With many potential benefits, from an engaged and informed community of participants, to generation of high quality high resolution data at scales that would otherwise be impossible, citizen science is a growing field that has applications to coastal and marine research and monitoring. This symposium explored best practices and lessons-learned for marine debris citizen science to achieve project goals that range from the personal (education, outreach) to the scientific (data and science generation that informs solutions). Policy makers, citizen science practitioners and researchers were invited to share their challenges and successes in working with citizen science projects. Topics included participant recruitment, retention and communication; ensuring and measuring data quality; developing protocols and materials that facilitate data quality and learning; and data management and delivery.

Highlight

Presentations spanned a breadth of geography - from the Arctic to Australia, Norway to Belize; audience - from scuba divers and outdoor adventure enthusiasts to coastal residents of small villages; and approach - from opportunistic phone apps to intensive standardized surveys. Across this variety, common themes emerged: there is a trade-off between protocol intensity and data usability and accessibility/retention for participants. Open data policies and transparent methods facilitate data use, and allow participants to see the results of their work. The field would benefit from more collaborative analyses across data-sets and increased capacity for participant training and engagement. Citizen science programs are filling important data gaps for the marine debris community, and the field is likely to continue to grow.

Oral Presentations | 1:30 PM - 3:00 PM

Increasing Volunteer Engagement in an Agency-Led Citizen Science Initiative: Lessons Learned From Six Years of the NOAA Marine Debris Monitoring and Assessment Project | Sherry Lippiatt, USA

Exploring the Australian Marine Debris Initiative | Heidi Taylor, Australia

Citizen Science for Better Management: Lessons Learned from Three Norwegian Beach Litter Data Sets | Jannike Falk-Andersson, Norway

The Global Microplastics Initiative: Engaging Outdoor Recreation Citizen Scientists in Monitoring of Microplastics to Affect Change | Katie Holsinger, USA (Presented by Abigail Barrows)

Understanding Marine Debris in Belize through Citizen Science and Participatory GIS | Ashley Little, USA

Citizen involvement in a HotSpot Survey about pathways of marine debris | Christian Aden, Germany

Oral Presentations | 3:30 PM - 5:00 PM

Exploring motivations, recruitment, and retention of participants in COASST | Hillary Burgess, USA

Dive Against Debris®: Lessons Learned, Challenges and Future Opportunities | Hannah Pragnell-Rasch, Australia

Citizen scientists reveal: marine litter pollutes Arctic beaches and affects wildlife | Melanie Bergmann, Germany

Participatory Sensing Marine Debris: The Marine Debris Tracker Mobile App | Katherine Shayne, USA

Marine LitterWatch - citizen science-based app | Štefan Trdan, Slovenia



Marine Debris Monitoring Programs: Applying Data To Answer Research Questions, Advise Management, And Inform Policy | Parts 1 & 2

Tuesday, March 13 | 8:30 AM - 10:00 AM, 10:30 AM - 12:00 PM

Session Chairs: Kate Bimrose, National Oceanic and Atmospheric Administration Greater Farallones National Marine Sanctuary | Caitlin Wessel, National Oceanic and Atmospheric Administration Marine Debris Program

Description

This session focused on the real life application of marine debris monitoring data to inform management and policy. Presentations described seafloor, coastal beach, and barrier island debris data collection processes in Italy, Israel, USA, South Korea, and Turkey. Data findings answered important questions about marine debris sources and movement in varying marine landscapes. These findings lead to changes in local and regional marine debris policy and demonstrate the importance of debris data collection in addressing the impacts of marine pollution. Session presentations were of interest to a wide audience including resource managers, scientists, policy makers, and the public.

Highlight

This session emphasized how marine debris monitoring data informs, and helps transform, policy and management in European, Asian, and North American countries. Collected data helped determine local and national trends in debris type, relation to recreational and maritime activities, and patterns in deposition. Despite varying marine debris policies between states and countries, information gleaned from data helped countries prioritize issues of concern related to their local marine debris problem. For example, data showing the presence of disposable water bottles along the beaches of Turkey helped the government secure funds to install drinking fountains in heavily visited areas. Another success story highlighted how monitoring data led to political leads campaigning for a long-term goal to make Israel a plastic free city. Outcomes from this session display the importance of debris monitoring data and its direct influence on government to make active changes in marine debris policy and management.

Oral Presentations | 8:30 AM - 10:00 AM

Citizen science: divers survey marine debris on the seabed of the Israeli Mediterranean coast | Galia Pasternak, Israel

Assessment of seabed litter in the Northern and Central Adriatic Sea (Mediterranean) over six years | Pierluigi Strafella, Italy

Accumulation and distribution of marine debris on barrier islands across the northern Gulf of Mexico | Katie Swanson, USA

Quantifying debris type and the spatial and temporal trends in marine debris density in coastal waters of the 4-island region of Maui, Hawaii | Jens Currie, USA

Quantities of marine debris along the coastline in South Korea have significantly decreased | Sunwook Hong, South Korea

Preliminary management recommendations based on marine litter research on Turkish northeastern Mediterranean beaches | Ahmet Erkan KIDEYŞ, Turkey

Oral Presentations | 10:30 AM - 12:00 PM

Optimization of Urban waste design | Sydney Barnes-Grant, USA

Marine Debris Monitoring on Heavily Impacted Remote Beaches | Chris Pallister, USA

Amounts, types, sources and distribution of marine debris derived from a statistical analysis of US data | George Leonard, USA

NOAA's marine debris monitoring protocol in action: Lessons learned on Virginia's coastal beaches | Christina Trapani, USA

A wooden, scientific "message in a bottle" - German university team researches sources and dispersal of macroplastics through large-scale public participation experiment | Rosanna Schoeneich-Argent, Germany

A Combined approach on surveying marine litter in Arctic Greenland | Jakob Strand, Denmark



Tools And Constraints In Monitoring Interactions Between Litter And Megafauna

Wednesday, March 14 | 10:30 AM - 12:00 AM

Session Chair: Françoise Claro, Museum national d'Histoire naturelle (MNHN) | Maria Cristina Fossi, Siena University | Denise Hardesty, Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Description

Monitoring the effects of marine litter on marine organisms is useful for the conservation of the marine environment, to understand the impact of marine litter on populations. Furthermore, it provides data to inform national or regional policies and can provide an important baseline for the establishment of new monitoring programs. However, the feasibility of monitoring may be subjected to constraints (e.g. appropriate methodology, logistics, etc.) which may hinder the development and implementation of a monitoring program. Because of their size and geographic distribution, and the preexistence of dedicated observation networks, several marine megafauna taxa are already used as ecological indicators of ecosystem health.

The technical session objectives were to share lessons learned from existing monitoring initiatives; share the results of recent; discuss methods, indicators and technical tools, standardization and possible cooperation; identify knowledge gaps and tools required to understand the impact of anthropogenic debris on major marine taxa, and identify practical recommendations to fulfill these gaps. The targeted audience was the stakeholders in charge of data collection (stranding, rescue, and observation of marine megafauna) as well as of monitoring programs in the frame of national and regional policies.

Highlight

Several tools were presented for monitoring the interactions between marine litter and megafauna: Forrier Transport InfraRed techniques for characterizing types of plastics ingested by swordfish and Bluefin tuna, blue shark, loggerhead turtle, and sperm whales in the Mediterranean sea; gas chromatography mass spectrometry to monitor micro-debris and phthalates in water samples and in Manta ray tissues in the Mexican Pacific ocean; and Phantom four drones for monitoring entanglement in the fur seal in Seal Rocks Island in Australia. A case study on entanglement and ingestion of marine debris by cetaceans in the USA, the feasibility of an entanglement indicator in Europe, and the development of a monitoring strategy in the Mediterranean presented biological, methodological, environmental and logistic constraints of indicators of micro- and macro-debris impact in biota, and the urgent need for standard and new methods to assess, in an unbiased way, the death rates and effects of marine litter on biota. The priority for conducting further pilot studies and tests were highlighted. It was proposed to enlarge networking for developing exchanges and collaborations between participants, and to organize expert workshops about methods and constraints in monitoring, like that advertised by one of the speaker teams.

Oral Presentations

Which marine debris do the Mediterranean megafauna prefer? | Matteo Bainsi, Italy

Oceanic manta rays and plastic pollution in the Mexican Pacific Ocean. | Tania Pelamatti, Mexico

Is Entanglement a relevant indicator of the impact of marine litter on biota? The contribution of INDICIT european project. | Françoise Claro, France

Entanglements and Ingestion of Marine Debris of Marine Mammals in South Carolina, USA | Wayne McFee, USA

Looking without landing – using Remote Piloted Aircraft (RPAs) and citizen science to monitor the prevalence of marine debris entanglements in fur seals | Rebecca McIntosh, Australia

The effect of Marine Litter on the Mediterranean Marine Biota: the development of a monitoring strategy for IMAP Candidate Indicator 24 | Christos Ioakeimidis, Greece (Presented by Francois Galgani)



Developing Guidelines to Promote Harmonised Monitoring and Assessment of Marine Litter

Friday, March 16 | 8:30 AM - 10:00 AM

Session Chair: Peter Kershaw, The Joint Group of Experts on Scientific Aspects of Marine Protection

Description

There is an urgent need to provide guidelines for the development of reliable monitoring and assessment programmes of marine litter for use by Regional Seas, national statutory bodies, NGOs, and other interested parties. The development of more harmonised approaches will help to promote data sharing and a common understanding of the distribution and impacts of all sizes of marine litter, together with evidence of time trends to measure the effectiveness of potential reduction methods.

This session described the objectives and progress of an international working group, which has been asked to produce a set of guidelines, for publication later in 2018. The guidelines will cover definitions of size and shape, sampling protocols in a range of environments, the selection of indicators, methods for physical and chemical analysis and overall programme design. The session intended to provide an opportunity for attendees to review the objectives, ask questions and provide suggestions.

Highlight

The session started with a brief presentation of GESAMP Working Group 40 “Harmonising methods for monitoring and assessment of marine plastics and microplastics”, including its motivation, strategy, planned outcomes and roadmap. Panelists were introduced and presented critical points in setting up monitoring and assessment programs. Relevance and support to policies and UN processes were stated as key statements. From the technical point of view, sampling strategy, quality assurance and quality control, requirement of standard reference materials and appropriate monitoring/assessment technology were cited as critical points. Relevant and simple indicators/proxies, new automated methods, large-scale risk assessment approaches and mapping of hot spot areas, and the need of data infrastructure to allow information sharing was shared. They were presented as additional challenges to support global and harmonized monitoring. All statements were then discussed with the floor, which was invited to comment and review. The feedback from the audience revealed the relevance and timing of the issue.

Panelists

Francois Galgani, French Research Institute for Exploitation of the Sea (IFREMER)

Sang Hee Hong, Korea Institute of Ocean Science and Technology

Heidi Savelli, United Nations Environment Program

Alexander Turra, University of São Paulo (USP)



Research & Microplastics/Microfibers

Approaches to Ecological and Public Health Risk Assessment from Marine Debris and Microplastic Exposure

Monday, March 12 | 1:30 PM - 3:00 PM

Session Chairs: Britta Denise Hardesty, Commonwealth Scientific and Industrial Research Organisation (CSIRO) | Chris Wilcox, Commonwealth Scientific and Industrial Research Organisation (CSIRO) | Beth Polidoro, Arizona State University

Description

Understanding plastic pollution from a systems perspective requires a way of conceptualizing sources, distribution and dynamics in the environment; identifying or quantifying impacts on wildlife, humans and other assets; and identifying and evaluating potential management responses. This session provided practitioners, community groups, businesses, government agencies, and scientists with different tools and approaches to assess ecological and public health risk from exposure to marine debris, including microplastics. Topics include quantitative and qualitative approaches to risk assessment, demonstrated through research and case studies. Methods and tools that are especially useful in data-poor regions were highlighted, in addition to more refined, or probabilistic methods for use in areas where more data are available.

Highlight

This session primarily highlighted the utility of a risk assessment framework, which relies upon quantifying exposure in comparison with toxicological or other adverse outcomes, for estimating the impact of marine debris and microplastics on organisms and humans. Given that marine debris and microplastics can have both physical and chemical impacts to species, ecosystems and humans; there are huge data gaps and uncertainties in terms of toxicological and other adverse impacts. Even as there are increasingly more studies on the accumulation of chemicals associated with plastic ingestion, results and outcomes are quite variable. By comparison, we seem to be gaining a better handle on exposure. Overall, more research is needed on probability of exposure and toxicological impacts, as well as methods to account for data gaps and uncertainties.

Oral Presentations

Why a risk framework for marine debris? | Britta Denise Hardesty, Australia

Risk assessment of plastic pollution on the marine diversity in the Mediterranean Sea | Montserrat Compa, Spain

Estimating the mortality from plastic ingestion - a new method based on stranding data | Chris Wilcox, Australia

Coping with uncertainty: action level for microplastics in seafood from the North Coast of Java, Indonesia | Budi Widianarko, Indonesia

Accumulation of plastic debris and associated contaminants in marine food webs | Noël Diepens, Netherlands

Assessment of microplastic pollution and ecological risk in Korean coastal waters | Won Joon Shim, South Korea



The Chemistry Of Plastic Marine Debris | Parts 1 & 2

Monday, March 12 | 1:30 PM - 3:00 PM, 3:30 PM - 5:00 PM

Session Chairs: Chelsea Rochman, University of Toronto | Sang Hee Hong, Korea Institute of Ocean Science and Technology | Won Joon Shim, Korea Institute of Ocean Science and Technology | Jennifer Lynch, National Oceanic and Atmospheric Administration | Hideshige Takada, Tokyo University of Agriculture and Technology | Hrisi Karapanagioti, University of Patras

Description

Plastic makes up the majority of marine debris. When it enters the environment, plastic undergoes physical, chemical, and biological weathering which decreases its size via fragmentation and alters its original shape, chemical composition, and surface characteristics. As such, chemical techniques are used to measure several variables related to plastic debris. Laboratory and field research studies related to the chemistry of plastic marine debris were presented in this session. Topics included analytical methods to detect, identify, and quantify synthetic polymers in complex environmental samples; chemical characterization of plastics including weathering processes; and investigations of the fate of additives or sorbed contaminants. The target audience was people seeking a better understanding of what makes up marine debris, how it changes in the environment, how it might transfer toxic chemicals to marine organisms, and how to best measure those chemical processes.

Highlight

The chemistry of plastic debris helps us in understanding its environmental fate and effects. Most plastic does not completely degrade, but studies presented rates of fragmentation and how weathering can change the polymer chemistry and release greenhouse gases. Chemists shared automated and validated methods for identifying polymers in environmental samples. Studies demonstrated that debris contains additives and sorbed chemicals, and these chemicals can be detected in organisms that ingest debris. Studies examined the kinetics of chemical release into digestive fluids and whether debris or prey is the primary source of these chemicals, but toxicity was either not observed or examined.

Oral Presentations | 1:30 PM - 3:00 PM

Nano-fragmentation of expanded polystyrene exposed to sunlight | Young Kyoung Song, South Korea

To what extent microplastic from the open ocean are weathered? | Alexandra ter Halle, France

Production of hydrocarbon gases from plastic at ambient temperatures | Sarah-Jeanne Royer, USA

Quantitative determination of sorbed and additive chemicals in microplastics from the Korean coastal waters | Sang Hee Hong, South Korea

Persistent organic pollutants on plastic debris from the Great Pacific Garbage Patch: concentrations and prospective risk assessment | Qiqing Chen, Netherlands

Dynamics of chemical transfer on microplastic in gut | Nur Hazimah Mohamed Nor, Netherlands

Oral Presentations | 3:30 PM - 5:00 PM

Study of the leaching of additive from microplastics using an in vitro enzymatic digestion model | Ludovic Hermabessiere, France

Occurrence of wide-range of additives in marine plastics and their exposure to marine organisms | Hideshige Takada, Japan

Microplastic occurrence in La Paz Bay (Mexico) and phthalate esters concentration in two resident filter-feeder species | Matteo Galli, Italy

Validation of ATR FT-IR to identify polymers of ingested plastic marine debris | Jennifer Lynch, USA

Automated Identification and Quantification of Microplastics by FTIR Imaging and Image Analysis | Sebastian Primpke, Germany

Plastic debris can be both a source and sink for flame retardants in ring-billed gulls (*Larus delawarensis*) | Clara Thaysen, Canada



Big Data: Making Meaning From Land And Sea Observations

Monday, March 12 | 3:30 PM - 5:00 PM

Session Chairs: Marcus Eriksen, 5 Gyres Institute | Win Cowger, University of California, Riverside

Description

This session looked at the monumental challenge of merging the many data-sets of plastic debris on land and in the sea. It highlighted the entire process of utilizing big data to make policy decisions from data inception to decision. This session aimed to bring together the many data sets on land and sea that document plastic pollution. Our team of experts on Data Creation, Data Merging, Data Analysis, and Policy each used personal experiences and current projects to highlight positive and negatives that can be improved in this process. Our intended audience was data curators, managers, and modelers.

Highlight

We learned that there are many organizations who have unpublished data at the moment. People were extremely curious about what open data could provide them and the field. At one point, there was a standing ovation for open data, people really want it and they know it's value. There was also interest in creating better methods and models of marine debris.

Oral Presentations

Anthropogenic microparticle distribution in global marine surface waters: results of an extensive citizen science study | Abigail Barrows, USA

Merging Big Data | Win Cowger, USA

Analyzing large scale marine debris monitoring data - challenges, solutions, and patterns | Chris Wilcox, Australia

Big data as a source of policy to address plastic marine pollution | Marcus Eriksen, USA

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The Importance Of Oceanic Subtropical Gyres As Debris Accumulation Zones And How They Affect Ocean Life

Tuesday, March 13 | 8:30 AM - 10:00 AM

Session Chairs: Captain Charles Moore, Algalita Marine Research and Education | Shelly Moore, Southern California Coastal Water Research Project (SCCWRP)

Description

The goal of this session was to bring together those doing research in Oceanic Subtropical Gyres, not only to report on the research, but to also strategize moving forward in order to develop methodologies and recommendations for actions to address the overarching problem. The movement of debris from land-based sources and the debris input from the ocean-based fishing industry into oceanic current systems have been shown to result in the accumulation of marine debris in subtropical gyres. Subtropical gyres serve essential roles as nursery areas for many pelagic species. The accumulation of persistent plastic debris in these areas skew the species distribution. Species that utilize the available and accumulated debris will find these conditions to be favorable, whereas others will not. Recent surveys have shown that certain coastal species such as sea anemones are increasing in these areas. The accumulation of debris in subtropical gyres also affects foraging opportunities for seabirds, such as the albatross. Much work remains to address the changes in species composition and survival in areas of high debris accumulation. With the recent monitoring in remote areas of the Arctic showing the presence of persistent marine debris, this problem has been elevated to even more of a global scale, with clear international implications.



Highlight

This session was designed to offer an opportunity for those involved in research of deep sea oceanic gyres to present their research and actions aimed at remediation of associated marine debris, and to expose the general public to areas of the ocean rarely visited. Six presenters covered gyres in the North and South Pacific, and the North Atlantic and South Atlantic. Valuable information was shared by Kahi Pacarro, of Hawaii, regarding the formation of mini-gyres and their facility of cleanup. Christopher Pham detailed extensive government sponsored research that looked at ingestion by Coreys shearwater and juvenile Loggerhead turtles in the Azores. He also quantified economic costs for beach cleanups. Research on the North Atlantic Gyre by Alexandra ter Halle related sea level anomalies, and associated currents and chlorophyll to plastic concentrations. Higher levels by a factor of 70 were found in areas with high sea level anomaly. Raquelle De Vine reported on initiatives in the South Pacific to raise awareness of the South Pacific Gyre and Kevin O'Brien with NOAA detailed collection of marine debris in the Northwest Hawaiian Islands. Captain Moore gave his impressions of what these gyres are like when one spends weeks surveying them.

Oral Presentations

Subjective Impressions from a denizen of the Gyres | Charles Moore, USA

Anticyclonic eddies increase accumulation of microplastic in the North Atlantic subtropical gyre | Alexandra ter Halle, France

Impacts of plastic pollution in oceanic islands off the North Atlantic subtropical gyre | Christopher Kim Pham, Portugal

Midway Atoll (Northwestern Hawaiian Islands) Marine Debris Accumulation Project | Kevin O'Brien, USA

Mini-Gyres showing up across the State of Hawaii | Kahi Pacarro, USA

Gyres North & South. A Partnership on both sides of the Equator to Mitigate Marine Debris. | Raquelle de Vine, New Zealand

Effects Of Microplastics On Fish And Invertebrates | Parts 1 & 2

Tuesday, March 13 | 8:30 AM - 10:00 AM, 10:30 AM - 12:00 PM

Session Chairs: Chelsea Rochman, University of Toronto | Matthew Cole, Plymouth Marine Laboratory | Amy Lusher, Norwegian Institute for Water Research (NIVA)

Description

Microplastic pollution has been identified in habitats and animals, in both freshwater and marine ecosystems, from all over the world. Microplastics contaminate every level of aquatic food chains, from the smallest zooplankton to the largest vertebrates. This begs the question: how does microplastic impact animals that become contaminated via ingestion or absorption? The weight of evidence regarding impacts is rapidly increasing. This session aimed to highlight new findings that demonstrate the effects that microplastic (and associated co-contaminants) can have upon fish and invertebrates. This session highlighted both field and laboratory research investigating how microplastic exposure can affect fish and invertebrates at multiple levels of biological organization. Scientific presentations in this session contributed novel findings, worked to close some of the key research gaps relating to plastic pollution, and addressed topics relevant to policy change.

Highlight

The session highlighted novel methods for measuring microplastics, new research on contamination, and new research about impacts from microplastics alone and in combination with other stressors (e.g., climate change). Researchers that presented in this session presented novel work that included unique microplastic types (e.g., microfibers), novel animals (e.g., corals) and novel methods (e.g., using digestible fluorescent coatings to quantify ingestion). Based on the presentations, it is clear that microplastic contamination and ingestion are widespread. It is also clear that evidence regarding impacts to animals is complex and further researching determining how impacts vary by plastic type, dose, and exposure length are critical. The session had a packed audience and a lot of participation amongst researchers,



highlighting how much the field has advanced scientifically since the 5th International Marine Debris Conference in 2011.

Oral Presentations | 8:30 AM - 10:00 AM

Distribution and ecotoxicological effects of microplastics in Mediterranean marine organisms | Francesco Regoli, Italy

Microplastic fiber uptake, ingestion, and egestion rates in the blue mussel (*Mytilus edulis*) | Madelyn Woods, USA

Understanding scleractinian microplastic ingestion: size limits, retention, and calcification effects | Cheryl Hankins, USA

Effects of acute exposure of microplastics on the physiology of blue mussels | J. Evan Ward, USA

Hepatic gene expression in the European sea bass (*Dicentrarchus labrax*) experimentally exposed to PVC microplastics | Cristina Panti, Italy

The fate of microplastics ingested by the Mediterranean mussel: biochemical biomarkers and histopathology | Paula Sobral, Portugal

Oral Presentations | 10:30 AM - 12:00 PM

Effects of plasticizers on the immune system of juvenile salmon. | Patty Zwollo, USA

Exploring the effects of nylon microplastic on the development and energy reserves in coldwater copepods | Matthew Cole, UK

Effects of micro- and nanoplastics on fertilization, embryo-larval development and metamorphosis success of the Pacific oyster *Crassostrea gigas* | Kevin Tallec, France

Ingestion of microplastics by zooplankton in the natural environment | Penelope Lindeque, UK

A Platform for High-Throughput Assessments of Environmental Multi-stressors: A first look at the combined impacts of climate change and microplastics on zooplankton | Brian Nguyen, Canada

Trophic transference of microplastics under a low exposure scenario: insights on the likelihood of particles cascading along marine food-webs | Marina Ferreira Mourão Santana, Australia

Ingestion, bioaccumulation and depuration of nano- and micro-plastic particles by marine bivalves | Kayla Mladinich, USA

A comparison of microplastic contamination characteristics among marine invertebrates inhabiting in urban, rural, and aquaculture areas | Mi Jang, South Korea

A New Digestible Fluorescent Coating Method for Quantification of Cumulative Microplastic Ingestion | Evan Karakolis, Canada

Microplastics on sessile invertebrates in the eastern coast of Thailand: the effect and coastal zone management | Suchana Chavanich, Thailand

A long term exposure experiment tests the effects of clean and contaminated microplastics on juvenile blue mussels *Mytilus edulis* | Thea Hamm, Germany



Marine litter in the Mediterranean Sea

Tuesday, March 13 | 10:30 AM - 12:00 PM

Session Chairs: Francois Galgani, French Research Institute for Exploitation of the Sea (IFREMER) | Tatjana Hema, United Nations Environment, Barcelona Convention Secretariat

Description

The session was dedicated to scientists, stakeholders, institutions, and managers to present and discuss their results from research and monitoring marine litter in the Mediterranean Sea and propose or discuss reduction measures in the framework of the Mediterranean Regional Action Plan. The presentations described the importance of tourism as a main driver for pollution by plastic, and described how the various compartments of the whole basin are affected by litter, including beaches, the seafloor, and the pelagic environment. Strategies to assess impacts and results on contamination of fishes and biota were also discussed in terms of both environment and human health. Densities are some of the highest found worldwide since the Mediterranean sea is a closed basin, with an important coastal population and 30% of the world maritime traffic between Gibraltar and Suez. The discussion concluded that management and reduction measures have now become critical and stated the importance of the Regional Plan and various European projects.

Highlight

Levels of marine litter in the Mediterranean sea have become critical. As marine litter affects different ecological compartments, the study of its impact on marine biota of all trophic levels on the same temporal and spatial scale is of increasing importance. For ingestion, highly affected species include common fish and invertebrates that may be used for monitoring. In terms of management, reduction measures must be implemented, giving priority to classical reduction measures, but also specific actions to prevent the impact of tourism and littering in Marine Protected Areas. More generally, the UN Env/MAP Regional Plan will provide a framework and support actions on monitoring and reduction measures when research is still necessary to better understand harm.

Oral Presentations

Presence of plastics debris in Mediterranean pelagic and demersal fish of commercial interest | Dario Giani, Italy

Microplastics in the Adriatic Sea: Occurrence, characterization, distribution and environmental management | Alessio Gomiero, Norway

How to detect the impact of marine debris on Mediterranean biodiversity? The three fold monitoring approach | Maria Cristina Fossi, Italy

Marine Debris in the deep Mediterranean Sea | Michela Angiolillo, Italy

Driving factors determining macroplastic distribution in seafloor habitats around the Balearic Islands, Spain | Carme Alomar, Spain

Assessing marine litter in vulnerable coastal ecosystems response to tourism activities | Salud Deudero, Spain



Where Is All The Plastic? New Tools To Determine The Plastic Marine Debris Budget

Tuesday, March 13 | 1:30 PM - 3:00 PM

Session Chairs: Tracy Mincer, Woods Hole Oceanographic Institution | Linda Amaral-Zettler, Utrecht University

Description

The session's overarching theme and goal of this session was to discuss integrative approaches of technologies, to enable the collection of datasets to rigorously determine, the residence time, distribution, sources and sinks of PMD. This session offered a look into the leading edge of technologies and platforms for more accurate PMD estimation to better understand and prioritize this ongoing problem in all parts of the world's oceans.

Highlight

In this session, talks and posters detailing innovative tracking methodologies for Plastic Marine Debris (PMD) including modified survey techniques and in situ Raman spectroscopy were presented. Survey data collected using these innovative techniques were presented, revealing a dataset of even smaller size fractions of PMD comprised primarily of fibers and fragments particularly in the Arctic and Antarctic which have the potential to collect in filter feeding organisms, adding another layer of complexity to the collateral effects of PMD. Measurement and modeling data were presented on how size and rigidity of plastic material can influence its distribution in the water column due to its change in terminal rising velocity—greatly affecting surface PMD surveys with varying wind conditions. The microbiome of PMD (termed the Plastisphere) can also influence the density of plastic in the water column and influence its transport to benthic environments.

Oral Presentations

Micro-Plastic Particle Analysis of Hudson River Surface Water Using Novel Flow-Through Imaging Raman Spectroscopy | Scott Gallager, USA

The Role of the "Plastisphere" Microbiome in Plastic Resin Density Changes Over Time | Linda Amaral-Zettler, Netherlands

The terminal rising velocity of ocean plastic | Francesco Federico Ferrari, Netherlands

Plastics in Antarctica – preliminary findings from the Antarctic Circumnavigation Expedition (ACE) | Peter Ryan, South Africa

Microplastic screening and plastic surface weathering characterization with optical microscopy and SEM/EDS | Zhong-Min Wang, USA

The Arctic deep sea - a sink for microplastic? | Melanie Bergmann, Germany

Microfibers: Taking Action On What Is Known, Prioritizing Research On The Unknown

Tuesday, March 13 | 1:30 PM - 3:00 PM

Session Chair: Nicholas Mallos, Ocean Conservancy

Description

Studies demonstrate that microfibers are released from clothing during washing and enter wastewater via washing machine effluent. Some of the concerns are around microfibers originating from synthetic textiles (such as nylon, acrylic or polyester) that are being used by consumers. Microfibers have been reported in rain and aquatic habitats (both freshwater and marine) across the globe. In some cases, they are the most common type of marine debris found in habitats and inside animals. It is a topic gaining the attention of the news media, environmental NGOs and scientists, but our understanding of the emissions, fate and toxicity of microfibers is relatively limited. This panel brought together leaders from conservation organizations, academia, and innovative industries to lay out the background of the issue, define the future research agenda for this issue, and discuss potential solutions to the known challenges.



Highlight

Speakers discussed what is known about the sources, fate and effects of microfibers and highlighted known research gaps that are critical to address to inform management and design decisions. Key gaps in scientific understanding include the total amount of annual microfiber emissions to the environment, and the relative contributions of various identified sources (e.g. % from apparel vs. other sources like carpet and upholstery), and the relative contributions of various microfiber transport pathways (e.g., WWTPs versus industrial emissions). Important questions remain about the demonstrable physical and chemical impacts of microfibers compared to microplastics in general, and the extent to which microfibers impact aquatic and terrestrial ecosystems and human health. Despite these uncertainties, action is warranted and current technologies exist and are effective at mitigating certain emission pathways while additional opportunity exists for industry to adopt and implement best practices throughout their respective supply chains. Going forward, there is optimism about the ability of diverse, cross-sector stakeholders to fill research gaps, use evidence to inform solutions, and leverage existing knowledge to reduce emissions via best practices.

Oral Presentations

Science to Inform Solutions – Source, effects and potential solutions for microfibers | Chelsea Rochman, Canada

Wastewater treatment plants as a pathway for microplastics: A case study from Mersin, TURKEY | Ahmet Erkan KIDEYŞ, Turkey

Microfibers, a prominent contaminant in fish from the Great Lakes | Lisa Erdle, Canada

A human-scale solution to Microfiber Pollution: the Cora Ball - conception, research, design and impact | Rachael Miller, USA

Confronting microfiber pollution: forging a road map to action | Nicholas Mallos, USA

What, Why and How: Using Research to Change Littering and Recycling Behaviors

Tuesday, March 13 | 3:30 PM - 5:00 PM

Session Chairs: Cecile Carson, Keep America Beautiful | P Wesley Schultz, California State University

Description

Like many social problems, litter and marine debris is caused by human behavior. Whether intentional or accidental, litter begins with the individual. Given the social, economic, and environmental problems that result from litter, numerous interventions have been developed, implemented, and evaluated. Yet despite these efforts, litter continues to be a problem. In an effort to go beyond the typical self-report measures used to study littering behavior, our research includes observations of individuals in a diverse sample of public locations. With regard to general littering, our statistical analyses revealed several important predictors. The goal was to obtain a small, representative sample of individuals and to link the responses from our intercept interview to the observed disposal behaviors. At each of the selected intercept locations, individuals who had been observed disposing (either properly or improperly) were approached to take part in a face-to-face survey. Based on this information more targeted approaches may be taken to address littering and marine debris.

Highlight

Two speakers provided foundational information on research and research approaches using observation and intercept methodology and targeted messaging. Two speakers provided examples of the implementation of strategies based on the research methodology. Topics of discussion included community appearance and value of consistent and ongoing community clean-up activities, convenience to containers, and role for awareness and motivation campaigns, and local messaging and signage.



Oral Presentations

Prevent Marine Debris Through Empowering New Generations' Actions at Educational Institutions | Christine Flowers, USA

Regional Litter Prevention Campaign: Building a Campaign That Works | Hannah Seligmann, USA

Who Gives a Hoot Intercept Surveys | Renee Bator, USA

Behavior Change Strategies to End Littering and Improve Recycling | P Wesley Schultz, USA

Research In Action: Leveraging Marine Debris Data To Inform Reduction Efforts And Policies

Wednesday, March 14 | 10:30 AM - 12:00 PM

Session Chairs: Lauren Blickley, Swell Consulting | Megan Lamson, Hawaii Wildlife Fund

Description

This session evaluated the role of marine debris research in supporting policies, programs, and clean up strategies to reduce local marine debris - most notably plastic pollution. Overall, the session emphasized the importance of establishing baseline data and identifying primary sources of plastic pollution. Hosting speakers from around the world, and covering both macro- and microplastics, the session demonstrated how research is being effectively utilized to inform both removal and reduction efforts. With the knowledge and understanding provided by research, communities are able to develop and implement mitigation strategies that most appropriately (and effectively) address local marine debris and plastic pollution loads. Furthermore, the session helped to identify research gaps that would be helpful in supporting mitigation efforts, shared best practices in terms of connecting science to policy action and education programs, and addressed opportunities for partnerships between researchers and policy makers.

Highlight

While marine debris, particularly plastic pollution, is a pervasive and global issue, mitigation strategies, policies, and removal efforts vary widely across communities. This session highlighted the ongoing need for locally relevant marine debris and plastic pollution data that can support efforts to effectively reduce debris loads. In Brazil, for example, researchers investigated the role that tourists play in contributing to coastal debris, while debris surveys in San Francisco Bay seek to identify the flow of plastics from the terrestrial to the marine environment. Debris data is especially critical in regions lacking baseline information on debris amounts, types, and sources. By identifying debris sources in areas like French Polynesia, Maui, and Canada, local mitigation strategies have been identified/implemented that most effectively address key debris sources and types (e.g. addressing agriculture plastics in Canada versus polystyrene containers on Maui). Research is also important in evaluating the effectiveness of plastic pollution policies. Moving forward, it is important to continue to utilize research to better understand the source of debris, evaluate the efficacy of mitigation efforts and policies, and quantify the amount of plastic pollution along coastlines (including microplastics down to the polymer level).

Oral Presentations

Leveraging marine debris data to inform marine debris mitigation efforts on Maui | Lauren Blickley, USA

Bans don't stop cups: citizen science indicates that the ban of styrofoam cups resulted in the use of other types of cups | Chieh-Shen Hu, Taiwan

Characterizing microplastics in the San Francisco Bay and adjacent National Marine Sanctuaries to inform regional policy recommendations |Carolynn Box, USA

How land-use and hydrology characteristics affect microplastic contamination and distribution in subwatersheds of Lake Ontario | Jelena Grbic, Canada

Paradise Trashed? Understanding the types and sources of marine debris in French Polynesia as a means of assessing local mitigation strategies | Krista Verlis, Australia

Solid waste in coastal cities: an initial assessment on the transboundary role of tourists | Marina Ferreira Mourão Santana, Australia



The Risks Of Marine Debris Mega-Pulse Events: Lessons From The 2011 Great Japan Tsunami

Wednesday, March 14 | 1:00 PM - 3:00 PM

Session Chairs: Cathryn Clarke Murray, DFO, Canada | Alexander Bychkov, North Pacific Marine Science Organization (PICES)

Description

The Great East Japan Earthquake and Tsunami of March 2011 resulted in a unique mega-pulse marine debris event that became the subject of many research programs around the North Pacific Ocean. In addition to the sheer magnitude of this event, Japanese Tsunami Marine Debris (JTMD) became an important vector for many Japanese species to reach the shorelines of North America and Hawaii. This session focused on exciting advances in marine debris research that have arisen from efforts to characterize and understand JTMD behavior, including higher resolution ocean modeling of marine debris movement, the development of novel surveillance and monitoring tools for marine debris landfall and accumulation, and the application of bioforensics and risk assessments to determine the potential threats from exotic species transported by long-lasting anthropogenic rafts. Although large-scale natural disasters will remain difficult to predict, lessons learned from the research arising from the 2011 Great Japan Tsunami provide a framework for other mega-pulse events, including predicting the potential fate and impacts associated with the sudden appearance of massive debris fields in the ocean that can inform management decision-making or policy development around marine debris. The targeted audience included researchers and managers working on large-scale marine debris issues.

Highlight

The session highlighted many novel advances, applications, and lessons learned from studies of Japanese Tsunami Marine Debris (JTMD) in the North Pacific that can be used elsewhere. This is an important outcome as global climate change is already affecting the frequency and scale of storm activity, including hurricanes, typhoons, and monsoons, which increases the probability and magnitude of future mega-pulse debris events. JTMD research also provided the first opportunity in the history of marine science to track large-scale (7000+ km) transoceanic rafting event of marine life. It was clearly demonstrated that modern rafting is very different from historic rafting as it includes largely non-biodegradable anthropogenic (plastic) objects which differ fundamentally in their at-sea longevity from naturally floating woods and seaweed. Persistence of anthropogenic materials has revealed the previously unknown capacity of coastal species to survive for multiple years on a transoceanic journey and thus critically extended the potential for long-term and long-distance transport of non-native species. As a result, the trans-oceanic movement of species on marine debris is becoming an emerging issue in invasion and debris research.

Oral Presentations

Pathways, impacts and fate of marine debris generated by the 2011 tsunami in Japan derived from a synthesis of numerical models and observational reports | Nikolai Maximenko, USA

Finding a needle in a debris haystack: surveillance of debris from the Great Japan Tsunami | Cathryn Murray, Canada

How the 2011 Japanese Earthquake and Tsunami Prompted a Marine Debris Monitoring Program in Central California, USA | Kate Bimrose, USA

An estimate of the abundance of Japanese tsunami marine debris washed ashore on the west coasts of the North America, based on a combination of webcam monitoring and a particle tracking model experiment | Shinsuke Iwasaki, Japan (presented by Atsuhiko Isobe)

Diving into debris: the biology and ecology of biota transported on Japanese tsunami marine debris | Jessica Miller, USA

The invasion risk of invertebrate species associated with Japanese Tsunami Marine Debris in North America and Hawaii | Thomas Therriault, Canada

Megarafting: The Role of Marine Debris in the Coastal and Transoceanic Transport of Marine Life | James Carlton, USA



Transport And Fate Of Marine Debris In The Ocean And Shelf-Seas: Theory, Modeling And Observations | Parts 1 & 2

Thursday, March 15 | 8:30 AM - 10:00 AM, 10:30 AM - 12:00 PM

Session Chairs: Erik van Sebille, Utrecht University | Kara Lavender Law, Sea Education Association

Description

This session focused on how ocean waves and ocean currents move plastic and other marine debris around the world, and how processes in the ocean change its density and thereby its fate. Knowing how and where marine debris is transported by the ocean is key to understanding its fate and impact on marine ecosystems. Oceanographic phenomena that impact the transport and dispersion of marine debris occur on a large range of scales, from thousands of kilometers for the Ekman convergence in the subtropical gyres to a few centimeters for the Stokes drift by individual surface waves. The way that these different phenomena affect the dispersion of marine debris, and how this leads to the emergence of patch accumulation regions and 'hotspots', is a major knowledge gap.

Highlight

This session hosted twelve fantastic presentations, all focusing around the topic of transport and distribution of plastic in the open ocean. One of the themes through the presentations was that plastic can now be found almost everywhere in the ocean, yet we still don't know the heterogeneity in its distribution or how it moves around. Individual presentations focused on the patterns and variability of accumulation, from the basin scale to the beach scale, and from the surface of the ocean to the deep sea.

Oral Presentations | 8:30 AM - 10:00 AM

A journey into the Great Pacific Garbage Patch | Laurent Lebreton, New Zealand

An estimate of future spread of pelagic microplastics based on a transoceanic survey and numerical modeling over the Pacific Ocean | Atsuhiko Isobe, Japan

Is there a garbage patch in the Indian Ocean? | Mirjam van der Mheen, Australia

Source to Sea Transport of Microplastics: Modeling Fate and Transport in San Francisco Bay and the Coastal Ocean | Rusty Holleman, USA

Coastal accumulation mapping of microplastic particles emitted from the Po River, Italy: Integrating remote sensing, in situ sample collections and ocean current modelling | Elizabeth C. Atwood, Germany

Predicting accumulation zones of marine debris at management relevant scales | Kay Critchell, Australia

Oral Presentations | 10:30 AM - 12:00 PM

Understanding wind-driven vertical mixing of microplastics | Jessica Donohue, USA

Use of NOAA's Trajectory Analysis Planner (TAP) for Marine Debris Transport Studies | Dylan Righi, USA

Beneath the waves: a deep dive into the transport and fate of microplastics in pelagic ecosystems | Anela Choy, USA

From the sea surface to the deep seafloor: microplastics prevail at all ocean depths of the HAUSGARTEN observatory (Arctic) | Mine B. Tekman, Germany

Generation of secondary microplastics in the sea swash zone | Irina Chubarenko, Russia

Making virtual particles behave like plastic: developing the OceanParcels Lagrangian Ocean Analysis framework | Erik van Sebille, Netherlands



Plastic Debris Pollution In Freshwater Environments Of The World | Parts 1 & 2

Thursday, March 15 | 1:30 PM - 3:00 PM, 3:30 PM - 5:00 PM

Session Chairs: Patricia Corcoran, University of Western Ontario | Sarah Lowe, National Oceanic and Atmospheric Administration, Marine Debris Program/MSG | Lorena Rios-Mendoza, University of Wisconsin-Superior

Description

This session gathered experts in the field of freshwater debris research. Presentations discussed and outlined the current state of knowledge, shared lessons-learned on techniques and challenges in freshwater systems, and educated the wider marine debris community about upstream effects. Plastic pollution and other marine debris has been documented in both fresh and salt water environments around the globe. This conference was the first time where researchers from multiple countries and in both oceanic and freshwater environments met together to share their advances in the study of debris and their effects in aquatic ecosystems.

Highlight

Several highlights emerged from this session including, the necessity to develop and continue to refine methodologies to collect, analyze and interpret microplastic samples in different matrices (water, sediment, tissues, wastewater sludge). Participants acknowledged that methodologies differ in their success based on the environment. Participants were invited to participate in a summary paper to submit in a peer-review journal about the current state of research in freshwater environments. Furthermore, there is a need to continue to investigate trophic interactions and transfer of microplastic debris across the food chain, including human consumption.

Oral Presentations | 1:30 PM - 3:00 PM

Microplastics in riverine sediments and the factors affecting their accumulation | Patricia Corcoran, Canada

Plastic pirates sample macroplastic litter along rivers from Germany – riverside litter and sources estimated by schoolchildren | Martin Thiel, Chile

Floating macro litter input from rivers to the European Seas | Daniel Gonzalez Fernandez, Spain

Predicting microplastic behavior in rivers on a US national scale | Albert Koelmans, Netherlands

Analysis of microplastic pollution in Slovenian watercourses and lakes | Andreja Palatinus, Slovenia

Spatiotemporal Distribution and Characteristic of $> 20 \mu\text{m}$ Microplastics and Annual Load on Nakdong River in South Korea | Soeun Eo, South Korea

Oral Presentations | 3:30 PM - 5:00 PM

Macro and Microplastics: St Louis River Estuary and Lake Superior | Lorena Rios Mendoza, USA

Microplastic and anthropogenic litter in rivers: Sources, retention, export, and biological interactions | Timothy Hoellein, USA

Microplastic Ingestion By Several Species of Fish from the Great Lakes | Keenan Munno, Canada

Microplastics from waste-water treatment plants in Portugal. Preliminary data | Joana Antunes, Portugal

Removing microplastic particles from samples with high organic matter content: a countrywide investigation of sewage sludge produced across Norway | Amy Lusher, Norway

Anthropogenic Contamination of Beer, Sea Salt, and Drinking Water | Sherri Mason, USA



Degradation Of Plastic Debris In Different Marine And Coastal Environments

Friday, March 16 | 8:30 AM - 10:00 AM

Session Chairs: George Papatheodorou, Department of Geology, University of Patras | Hrissi K. Karapanagioti, Department of Chemistry, University of Patras

Description

This session is focused on marine debris scientists dealing with environmental degradation, and floating, beached and benthic plastic litter. Plastics are ubiquitous in the marine environment and present even on the most remote areas of the planet. Global plastic production reached up to 280 million tons in 2012. The imprudent use of plastics in our everyday life has elevated plastics to a major environmental threat. The generated plastic waste in 192 coastal countries in 2010, has been estimated at approximately 275 million metric tons (MT), from which 4.8–12.7 million MT have entered the oceans. The synthetic polymer degradation process starts once they are deposited into the oceans. Their degradation rate is significantly slow, which makes them extremely persistent. Thus, plastics can last in the marine environment for decades or even hundreds of years when on the surface and likely far longer when in the deep sea. This session addressed topics on identification and characterization of plastic, determination of the alterations, identification of possible mechanisms of degradation, dating of plastics and estimation of lifetime of plastics in the environment. Studies based on samples from field surveys and also studies from laboratory experiments were highlighted, with focus on studies that provide characterization of plastic samples collected from the field.

Highlight

The degradation process of plastics is a very complicated topic and only a limited number of studies exist with samples that are found in the environment where their age could be determined. There are different scenarios related to degradation mechanism and whether it is a surface process or not. Deterioration of plastic into smaller pieces is faster in air than in seawater, whereas oxidation of the plastic surface is observed in air but not in seawater. Tested plastic films/bags characterized as biodegradable or not result after degradation into microplastics. Studying degradation requires a good knowledge of the environmental conditions and how to simulate them. Knowledge of polymer chemistry and microorganisms behavior is also needed. In addition, additives may play a crucial role in the chemical degradation of plastics. Thus, even though polymer scientists have studied the degradation of plastics in the laboratories many years ago, the uncontrolled exposure of plastics into the environment creates a whole new area of research related to the behavior of this material.

Oral Presentations

Investigating Physical and Chemical Degradation of Plastics using Open Ocean Microplastic Samples and Laboratory and Field Weathering Experiments | Kara Lavender Law, USA

Deterioration of plastics in air and sea water | Nicolas Biber, USA

Degradation of plastics in term of loss mechanical properties a coastal zone, port of Manzanillo, Colima | Juan Carlos Alvarez Zeferino, Mexico

Artificial ecosystem selection for marine polymer degradation | Robyn Wright, UK

A model study to explore the kinetics of polymer fragmentation in aquatic environment. | Fanon Julienne, France

Degradation of the Mulch Plastic in Soil Environment by photodegradation and biodegradation | Yüksel Ardali, Turkey

Prevention



Microplastics in Wastewater Treatment Plants — A totally preventable source

Tuesday, March 13 | 3:30 PM - 5:00 PM

Session Chairs: Hrissi K. Karapanagioti, Department of Chemistry, University of Patras | Ioannis Kalavrouziotis, Hellenic Open University

Description

Most microplastic particles and synthetic fibers can be effectively removed by different wastewater treatment plant (WWTP) processes depending on their density. However, more efficient methods such as microfiltration should be employed to protect the environment. Despite the highly efficient removal rates of microplastics achieved by WWTPs, when dealing with such a large volume of effluent even a modest amount of microplastics being released per liter of effluent could result in significant amounts of microplastics entering the environment. In most cases, microplastics and synthetic fibers concentration was higher in the WWTP effluent compared to the receiving body of water. This indicates that WWTPs may operate as a route for microplastics entering the sea. WWTPs can act as a primary source for marine microplastics.

Highlight

Wastewater treatment plants (WWTP) are a point source of marine microplastics that should be controlled. Monitoring can provide information on the source of microplastics into wastewater/stormwater. WWTP effluent seems to be a major source of microplastics and fibers for different marine environments, even for small populations. However, the identification of microplastics in the complicated matrix of wastewater is challenging. Matrix specific treatment is needed. The same is true for micro-sized fibers. Changes in consumer behavior may be the most effective way to reduce microplastics in the environment. In addition, laundry machines should be regulated to include a fiber collection system that is readily available.

Oral Presentations

Microplastics in Wastewater Treatment Plants | Hrissi Karapanagioti, Greece

Microplastic Particle Morphology and Categorization: Implications for Managing Sources to the Great Lakes | Paul Helm, Canada

A wastewater utility's attempt to optimize extraction and identification of microplastics in secondary Waste Water Treatment Plant (WWTP) effluent | Artem Dyachenko, USA

A new analytical approach for the detection of micro-sized fibers from textile laundry | Jasmin Haap, Germany

Micro plastic and fibres in the marine environment of Svalbard, Norway | Dorte Herzke, Norway

Microplastic distribution in environmental matrices (water-sediment) in Todos Santos Bay, Mexico. | Nancy Ramírez-Alvarez, Mexico



Plastic Pollution & Environmental Justice

Wednesday, March 14 | 10:30 AM - 12:00 PM

Session Chairs: Jane Patton, Plastic Pollution Coalition | Genevieve Abedon, Ecoconsult

Description

The forums of discussion in which strategies for tackling plastic pollution are developed and adopted have historically included a much more prominent voice of industry, creators of the plastic pollution crisis, than of the communities most acutely harmed by its damaging effects. The intention of this session was to bring a much needed conversation to IMDC, elevate under engaged voices that are traditionally not included in finding solutions but are doing meaningful work on the ground, shift the narrative from plastic pollution as a coastal/oceans issue to it as an everywhere issue, emphasize that plastic pollution is not just a resource management issue but begins with extraction and affects communities all along the plastics supply chain, that locally and culturally relevant solutions are more worthy of consideration and funding than industry-driven technological fixes that ignore real human needs, and leave attendees with a sustained impression of the need to listen to and work alongside communities of color globally in equitable solutions to plastic pollution. The targeted audience included policymakers, industry, and NGOs.

Highlight

The session was well attended and folks were quite pleased to have had a panel of this nature at the conference. Some big takeaways included the cycle of extraction to disposal, no one should bear the brunt of other people's consumption and that there should be an equitable distribution of both benefits and burdens. Another highlight included the need to get to know local communities, what they are working on, and to deeply listen to them. A blog that was written about the conference stated "what may have been the most moving panel of the session, a panel of diverse voices on environmental justice—representatives who work to empower the most at-risk communities with culturally-relevant messaging and actions."

A fabulous outcome was securing funding for the panelists to be able to attend the conference and bring their message. Additionally, this connected them with potential future funding. As mentioned in the panel conversation, a barrier for many smaller environmental justice organizations is funding so a big takeaway was to connect them with funders.

Panelists

Von Hernandez, Break Free From Plastic

Marcela Graudiņš, Azul

Amanda Ford, Environmental Justice Coalition for Water

Bharati Chaturvedi, Chintan Environmental Research and Action Group

Rosa Furumoto, California State University, Northridge

Irma Munoz, Mujeres de La Tierra

Stiv Wilson, The Story of Stuff Project



The Elephant In The Room: Addressing Vulnerable Human Populations Impacts By And Contributing To Marine Debris

Wednesday, March 14 | 1:00 PM - 3:00 PM

Session Chair: Albert George, South Carolina Aquarium

Description

Vulnerable communities struggle with a litany of social issues, which includes being both directly impacted by, and a contributing source of, litter and marine debris. From trash pickers who rely on collecting discarded scraps to support their families, to poor communities who lack the political influence to say “not in my backyard”, these communities are exposed to many hazards related to mismanaged waste and marine debris. Debris generated by low-income and homeless populations is a growing problem in San Diego and across the United States, but also prevalent in least developed countries worldwide. In California, homeless encampments are common in or adjacent to rivers and streams, and a source of a significant amount of marine debris.

Highlight

This session explored the interconnectedness of environmental justice and social issues, particularly as it pertains to waste generation and leakage into the marine environment. We invited presentations on efforts and strategies to address litter and marine debris that affect vulnerable communities or are generated by the homeless and those living in poverty, including cleanup programs, effective partnerships across disciplines, and other success stories or lessons learned. Developing and implementing strategies to engage under-served or poverty-stricken communities is absolutely critical in reducing the impacts of marine/aquatic debris.

Oral Presentations

Global Flow of Plastic: Imports and Exports of Plastic Scrap Around the World | Amy Brooks, USA

Sustainable alternatives and marine focused education to combat plastic waste in Indonesian schools | Cassidy Fitzclarence, Australia

Addressing marine debris as a coastal hazard: opportunities and awareness | Carla Elliff, Brazil

Favelas and stilt houses contributing to floating marine litter in an estuarine environment in the coast of São Paulo, Brazil | Gerson Fernandino, Brazil

The San Diego River: A case study in strategies to address urban encampments as a significant source of marine debris | Rob Hutsel, USA

Management of Homeless Encampments | Christine Flowers, USA

Resilience Initiative for Coastal Education (RICE): Engaging Vulnerable Human Populations Impacted by and Contributing to Marine Debris | Albert George, USA

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Strategies For Preventing Trash Before It Starts

Thursday, March 15 | 8:30 AM - 10:00 AM

Session Chairs: Sydney Harris | Samantha Sommer, Clean Water Action and Clean Water Fund

Description

This session reviewed and shared strategies, resources, tools, and challenges for developing successful upstream solutions to prevent ocean litter. We brought together an interdisciplinary mix of professionals from the solid waste and materials management sector, ocean policy advocates, citizen and academic researchers, and experts in behavior change to discuss leading strategies in upstream waste prevention and best practices to stop marine debris at the source. Representatives of ReThink Disposable and other organizations shared case studies describing the costs, benefits, difficulties, and accomplishments they have experienced in efforts to minimize unnecessary packaging designed for single-use and replace disposable items with reusable items.



Highlight

Attendees and speakers discussed the ample evidence showing that single-use disposable foodware items make up the bulk of land-based ocean plastic litter. We agreed that these findings point toward source reduction policies and practices because recycling and composting programs not only cannot capture all of the items being used, but all single-use items, whether land-filled, recycled, composted, or littered, require a substantial amount of resources compared to the fewer number of reusable items that can replace them. People left the room buzz with conversation and hopefully filled with motivation to tackle source reduction head-on in their communities!

Oral Presentations

Plastic Free July – A case study in behaviour change best practice | Rebecca Prince-Ruiz, Australia

Oregon's Experience Moving Up the Hierarchy to Waste Prevention | Peter Spendelow, USA

Plastics Reduction Policies in California- Past, Present, Future | Miriam Gordon, USA

ReThink Disposable: Stop Waste Before it Starts | Samantha Sommer, USA

The success of waste campaigns and policies at reducing plastic waste into the marine environment | Kathryn Willis, Australia

Lose The Loop: Global Collaboration To Reduce And Prevent Pinniped Entanglement In Marine Debris

Thursday, March 15 | 10:30 AM - 12:00 PM

Session Chairs: Kim Raum-Suryan, National Oceanic and Atmospheric Administration, NMFS Alaska Region, Protected Resources Division | Elizabeth Hogan, World Animal Protection

Description

This session brought together experts in responding to and disentangling different pinniped species, as well as those developing technology intended to prevent or resolve entanglement. Safely capturing and removing entangling materials from pinnipeds poses many challenges. Certain species are small enough to capture and manually restrain on shore, while others can only be safely handled under sedation. Advances in remote chemical immobilization have now made it possible to safely capture and disentangle large pinnipeds, even if they enter the water. With each entanglement response and capture, responders learn many valuable lessons that could help other scientists who plan to embark upon this method. Many factors impact the success of a capture including the feasibility of rescue response; location, size, and position of the animal; communication and decision making among responders; experience of responding personnel; adaptive techniques when the unexpected occurs; weather, tidal, and other environmental conditions; capture equipment and satellite tag application; and the response of the target animal after darting. Each panelist explained their best practices and lessons learned.

Highlight

The session connected marine wildlife rescue experts with new advancements in technology, and gave rescue experts an opportunity to connect and exchange best practices. This session was also an opportunity to share with the 6IMDC audience the real impact of ocean plastic on wildlife and create an understanding of the suffering endured by each affected animal, along with the incredible effort, skill, training, and resources dedicated to every single animal that is rescued. While all audience members at the 6IMDC have backgrounds in the topics surrounding ocean plastic, few have firsthand experience in wildlife rescue, and hopefully the exposure to this work will assist in driving the public sense of urgency to find solutions.

Oral Presentations

Packing Bands Entangling Pinnipeds Around the World: Policy and Practical Solutions | Elizabeth Hogan, USA

Examining utility and functional aspects of remote, line-free lobster and crab fishing systems with modelling and prototype development for reduction of marine mammal foraging habitat impact and reduction of marine debris. | Daniel Greenberg, USA (presented by Richard Riels)



Understanding the impact of marine debris entanglements on pinniped health: a 10-year study of entangled California sea lions rescued along the central California coast. | Elsa María Coria-Galindo, Mexico

Marine debris is the most frequently encountered anthropogenic threat to pinnipeds in central California: a comparative review of two decades of marine mammal stranding cases | Daniela Barcenás, Mexico

Marine debris in harbour porpoises and seals from German waters | Bianca Unger, Germany

Pinniped Marine Debris Entanglement Response: Best Practices and Lessons Learned – A Panel Discussion | Kim Raum-Suryan, USA

Panelists

Kim Raum-Suryan, NOAA/NMFS Alaska Region, Protected Resources Division

Kate Savage, NOAA/NMFS Alaska Region

Mike Williams, NOAA/NMFS Alaska Region, Protected Resources Division

Daniela Barcenás, The Marine Mammal Center

Rebecca McIntosh, Phillip Island Nature Parks

Lynda Doughty, Marine Mammals of Maine

Engineering Effective Marine Debris Interception

Thursday, March 15 | 1:30 PM - 3:00 PM

Session Chairs: Thomas G Sprehe, KCI Technologies, Inc | John Kellett, Clearwater Mills

Description

The session focused on engineering elements of marine debris interception in streams and rivers, while pointing out ongoing efforts at Tijuana River Watershed (CA), Anacostia River (Washington D.C.), and Baltimore (MD). Bronti Patterson, from Tijuana River National Estuarine Research Reserve presented on “Basins and Booms: An Effective Model for Marine Debris Capture in the Tijuana River Watershed”. Matt Robinson of the DC Department of Energy and Environment, Watershed Protection Division presented on “Implementing a Trash Diet for the Anacostia River”. Thomas Sprehe, from KCI presented on “The Case for Debris Interception Versus Other Management Methods”. The session target audience was the public works sector (solid waste management), private sector, NGOs, academia, and research institutes among others.

Highlight

In 2005, the Goat Canyon Sediment Basin was constructed at a cost of nearly \$6 million dollars, in order to capture 60,000 cubic yards annually of sediment and debris directly impacting estuarine and ocean habitats associated with the Reserve. The Goat Canyon Sediment Basin serves as a potential model effort toward alternative and sustainable natural resource maintenance in both the U.S. and Mexico.

In 2010, D.C and Maryland jurisdictions developed a total maximum daily load (TMDL) for trash for the Anacostia river. This “trash diet” requires both jurisdictions to install controls to prevent or remove over 1 million pounds of trash per year, such as the installation of trash traps; establishment of a 5% fee on single-use plastic bags; banning of expanded polystyrene foam food products; and installation of large underground tunnels to capture combined sewer overflow. This work will hopefully inspire jurisdictions to adopt similar approaches to reduce the amount of trash in the nation’s water bodies.



Oral Presentations

Implementing a Trash Diet for the Anacostia River, Washington, District of Columbia, USA | Matt Robinson, USA

Basins and Booms: An Effective Model for Marine Debris Capture in the Tijuana River Watershed | Bronti Patterson, USA

Prioritizing debris interception versus other management methods | Thomas Sprehe, USA

Life-Cycle Considerations To Addressing Marine Debris – Reflections On Municipal Waste

Thursday, March 15 | 3:30 PM - 4:30 PM

Session Chair: Eric DesRoberts, Ocean Conservancy

Description

Aside from the recognition that plastic litter does not belong in the ocean, there are often grey areas and trade-offs to be assessed throughout a product and packaging system that makes the topic of marine debris incredibly complex. This session covered some of the design decisions behind items and materials that pose some of the biggest marine debris challenges, the importance of including more system-based thinking into operations, and the business case for addressing marine debris. This session focused on decisions made at different points along product value chains, why some of these decisions create problems for our ocean, and some of the existing efforts to integrate marine debris impacts into life cycle assessment methodologies.

Highlight

It is important to think about product and packaging systems throughout their entire life cycle. There are trade offs that happen at every point along a value chain and decisions should be made to balance these trade offs to result in the best overall outcome for a product and packaging system. When assessing systems, we often think about different attributes (recycled content, recyclability, renewable content, etc.). However the impacts (in the case of ocean health - GHG emission, acidification potential, eutrophication potential, etc.) should also be considered to help identify the best overall outcome. The methodology currently in place to quantify these impacts is currently incomplete, and the impacts from mismanaged waste are not fully represented. Research is underway to clarify the consequences of inappropriate plastic waste disposal on marine life biodiversity.

Oral Presentations

A systems perspective on plastics and ocean waste | Alix Grabowski, USA

How Life Cycle Assessment Can Inform Solutions to the Problem of Marine Debris | Peter Spendelow, USA

The Inclusion of Marine Plastic Mismanaged in Life Cycle Assessment | Naiara Casagrande, Brazil

Global Toolkit For Reducing Single Use Packaging And Plastic Pollution Through Source Reduction Action

Thursday, March 15 | 4:30 PM - 5:15 PM

Session Chairs: Jane Patton, Plastic Pollution Coalition | Leslie Tamminen, Seventh Generation Advisors

Description

Two nongovernmental environmental organizations, the Plastic Pollution Coalition and UPSTREAM, in consultation with Seventh Generation Advisors, BreakFreeFromPlastic, Zero Waste Europe, GAIA, the State of California, and others, introduced a global toolkit for reducing single-use packaging and plastic pollution through source reduction actions. The toolkit is meant for advocates and regulators in developed countries and subnational governments, as well as developing countries, including least developed countries and small island developing states.



The toolkit will focus on actions for integral policies such as Extended Producer Responsibility, and, as of the date of the conference, actions on predominant types of plastic litter such as plastic bags and polystyrene (the toolkit will eventually reach other products such as microbeads, straws, cups, etc.). Meant to be a comprehensive online resource, the toolkit will be a compilation of local, state, and federal single-use plastic bag and polystyrene mandates across the globe, existing ordinances and statues, regulatory effectiveness information, scientific data, legal resources, and community engagement tools for regulators and advocates. As a global, non-branded resource, it will necessarily rely upon linkages to multiple other organizations, institutions, and agencies.

Highlight

It was important for conference attendees to understand how the toolkit is structured and its utility to their specific situation. Panelists provided a brief introduction to how and why the toolkit was developed (currently, there is not an up-to-date, international source reduction compendium resource for regulators and advocates), and an in-depth review of toolkit contents. Their review focused on graphic charts that correlate actions to a specific outcome and actions to a category of user (e.g., developed or developing nation or subnational government). Panelists also included a summary on prospective additions to the toolkit. Session attendees gained an understanding about the value of toolkits for a wide range of source reduction actions and policies.

Panelists

Doorae Shin, Kōkua Hawai'i Foundation

Bharati Chaturvedi, Chintan Environmental Research and Action Group

Von Hernandez, Break Free From Plastic

Sean Bothwell, California Coastkeepers

Reducing Marine Plastic Pollution Through Innovation And Entrepreneurship And Leveraging The Social Enterprise

Friday, March 16 | 8:30 AM - 10:00 AM

Session Chairs: Daniella Russo, Think Beyond Plastic | Anne Warner, Think Beyond Plastic

Description

A new approach to the problem of plastic pollution is required: one that embraces design thinking and focuses on building the economic engine to support the systemic, permanent reduction of marine and land-based plastic pollution. It means investments in forward-looking innovations, including new materials, new manufacturing and recycling processes, and new design following the principles of a circular economy. Disruptive innovation should be directed toward key problem areas of plastic pollution where consumption is the highest and market failures are the greatest.

The social enterprise for a targeted geographical area must be developed in collaboration with local partners (NGOs, policymakers, and businesses) and relevant stakeholders by following an innovation ecosystem approach. Leveraging partnerships is key. Benefits of this approach include: that it is regenerative by design; produces incremental revenues as a result of behavior change; promotes synergistic impacts among the environment, economics, and health; and transitions from a linear use-discard economy to a circular economy of reuse.

The panel discussion was designed to bring together a wide cross-section of the population, as will be required to advance systemic and sustainable solutions to the global plastic pollution problems. The target audience of this session included NGOs, economists, business leaders, academics, entrepreneurs, innovators, and scientists.



Highlight

Consensus is that consumers are interested in extended producer responsibility or other governmental support mechanisms to deter continued dependence on oil-based plastics. Education is required, however, to provide insight into different solutions and their impacts, while avoiding greenwashing, and to provide overall frameworks that demonstrate the impacts of different consumer behaviors. Directing behavior change toward benign alternatives that “turn off the tap” of production and away from the focus on recycling and clean-up efforts remains a challenge.

Complexity and resistance to change in the supply chains of both waste management and plastics make system level change difficult. Solutions that can offer economically attractive alternatives that create incentives to change behavior are ideal. We need solutions that are sustainable and make economic sense, not solutions reliant on subsidization from governments or philanthropy. The need to develop improved recycling systems for traditional materials as well as an expanded and improved collection system for organic and compostable materials is essential. Focus continues to be more on recycling improvement than on the introduction of new compostable materials solutions.

Panelists

Spurgeon Miller, Mayor of Guanaja, Honduras

Andrew Falcon, Full Cycle Bioplastics

Amy Brooks, University of Georgia

Doug Woodring, Ocean Recovery Alliance

Rachael Miller, The Rozalia Project



Private Sector Collaboration, Technology & Innovation

Innovation For A Clean Ocean: R&D, Unique Programs And Initiatives That Are Leading The Way Into The Solutions Phase Of Marine Debris Action

Monday, March 12 | 1:30 PM - 3:00 PM

Session Chair: Rachael Miller, The Rozalia Project

Description

It is difficult to keep track of the myriad of ideas, projects, and innovations happening that are related to marine debris, much less have an opportunity to speak with the innovators. Currently, there are organizations who are pushing forward technology and techniques that have the potential to make a big impact when it comes to solution-finding and implementation. This session gave attendees an opportunity to hear from some of those innovators whose programs or ideas are viable and exciting, but not necessarily in the spotlight. This session benefited the conference by highlighting high quality programs whose innovations could prove important to many of the conference attendees. These were more than inventions, including processes and techniques that can measurably help our oceans, lakes, and rivers become free of marine debris.

Highlight

This session received some great feedback about the breadth of innovations shared during this session. The room was packed. Attendees had a chance to connect with the presenters to ask questions and discuss ideas. A specific take-away was that innovations that can support the work of the diverse groups attending the conference do not have to be something one holds or just scientific, but can be innovations related to messaging or a new way of looking at a regulation.

Oral Presentations

MantaRay II: A second generation autonomous real-time sampling instrument for the quantification of marine microplastic debris | Ethan Edson, USA

What screams at you? An unique education and innovation program to address marine debris. | Rachael Miller, USA

De-Risking Ocean Plastic for Major Consumer Brands | Rob Ianelli, USA

Clean Tax Cuts and the Opportunities to Drive Innovation Across Countries for a Plastic Circular Economy | Doug Woodring, Hong Kong

Biodegradation of plastic bags: A technological alternative for preventing marine debris | Rocio Tijaro-Rojas, Chile

Harnessing the Power of Sport to Tackle the Issue of Ocean Plastic | Michelle Carnevale, USA

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Local To Global Partnerships: Overcoming Debris Barriers Through Collaboration

Monday, March 12 | 3:30 PM - 5:00 PM

Session Chairs: Eben Schwartz, California Coastal Commission | Nicholas Mallos, Ocean Conservancy

Description

The marine debris community is filled with silos in which various forms of work, such as research, education, and advocacy, may ultimately inform one another but generally advance independently. There are various efforts underway to break through those barriers to allow for greater collaboration and cross-cutting work. This session examined these and other efforts designed to increase and promote regional and international partnerships to better coordinate marine debris work, share resources and best practices, avoid duplication of effort (increasingly important in a world of diminishing financial resources), and move the marine debris community forward in a collaborative, informed fashion.



Bringing Value to Marine Debris

Wednesday, March 14 | 1:00 PM - 3:00 PM

Session Chair: Kahi Pacarro, Sustainable Coastlines Hawaii

Description

This session demonstrated multiple ways to take a negative in the form of ocean plastic debris and turn it into a valuable commodity that can help to reduce its own existence through awareness and prevention-related funding. It focused on local solutions that can be implemented at low cost in remote locations, along with large scale projects that bring mass value to the end-product by incorporating ocean plastic into the manufacturing process.

Highlight

This session created inspiration amidst a conference filled with scary and daunting statistics and scientific findings. It provided a silver lining along with tangible paths people can take to address the situation we are in beyond just cleaning it up.

Oral Presentations

Treating marine debris as the resource that it is: Sorting and recycling after cleanups | Doorae Shin, USA

Community Based Waste Management and Up-cycling Enterprises – Watamu, Kenya | Steve Trott, Kenya

Creating Value Through Emotional Connections To Marine Debris | Brittany Webster, USA

Waste to Wonder | Brodie Neill, UK

Sustainable Coastlines Hawaii – Making waves in Hawaii, seeing ripples in your home town. Increasing Awareness Internationally. | Katherine Ziemann, USA (Presented by Shannon McCarthy)

Commodifying Plastic Marine Debris as Art Supplies | Bette Booth, USA

Eco Innovation | Cyrill Gutsch, USA (Presented by Michael Long)

Plastic Waste: A New Resource For The Energy Transition

Thursday, March 15 | 8:30 AM - 10:00 AM

Session Chairs: Frederic Sciacca, Race for Water Foundation | Kim Van Arkel, Race for Water Foundation

Description

Joint action at the global level is urgently needed to address the perils facing our oceans. The plastic waste-to-energy model can help by tackling the issue of plastic pollution on land, and can directly improve the health and life of local communities who are often the first victims of this worldwide issue. The first part of this session focused on the outcomes of the first Race for Water Odyssey realized in 2015: plastic pollution is everywhere; a grand-scale clean-up of the ocean is unrealistic; and land-based solutions are key to an efficient fight against plastic pollution. Plastic waste is the problem as well as the solution. How do you incentivize a local population to collect end-of-life plastics?

This model is appropriate in remote and under-equipped communities to foster plastics waste collection at the earliest possible stage. Simple equipment allowing them to more easily sort, clean, grind, and compress materials would also help to upcycle plastics and improve the local waste management hierarchy. A combination of community sized solutions is key to overcoming the challenges of waste management, which is exemplified in Palau. When communities face specific waste challenges such as derelict fibreglass vessels, complementary approaches including repurposing as an alternative fuel are also helpful.



Highlight

This “Plastic Waste as an Energy Resource” session discussed existing small-scale local solutions using new technologies. The session specifically focused on plastic conversion solutions scaled to the size of a specific community to provide a new resource. Existing solutions highlighted included the transformation of dirty plastic into cement aggregate in Costa Rica and Panama, the utilization of conversion technologies with pyrolysis in Palau, and sustainable solutions for end-of-life fiberglass vessels in Rhodes Island.

These localized solutions aim to provide an effective, incentivized, and sustainable alternative to waste management in locations that are remote or lack traditional waste management infrastructure. Advancing alternative plastic conversion solutions reduces dependence on local land-filling and prevents plastic leaking into the ocean as a supplement to the current worldwide actions that include prevention, reduction, recycling, etc.

Oral Presentations

Plastic waste : a new resource for the energy transition | Serge Pittet, Switzerland (presented by Frederic Sciacca)

Moving up the Value Chain - Bringing Solutions Which are Sized for Communities | Doug Woodring, Hong Kong

Challenges to Plastic Up-Cycling in Small Island Communities: A Palauan Tale | Lark Starkey, USA

Sustainable Disposal for End-of-Life Fiberglass Vessels | Evan Ridley, USA

Global Plastics Alliance Efforts To Address Marine Debris

Thursday, March 15 | 10:30 AM - 12:00 PM

Session Chair: Stewart Harris, American Chemistry Council

Description

Established in 2011 at the 5th International Marine Debris Conference, the Global Plastics Alliance (GPA) has grown to 75 associations in 40 countries. As of the 2018 Progress Report, the GPA implemented 355 projects to address marine debris under the Declaration of the Global Plastics Associations for Solutions on Marine Litter.

Speakers from associations in the Philippines, South Africa, the Middle East, Europe, and the United States discussed ongoing efforts to address marine debris under the six focus areas of the Global Declaration. The session provided information on actions by the plastics industry to address marine debris by raising awareness, supporting research, promoting best policies, spreading knowledge, enhancing recovery, and preventing pellet losses.

Highlight

The session provided an opportunity for representatives from plastics associations, academia, and the consumer goods sector to describe ongoing efforts to address marine debris. The question and answer session was helpful in gaining feedback from conference attendees regarding actions that should be taken by the plastics value chain to address marine debris, as well as respond to specific questions.

Panel

Steve Russell, American Chemistry Council

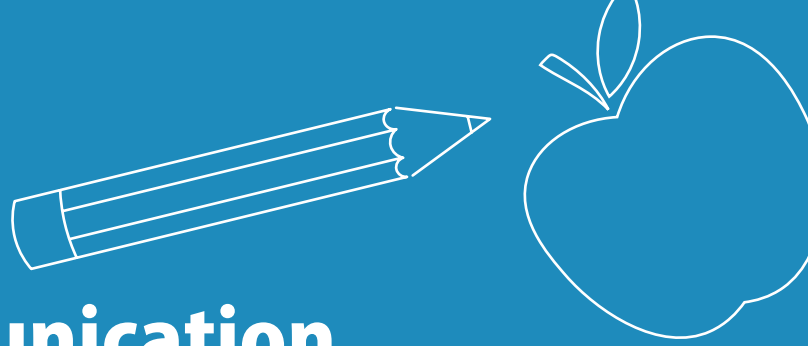
Crispian Lao, Philippine Plastic Industry Association

Douw Steyn, Plastics South Africa

Karl Forester, Plastics Europe, Belgium

Steve Sikra, Procter and Gamble

Alexander Turra, University of São Paulo (USP)



Education & Communication

Introducing A Real-World Interdisciplinary Approach To Marine Debris Education | Parts 1 & 2

Monday, March 12 | 1:30 PM - 3:00 PM, 3:30 PM - 5:00 PM

Session Chairs: Anika Ballent, Algalita Marine Research and Education | Katie Allen, Algalita Marine Research and Education

Description

This session was held to highlight current and budding examples of real-world interdisciplinary approaches to education through the lens of plastic pollution. This issue is an ideal environmental education topic because it is tangible, ubiquitous, and current, and its solution is interdisciplinary which requires a comprehensive approach to teaching. In effectively preparing the next generation to take on the challenges of marine plastic pollution, we as educators must create new teaching methods which allow students to work in real-time on creating systemic solutions. This session was held with the purpose of sharing and discussing progress and next steps in this realm. The intended audience included educators of various types, including public, private, charter, home-school, and informal educators, as well as youth, parents, non-profits as well as government and administration representatives.

Highlight

This session was a shared space for innovative plastic pollution curricula and education programs. Many perspectives were presented but all highlighted the need for hands-on experience, and many suggested community engagement and international connections to share, build, and refine programs. Educators urgently need resources which outside sources like non-profits are well suited to supply. Devising symbiotic collaborations and reducing duplicate efforts have been challenging for these outside groups. At the same time, they often struggle to meet the needs of their region, given their available resources.

Suggestions for improving programs included bridging gaps between schools and universities, training (pre-service) educators to improve efficiency and sustainability, providing feedback through recruitment, social media, new opportunities, and implementing project-based learning and various teaching modalities. We should allow students to take ownership of their learning to improve engagement – we need to listen to their needs and provide opportunities for leadership. Going forward, steps need to be taken across the board to provide educators with guidance on how to implement the resources provided. We'll need an informed and stimulated youth to turn the tide on plastic pollution, and we'll need to teach them imagination, collaboration, experimentation, and grit to make it happen.

Oral Presentations | 1:30 PM - 3:00 PM

Plastic Pollution: The Gateway to Effective Environmental Education | Katie Allen, USA

Preliminary lessons from the Integrated Plastic Pollution Curriculum | Anika Ballent, USA

Monterey Bay Aquarium's Ocean Plastic Pollution Summit | Mary Whaley, USA

Lessons learned from a nationwide Citizen Science Project about Marine Debris in Germany as a tool for educating school classes in science | Tim Kiessling, Germany

Marine Debris STEAMSS Curriculum Engages Students | Cait Goodwin, USA

Washed Ashore's Integrated Arts Marine Debris Curriculum: Combining Art and Science | Patrick Chandler, USA

Oral Presentations | 3:30 PM - 5:00 PM

Heirs To Our Oceans' Empowerment Learning: The Next Generation Taking The Ocean Crisis Into Their Own Hands | April Peebler, USA

The role of an action-oriented MOOC in addressing the worldwide marine litter pollution. | Ansje Löh, Netherlands (presented by Heidi Savelli)



A Cross-Cultural, Interdisciplinary Approach to Marine Debris Education. | Christine Parfitt, Australia

Empowering Communities to Reduce Land-Based Sources of Marine Debris in the U.S. Virgin Islands | Kristin Grimes, US Virgin Islands

Making environmental care an integral part of the school environment; an example from the Balearic Islands | Brad Robertson, Spain (presented by Marijana Gusic)

Education to Inspire Behavioral Change and Activism | Doorae Shin, USA

Equipping The Outreach Toolbox: Experts Share Their Most Successful Activities, Tips And Tricks | Parts 1 & 2

Tuesday, March 13 | 8:30 AM - 10:00 AM, 10:30 AM - 12:00 PM

Session Chair: Allison Schutes, Ocean Conservancy

Description

This session aimed to interest anyone (including educators, researchers, industry professionals, and conservationists in the field) who frequently interacts with the general public, such as students or cleanup volunteers. It focused on different methods to deliver concise, intelligible, and critical information to large groups in challenging settings. In this session, presenters explored examples of outstanding marine debris education programs, materials, and activities that exemplify diverse geographies, scales, and audience levels. Attendees learned from the challenges, trials, and successes their colleagues have faced. With presenters from Thailand, Turkey, Kuwait, and across the US, attendees heard about a vast diversity of activities and tools these leaders use in the field to better educate the public—and corporate sector—about the issue of marine debris. Is there one perfect outreach strategy that works for all sectors of the field and speaks to all audiences? No, but session attendees learned from each other's experiences and can now better employ a patchwork of programs, materials, and activities that can be tailored for specific educational opportunities.

Highlight

This session included a large diversity of presentations in both geography and lessons learned. The session bridged traditional educational programs with experiential ecotourism, and data recording/sharing with a Public Service Announcement competition. The work of the each presenter was unique yet offered the audience key insights on innovative ways to connect with people and have an impact on the issue. Key highlights included: Rozalia Project's eight years of experience working with thousands of people of all ages and hundreds of volunteer educators; As You Sow's approach using shareholder engagement to educate large publicly traded consumer goods companies; Kuwait Dive Team's youth focused Mobile Beach Cleanup Unit that grew out of the group's emergency post-conflict restoration work; and Capitalizing on three days of local marine conservation in Thailand, including: Local World Dolphin Day (14 April), and Local World Oceans Day (8 June), and Ko Kra Archipelago Day (Local Ramsar Site) (12 August).

Oral Presentations | 8:30 AM - 10:00 AM

From New England to England: a Tale of Traveling Disks | Jennifer Kennedy, USA

Communicating for a Clean Future: Creating a Public Service Announcement Competition for Students | Susan Bixler, USA (Presented by Sarah Lowe)

Equipping students to be the change they want to see | Marti Martz, USA

Non-Profit Collaborations: Ecotourism to Create Partnerships to Inspire the Behavior Change Needed for Plastic Pollution Reductions. | Wayne Sentman, USA

Shareholder Engagement on Ocean Plastic Pollution | Conrad MacKerron, USA

Robots, drones & 3D printers: going beyond cleanups for education and inspiration | Rachael Miller, USA



Oral Presentations | 10:30 AM - 12:00 PM

Talking Trash & Taking Action: Interactive Activities to Engage Anyone, Anywhere | Sarah Kollar, USA

The Mobile Beach Cleanup Unit: Bringing the Public to New Depths | Dari Alhuwail, Kuwait (Presented by Rebecca Farnum)

A long-term study and series of awareness raising activities for marine debris reduction: Case study of participatory multi-sector approach from southern Thailand | Phusit Horpet, Thailand

Creating Marine Debris Stewards Among Low Income Youth | Dan Haifley, USA

An effective University – Municipality partnership on K12 training aiming to reduce the marine litter and biodiversity loss of Mersin, Turkey | Ahmet Erkan KIDEYŞ, Turkey

Effective Marine Debris Messaging

Tuesday, March 13 | 1:30 PM - 3:00 PM

Session Chair: Krista Stegemann, National Oceanic and Atmospheric Administration, Marine Debris Program/IMSG

Description

This session was dedicated to effective marine debris messaging strategies, which are important for successful and strategic communication and help achieve the goal of both increasing understanding of the issue and leaving an audience feeling hopeful and empowered to take part in the solution. Marine debris is tangible and generally simple enough for people to understand, but it is still a complex topic to talk about and can easily become overly heavy and depressing, which can lead the audience to feel overwhelmed and powerless. This won't achieve the ultimate goal—prevention of marine debris. To achieve this objective, we must be strategic in our messaging and avoid being too depressing or aggressive in our communication. The ideal messaging strategy may be different in different circumstances. Cultural and demographic variables may alter the most effective approach. This session focused on marine debris messaging strategies and examples of those strategies. The 6IMDC provided a unique opportunity for communicators, educators, and others in the marine debris field to hear from communicators around the world. By better understanding what constitutes effective messaging in different locations, with different groups of people, and in different circumstances, marine debris communicators gained tools to more effectively reach their audiences.

Highlight

This session was heavily attended, likely due to its applicability to those from many different sectors of the marine debris field, and included presentations from five marine debris communication professionals. The topics covered included: tools for reaching a very broad audience, effectively using social media and hashtags in outreach and communication, the differences in perspective and how to reach expert audiences versus those with only a novice level of marine debris background, working with older audiences, and reaching those that live far from coastlines and don't necessarily see the marine debris issue firsthand. Speakers offered tools for effective communication in various circumstances, which led to a lively discussion during the session's last fifteen minutes about the best overall approach to marine debris communication. Both the speakers and those in the audience agreed that there is no ideal "go-to" approach, but that it is good to "mix it up" when possible in order to gain and keep your audience's attention. The group discussed how the best strategy depends heavily on who the audience is that is being addressed, and acknowledged that behavior change science can be helpful when crafting the best strategy for an audience. However, the behavior change field is still relatively new and everyone is still learning.

Oral Presentations

Talking Trashy: How the NOAA Marine Debris Program Approaches Marine Debris Messaging | Krista Stegemann, USA

Improving Marine Debris Hashtag Messaging | Bette Booth, USA

Cultural domains of marine debris among experts and novices | Ava Lasseter, USA

Messages to the Wise: Effective Marine Debris Communication for Older Generations | Lisa Swanger, USA



From mountain to ocean: Educating the future generation, raising awareness among the public | Julia Hager, Germany

#I Care – A behavioural change campaign to raise awareness and empower the public to reduce plastic waste | Sandra Ludescher, Switzerland (presented by Silvia Frey)

The Aquarium Conservation Partnership (ACP) And The Role Of Aquariums In Reducing Plastic Pollution

Tuesday, March 13 | 3:30 PM - 5:00 PM

Session Chairs: Aimee David, Monterey Bay Aquarium and Aquarium Conservation Partnership | Kim McIntyre, Aquarium Conservation Partnership

Description

This session focused on the Aquarium Conservation Partnership (ACP)'s consumer campaign to raise public awareness and increase consumer demand for alternatives to single-use plastic. Additionally, it highlighted what aquariums are doing to promote science-based policies to reduce sources of ocean and freshwater plastic pollution, and how aquariums are working in their own institutions and with business partners to model change in our aquariums and accelerate innovation in the broader marketplace. The ACP is a first of its kind collaboration of aquariums formed to increase their collective impact on ocean and freshwater conservation. Together, member aquariums work to advance science-based conservation goals by leveraging their unique assets, including scientific expertise, visibility with the public, business relationships, and credibility with decision makers.

Highlight

Aquariums enjoy high visibility and support across large, diverse audiences for their "attraction" and "authority" brands. They offer visitors world-class experiences with live animal exhibits, and they are respected among the broader public and decision-makers alike for their science, conservation, and education authority. ACP will continue to use its reach with the public, business leadership, and government influence to promote efforts to reduce single-use plastic, a major contributor to ocean and freshwater plastic pollution.

Last year, ACP launched a collective, consumer-focused campaign called "In Our Hands." ACP also made a joint business commitment to reduce plastic in its own institutions last July that garnered significant media attention in many of its regional markets. This year ACP wants to improve on our collective impact model by launching a new and improved consumer campaign. ACP also wants to continue the progress it made "walking the talk" in its own plastic reduction efforts, and see how it can partner with external businesses to expand its market impact. Policies to ban plastic straws are popping up in cities and states across the country. ACP will help build capacity in aquariums who want to promote these policies in their communities.


Panelists

Aimee David, Monterey Bay Aquarium

Stephanie Mathias, National Aquarium

Nicole Minadeo, Shedd Aquarium

Noah Chesnin, Wildlife Conservation Society's New York Aquarium



Implementing Effective Law, Regulations & Policy

Marine Debris Action Plans: Development, Implementation and Lessons Learned | Parts 1 & 2

Thursday, March 15 | 8:30 AM - 10:00 AM, 10:30 AM - 12:00 PM

Session Chair: Jason Rolfe, National Oceanic and Atmospheric Administration, Marine Debris Program

Description

Marine debris is a chronic and persistent problem around the world and we know that simply removing debris from the environment is not a long-term solution. In many coastal areas, marine debris action plans are a vital step to prevent and reduce marine debris. Action plans represent a compilation of recommended strategies and actions to prevent, research, and remove marine debris in a specific geography. Action plans are the culmination of collaborative efforts of federal and state agencies, tribes, local governments, non-governmental organizations, academia, and industry. The action plan development process brings together the entities working on marine debris to increase coordination and collaboration in executing on-going and future actions, and to help track progress over time. This session focused on the development and implementation of local, state, regional, and national action plans, as well as challenges throughout the process.

Highlight

Building off recommendations from the Honolulu Strategy, numerous action plans have been developed or are currently being developed around the globe. Many larger-scale plans, such as national action plans, are currently being developed with guidance from other regional countries. While not all action plans are structured the same, presentations in this session highlighted that they are successful in identifying goals and strategies to address priority marine debris issues including those that focus on derelict fishing gear and aquaculture debris, wildlife and habitat impacts, abandoned or derelict vessels, emergency response, and consumer debris. Despite all the effort to develop action plans, many challenges remain. These challenges include funding, communication and long-term commitment, as well as continued momentum and engagement through the life of the plan.

Oral Presentations | 8:30 AM - 10:00 AM

Lessons-Learned from the Great Lakes Marine Debris Action Plan | Sarah Lowe, USA

Leveraging the Virginia Marine Debris Reduction Plan to Advance Regional Ocean Planning | Kim Hernandez, Katie Register, Virginia Witmer, USA

Coordinating Action in Hawai'i: Successes and Challenges from the Seven Years of the Hawai'i Marine Debris Action Plan | Mark Manuel, USA

From "Source to Sea": Building governance and management framework for marine litter management in the Northwest Pacific region | Lev Neretin, Japan

Tools and Strategies for Reducing and Managing Marine Debris in MPAs | Gabrielle Johnson, USA

Stocktaking of Regional Action Plans | Karen Raubenheimer, Australia

Oral Presentations | 10:30 AM - 12:00 PM

Creating Marine Debris Action Plans in Oregon and Washington | Nir Barnea, USA

Marine Plastic Debris Management Program in Indonesia | Safri Burhanuddin, Indonesia

The California Ocean Litter Strategy: Addressing Marine Debris from Source to Sea | Holly Wyer, USA

The Implementation of the UN Environment/MAP Regional Plan on Marine Litter Management in the Mediterranean: Status, Work Plan and Further Steps | Christos Ioakeimidis, Greece (presented by Francois Galgani)

Development and Implementation of the Florida Marine Debris Reduction Guidance Plan (FMDRGP) | Jennifer McGee, USA

Emergency Response to Marine Debris: Regional Response Planning | Jessica Conway, USA



Policies, Other Initiatives And Technical Support Of The European Union Against Marine Debris

Thursday, March 15 | 1:30 PM - 3:00 PM

Session Chairs: Francois Galgani, French Research Institute for Exploitation of the Sea (IFREMER) | Georg Hanke, European Commission Joint Research Centre | Stefanie Werner, Federal Environment Agency, Germany | Michel Sponar, EU Commission | Michail Papadoyannakis, EU Commission

Description

The session was dedicated to the policies, other initiatives and technical support of the European Union against Marine Debris. The session described first the different EU legislative instruments and policy initiatives, including the European Strategy for Plastics, to combat marine litter. Then the interface between science and the Marine Strategy Framework Directive was presented. The way forward, the implementation of both monitoring and reduction measures was another part of the session, focusing on the importance of baselines, thresholds and targets, also considering new indicators and various compartments of the marine environment, and providing the technical advice required for their implementation at the European scale.

Highlight

The EU Marine Strategy Framework Directive (MSFD, 2008/56/EC) is a main driver to manage marine litter issue in Europe. It has established a framework, merging actions from policy makers and scientists to monitor the environment in an integrated manner. This will enable better understanding of how the marine environment is changing but also how to evaluate the efficiency of measures. Based on the measurement of relevant indicators, the definition of scientifically based baselines and thresholds and with the support of a dedicated technical group, the policy makers and managers will be able to more efficiently manage marine litter. The whole process will support largely the European Strategy for Plastic, improving reuse, recycling, and curbing marine litter.

Oral Presentations

EU policy framework and contribution in international collaboration to fight marine litter | Michail Papadoyannakis, Belgium (Presented by Michel Sponar)

EU Marine Strategy Framework Directive - interfacing Science & Policy | Georg Hanke, Italy

Marine Litter baselines in Europe | Anna M Addamo, Italy

BLASTIC – plastic waste pathways into Baltic Sea | Eva Blidberg, Sweden

Trends in the Amount and Composition of Litter Ingested by Sea Turtle: The Indict Project | Marco Matiddi, Italy (presented by Cecilia Silvestri)

Seafloor litter in the Mediterranean sea: quantities, distribution and typology in the French marine waters | Olivia G rigny, France

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Conservation and Community: a Binational Approach to Environmental Stewardship in the United States and Mexico

Thursday, March 15 | 3:30 PM - 5:00 PM

Session Chair: Angela Kemsley, WILDCOAST

Description

The southwest United States and northwest Mexico provide a unique opportunity to comparatively study and practice conservation techniques. Southern California and northern Mexico share many of the same species and populations, thereby creating mutual conservation issues between the two regions. Despite these similarities, the cultural, economic, and political systems of these two regions are vastly different, presenting unique challenges when engaging communities in conservation.



In the past, conservation projects, especially in Mexico, have focused on excluding locals, as community members themselves were often seen as part of the problem. This “fortress conservation” method has been shown to fail for, when projects ignore the livelihoods of cultural traditions of a community, members may become resistant to efforts and have even resorted to sabotage and violence. Recognizing the importance of community engagement and building support for conservation projects from the bottom up, recent projects have been working to reconcile conservation and community by including community participation as an integral part of the conservation plan.

This session brought together experts in the field of community-based conservation from projects both in the southwest United States and northwest Mexico including WILD COAST and Pronatura Noroeste.

Highlight

Garbage in the seas is one of the biggest problems worldwide, affecting the biodiversity, the economy, and the health of the population. In Baja California, Pronatura Noroeste developed the initiative Por un mar libre de plásticos (sea free of plastic), aimed at teachers to promote the separation of waste in schools, disuse of plastic bags and disposables in schools, and composting.

The U.S.-Mexico border Pacific Ocean coastline is home to 18,987 protected acres of some of the most ecologically significant coastal and marine ecosystems in the region. Approximately one million waste tires that originate in California are exported to Mexico each year. Through WILD COAST’s waste-tire recover and recycling project, a total of 40,000 waste-tires were prevented from entering the United States and impacting the sensitive riparian and estuarine habitat of the Tijuana River Watershed.

Also in California, the MPA Watch program trains volunteers to collect data on human use of coastal and marine resources. This data is used to inform science, management, and policy decisions. The MPA Watch network model is applicable across a wide range of locations, and the data collected is valuable to anywhere humans are using coastal or marine resources.

Oral Presentations

MPA Watch: monitoring Human Use of Marine Protected Areas | Angela Kemsley, USA

Por un mar libre de plásticos | Lizz Gonzalez Moreno, Mexico

Waste-Tire Recovery and Recycling Project in the California-Baja California Region | Paloma Aguirre, USA

Advancing Policy And Legislation Changes Regarding Microplastics

Friday, March 16 | 8:30 AM - 10:00 AM

Session Chair: Tony Walker, Dalhousie University | Dirk Xanthos, Ecology Action Centre

Description

Plastics are now ubiquitous in the marine environment. While researchers have noted the problem of plastics in the marine environment since the 1970’s, the issue of marine plastic pollution has only recently been identified as an issue of global significance. This session identified current international market-based strategies and policies to reduce plastic bags and microbeads, which were used to develop improved practices and policies, such as: (1) law and waste management strategies; (2) education, outreach and awareness; (3) source identification; and (4) increased monitoring and further research. The session intended to highlight current advocacy efforts for the advancement of microplastic policy and legislation, with the aim of providing direction for individuals to advance such changes in their own regions.

Highlight

Presenters were Karen Raubenheimer - University of Wollongong, Morag Campbell – Government of Scotland, Chelsea Rochman – University of Toronto.



Karen presented many international policy avenues discussing marine debris – G7, G20. The Basel and Stockholm Conventions were used as examples to provide global frameworks to reduce the impact of marine plastic litter. EPR was discussed as another potential tool. For example, Norway has a new EPR policy, working towards circular economy (CE). Morag presented the Marine Litter Strategy (MLS) of Scotland which is working towards a CE and improving how to manage and use plastics. A 5 p charge on plastic bags led to 80% reduction in use. Scotland implemented the first deposit return scheme in UK. MLS is looking to improve monitoring through laboratories. Legislation and policy is coming from steering groups. Citizen science through Marine Conservation Society – collecting marine litter data. Ban on plastic cotton buds in 2019. Hosting marine plastic conference in Spring 2019.

Chelsea showed how scientific data and hard facts can influence effective policy. Due to greater volumes/sources of marine debris, some countries need strategies more urgently. International agreement is needed, with a Foundation established like the Stockholm Convention, Montreal Protocol, and Paris Agreement. Alone, this is not enough. Solutions as such Waste Harmonization, Cities Initiative, to have regions with similar issues work together. International Framework is needed to mitigate the issue together.

Oral Presentations

Progressing legal and policy frameworks towards upstream solutions at a regional and international level to prevent harm environmental and human from plastic products and waste | Karen Raubenheimer, Australia

Scotland: A small country tackling the big problem of marine plastic litter with legislation and creative policies. | Morag Campbell, UK

Policy and legislation for plastic litter should match the scale of the problem and be informed by science | Chelsea Rochman, Canada



Removal

Challenges of community-based removal and disposal from the Bering Sea to the remote Pacific

Thursday, March 15 | 1:30 PM - 3:00 PM

Session Chairs: Victoria O'Connell, Sitka Sound Science Center | Veronica Padula, Tribal Government of St. Paul Island

Description

Community members that are actively working to remove marine debris from rugged remote areas in Alaska and Hawaii shared their experiences in this session, including the unique challenges communities face with removal and costs of shipping to recycling/disposal facilities on mainland Alaska and the Lower 48. The target audience was other groups involved in major marine debris removal efforts, with an attempt to build understanding that not all removal efforts are the same, especially when considering the diverse, remote and challenging environments in Alaska and Hawaii. Additionally, there was an emphasis on the impacts marine debris has on subsistence resources and the continued need for funding and ways to reduce plastic from entering into the environment in the first place. Finally, presenters emphasized the importance of education and outreach in bringing community members together to tackle this issue.

Highlight

One of the major highlights in this session was the sense of community built around the shared experience of marine debris removal in remote and challenging environments, and a deeper understanding that, while marine debris removal will always have its challenges, these challenges are unique across communities. It also brought more awareness to the issue in Alaska, which is heavily impacted by marine debris but does not always receive a great deal of attention. Additionally, while connections between Alaska and Hawaii are relatively strong, this session helped deepen the connection between these communities, with the potential for cross-cultural connections and travel between the states for cleanup and outreach efforts.

Oral Presentations

Marine Debris Removal on St. Paul Island, Alaska | Pamela Lestenkof, USA (presented by Paul Melovidov)

Marine Debris Removals in St George Island, Pribilof Islands, Alaska by the St George Traditional Council | Sally Mercurief, USA

Three Decades of Debris Data: What regular cleanup activities reveal about marine debris recovery efforts in Hawai'i | Megan Lamson, USA

Native Community Marine Debris Removal in the Bering Sea Critical Habitat | Scott Anderson, USA

Achieving Remote Area Cleanup Efficiency: Safety, Cost and Tonnage | Chris Pallister, USA

Southeast Alaska Marine Debris Removal - A Walk on the Beach - Not! | Kristina Tirman, USA (Presented by Callie Simmons)

It's Not Just Rubber Ducks: Container Ship Spill Prevention, Regulation, Mitigation, Environmental Impact, and Liability

Thursday, March 15 | 3:30 PM - 4:15 PM

Session Chair: Chris Pallister, Gulf of Alaska Keeper

Description

At any given moment, millions of shipping containers are crossing our seas. Each year, thousands of containers are lost overboard, and very few are ever recovered. This session showcased coastal resource managers, the general marine-debris response community, the container shipping industry, shipping insurers, and regulatory agencies to discuss



container ship regulation, container spill prevention, spill mitigation, response to environmental impacts, and liability issues. The first presenter in this session discussed the lack of recovery from shippers for environmental damages caused by shipping container spills, and the second presenter discussed the need to develop a regulatory framework to address the marine debris.

Highlight

Questions from a small but interested and engaged audience indicate that there is considerable interest in the marine debris community to recover marine-debris-related environmental damages caused by shipping spills and to use the legal system to do so.

Oral Presentations

Shipping Container Spills in the Gulf of Alaska: Environmental Impacts and Liability Issues | Chris Pallister, USA

Flotsam and Jetsam: Evolving a Modern Regulatory Framework for an Acutely Modern Marine Debris Problem | Selina Lee-Andersen, Canada

Prevention And Removal Of Abandoned And Derelict Vessels: Case Studies And Lessons Learned

Thursday, March 15 | 4:15 PM - 5:00 PM

Session Chair: Nir Barnea, National Oceanic and Atmospheric Administration, Marine Debris Program

Description

The session focused on sharing experience and lessons learned concerning Abandoned and Derelict Vessels (ADV) prevention and removal. The session was open to anyone interested in learning about ADV removal in the US. ADVs obstruct navigational channels, damage ecosystems, and diminish the recreational value of the surrounding area. Over the years, programs were developed in the US and worldwide to prevent and remove ADVs, and the presentations highlighted how innovative and collaborative efforts can remove ADVs quickly and effectively.

Three presenters shared their ADV removal experience. The first presentation described removal of ADVs in Florida after hurricane Irma, and how the National Response Framework, bringing together multiple agencies and other stakeholders, was used to remove over 2,679 vessels, mostly from the Florida Keys. Then second presentation highlighted California's response to ADVs, especially in the Sacramento River delta, and covered recent additions to the program, including a state-wide tracking mechanism, insurance requirements, and additional funding. The third presentation offered EPA's perspective on ADV removal, especially in California. Challenges such as tracking ownership, hazardous materials on board the ADV, and difficult removal environment were discussed. There was time for Q&A and the audience asked good questions.

Highlight

The main takeaway from the session is that ADV removal can be expensive, complicated, and difficult. More can be done to provide the state and other entities meaningful tools to prevent ADVs from occurring in the first place, and if vessels do sink, have adequate funding and legal authority to remove them. While a force of nature, such as a hurricane, could cause a massive amount of vessels to be lost and sink, all coastal states in the US experience an ADV problem that is for the most part preventable, given a proper legal framework and successful prevention program. There was wide agreement that a successful prevention program could be useful for reducing ADVs.

Oral Presentations

Coordinated Response to Remove Derelict Vessels in Florida Post Hurricane Irma | Charles Grisafi, USA

Improving California's Prevention and Response Strategies for Abandoned and Derelict Vessels – a study of the Sacramento-San Joaquin Delta | Andrea Daly, USA

Collaborative approaches to removing Abandoned Derelict Vessels: Case studies on US EPA cleanup work with partnering agencies | Harry Allen, USA



State and Local Best Practices, Insights, and Innovations to the International Coastal Cleanup Day

Friday, March 16 | 8:30 AM - 10:00 AM

Session Chairs: Moriah Saldana, I Love A Clean San Diego | Eben Schwartz, California Coastal Commission

Description

I Love A Clean San Diego (ILACSD), the California Coastal Commission (CCC), and other partners joined together on a panel to discuss International Coastal Cleanup Day (CCD) coordination from their unique perspectives. They discussed all levels of event coordination, including data collection and its impact on the community, best practices, and innovative strategies for the event.

Highlight

The data and volunteerism from CCD has been instrumental in changing mindsets on the causes and impacts of marine debris. Practitioners shared their experiences coordinating CCD on a wide scale, including novel programming that makes their local coordination unique. Audience members and panelists learned from each other how to incorporate art, social media, IT, and youth into their own event coordination.

Oral Presentations

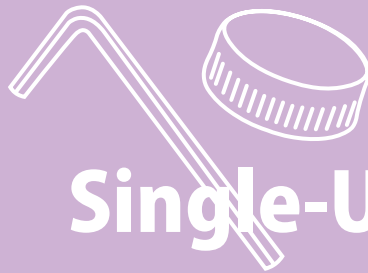
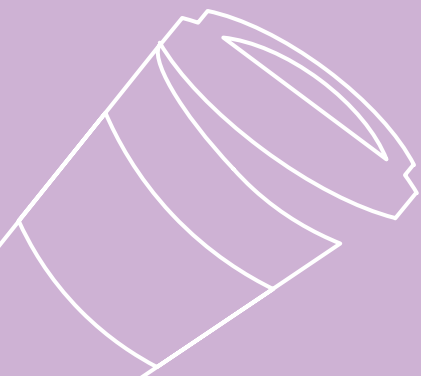
California Coastal Cleanup Day – a Gateway to a Lifetime of Coastal Stewardship | Eben Schwartz, USA

Oregon’s “Train the Trainer” Model and Best Practices during the International Coastal Cleanup | Joy Hawkins, USA
(Presented by Monica Gunderson)

Coastal Cleanup Day – A Local Perspective on Coordination and Innovation | Moriah Saldana, USA

Every Day is International Coastal Cleanup Day in Miami! | Dara Schoenwald, USA

State and Local Best Practices, Insights, and Innovations to the International Coastal Cleanup Day | Marianne Butler, USA



Single-Use Product Policies, Regulations & Laws

Save the Albatross!

Wednesday, March 14 | 1:00 PM - 2:00 PM

Session Chairs: Ruth Abbe, Zero Waste USA | Richard Anthony, Save the Albatross

Description

This session focused on the connection of bottle caps and single-use product legislation and its effects on far-ranging populations from humans to seabirds. Just as the canary in the coal mine forewarns of danger, the Laysan or Pacific Albatross provides a way to measure the impact of plastics in the ocean. Known as the sailor's companion, this once ubiquitous bird is threatened to extinction because of the unintended consequences of our discards that look like food but are not. There is need to bring the producers of these products and packages to the world table to draft Zero Waste responsibility plans for proper management of discarded plastic via re-design for recyclability, buy-back purchasing opportunities (closed circle), and recovery campaigns for vagrant plastics on land and sea.

Highlight

The session emphasized that producers must redesign products and take responsibility for their actions. The audience learned concrete strategies for making positive change to reduce marine debris (such as bottle caps) through outreach, education, and public policy initiatives. The panel featured speakers from the Save the Albatross, UPSTREAM, Zero Waste USA, Algalita Education Foundation, and Save the Albatross Coalition. The session also spoke to the cultural change needed to reverse this trend to focus the public's attention on the unintended consequences of single use non-recyclable plastic packages, containers, and products.

Panelists

Richard Anthony, Save the Albatross

Miriam Gordon, UPSTREAM

Ruth Abbe, Zero Waste USA

Katie Allen, Algalita

Lori Mendez, Save The Albatross Coalition

Preemption Of Local Plastic Pollution Ordinances At The State Level Threatens Effective Marine Debris Regulation

Wednesday, March 13 | 2:00 PM - 3:00 PM

Session Chair: Jennie Romer, Esq, PlasticBagLaws.org

Description

Preemption of local plastic pollution control ordinances is an increasingly concerning effort that is playing out at the state level of government in the U.S. as a way to quash local environmental efforts. These preemption laws generally prohibit municipalities from adopting local ordinances regulating a particular product, namely bans or fees on carryout plastic bags. More and more commonly, these laws apply more broadly by banning all local ordinances regulating "ancillary containers" (bags, expanded polystyrene foam food containers, etc.). Preemption laws infringe upon municipalities' right to regulate traditionally "local" fields such as the protection of health and safety, including the power to regulate waste, as well as usurping Home Rule.



To combat preemption, ocean advocates should oppose statewide legislation that takes away the right of municipalities to improve their environment and continue to push for strong statewide legislation, like the recent passage of the California statewide bag ban. Ocean advocates also need to make sure that strongest possible local laws continue to be adopted and that we diligently track the efficacy of local bag bans and fees and demonstrate how these policies effectively change consumer behavior and reduce the amount of single-use plastic pollution in local parks, streets, beaches, and waterways.

Highlight

The panelists were all from the U.S. but we opened the floor to ask about similar experiences in other countries and the audience members shared insights from Canada and the European Union. Many of the audience members were knowledgeable about plastic bag and EPS law but not about preemption, so we received good feedback that audience members came away from the session more aware of the issue and what to look out for.

Panelists

Jennie Romer, PlasticBagLaws.org

Christopher Chin, Center for Ocean Awareness

Angela Howe, Surfrider Foundation

Matthew Anderson, City of Coral Gables

Local, State And Federal Ocean Litter Laws From Around The Nation

Thursday, March 15 | 8:30 AM - 10:00 AM

Session Chairs: Angela T. Howe, Surfrider Foundation | Melissa Gates, Surfrider Foundation

Description

This session was meant to educate the audience on successful local, state and federal laws aimed at preventing plastic pollution of the ocean. Sometimes these efforts are similar, but in other instances there are important variations in laws that address the same problem. The panel allowed advocacy experts to explain how a local, state or federal law was passed, including the drafting of the law, the process to have the law pass through the legislature, and any outcomes or results of the law after implementation.

Highlight

The Local, State and Federal Litter Laws panel offered a great sampling of ocean pollution reduction ordinances from every corner of the United States. From the federal microbead ban passed in the U.S. Congress to the local Maui County (Hawaii) polystyrene foam ordinance, the panel offered insightful reviews of successful advocacy efforts and proven efficacy of plastic pollution abatement laws. The panelists covered the Northeast region, Oregon, and Hawaii history of marine plastic pollution regulation in depth with a broad picture of what other U.S. states and regions are accomplishing, as well.

Panelists

Angela T. Howe, Surfrider Foundation

Melissa Gates, Surfrider Foundation

Charlie Plybon, Surfrider Foundation

Lauren Blickley, Swell Consulting



Global Single-Use Product Case Studies

Thursday, March 15 | 10:30 AM - 12:00 PM

Session Chair: Erica Nuñez, National Oceanic and Atmospheric Administration, Office of International Affairs

Description

The Global Single-Use Case Studies session explored ways in which the international community has taken action to reduce plastic pollution within our oceans. The session included four dynamic presentations representing various parts of the globe discussing strategies and solutions to the single-use plastic pollution issue. The first speaker, Dirk Xanthos, took a broad approach and examined international policies and legislative tools aimed to reduce plastic pollution, specifically single-use plastics and microbeads globally. The second presentation by Galia Pasternak discussed how a three-year study conducted on various local beaches within Israel led to legislation that since its effective date, has significantly reduced the amount of plastic found on the coast in some areas. Martina De Marcos focused specifically on the Wider Caribbean Region and analyzed approaches for the successful enforcement of plastic bag bans that could potentially be duplicated in other Small Island Developing States. The final presentation by Hsin-Chen Sung gave an in-depth analysis of Taiwan's PET bottle recycling program and the innovative ways the country has addressed the plastic pollution problem.

Highlight

This session was successful in showing the various actions taken by countries across the globe to address marine plastic pollution. The presentations showed that countries are increasingly taking concrete steps by instituting plastic bag bans or incentives to reduce the use of single use plastic bags. The session presentations also discussed how the implementation of single-use plastic bag bans have resulted in a reduction of plastic bag debris found on the coastal and marine areas studied. One of the highlights of the session was a presentation showing innovative ways in which one country's recycling program includes a method of processing recycled plastic to produce various consumer products such as box packaging, water bottles, garments, even a women's purse. This session provided attendees varying solutions that could be undertaken to reduce the introduction of single use plastic bags into the environment.

Oral Presentations

International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review | Dirk Xanthos, Canada

Single-use debris on the Israeli coast | Galia Pasternak, Israel

Plastic Bag-ban Legislation in the Caribbean | Martina De Marcos, Australia

Taiwan's PET Bottle Recycling System and Application | Hsin-Chen Sung, Taiwan

The Anatomy Of A Plastic Bag Ban Campaign

Thursday, March 15 | 1:30 PM - 3:00 PM

Session Chairs: Sarah Abramson Sikich, Heal the Bay | Jennie Romer, Esq, PlasticBagLaws.org

Description

Using California and Hawaii as case studies, experts from a variety of disciplines discussed how each state approached advancing its respective single-use bag policies. Panelists discussed opportunities, challenges, policy evolution, and pivot points that led to eventual passage of plastic bag bans in Hawaii and California. Panelists provided critical commentary and insights on the roles that various stakeholders – educational, business, government, legal, and environmental non-profit – play in environmental campaigns. The dialogue engaged with the audience to discuss strategy and work through opportunities and challenges that areas outside of California and Hawaii may face in advancing source reduction strategies for marine debris.



Highlight

Session panelists discussed opportunities, challenges, and approach for successful plastic bag ban campaigns. There was robust discussion among the panelists and audience members about policy structure and how to avoid unintended consequences and loopholes (e.g. causing a transition to thick plastic bags, exemption of certain stores based on size or products sold, preemption of local action by overriding state policy, and other issues). Panelists offered several recommendations for success, including educating and engaging local communities; proactively engaging the business community; engaging media; promoting stamina for policy that take a long time to pass; using clean-up data and other scientific reports to support policy-making; and ensuring the monitoring, enforcement, and reporting criteria are strong. Audience members had a lot of questions for the panelists, so it appears that there was a strong appetite for lessons learned for communities that have not yet banned plastic bags or that are considering improving their plastic bag laws and policies.

Panelists

Jennie Romer, Esq, PlasticBagLaws.org

Dean Otsuki, B.E.A.C.H.

Suzanne Frazer, B.E.A.C.H.

Rita Kampalath, Los Angeles County

Elissa Foster, Patagonia

Sarah Sikich, Heal the Bay

Bags, bottles, and beads: the way forward on product and corporate campaigns

Thursday, March 15 | 3:30 PM - 5:00 PM

Session Chairs: Anna Cummins, 5 Gyres Institute | Dune Ives, The Lonely Whale Foundation

Description

NGOS, policymakers, and advocates have worked together over the last few decades on product-specific source reduction through both regulatory and corporate facing campaigns to address particularly problematic items – plastic bags, microbeads, and polystyrene to name a few. Several of these product campaigns have resulted in legislative outcomes – the California and Hawaii statewide bans on plastic bags, the Federal ban on microbeads, as well as numerous municipal policies directed at sources reduction around the country. But non-legislative campaigns have also lead to successful initiatives – such as Ikea’s and McDonald’s phasing out of polystyrene, and restaurants around the country switching to paper straws and recyclable/compostable packaging. What can we learn about these successes, failures, challenges, and outcomes going forward to better inform plastic waste reduction campaigns? This panel featured experts from both the legislative/policy perspective, and the corporate engagement sector, to share case studies, best practices, strategy, and engage the audience in a discussion around collaborative future approaches.

Highlight

Given the scope and severity of the plastic waste crisis, partial solutions that fail to hold industry responsible for their role in producing products without an end life plan fall short. Cities need to rapidly move towards zero waste systems that prevent waste, instead of merely attempting to manage it. A critical first step is shifting the narrative - all too often industries responsible for producing plastic waste blame countries in the Global South for the resulting pollution, while increasing their production every year of products with no recovery plan. Instead we must look at the entire supply chain of plastics – from extraction to disposal, and hold accountable the industries that contribute to a linear economy. Adding brand identification to global beach cleanups/surveys can help generate reliable data to determine which industries and corporations are contributing most to our global waste problem, and can thereby provide more industry leadership in shifting towards a circular economy.



Panelists

Dune Ives, The Lonely Whale Foundation

Anna Cummins, 5 Gyres Institute

Nicky Davies, Plastic Solutions Fund

Monica Wilson, GAIA

Kate Melges, Greenpeace USA



Derelict Fishing Gear

Building Evidence Around Ghost Gear: Global Trends And Analysis For Sustainable Solutions At Scale

Wednesday, March 14 | 10:30 AM - 12:00 PM

Session Chairs: Kelsey Richardson, University of Tasmania, Australia and Commonwealth Scientific and Industrial Research Organization (CSIRO) | Elizabeth Hogan, World Animal Protection

Description

This session focused on the data and information available (and not available) surrounding abandoned, lost or otherwise discarded fishing gear (ALDFG). The session summarized the work by the Global Ghost Gear Initiative's (GGGI) Build Evidence Working Group to compile a diverse data collection related to ALDFG and ghost gear from a variety of stakeholders around the world, presenting efforts at local, regional, and global levels. The session also demonstrated ongoing efforts to make this information known and accessible to anyone interested in and engaged with the ALDFG or ghost gear issues via currently available and future data.

Highlight

A major highlight of this session was sharing the availability of data tools, including the newly launched globalghostgearportal.net. The session also served as a platform to develop data partner relationships and collaborative projects on or involving DFG data points. Another highlight was the establishment of baseline data across different fora, including the United Nations SDG 14.1. One outcome that revealed a significant challenge across data collection was the lack of consistent units of measurement when reporting DFG.

Oral Presentations

Harnessing the power of citizen science to build evidence for sustainable solutions: Dive Against Debris®, a case study | Hannah Pragnell-Raasch, Australia

Documenting Species Impacts From Entanglement in Derelict Fishing Nets in the U.S. Salish Sea | Joan Drinkwin, USA

Using and improving data relating to lost fishing gear. | Gideon Jones, Canada

How building evidence on ghost gear drives advocacy efforts to implement the sustainable development agenda and catalyses sustainable solutions at scale. | Ingrid Giskes, Australia

Building evidence for the health impacts of lost, abandoned and discarded fishing gear on marine wildlife | Kirsten Gilardi, USA

Don't assume it is all trash: accurate gear type characterization is critical for entanglement mitigation | Regina Asmutis-Silvia, USA (Presented by Laura Ludwig)

Papahānaumokuākea Marine National Monument (Northwestern Hawaiian Islands) Derelict Fishing Gear Removal Project | Kevin O'Brien, USA



Fighting The Ghosts In Our Oceans: Implementing Best Practice To Eliminate ALDFG Through Policy, Practice, Education And Outreach

Wednesday, March 14 | 1:00 PM - 3:00 PM

Session Chairs: Joanna Toole, Food and Agriculture Organization of the United Nations (FAO) | Lynn Kavanagh, World Animal Protection | Jason Morgan, Northwest Straits Foundation

Description

This session showcased efforts being made to eliminate the threat of Abandoned, Lost or Discarded Fishing Gear (ALDFG) from the world's oceans through the development of best practice guidelines, and education and outreach initiatives with fishing communities and other stakeholders.

The Global Ghost Gear Initiative's (GGGI) Best Practice Framework for the Management of Fishing Gear (BPF) was presented to demonstrate how the cause and impact of ALDFG can be reduced with actions and interventions across the seafood supply chain. The development of International Guidelines on the Marking of Fishing Gear by the Food and Agriculture Organization of the United Nations (FAO) was presented as an example of best practice. This work includes examples of pilot projects demonstrating the implementation of these guidelines.

Other presentations featured projects showing the implementation of various best practices through research, outreach, education and derelict gear recovery programs. NGOs and governmental organizations working directly with fishing communities shared learnings about research into attitudes and motivation for creating behavioral and policy change related to better management of fishing gear. Fisher education and engagement projects gave insights into the causes of gear loss in various fisheries and the motivating factors that encourage fishers to implement better management practices to reduce gear loss and report lost gear.

Highlight

The session provided attendees with an internationally diverse range of examples which highlighted great work being done around the world to address the issue of ghost gear. The session also highlighted the diversity of this work, the challenges and the varying approaches that are being used to engage stakeholders. Some of the presentations provided information on work being done directly with the fishing industry to support them in solving and managing the problem of ALDFG, it highlighted that despite this being a global issue which has some universally applicable principles, demonstrated by the GGGI Best Practice Framework and the work of FAO, local level approaches and stakeholder engagement are required to effectively implement and tailor solutions to address local challenges.

Oral Presentations

Showcasing best practice guidelines and solutions to the problem of abandoned, lost and otherwise discarded fishing gear | Lynn Kavanagh, Canada

The development of best practice measures to reduce ALDFG and its impacts at Intergovernmental level - an update on progress from the Food and Agriculture Organisation of the United Nations | Joanna Toole, Italy

Leave No Traps Behind | Sean Hastings, USA

Preventing loss and dumping of fishing gear in the Arctic | Kjersti Eline Busch, Norway

Mechanisms for fishing gear resource management | Dina Margrethe Aspen, Norway

Working with User Groups to Develop Outreach Campaigns to Prevent Impacts of Lost and Abandoned Fishing Gear | Jason Morgan, USA

Fishermen's perception on the cause, motivation, and mitigation measures of derelict fishing gears in South Korea | Sunwook Hong, South Korea

Managing derelict fishing gear in marine aquaculture in Taiwan | Po-Hsiu Kuo, Taiwan

Working with Welsh fishermen to reduce impacts of derelict fishing gear | Christina Dixon, UK



Using Acoustic Data To Locate, Identify, Assess And/Or Recover Derelict Fishing Gear In Myriad Habitats

Thursday, March 15 | 8:30 AM - 10:00 AM

Session Chairs: Mark Borrelli, University of Massachusetts | Laura Ludwig, Center for Coastal Studies

Description

The recovery of derelict, lost, abandoned, or discarded fishing gear in marine and freshwater environments has become an important tool worldwide for reducing the amount of debris in our waterways and thus mitigating impacts to habitat and living resources. This session convened investigators and project teams that incorporated sidescan sonar and other acoustic techniques to aid in the detection, removal and/or study of ALDFG in coastal environments, with an exploration of the different results found in shallow nearshore waters, at great depth, and on differing substrate types. Presentations explored image, signal and data interpretation, efficiency of various methodologies used across a wide range of habitats, ground truthing efforts, cost-benefit relationships, and lessons learned. Audience members included international project managers, project participants, equipment technicians and others.

Highlight

We felt that the session effectively represented a wide range of operator experience, a key consideration when using acoustic technology in any application. The consensus was that using side scan sonar as a tool in gear identification and recovery projects can aid in efficient removal; but that it is critical to understand the equipment's operating requirements and have a high confidence level in image interpretation for best results. A variety of equipment and techniques were presented, and session participants benefited from learning about applications that may be of use in their future gear recovery or assessment projects. Comparing experiences with like equipment was also a useful part of the discussion, particularly given the uneven scale of expertise in using sophisticated sonar equipment. A primary take home message was the importance of working with equipment operators whose image interpretation skills and field experience are on par with the equipment's capabilities, so as to maximize the cost-benefit relationship. Additionally, mapping the seafloor using bathymetry equipment while conducting sonar surveys was highlighted as a great benefit for the resulting data.

Oral Presentations

Don't Have a Pot to Ping in: The Efficacy of Using Sidescan Sonar to Detect, Locate and Identify Derelict Fishing Gear. | Mark Borrelli, USA

Derelict crab trap removal and prevention in southern New Jersey coastal bays: big implications for smaller scale systems | Mark Sullivan, USA

Use of Sidescan Sonar Imaging for Planning and Implementing Effective Derelict Fishing Gear Recovery Operations in Washington, British Columbia, and Alaska | Kyle Antonelis, USA

Using Side Scan Sonar to locate derelict fishing gear to mitigate the effects of ghost fishing in the Upper Gulf of California. | Ryan Solymar, USA



How Circular Economy And Cross-Sectoral Collaborations Can Unlock Solutions For Eliminating Ghost Fishing Gear

Thursday, March 15 | 10:30 AM - 12:00 PM

Session Chairs: Christina Dixon, World Animal Protection and Global Ghost Gear Initiative | Joan Drinkwin, Natural Resource Consultants

Description

This session was intended to showcase the application of circular economic business models to recycling and upcycling of end of life fishing nets and fishing gear recovered from beaches and oceans. The session was intended to build awareness that this type of marine debris can be viewed as a resource that can be used beneficially through innovative recycling, manufacturing and product design approaches. The session was designed to focus on international examples for coastal communities and fishing industry stakeholders of how innovative ideas and cross-sectoral collaborations are creating financial and environmental benefits while facilitating the reduction of abandoned, lost, and discarded fishing gear.

Highlight

This session featured speakers from around the world highlighting the challenges and opportunities for using circular economic principles in the recycling and upcycling of end of life fishing nets and fishing gear recovered from beaches and oceans. Claire Potter (Claire Potter Design) introduced the concepts and terminology of circular economy. Christina Dixon (World Animal Protection) presented on her experiences coordinating and supporting different projects collecting and recycling end of life fishing gear, showing examples of successful recycling projects. Heidi Nilsen (Northern Research Institute) explained the current situation in fishing areas of the Arctic, identifying possible future solutions to lost fishing gear there. Falk Schneider (University of Bath) explained his research of novel material recycling pathways for recovered fishing gear. Jacob Arney (Claire Potter Design) showcased a unique project in Brighton UK that is engaging the community in visioning new uses and flash manufacturing methods to turn lost fishing gear into 'precious plastics.' Finally, Dan Webster (Planet Love Life) explained how he teams with ocean-focused organizations, creating products from recovered fishing gear, to raise awareness of the problem, at the same time building a sustainable business.

Oral Presentations

Challenges and opportunities for collecting and recycling fishing gear | Christina Dixon, UK

Design-led circular economy solutions to marine plastic and ghost gear | Claire Potter, UK

Insights from the Fishing Industry for a sustainable circular economy: Understanding the current situation in fishing areas of the Arctic and identifying ways to go forward. | Heidi R. Nilsen, Norway

A novel material recycling pathway for ghost fishing gear – lessons from Germany | Falk Schneider, Germany

Investigating how Ghost Gear and Marine Plastics can become Precious Plastics | Jacob Arney, UK

Creating Connections between non-profit cleanup organizations, small business, & General public | Brittany Webster, USA

Innovative Advancements In Limiting The Impacts Of Derelict Fishing Gear

Thursday, March 15 | 1:30 PM - 3:00 PM

Session Chair: Carlie Herring, National Oceanic and Atmospheric Administration, Marine Debris Program/IMSG

Description

Lost or discarded fishing gear that is no longer under a fisherman's control becomes derelict fishing gear (DFG), and it can continue to trap and kill marine organisms and seabirds. Common types of DFG that ghost fish are gill nets and



crab pots/traps. Ghost fishing can impose a variety of harmful impacts, including: the ability to kill target and non-target organisms; causing damage to underwater habitats and benthic fauna; and contributing to marine pollution.

Derelict fishing gear can continue to confine and entangle target and bycatch species with implications for the overall status of these populations. DFG resting on or becoming entangled with habitat-forming species leads to physical abrasion and breakage. Although the contribution of abandoned, lost, or otherwise discarded fishing gear (ALDFG) to marine debris has long been recognized worldwide, quantitative data are sparse for many regions.

This session focused on causes of gear loss, gear modifications to prevent loss, technologies and lessons learned in finding lost gear, and findings from research and modeling exercises to prevent future gear loss in order to reduce target species mortality and habitat impacts. Speakers in this session highlighted actionable guidance and best management practices that could be implemented more broadly through pilot studies or regulatory changes.

Highlight

This session provided a nice balance of innovative advancements in gear technology to prevent gear loss, recovery of lost gear, and research that analyzed the root cause of why gear is lost. One presentation discussed a new technology that notifies the fishermen if their gear starts drifting away through the use of 'smart buoys'. Technologies and lessons learned were discussed in a separate presentation on how to best recover derelict crab pots including, cost/performance analyses between different brands of side scan sonar. One presentation highlighted the benefits of crab pot removal programs and how such programs are viable options in natural resource damage assessment restoration projects. Another presentation highlighted the challenges of trying to bring value to used/old gear through recycling and reuse of ALDFG.

Oral Presentations

Using ecosystem services to evaluate environmental impacts from ALDFG | Dina Margrethe Aspen, Norway

Derelict Gillnets in the Salish Sea: Causes of Gillnet Loss, Extent of Accumulation and Development of a Predictive Transboundary Model | Kyle Antonelis, USA

Understanding causes of gear loss provides a sound basis for fisheries management | Kelsey Richardson, Australia

Grappling the Invisible: A Derelict Crab Pot Removal Pilot Study in the Delaware Bay- Lessons Learned | Nicole Rodi, USA

Using Smart Buoys to Detect and Locate Lost Gear | Kortney Opshaug, USA

Estimating the Ecological Benefits of Techniques that Reduce Ghost Fishing | Courtney Arthur, USA

The Role Of Local Ecological Knowledge To Solve Derelict Fishing Gear And Other Marine Debris Problems

Thursday, March 15 | 3:30 PM - 5:00 PM

Session Chair: Dan Tonnes, National Oceanic and Atmospheric Administration, National Marine Fisheries Service
Kyle Antonelis, Natural Resource Consultants, Inc.

Description

This session detailed research, documentation, prevention and removal of various types of marine debris and lost fishing gear through aid of Local Ecological Knowledge (LEK). LEK is a methodology in the field of ethnoecology that is accepted and used by many natural resources agencies and researchers. By highlighting work conducted in the Great Lakes region and Puget Sound in North America, and Norway, this session illustrated how LEK can result in better understanding of local fishing businesses, social dynamics of fishing, and fishing communities' knowledge of the factors that may contribute to the loss of gear. The presenters illustrated the methods used to determine the spatial and temporal extent of lost fishing in any given location is a major step in identifying solutions for reducing derelict fishing gear presence, measuring its effect upon the environment, and reducing the associated ecologic and economic impacts.



Highlight

The session showed how LEK can supplement records reflecting information about lost fishing gear when empirical data records are rare, even under some of the most sophisticated fishery management regimes. Therefore, LEK is often the only source for initial investigations aimed at understanding the location, quantity, density, and extent of lost fishing gear in a particular region. The presenters showed how LEK has been a major contributor to determining gear loss rates within specific fisheries, identifying lost gear high-concentration areas or “hot spots”, and understanding reasons for gear loss and how to avoid additional gear loss. Several questions were asked by the audience and we sincerely hope that information shared during this session will assist researchers in the development of programs aimed to solve derelict fishing gear and other marine debris issues.

Oral Presentations

The Role of LEK in the Development and Progress of the Derelict Fishing Gear Program in U.S. Waters of the Salish Sea | Dan Tonnes, USA

Using Fishermen Survey to Realize the Behavior of Typical Fishing Gears upon Deployment and Potential Estimates of Gears Lost Annually in Norway. | Paritosh Chakor Deshpande, Norway

Metrics for Evaluating the Local Ecosystem Service Impacts from Derelict Fishing Gear | Amanda Laverty, USA

Crowdsourcing ghost net location in Lake Superior | Titus Seilheimer, USA

Preliminary Results from Material Flow Analysis (MFA) of Five Types of Fishing Gears Used in Norway | Paritosh Chakor Deshpande, Norway

Achieving Regular And Systematic Removal Of Newly Lost Fishing Gear Through Collaborative Fisheries Management

Friday, March 16 | 8:30 AM - 10:00 AM

Session Chair: Joan Drinkwin, Natural Resources Consultants

Description

This session highlighted five programs in North America that take systematic approaches to regularly remove lost fishing gear from marine waters. The session was designed to showcase models of programs used by regulatory and resource management agencies and fisheries associations to effectively minimize negative impacts of lost fishing gear by removing it on a regular basis. The best managed fisheries still experience inevitable fishing gear loss, from weather, mechanical failure, etc. This session showcased that the best approach to this inevitable loss is to recognize it and take action to remove lost gear on a regular basis.

Highlight

This session was organized as a panel discussion. Speakers shared their programs, answering key questions related to fishery characteristics, rate of gear loss, program partners, amount of gear removed, and cost and funding sustainability. Kyle Antonelis (Natural Resources Consultants) explained the program in the Washington coastal crab fishery, where fishermen receive permits at the end of the season to remove any pots they can find that are left in the grounds. Zachary Thomas (Texas Parks and Wildlife) showcased Texas’ longstanding program to engage volunteer boaters in the removal of lost crab pots during an annual closure period. Amanda Barney (Ecotrust Canada) presented on a program in British Columbia where the industry association pays for lost crab pot removal operations in conjunction with a soft shell crab survey chartered every year. Jason Morgan (Northwest Straits Foundation) described a program in Puget Sound that mobilizes on-call dive removal teams to remove newly lost nets reported through a reporting system. Kirsten Gilardi (California Lost Fishing Gear Program, UC Davis) presented on efforts in California of commercial crab fisheries that have organized to remove lost crab pots at the end of the season and developed a cost-retrieval scheme that makes the retrieval work self-sustainable.



Oral Presentations

A Permitted Crab Fishing Gear Recovery Program; Fisherman Working To Remove Marine Debris | Dan L. Ayres, USA
(Presented by Kyle Antonelis)

The Texas Abandoned Crab Trap Removal Program | Zachary Thomas, USA

Derelict Crab Trap Removal from BC's North Coast - building on the steps of the commercial industry's long standing practices | Amanda Barney, Canada

Newly Lost Net Reporting, Response, and Retrieval Program for Washington State's Salish Sea, USA | Jason Morgan, USA

Fishermen-informed and led lost, abandoned and discarded fishing gear location and retrieval in California | Kirsten Gilardi, USA



Innovative Case Studies from Around the World

California Dreaming - Lessons Learned from Nearly Two Decades of On-Land Trash Control Programs and Monitoring Efforts

Monday, March 12 | 1:30 PM - 2:15 PM

Session Chair: Chris Sommers, EOA, Inc

Description

This session shared the approaches taken by water quality regulators and municipalities in California to prevent and reduce the impacts of on-land (watershed-based) sources of trash on water bodies. The intended audience was regulators, municipal staff, non-governmental organizations, and others interested in learning about the successful (and not so successful) approaches to reducing trash impacts from on-land sources. The two presenters (Chris Sommers – EOA, Inc. & Jonathon Bishop – State of California) shared the approaches that the State and municipalities in California are taking to reduce the impacts of on-land sources of trash on water bodies. Since the late 1990's, the State of California has recognized that trash/litter is significantly impacting recreational uses and wildlife habitat in streams, rivers, lakes, estuaries and the Pacific Ocean. The State of California has listed 73 water bodies as "impaired" due to the presence of large amounts of trash. Trash discarded on-land is frequently transported through storm sewer systems to waterways and the ocean, making these systems an important pathway. California has attempted to control trash through Clean Water Act permits that limit the amount of trash and other pollutants allowed in discharges from storm sewer systems to water bodies.

Highlight

To-date, hundreds-of-millions of dollars have been spent by California municipalities to comply with permit requirements and reduce the impacts of trash on waterways from storm sewer systems. Millions more will be spent over the next decade to combat this pervasive pollutant. Strategies to prevent or reduce the impacts of trash discharged from storm sewer systems include: source controls, such as the adoption of bans/prohibitions for the distribution or sale of litter-prone items (e.g., plastic bag bans); interception of trash via street sweeping or other institutional controls; screening trash from stormwater by installing trash capture systems (e.g., screens, nets, filters); and conducting cleanup events in water bodies. Novel trash assessment and monitoring programs designed to evaluate the collective benefits of these actions have also been developed and implemented in California. These trash management and monitoring/assessment approaches have made California a global leader in addressing on-land sources of trash.

Oral Presentations

Control of Trash Entering Waterways in California | Jonathan Bishop, USA

Lessons Learned from Implementing Trash Management and Monitoring Programs in the SF Bay Area | Chris Sommers, USA

From Your Block To The Bay: Innovative Solutions to Trash Pollution in Baltimore

Monday, March 12 | 2:15 PM - 3:00 PM

Session Chairs: Julie Lawson, Trash Free Maryland | Thomas Sprehe, KCI Technologies

Description

As a post-industrial city with a declining population, Baltimore, Maryland faces numerous challenges. Development of trash removal regulations (TMDL) for the Inner Harbor in 2014 spurred additional investment in preventing and cleaning up trash pollution in the water, but the blight of litter is also a major community concern, diminishing quality of life and contributing to infrastructure issues. Through extensive partnership and innovation, the city now has a nearly complete system of interventions to address litter and marine debris through behavior change, community engagement, and



Oral Presentations

Indonesian Waste Platform - promoting and facilitating cross-sector collaborations to tackle marine debris | Jella Kandziora, Germany

Portuguese Marine Litter Association – promoting marine litter outreach, awareness and collaborative work among stakeholders | Patricia Louro, Portugal (Presented by Paula Sobral)

The Australian Marine Debris Initiative - a national partnership platform | Heidi Taylor, Australia

Marine Litter Network – A Resource Providing the Status of Marine Litter Work Around the World | Jenna Jambeck, USA

African Marine Waste Network building the partnerships to reduce litter in Africa | Anthony Ribbink, South Africa

The German Round Table Marine Litter | Stefanie Werner, Germany

Cross-Sectoral Collaboration For Rapid Solutions: Providing Sustainable Waste Management In Developing-Economy Cities

Tuesday, March 13 | 8:30 AM - 10:00 AM

Session Chair: Heather Troutman, EAP Consult Ltd

Description

The session brought together a diverse group of academics, civil society organizations, the private sector and government personnel from four continents to discuss the challenges of bringing affordable waste management services to the urban poor and various strategies for valorizing waste streams as a highly productive approach. Presenters spoke on innovations ranging from mobile phone apps similar to Uber, but customized for the recycling industry, to industrial-scale pyrolysis facilities converting waste plastics into clean diesel fuel (i.e. no sulphur). Other presenters described practical manufacturing to offset imports in import-dependent nations, such as mosquito nets and fishing rope. One project was building beautiful and sustainable affordable housing from waste plastics that were destined for the ocean.

Highlight

The major insight derived from our session is that the challenges and opportunities related to plastic pollution, which is most often marine bound, are incredibly similar in developing-economy cities all over the world. The challenge is to bring waste management services to the urban poor, particularly informal communities, which are most often developed alongside creeks and rivers. The opportunity is to valorize plastic waste by creating enterprises that transform plastic waste into valuable products. Such solutions incentivize citizens, and particularly vulnerable citizens that need support the most, to collect and recycle waste plastics for monetary rewards. These schemes require little capital investment and create millions of jobs, when done effectively.

Oral Presentations

Waste Management Index: Strengthening ICT Data Waste Management Platform | Vanessa Letizia, Indonesia

Solid Waste Collection Improvements with Independent Waste Collectors in Denpasar, Indonesia | Kathryn Youngblood, USA

Reducing trash while reducing flood hazards: a case study from Tijuana, Mexico | Kristen Goodrich, USA

Looking to innovation and collaboration to enable comprehensive resource recovery in informal settlements. | Heather Troutman, Ghana

Transforming Marine Debris into a Valuable Resource | Chloe Dubois, Canada



Land-Based Strategies to Address Marine Debris: Vietnam Case Study

Tuesday, March 13 | 10:30 AM - 11:15 AM

Session Chair: Eric DesRoberts, Ocean Conservancy

Description

During this session, we heard from three NGOs based in Vietnam about the work that they are doing to combat marine debris. The purpose of this session was to provide local context and insight into some of the on the ground challenges in Vietnam as well as to learn about ongoing initiatives from these organizations. The topics covered through the presentation ranged from background information on the country, key industrial and economic drivers, cultural practices, challenges with the existing waste management options, the role of women in the solid waste management, and ongoing efforts by all three of these organizations. The intended audience was people looking to learn more about the challenges and opportunities to address marine debris in Vietnam – which was identified as a key geography with high amounts of plastic leakage into the ocean.

Highlight

Implementation and adoption of reduce, reuse, and recycle has been a challenge due to a lack of policy support and the existing infrastructure. Both of these pieces remain big challenges in developing a strong waste management strategy. More specifically, stronger coordination among ministries and agencies responsible for overseeing solid waste management could help advance effective waste management infrastructure developments. In addition, there is a need around household and cultural practices to strengthen things like waste and material sorting at the household level, empower women (currently prominent in the least desirable positions in the value-chain), and a to have better knowledge of the waste picker and informal collector sector.

Oral Presentations

A Local Perspective on Challenges, Opportunities, and Existing Efforts to Combat Marine Debris in Vietnam | Ngoc Pham Anh, Vietnam

Coastal Clean Ups in Vietnam – Looking Backwards and Facing Forward | Nguyen Thi Thu Trang, Vietnam

Trash Free Seas Alliance Exploring Waste Management Challenges in Vietnam | Eric DesRoberts, USA

A Tale Of Two Cities' Marine Trash Removal Efforts: Baltimore, MD USA and Rio de Janeiro, Brazil

Tuesday, March 13 | 1:30 PM - 3:00 PM

Session Chair: Robert Summers, KCI Technologies

Description

The world's oceans are being buried in debris now. We must stop the bleeding and remove debris before it gets into our waterways, breaks down and disperses into the oceans. At the same time we must continue to develop more aggressive preventative measures, or it may be too late. The further marine debris travels into the world's coastal waters and the sea, it becomes more and more difficult and expensive to remove and has more time and opportunity to wreak havoc on the ecosystem and human health. This session was of interest to action-oriented people of all disciplines seeking methods to stop the flow of trash from cities to the marine environment now. The presentations covered the scale of the problem and solutions being applied and planned in two very different parts of the world -- Baltimore, Maryland, USA and Rio de Janeiro, Brazil. Efforts in Baltimore are being driven by a unique private-public partnership. Rio de Janeiro is taking a government focused approach but action is also being taken by a non-governmental organization that uses the marine environment as a teaching tool to educate and engage students from poor families living in the watershed.



Oral Presentations

Amounts, trends and types of marine Litter in the North East Atlantic | Jennifer Godwin

Can we fix it? Yes we can! | Sue Kinsey, UK

OSPAR Regional Action Plan on Marine Litter – State of affairs and outlook | Stefanie Werner, Germany

Options addressed within OSPAR to reduce leakages of pre-production pellets in the environment | Sarah Sananes, France

Fishing for Litter - Cleaner seas, safer fishing | Ryan Metcalfe, UK

Marine litter in the Netherlands, Green Deals and crossing OSPAR borders | Lex Oosterbaan, Netherlands



Special Events

Opening Night Reception | Monday, March 12

The Opening Night Reception of the conference provided a space and time to relax and network with colleagues from around the world. During the reception, UN Environment showcased two recent initiatives – the marine litter innovation challenge for universities and the #CleanSeas photo competition. Highlighting these young entrepreneurs and innovative ideas in front of the larger 6IMDC audience provided increased visibility to their work and exposure to possible partners and sponsors for their projects.

Launched in June 2017 by UN Environment in partnership with Think Beyond Plastic, the innovation challenge was meant to inspire university students worldwide to produce innovative solutions to the problem of marine litter. Submissions could be made in the areas of: engineering, communications, economics, and prediction and recovery. Almost two hundred original and forward-looking project proposals were submitted to a jury of leaders in science, business, visual and performing arts, film making, and economics with four winners taking home awards.

The #CleanSeas photo competition, launched in April 2017, was part of the public engagement efforts under the UN Environment's #CleanSeas campaign which aimed to encourage citizens to collect evidence of marine litter in their own environments. There were four categories in the challenge: marine habitats at risk, humans and the problem of marine litter, underwater photo and macro photography.

Innovation Challenge Track and Team Leaders

Communications: Tasini - break the plastic bag habit, University of Freiburg, Germany, Student Team: Paritosha Kobbe, Roger Spranz, Adityo Nugroho, Lia Nirawati and Sazkia Anggraini

Designing/Engineering: Eggcellent Plastic, Rice University, United States of America, Student Team: Seohui (Sylvia) Jung, Iyabo Lawal and Peter Owuor

Economics: Recycling plastic waste in Ecoboat, Institute of Fisheries and Aquatic Science, Cameroon, Team Leader: Ismael Essome (no others)

Prediction and recover: AMD detection in coastal zones, University of Chile, Student Team: Richard Taylor and Lucas Amézquita

#CleanSeas Photo Winners

Habitats at risk: Fedorah Bikay, Democratic Republic of Congo

Humans and the problem of marine litter: Emmanuel Sofa, Nigeria

Underwater photo: Christine Ren, United States of America

Macro photography: Ana Filipe Besa, Portugal

More information on the award winners can be found in [Appendix B](#).

Poster Night | Tuesday, March 13

After a full day of sessions, conference participants continued to soak up marine debris information by attending the 6IMDC Poster Night. The well-attended evening event provided a more relaxed environment to learn more about marine debris findings, collaborate with existing partners, and extend networking circles. It also offered an opportunity to collaborate with people from around the globe. For instance, participants from countries surrounding the Pacific Ocean were observed huddling over a poster and working together to identify photos of debris items found on their local beaches.

Over 170 posters were highlighted during Poster Night, representing presenters from 30 countries. Posters covered a wide range of topics, covering the ten conference tracks. The night highlighted a diverse set of presenters, including a group of middle school students discussing their 'Skip the Straw, Save our Seas' campaign.

Networking Lunch | Wednesday, March 14

The Networking Lunch was created to address requests by 6IMDC participants to have an informal forum to interact and discuss marine debris issues of interest outside of formal technical sessions and presentations. Prior to the conference, all registered participants were invited to provide ideas for discussions and to volunteer as discussion facilitators. A total of 47 discussion topics were categorized into six groups: Outreach, Partnerships, Reduction, Policy, Research, and Microplastics.

Spread throughout Hilton San Diego's outdoor areas, participants engaged enthusiastically in discussions and learning about each other's organizations and areas of work. Round table discussion topics were varied and wide reaching, such as international solutions to marine debris, composting, stormwater and trash, and transporting fishing nets. New connections and ideas for collaboration were a common outcome within topic tables.

6IMDC participants (right) connect during the Networking Lunch .

David Westerholm speaks with students from Skip the Straw about their research during the Poster Night (Photos courtesy of the National Oceanic and Atmospheric Administration).





Movie Night | Thursday, March 15

After a full day of technical sessions, Thursday evening featured seven marine debris short films which were provided by the International Ocean Film Festival, an annual event held in San Francisco, California. The organization is dedicated to using film as a medium to increase public awareness of the environmental, social, and cultural importance of marine ecosystems, and to foster a spirit of ocean stewardship.

Approximately 125 people attended the Movie Night, ranging in age from 4 to 100. Attendance fluctuated throughout the night as participants were welcome to come and go, able to explore the Matters of the Ocean Art Gallery, which was also open during the evening. Students from the local Mission Bay High School were in attendance and were recognized for their efforts on marine debris.

Each of the films presented supported the 6IMDC theme of "Innovation. Collaboration. Action." and inspired change at both a personal and community level.

Matters of the Ocean Art Gallery | Thursday, March 15

With 21 professional artists from five different countries, as well as local California student artists from High Tech High and Mulberry School, the Matters of the Ocean Art Gallery created a space in which conference attendees could be immersed in the artists' emotional and visceral perspectives of the impact of marine debris globally. This show, curated by Katie Peck, highlighted the discussion within the art community of the world ocean and allowed for the scientific community to join in on the shared conversation. Featured artists were selected based on their artistic practice – whether they highlight collected marine debris in their pieces or if their artwork captures the emotional impact humans experience within the ocean. Thursday night's reception provided a positive and joyous environment where attendees were able to share their thoughts and information gathered through the week. Gallery visitors were also given the opportunity to channel their creative side and make art themselves by creating a Love Letter to the Sea, a project by Sondra Weiss.

Acknowledgements

We would like to acknowledge the excellent work of the 6IMDC Planning Team which comprised of the following:

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Kathy Mandsager
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Working Groups

Zero Waste

Amanda Lavery (Lead)
Demi Fox
Sarah Latshaw
Sherry Lippiatt
Carlie Herring
Christy Kehoe
Jessica Conway

Communications and Outreach

Emma Tonge (Lead)
Krista Stegemann
Jennafer Malek
Amanda Lavery
Robin Garcia
Lindsey Palardy
Laura Fuller
Shanelle Naone
Carla Friedrich
Christy Kehoe



Arts and Multimedia

Sarah Lowe (Lead)
Amanda Lavery
Emma Tonge
Krista Stegemann
Christy Kehoe

Logistics Coordination and Session Support

Caitlin Wessel (Lead)
Jason Rolfe
Tom Barry
Charles Grisafi
Nir Barnea
Peter Murphy
Mark Manuel
Sherry Lippiatt

Hilton San Diego

Sales Director Deneda Young
Conference Services Manager Jessica Finney
Director Event Technology- PSAV Michael Frye

The 6IMDC Team would like to also extended our appreciation to all of our plenary speakers, panel moderators, session chairs, and those that facilitated field learning activities. We are thankful for your participation, hard work and contributions towards making the 6IMDC a great success.

Appendices

Appendix A | Zero Waste Totals and Calculations

Zero Waste By the Numbers

Note: These numbers are based on 725 attendees. We understand that some of our Zero Waste results do not account for energy, water (e.g. opting out of room services), and transportation (e.g. carpooling to the Gaslamp District) savings. However, for the purpose of this report, the focus is solely on Zero Waste efforts from a marine debris standpoint.

Reduced 74,583+ items, including:

- 27,913 sheets of paper by providing only digital copies of the program on the 6IMDC website or through the Attendify app, which had 576 users-- nearly 80% of conference attendees
- 3,240 single-use water bottles (16 oz/0.45 kg) by using 81 (5 gallon/18.95 L) water jugs
- 11,765 single-use coffee cups (12 oz/0.34 kg) by using steel cups and ceramic mugs during conference breaks
- 5,438 plastic straws by providing zero straw options
- 3,177 single-use plastic cups (12 oz/0.34 kg) by using reusable glasses for the 4 lunches and Movie Night
- 5,075 single use plates by using reusable dishes
- 6,525 plastic utensils by using reusable silverware during meals
- 4,350 plastic/wooden stir sticks by using reusable spoons during coffee breaks
- 6,525 paper napkins by using cloth napkins

Reused 2,358+ items, including:

- 725 handmade, chalkboard name tags to avoid plastic and paper options.
 - Name tags will be reused by the NOAA Marine Debris Program staff during future workshops and events.
 - Directions for making your own name tags can be found on the [6IMDC zero waste webpage](#)
- 725 cotton lunch bags
- 725 stainless steel cups
- 21 fishing nets borrowed from The Marine Mammal Center in California (TMMC) and displayed throughout the conference
 - 21 net labels, featuring entanglement and ingestion cases, returned to TMMC for use in future outreach efforts
- 15 lobster traps borrowed from San Diego State University Coastal and Marine Institute Laboratory and exhibited throughout the conference space
- 60 table sign holders
- 1 sea turtle sculpture filled with debris collected from local San Diego beaches and hotel-generated waste donated to the [Living Coast Discovery Center](#) in San Diego
- 16 sheets of plywood used to create the displays for the Matters of the Ocean art gallery were donated to a family remodeling their home

- 70 pieces of lumber used to create the displays for the matters of the sea art gallery donated to habitat for humanity

Recycled 530 pounds (0.24 metric tons)

- 530 pounds/0.24 metric tons recycled throughout the week - double the amount typically recycled at the Hilton San Diego
 - 577 beer bottles from the reception events
 - 131 wine bottles from the reception events
 - 39 large paper posters for session room signs
 - 212 small paper signs
 - 47 cardboard backings for signage
 - 2,900 bagged lunch wrappers

Rotted/composted 6,900 pounds (3.13 metric tons)

- 5,865 pounds (2.66 metric tons) from food preparation scraps
- 1,035 pounds (0.46 metric tons) from attendees' scraps

Donated 300+ uneaten meals to [Chefs to End Hunger](#)

Totals

Table A1. Example zero waste calculations for items reduced over the course of the conference.

Item	Quantity	Calculation
Sheets of paper	27,913	725 attendees * 38.5 double-side pages
Single-use water bottles	3,204	(81 jugs * 5 gallons * 128 oz/gallon)/16 oz
Single-use coffee cups	11,765	(1,103 gallons of coffee/tea consumed * 128 oz/gallon)/12 oz
Single-use straws	5,438	725 attendees * 1.5 straws per person per day (US average) * 5 days
Single-use cups	3,177	[Lunches = (725 attendees * 4 meals) * 12 oz beverage = 34,800 oz] + [Movie Night = 26 gallons of tea, lemonade, and hot cocoa * 128 oz/gallon = 3,328 oz] = Total: (34,800 oz + 3,328 oz)/12 oz = 3,177 cups
Single-use plates	5,075	725 attendees * 7 meals (5 breakfasts + 2 buffet lunches) * 1 plate/meal
Single-use utensils	6,525	725 attendees * 9 meals (5 breakfasts + 4 lunches) * 1 utensil/meal
Single-use stir sticks	4,350	725 attendees * 50% spoon use * 12 coffee breaks
Single-use napkins	6,525	725 attendees * 9 meals (5 breakfasts + 4 lunches) * 1 napkin/meal
TOTAL	74,008 items	

Similar methods were used to determine totals for items reused, recycled, and donated. Rotted (composted), and several recycled items were measured by weight.

Table A2. Totals for items reused, recycled, rotted, and donated. Please note, some items are measured by quantity while others are measured by weight.

Zero Waste Method	Quantity	Weight (lbs)
Reduced	74,008	
Reused	2,358	
Recycled	3,906	530
Rotted		6,900
Donated	300	
TOTAL	80,572 items & 7,430 lbs (3.37 metric tons)	

Appendix B | Opening Night Reception

The UN Environment Innovation Challenge winners were as follows:

Communication track winners put forth the idea of reusable bags coupled with a strong outreach effort to encourage people to stop using single-use plastic bags. The bags, called Tasini, are designed as different marine animals that represent the ecosystems they aim to protect. They will appear as eco-ambassadors in several cartoons that the project will produce. The winning solution was presented by the team leaders Paritosh Kobbé and Roger Spranz from the University of Freiburg, Germany.

Design and engineering winners created a biodegradable plastic out of egg whites from waste eggs. The project, aptly named eggcellent, aims to use this “plastic” to make cups and plates and sell these commercially. The winning solution was presented by the team leaders Sylvia Jung together with Peter Owour and Iyabo Lawal from the Rice University.

The winning economics track project called Ecoboat, of Cameroon, created a recycling scheme for plastic bottles that were then used to build canoes, to be used by artisanal fisherfolk. This innovation was presented via a video by team Leader Ismael Essome from the Institute of Fisheries and Aquatic Science, Cameroon.

Prediction and recovery winners utilized remote sensing to detect marine litter along the Chilean coast. The project was presented by team leaders, Richard Taylor and Lucas Amezquita, from the University of Chile (Universidad de Chile).



Innovation. Collaboration. Action.

