AN ABYSS OF PLASTIC WISDOM,
A SOLUTIONS-ORIENTED DIALOGUE

November 19, 2021
On 21 October 2021, UNEP, through its CleanSeas programme, published a seminal report “From Pollution to Solution: A global assessment of marine litter and plastic pollution” (POLSOL) which examines the magnitude and severity of marine litter and plastic pollution and reviews existing solutions and actions. It demonstrates that there is a growing threat from marine litter and plastic pollution in all ecosystems from source to sea, through a comprehensive update on current research and knowledge gaps with respect to direct impacts on marine life, risks posed to ecosystems and human health, and social and economic costs.

Only a few days after the publication of this report, The SeaCleaners hosted a unique roundtable to further explore the solutions to be implemented to fight the scourge of plastic pollution.

Entitled "An Abyss of Plastic Wisdom, A Solutions-Oriented Dialogue", this roundtable was part of the UN Decade of Ocean Science for Sustainable Development’s ‘A Clean Ocean’ laboratories.

Organized by the Scientific Hub of The SeaCleaners, a non-profit dedicated to fight ocean plastic pollution, it pooled 9 experts from all horizons and areas of expertise to develop a fully interdisciplinary approach of the subject and deconstruct prejudices and widespread misconceptions. The roundtable went beyond the observations that everyone shares to address the fundamental question: ‘what can we do collectively?’
Action-oriented, the roundtable covered a wide variety of topics, ranging from the development, relevance, and accuracy of science-based and technology-based solutions, down to the usefulness of behavioral sciences and citizen sciences, to the necessity of taking into consideration the intercultural differences, to the unavoidable economic upgrading of the plastic value chain, and to the regulatory frameworks and issues.

EXPERTS:

- **Citizen-scientist: Ms. Bhargavi MANTRA**, Head of Community, Litterati, Canada
- **Media: Ms. Houmi Ahamed-MIKIDACHE**, Founder and director, Era Environment, Comoros
- **Policy Maker: Ms. Alena PETRIKOVIČOVA**, Policy Officer – Marine litter, European Commission, Directorate-General for Maritime Affairs and Fisheries
- **Remote Sensing expert: Dr. Marc LUCAS**, Senior Oceanographer & Project Manager, CLS Groupe (Collecte Localisation Satellites), France
- **NGO: Mr. Kevin F. HANNOJO**, Team Leader, Surabaya, Bye Bye Plastic Bags, Indonesia
- **Macroplastic expert: Dr. Tim VAN EMMERICK**, Assistant Professor Hydrologic Sensing, Wageningen University & Research, The Netherlands
- **Micro-plastic expert: Dr. François GALGANI**, Project Manager, IFREMER, France
- **Science-policy interface: Dr. Britta Denise HARDESTY**, Senior Research Scientist, CSIRO Oceans and Atmosphere, Australia
- **Industry: Mr. Luc DESOUTTER**, Sustainability Officer, Sidel, France
- **Organizer: Ms. Gwenaële COAT**, Scientific Director, The SeaCleaners, France
- **Moderator: Ms. Elise D’EPENOUX**, Head of International Communication, The SeaCleaners, France
When it comes to plastic pollution, we touch upon environment, health, economic and social concerns at the same time. It is almost impossible to decide which one of these issues is the most pressing, as they should all be addressed. How is it possible to raise public awareness about so many issues? And can there be a consensus about the importance of fighting plastic pollution?

According to Mr. Kevin F. Handojo, the “sense of urgency” is a particularly important trigger, pushing people to action. Therefore, the messages likely to be the most effective are messages highlighting the irreversibility of the consequences of plastic pollution if no short-term action is taken. He insists that the younger generations are influencers and opinion-leaders, able to sound the alarm vocally and efficiently about the dangers of plastic pollution: “We [the youth] cannot work on the development, on the recyclability and on the industry, but we can work on the prevention side, fighting for people to say no to plastics. Recycling should be the last step. The first step is to prevent people from producing waste in the first place.”

Ms. Bhargavi Mantha highlights: “The more people become aware of the problem, the more they take action, the more they raise awareness in their communities. We need to cascade the knowledge in the communities, through young leaders for example.” The plastic pollution problems are very complex, she adds, pointing out that “putting plastic in a dedicated bin is not that easy in some parts of the world. In some places there is no bin. Or there is no [plastic waste] collection. Or there is a bin and collection, but no waste management. Or there is a bin, and a collection and waste management, but people don’t know about the bin in the first place”. She concludes: “it starts with awareness and ends with action.”

Dr. Tim van Emmerick also raises the point that most of the time in Western countries, people tend to think that plastic pollution is far away, in remote countries and that it is not an issue of concern to them. But it is not true “There can be huge influx of plastic in rivers, in Western countries, as evidenced during the last floods of the river Meuse in the Netherlands, Belgium and Germany […] Plastic is not at sea at large, very far away, it is right there.”

Bhargavi Mantha expresses her concerns: “People are aware of the problem of single-use packaging and ocean plastic pollution, but I’m appalled by the amount of little plastic gizmos and goodies you can buy for Halloween or Christmas. People do not realize that it is also plastic they consume. Research shows that people don’t connect their actions, their behavior as consumers to the problem of plastic pollution.”

Dr. Marc Lucas elaborates even further and adds “Plastic is not only a problem in developing countries, but everywhere, it is global. Developed countries have actually a responsibility to find solutions as the problem started at home.” He also points out the paradoxical positive effect of shocking images of marine plastic pollution to raise awareness: “The Great Garbage Patch has raised awareness in a way that nothing else has. It acts as a wake-up call.”

Awareness messages should be adapted to local issues and cultural differences, and take into account what matters to people, whether they have a political focus, or an economic focus, or a biodiversity focus.
Dr. Denise Hardesty insists that messages should always be “culturally and socially appropriate”. For example, it’s nonsense to advocate “for no single use water bottle in a country where they do not have clean drinking water”.

Ms. Houmi Ahamed-Mikidache also expresses her skepticism about creating a consensus about plastic pollution: “you need to contextualize. The question is different in developing countries where the main concern for a lot of people is ‘how do I feed my family?’ They throw away garbage in nature, because they do not see how littering can be a problem for them in their daily life where they struggle with poverty. We need to explain the link.”

Regarding the important role of youth, Ms. Alena Petrikovicova mentions “At the EU Level, we have a Youth for Ocean initiative, that implies educational activities. It is addressed to kids from a very young age. Through games, we can inspire them. As young adults, they will have a better understanding and knowledge of the impact of their choices.” According to Alena, a public information service is very important to create a consensus in the perceptions of the public, as they may vary from one country to another. Fighting prejudices fake preconceived ideas (“like plastic pollution is the fault of fishermen”) is also crucial to make progress, so is involving all players, members states, communities, professionals, industries, recyclers... “If you don’t connect all the communities, it will not work in practice.”

Houmi Ahamed-Mikidache agrees that information should come first, but she points out the limitation, such as the lack of constituted and representative organisms in some parts of the world: “How do you inform people and especially children? Or local fishermen in informal networks that are not part of international organizations for example?”

Denise Hardesty insists on the scientific community's responsibility to inform and advise policymakers, avoiding the easy trap of dramatization to shock people. Taking the example of the alleged contamination of the food chain by plastic and its impact on health, she explains: “Let’s not mistake presence [of plastics] with impact. We, as human, we remove the digest tracts of the fish we eat, so we remove the plastic. We do not eat the entire fish, unless it’s anchovy. I’d be much more concerned about the presence of heavy metal contaminants than plastic. Let’s not sensationalize the information. As research scientists, as advocates, we need to spread accurate information to inform decision-makers.”

SOLUTION #2

SHIFT THE VALUE CHAIN OF PLASTICS?

In its POLSOL report, the UNEP points out that the global economy is heavily affected by plastic pollution. The effects on tourism and fisheries, as well as the costs of clean-up operations, have been estimated between USD 6 to 19 billion worldwide in 2018. By 2040, companies face an annual financial risk of some USD 100 billion if governments require them to cover waste management costs based on volumes and recycling possibilities. Among the collective measures promoted by UNEP to protect the oceans are socio-economic measures: including an accelerated transition from fossil fuels to renewable energy, the removal of subsidies to the plastics industry and a shift to circular approaches. The UN organization also encourages a transformation of the entire plastics’ value chain. What do our experts think?
Mr. Luc Desoutter adds: “It is absolutely necessary to integrate the question of the recyclability of components from the outset, and to think about the recovery of plastic, without relying solely on degradation by nature, because we know that this produces CO₂ and toxic gases (...) If consumers have no other solution than littering, we have a big issue. If we have alternative solutions, then we can start to make progress". And he reminds us that "companies [in the plastics sector] are funding research on the topics of component recyclability."

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Dr. François Galgani goes further: "Improving recyclability would give value to plastic in the environment. If we give value to the plastic in the environment, we solve a big part of the problem."

Denise Hardesty also believes that putting a value on used plastic could significantly reduce plastic pollution: "Incentives are very important, it works. If you put a price on plastic, call it a tax, a levee or a fee, it will cease to be lost in the environment. We see this happen over and over again. when we treat plastic as a commodity rather than a waste and a cheap product that has these negative externalities, it will shift our relationship with plastics. A very small amount of financial reward or incentive can be incredibly effective, wherever you are around the world. If we put a price on plastic and valorize it, we will fundamentally change the game."

Marc Lucas concurs: “One of the reasons that plastic is so common is because it is so cheap. Citizens are asked to do a lot. There are a lot of awareness campaigns to encourage them to reduce their consumption. But it is just like oil & gas: as long as it is so cheap, plastic will be developed. The alternatives are just too expensive”.

Our single-use plastics has generated in China in terms of job creation, legislation, value, waste management technics, waste management selection”. But such developments cannot be done in a deregulated way: "Private sector on its own cannot be a solution. Solution is a combination of private sector efforts + legislation + information towards consumers." Luc points out that the large companies that use plastics are not immune to these issues: "Because of the high demand, the price of recycled PET is twice the price of the virgin one. Brand owners pay for that value because they do understand that consumers no longer accept plastic unless it is recycled […] The Ellen McArthur Foundation monitor very effectively the progress on a yearly basis of all the commitments made by big brands in that respect."

Finally, Houmi Ahamed-Mikidache reminds us to be mindful to contextualize in a global framework. In a large part of the world, we cannot think of a change in the plastic value chain by only taking into consideration the situation of the richest and most developed countries. “In many countries in Africa and Asia, where plastic pollution is very high, there is an informal plastic waste management sector that supports whole communities”. And she asks the question: “How can we involve the informal sector, for example in Africa, which is already working in waste management, in these new jobs that are about plastic recyclability?”
In recent years, plastics companies and research institutes have been competing in ingenuity and marketing efforts to announce the development of new materials to replace hydrocarbon-based plastics. Yet in its POLSOL report, UNEP warns that alternatives to single-use products, such as biobased or biodegradable plastics, "currently pose a similar chemical threat to conventional plastics". This was confirmed by the experts at the roundtable.

Referring to the cheap price of plastic, François Galgani explains: “Plastic has become the preferred material also because it is light and resistant. And there are no alternatives: bioplastics cannot be used in components that require strength. However, there is an interesting market for products where strength is not required, such as packaging for fruit and vegetables. But the end of life of these products is not managed, which is a problem.”

We should be mindful about these new materials that can pollute the waste stream because we do not yet know how to manage them.

Luc Desoutter believes that “with science, we can solve a lot of things, but it is not perfect”. An interesting avenue that is currently being developed involves micro-organisms, such as algae, to produce bio-sourced polymers. And he points out “When you develop alternative products, it’s important to do a full life cycle analysis. Sometimes there is a genuine feeling that a solution is better than another in terms of environmental impacts and it’s not.”

Alena Petrikovicova raises a point of caution, contrasting the development of alternative products with the implementation of national strategies to ban single-use plastic products, which are becoming increasingly common around the world: “Replication at the international level of the European ban on plastic bags is not possible if there is no product easily available to replace the banned items. We cannot introduce bans on plastic products if we do not have affordable and easily accessible alternatives. Bans are good where there are alternatives.”

Denise Hardesty shares this opinion and calls to remain mindful about the unintended consequences related to bioplastics. She says: “are we going to grow food for the world or are we going to grow packaging material for the world?” About waste management, she adds: “we do not have the waste infrastructure to recover materials from bioplastic and these other materials. Even though there is an interest from the industry and the willingness, we should be mindful about these new materials that can pollute the waste stream because we do not yet know how to manage them.”

Drawing on his own experience and the exchanges his own NGO Bye Bye Plastic Bags has had with the Indonesian government, Kevin F. Handojo makes the same point: “Implementing a ban is harder if you don’t have alternatives. We need to develop alternatives first and encourage people to use reusable alternatives, before slowly lowering the production of plastic bags.”
Gwenaëlle Coat explains: “There are a few international treaties that are important to know to be able to understand how we can better manage plastic waste and its flow worldwide. Those are the Basel Convention, which regulates Hazardous Waste and generally its shipment from developed to less developed countries; the Rotterdam Convention, which regulates the shared responsibilities when hazardous chemicals are imported; and the Stockholm Convention on Persistent Organic Pollutants. A new global treaty on plastics is currently under consideration at the UN level, some countries asking for tougher resolution, and specifically demanding that it is rendered legally binding. So more is coming on plastic regulation, and its trade internationally.”

She concludes: “Bans need to be planned according to the reality on the ground. For example, in Kenya, there was an unforeseen outcome of the plastic bag ban, which is smuggling of the bags from neighboring countries. While the ban has an overall positive effect on the ecosystem, making sure it is prepared on the ground and provide people who are using the bags with alternatives is crucial, so no other issues arise that might be a bigger problem down the road.”

**SOLUTION #4**

**BETTER UNDERSTAND THE SOURCES AND PATHWAYS OF PLASTIC POLLUTION THROUGH SCIENCE AND TECHNOLOGY?**

Research shows that plastic is a land-based issue. According to the most recent studies, plastic accounts for 85% of all marine plastic waste and up to 80% comes from land. While there is a consensus on these data, scientific research is still far from unanimous in explaining how this plastic pass from the terrestrial environment to the marine environment and then end up in the oceans: how fast? By which pathways? By what mechanisms? The increasing number of sometimes contradictory studies on that particular topic can be confusing. How can we improve our knowledge in this area? A crucial issue in order to build on science-based evidence able to influence policy making in the right direction.
Tim van Emmerick explains that a range of mechanisms enter into account to explain how plastic waste ends up in the river streams “Unintended leakage from infrastructure, private littering from individuals, leakage from industries, leakage from some activities, unforeseen mobilization mechanism caused by extreme events such as tsunamis or floods”. The question remains: once it has entered the river system, how does plastic travel through the environment to the ocean? Unfortunately, there is no straight and simple answer: “Research is still on-going as it depends on a lot of factors such as the type of plastic, wind, hydrometric variables, type of environment, surface, river flow…”

However, recent studies allow us to better understand where plastics accumulate and get concentrated in the river and marine environment, so that more effective plastic collection operations can be considered. As Tim explains: “Macroplastic debris will tend to stay stuck in different places: in vegetation, in floating vegetation, in sediments, along the riverbanks, along the infrastructures, in estuaries because there are bidirectional flows, on the backshore.”

Denise Hardesty adds: “Among the waste that reaches the ocean, 90% of macrowaste will remain in the coastal zone. Most of that will remain trapped in the backshore agitation along the coastlines. There is so much onshore wind and waves forcing that it is actually difficult for plastic debris to make its way out into the open ocean. It happens and we know that things can be transported for a very long distance especially with major storms.”

Marc Lucas mentions the many advances that are taking place in the field of satellite detection of marine litter, using artificial intelligence. However, he acknowledges that there is still room for improvement in the technology and wonders how it can be improved: “How can we refine the models for predicting plastic inputs into the ocean? Validity and reliability of modelling are a real issue (…) The more time you spend with models, the more you realize you need observational data. Large scale models can be very wrong. Improvements come from empirical data and field observation.

Citizen science data could help satellite detection to improve technologies. It is a slow, step-by-step process.” He adds “Models are incredibly useful but you don’t get an absolute truth from them, you have to use them carefully. The most important is the combination of technologies: in situ observation [CLS follows plastic by tagging debris], with modelling and satellite data.”

He points out that combining technology and citizen science could be a very effective way of improving technologies: “With all the data from citizen science activities that has been gathered around the world, there are certainly more data available, but they are not accessible in an easy way to the scientific community. Citizen science data could help satellite detection to improve technologies.” Mechanisms of interaction between the two levels of observation should be further developed, to produce “databases on a global scale”.

Denise Hardesty underlines: “When we actually go [in the field] and test some ideas, we learn these assumptions are not as accurate as we had thought. We are better to work from a direction and make incremental improvements along the way to make progress, while still operating with a precautionary principle. We don’t need to know everything that is happening everywhere to make evidence-based decisions with the best available knowledge and shift as we improve our knowledge. Let us not be paralyzed because we don’t have all of the perfect data at hand.”
Tim van Emmerick supplements this idea: “If you zoom out and try to learn from observations in the field, you can try to work out a different modeling approach where you don’t try to predict the source and fate of each individual plastic item but rather start thinking in terms of risks and likelihood of the presence and accumulation of plastics in river systems or coastal areas. It could be informative for planning data collection and monitoring, and to steer action on mitigating plastic pollution”.

Alena Petrikovicova, who has been working on harmonized standards for fishing gear and on the future materials used to manufacture them in order to mitigate their impact on the marine environment in case they are lost, stresses the fundamental importance of scientific data and evidence to inform public policy making: “Data monitoring and reporting on existing measures that have been implemented in the member States is compulsory, like for example on the single plastic directive. This way, after evaluation, we can produce new concrete targets, adjust our efforts and be more ambitious in the next regulations. But we need data first to base our actions on it.”

Finally, there is the difficult question of harmonizing data and scientific methods to effectively combat plastic pollution.

As François Galgani points out “we need to pool strong resources and strong actions. It is impossible with just one team, or one NGO to solve the problem. We need to team up resources, it must be global and large-scale.”

Tim van Emmerick adds: “It is difficult to keep people involved and motivated in contributing to science and clean-up on the long term. Only successful large scale citizen initiatives are the ones who keep contacts with volunteers, disseminate the findings, update protocols, make sure data are consistent, make sure clean-ups are rightly organized. You need infrastructure and professional involvement to keep that. You need local commitments and global umbrella initiatives to make sure that methods are harmonized, data are transferrable, that we can compare the Netherlands with Indonesia. And only then we will be efficient.”

Gwenaële Coat agrees: “This is a key aspect of the work of the scientific hub at The SeaCleaners. Not only working with our International Science Advisory Board to understand how to contribute to tackling the plastic issue through scientific missions aboard the Manta ship, but also characterize the plastic debris we will collect as of next year with the smaller depollution boat Mobula 8. The clean-ups we do with volunteers are also used to collect data, which are usable not only for evidence-based science but also eventually informed decision-making for policymakers locally. Last but not least, awareness raising activities help citizens understand how their actions impede ecosystems on which they depend and encourage them to change their behaviors.”

Recently, company-led initiatives and other cross-industry partnerships have multiplied, focusing on packaging, the circular economy, alternative materials, etc. World leading brands have also put in place plans to retool and reconfigure their supply chains, moving away from fossil fuel-based plastics production to recycled materials.
Behavioral changes and the introduction of alternatives are also giving a boost to action. Citizen scientists’ applications, such as the one developed by leading data science platform Litterati, allow users to document collected litter by uploading a photo to the app. They pit participants in collections against each other, but more for fun and excitement than anything else. With similar apps, the waste collected is tracked in order to identify trends in neighborhoods and those with higher amounts of waste.

As Head of Community for Litterati, Bhargavi Mantha wonders how communities can connect with the industry or with policymakers to share their feedback and data on the kind of trash they collect from clean-ups, and more broadly how the industry can also drive change to reduce plastic pollution.

In response, Luc Desoutter acknowledges that the plastic industry has a responsibility at the various levels of the chain. As he explains “The industry has taken quite a turn. Our customers don’t sell plastic, they sell their products. They are not heavily attached to a packaging material. They chose PET for a number of reasons: economical, recyclability, carbon footprint… We are looking at alternatives. But they must not be worse than what we have today. Industry cannot drive change alone. It’s a collaborative effort.”

He insists on the crucial role of the regulatory framework: “we help customers [major brands and companies] to switch from PET to recycled PET. The average commitments for using recycled PET by our clients is 10 to 15% higher than the current EU regulations requires for single-use plastic. But it depends on skills and inputs. One of the problems is the lack of input material in Europe. The capacity in Europe to recycle PET is at least 30% above the capability of providing the needed PET to the recycling plants (…) There are also a lot of regulation issues. In some countries, like China, India, Thailand, you cannot use recycled PET back in PET bottles because there are no regulations there.”

Luc concludes “The industry has done a lot of work and will continue to do efforts to reduce packaging weight, which has been divided by 3 over the last 20 years, and incorporate more recycled PET.”

The SeaCleaners warmly thanks the participants in the round table for the wealth of the exchanges and the great value of their inputs.

Inger Andersen, UNEP’s Executive Director stated: “The speed at which plastic pollution is capturing public and media attention is very encouraging. It is vital that we use this momentum to make progress towards a healthy, resilient and clean ocean”.

All our guests, in their own way, and each in their own discipline, highlight the pervasiveness of plastics and microplastics, from the deepest abyssal environments to the most remote oceanic islands, and the extreme pressure being exerted on the planet.

Connecting all the different responses and actions of governments, businesses and citizens is now more critical than ever. Let’s continue the fight, each of us in our own capacity.

The SeaCleaners