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Thematic Track Event

Protecting Oceans from Chemical and Plastic Pollution

February 15, 2018

PROCEEDINGS

India Habitat Centre | New Delhi



Thematic Track Event

Protecting Oceans from Chemical and Plastic Pollution

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Background note of the event

The thematic track event titled: ‘Protecting Oceans from Chemical and Plastic Pollution’ during the World Sustainable Development Summit-2018 was hosted by The Energy and Resources Institute (TERI), Ministry of Climate Change and Environment of Norway, Norwegian Embassy in New Delhi, Norwegian Institute of Water Research (NIVA) and Mu Gamma Consultants Pvt. Ltd. (MGC). The objective of the event was to discuss the role of transnational capacity building around international conventions to reduce emission and transport of pollution to the oceans. By improving the knowledge base, sharing experiences, and discussing sound policy and management options, the event aimed to contribute towards setting the framework for better waste management and reduced release of hazardous chemicals, marine litter, and microplastic pollution.

The coastal countries in both the “Global North and South” are relying on a healthy ocean for subsistence and growth. Hence, improved knowledge, stronger international collaboration, and sharing of best practices to deal with hazardous chemicals and plastic pollution, are pivotal elements to achieve global sustainable development and protect our shared ocean ecosystem.

Many developing countries have taken up the challenge of protecting the environment and human health from the risks posed by chemicals and plastic pollution. Among them, those with rapidly emerging industrial economies, such as India, have been identified as hotspots of pollution in several scientific reports, with documented examples of on-going adverse impacts on people and the environment. The present workshop aims to address land-based pollution sources and processes that result in transport and release of chemicals and plastic waste to the ocean.

Hazardous chemicals accumulating in the marine environment

Recognizing the need for preventing persistent organic pollutants (POPs) enter the environment and the need for a global, consolidated approach the United Nations Environmental Programme launched the Stockholm Convention (SC) on POPs and the Minamata Convention (MC) on mercury (Hg). These policy tools are the backbone for international chemical management.

The complex and dynamic character of international regulatory regime on chemicals, in particular the SC, represent a substantial challenge for transitional economies, such as India. The complexity and continuous inclusion of new priority substances represent a major task for chemical management in countries with economic development and significant industrial and agricultural sectors, yet limited capacity on the implementation side. India, taken as an emblematic example of a large country with a booming economy, is a major global player and an emerging industrial hub for the society at large. As a reflex, India will increasingly be a potential hotspot for contaminants of global relevance, as production and contemporary consumption habits of the local population will intensify. Similarly, India, as one of the largest users of mercury in the world, is yet to ratify and allocate resources and develop a plan that would enforce the provisions of MC. Even though the country has signed the Convention, “Hg awareness” is still low in some industries and there are no consolidated regulations which are specific to its sound management and disposal of Hg-containing waste.

Land-based processes, human activities, and remobilization of “old” contaminants stored in soils are key sources to deliver hazardous chemical contaminants in the coastal and open ocean environment. Contamination of freshwater

resources and riverine transport along with atmospheric depositions are the processes underpinning such a transfer. Protecting the ocean from chemical pollution therefore, requires “total” action and a holistic regulatory and management frame.

Several factors can hinder the establishment of sound chemical management, especially in emerging countries such as India. Lack of capacity in data collection and analysis, emission inventories and hotspot determination, poor stakeholder involvement are some of the critical challenges that have been identified, as well as difficulties in exploiting and managing existing national and international know-how.

Riverine transport of plastic waste

Alongside chemical pollution, plastic waste is considered as one of the most serious environmental problems today. An enormous amount of plastic is entering the ocean worldwide, roughly eight million tonnes every day. In coastal regions, around one-third of all the plastic waste generated is mismanaged. The top 20 countries with the largest release of plastic into the ocean account for 83%¹ of mismanaged waste entering the ocean globally. India is one of the countries on the list, however, there are huge uncertainties regarding data on plastic waste management, generation, and release. The Asian region is by far the biggest contributor to plastic pollution to the ocean. Reports also indicate that as much as 95 percent of plastic waste to the oceans of the world is coming from just 10 river systems², of which two pass through India. Once these enter the environment, the plastic will start degrading into microplastic, making it more difficult to track and mitigate. Additionally, plastic can be transported over long distances through

rivers and currents.

Concerning plastic waste, countries with transitory economies face the difficult challenge of dealing with increasing volumes of waste as a result of the rapidly changing consumption habits and lifestyle of the population, and often a not yet established effective waste management. With its long shoreline, large population, and expanding economy, India is surely an emblematic example as it is both vulnerable and highly exposed to marine plastic pollution. Indian authorities are paying increasing attention to the plastic waste problem. At the third United Nations Environment Assembly (UNEA-3) in December 2017, India supported the Norwegian proposal urging all actors to “step up actions” by 2025, to prevent and significantly reduce marine pollution of all kinds. The resolution also encourages member states to prioritize policies that avoid marine litter and microplastics entering the marine environment. At a recent big beach clean-up of plastic in Mumbai, India's Prime Minister Shri Narendra Modi praised the efforts, “It is our duty to protect the environment for our future generations”.

In order to reduce the country's global impact on plastic waste pollution issues, India is confronted with multiple challenges. One example is introduction of the recent tax on recycled plastic which made recycled plastic more expensive than virgin plastic, thus removing an important incentive for the informal recycling sector. Another challenge is China's recent ban on import of plastic, which potentially may increase the inflow of plastic to India. These developments come on top of increasing volumes of waste generated by an increasing urban population and combined with inadequate waste collection, treatment and disposal, thus posing a serious challenge.

¹ LÖhr et al, Solutions for global marine litter pollution, Current Opinion in Environmental Sustainability 2017, 28:90–99

²<http://www.timesnownews.com/technology-science/article/95-of-plastic-polluting-the-world-ocean-comes-from-just-10-rivers/109670> (Accessed on 5th Feb 2018)

Achieving progress through international collaboration and regulatory regimes

The fight against transboundary pollution is a central pillar for global conventions. The international legal framework gives certain commitments to build capacity, exchange knowledge and technology, and support developing countries in their efforts to tackle environmental degradation.

Being a developed country with tight national restrictions on chemicals and waste, and with close interactions and interlinkages with EU regulation on these issues, Norway is an active promoter of an effective and strict regulatory international framework. Recently Norway proposed the listing of a chemical called perfluorohexane sulfonic acid (PFHxS), its salts and related compounds. Furthermore, it is an active contributor and supporter to EU proposals to list other chemicals, in which commonly has been banned in EU and Norway at an earlier stage. As accentuated in the SC, the international community, through institutional and non-governmental stakeholders, is committed to support India in its impelling and difficult task on hazardous chemicals.

Norway has recently also taken a leading role in the international battle against marine litter and microplastics. At the third meeting of the UNEA, Norway proposed a targeted process

with concrete recommendations on how to strengthen the international collaboration against marine litter. Norway also contributes with considerable funds to UN to work on the issue. Domestically, Norway has developed advanced strategies and regulations to control and reduce plastic and microplastic pollution, simultaneously applying effective measures, such as sound waste management, extended producer responsibility, beach cleaning, taxation, and more. Together with other international experiences, these measures may be highly relevant examples for other countries.

The proactive international role played by Norway and other developed countries will have reduced value if developing countries and economies in transition lack the capacity and resources to deal with the environmental problems associated with hazardous chemicals and plastic pollution entering the marine environment. Thus, there are strong reasons to build a stronger collaboration between countries that are pushing the borders of the regulatory regime and those countries that faces the most significant challenges with implementation. Better international collaboration may contribute to a better understanding of such challenges and the countries' special national circumstances, thus, increase the chances of identifying sound, effective, and relevant policy and management options in the future.

Summary of the event

The session mainly highlighted the impact of chemical and plastic pollution in the oceans. It also deliberated on the policies and conventions across the globe to address the issue of chemical contamination on land leading to pollution in the ocean. The speakers emphasized on how plastic pollution is one of the major problems for ocean ecosystems.

The speakers mentioned the quantum of plastic pollution and reiterated the fact that every year, around 8 million metric tonnes of plastic is being dumped into the ocean which has an adverse impact on coastal ecosystem due to its non-biodegradability. Majority of this contamination is due to untreated or partially treated industrial effluents and littering of plastic wastes which eventually ends up in the ocean. This being an international challenge, international collaboration is essential in order to arrive at a common solution. Plastic waste disposal is usually mismanaged at varying degrees globally, more so in countries such as India, China, Indonesia, Sri Lanka, etc.

The speakers also discussed about chemical pollutants such as persistent organic pollutants (POPs) and mercury. The other chemical pollutants with adverse health impacts are endocrine-disrupting chemicals (EDCs) which are present in toothpaste and other personal care products, baby feeding bottles, etc. Studies have revealed that our drinking water sources are contaminated with pharmaceuticals and antibiotics, which are adding to marine pollution. This eventually finds its way into the food chain and adversely impacts human health and the ecosystem. One of the speakers mentioned that key anthropogenic

drivers that lead to ocean contamination are categorized in to three main categories: the combustion processes, mechanical engineering processes and agro-chemistry.

International regulations play a pivotal role as global conventions provide a framework for essential technical and financial support. The Stockholm Convention on POPs and Minamata Convention on mercury are two important international commitments. The Stockholm Convention entered into force in 2004 and has been ratified by 182 countries. There are about 34 chemicals listed in this convention and about 3 chemicals are under review. India has prepared a National Implementation Plan (NIP) which entails details of how to deal with POPs under its obligations in Stockholm Convention. The Minamata Convention entered into force in 2017 and has about 88 parties and 128 signatories. The Union Cabinet of India has recently approved to ratify this Convention.

The solutions for protecting oceans from plastic and chemical pollutants depends upon international cooperation in the field of science, legislation, regulation, stakeholder engagement and capacity building of institutions, officials as well as communities. Change in consumption patterns by reducing use of plastic products, better management of waste and resource recovery are important parts of the solution. With systems-based approach, international cooperation and community engagement, chemical and plastic waste can be managed to a large extent, thereby reducing pollution load on oceans.

KEY MESSAGES

- Need for environmentally-sound management of chemicals, hazardous waste, and plastics in India
- Effective capacity building of human resources as well as infrastructure
- Development and promotion of alternatives to harmful chemicals (pesticides/ insecticides/ fertilizers)
- International collaboration in combating long transport of pollutants.
- Need for evidence-based data to help MoEF&CC in taking informed decisions.
- Need for effective law for implementing the various international conventions which India has ratified.

WAY FORWARD

- Research studies to generate quality data for informing the concerned ministries regarding chemical waste management, plastic pollution, protecting marine environment, preparing National Implementation Plans for newly added chemicals, and Mercury waste management
- International collaboration for capacity building activities in India on the management of chemical wastes, plastic wastes, e-wastes, Stockholm Convention, Minamata Convention, and other conventions of which India is a signatory.

Session I:



As the chair for the first session of the event, **Dr S K Sarkar, Distinguished Fellow and Senior Director, TERI**, deliberated on the issue of marine pollution due to chemical and plastic wastes. He stated that the oceans cover around 71% of the Earth's surface and perform a vital regulatory function in the global weather and climate systems. The Sustainable Development Goal-14 recognizes the environmental, economic, and social benefits provided by healthy oceans. Human activities have weighed heavily on the health of the oceans, particularly in the recent decades, plastic pollution has been a huge factor. The major sources of pollution are in form of chemical, industrial, and plastic pollutants.

Speaking about plastic pollution, Dr Sarkar mentioned that around 2 million metric tonne (Mt) of plastic bags are being dumped into the ocean every year and this is increasing by the day. This has a huge adverse impact on coastal ecosystem health as they are non-biodegradable. The

sources are different and its impacts are different too. He spoke about the magnitude of plastic and chemical pollution in the ocean. Discussing the status of such pollution in India, he mentioned that India's contribution to plastic waste, dumped into the world's oceans every year, is very high. Data suggests that India generates around 56 lakh tonnes of plastic waste per year, whereas Delhi alone accounts for 9,600 metric tonnes per day.

Dr Sarkar touched upon the regulatory and policy gaps by mentioning that the National Green Tribunal has suggested a ban on disposable plastic, such as cutlery, bags, and other plastic items. However, effective law has been in place to implement the same. Summing up, he mentioned that a scientific understanding of the ocean's responses to pressures and management action is fundamental for sustainable management. There is a lot India can learn from other countries such as Norway in order to tackle the issue of chemical and plastic pollution.



His Excellency, Nils Ragnar Kamsvåg, Ambassador, Royal Norwegian Embassy in New Delhi, India

The Ambassador of Norway to India, HE Nils Ragnar Kamsvåg, gave a very insightful talk on the topic of protecting oceans from chemical and plastic pollution. He began his talk by mentioning the importance of ocean in supporting and sustaining life in the world. He also explained how this life support system is now breaking down. Unless preventive action is taken up, it will be extremely difficult for most species to live in such conditions.

He further mentioned that both Norway and India with significant exports of fish, rely on the services provided by aquatic and marine ecosystems. He emphasized that we must ensure that production and harvest is sustainable and safe for consumers and the market. To do so, we must act decisively and with a consolidated approach on chemical and plastic waste management in a safe and environmentally-friendly way.

He elaborated the management of chemicals in Norway which is closely interlinked with the

European Union (EU). Norway, as part of the European Economic Area, has implemented the EU regulation on chemicals - REACH. The REACH system is a collective effort to control and manage chemicals, where countries share the burden of registration, evaluation, and authorization of chemicals.

“Plastic pollution in oceans travels across the globe – it is a global transport”

Norway has taken a proactive role to establish and strengthen the multilateral environmental framework on chemicals and waste. This will help reduce the transboundary pollution, as well as reduce the burden on countries with less capacity to mitigate and remediate environmental pollution.



He further mentioned that Norway would like to strengthen its work with India on the conventions in the chemicals field. He dissuaded the apprehension about industrial development not being environmentally sustainable and further reiterated that there is no contradiction between growth on one side and protecting the public health environment on the other, and there is a cost to not acting on environmental hazards.

He also brought the attention of the audience on the issue of marine litter, which is a global environmental problem. Through decisions by the UNEA, Norway has placed the issue on the global agenda with a vision of zero discharge of litter and micro plastics into the oceans.

He stated that Norway is contributing substantially to the work in the United Nations on this topic and has put up nearly US\$20 million for a programme aimed at combatting marine litter and micro plastics in the oceans in developing countries.

To sum up his talk, Ambassador Kamsvåg said that Norway and India have a lot to gain through closer collaboration on issues, such as chemical pollution, waste management, and sustainable fisheries. He acknowledged his gratitude towards the work of Norwegian and Indian scientists in paying attention towards the issue of protection of oceans from chemical and plastic wastes.

Prof Thorjørn Larssen, Research Director, Norwegian Institute of Water Research (NIVA)



Prof Thorjørn Larssen delivered an interesting presentation on the topic: ‘Global challenges regarding chemicals and plastic pollution: A Land-Ocean interaction perspective’. He began his presentation by giving an introduction about the works of NIVA, which is Norway’s leading multidisciplinary research institute in the field of use and protection of water. He further mentioned that NIVA has a holistic perspective on the aquatic ecosystems and it serves the authorities, the private sector and the public, and national and international institutions towards an improved aquatic environment.

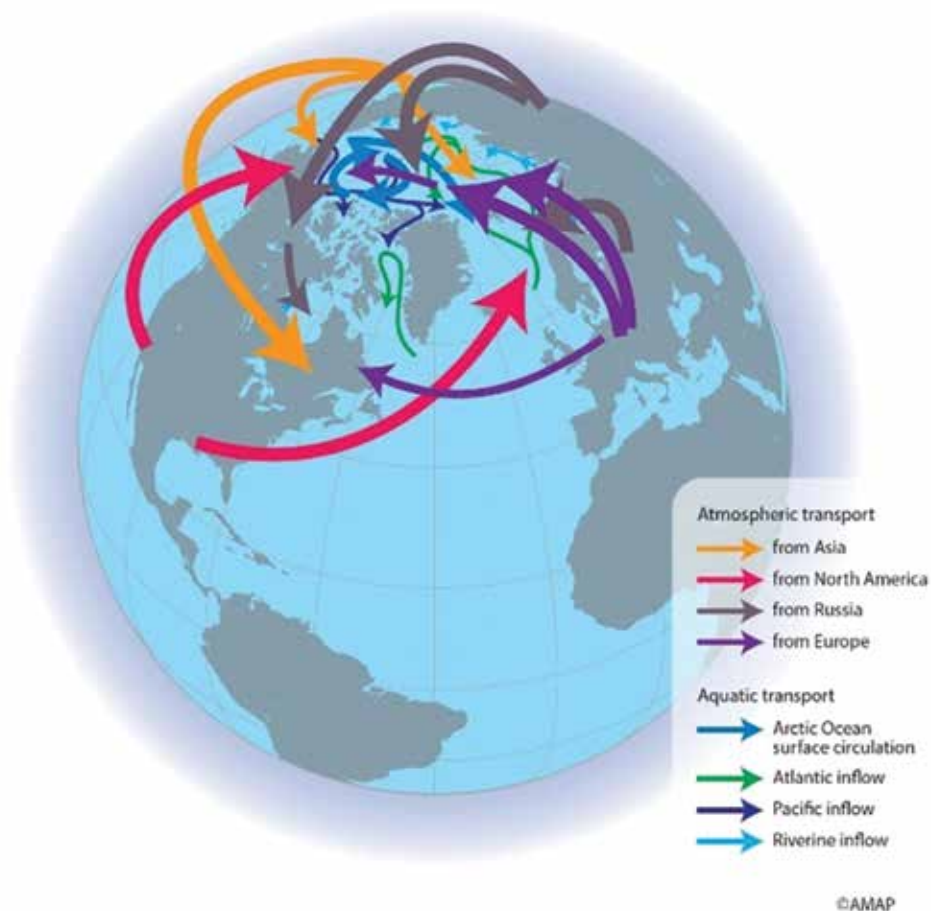


Figure 1: Atmospheric and aquatic transport of pollutants

Source: AMAP, 2012. Arctic Climate Issues 2011: Changes in Arctic Snow, Water, Ice and Permafrost. SWIPA 2011 Overview Report. Arctic Monitoring and Assessment Programme (AMAP), Oslo.



Figure 3: Plastic waste produced and mismanaged
 Source: Accessed from www.grida.no/resources/6931

He explained the links between plastics, POPs, and biological uptake. Summing up his talk, he mentioned how consumption patterns, waste management, and resource recovery are important parts of the solution and international cooperation is required in scientific collaboration, legislation, regulation, and community engagements.

Ms Anne Marie Mo Ravik, Senior Adviser, International Section, Norwegian Environment Agency (NEA)

Ms Anne Marie Mo Ravik, Senior Adviser, International Section, Norwegian Environment Agency (NEA), gave a presentation on the topic: “Norway and EU policy initiatives on

chemicals and plastic pollution mitigation”. She began her talk with details about the vision and activities of the NEA and mentioned that NEA is a Directorate under the Ministry of Climate and Environment, Norway. It was established in 2013, though it has a prehistory in 1970`s. The priority areas of NEA are: climate, pollution, biodiversity,

Outdoor life. The main functions are:

- Acquire knowledge about the environment
- Exercise regulatory authority
- Provide guidance on the regional and municipal levels
- Provide policy advice
- International work



She narrated the policies of Norway and European Union on chemicals and deliberated on the national goal of eliminating release of hazardous substances. She also mentioned how NEA's experts contribute in the processes on developing international regulations such as the REACH (Registration, Evaluation, Authorization, and restriction of Chemicals) and Classification, Labelling and Packaging of substances and mixtures (the 'CLP Regulation'), the Stockholm

Convention on PoPs and the Minamata Convention on Mercury.

She also mentioned about Plastic pollution and marine littering and mentioned that the National strategy is to Avoid plastic pollution and undertake Clean-up. Marine littering is a global problem, which needs national and regional work along with UN initiatives.



Figure 4: Marine Litter

Photo credit: Hold Norge Rent

“Plastic constitutes 75% of the marine litter and plastic degradation takes time, a plastic bag degrades in 10-20 years whereas a plastic bottle takes 450 years to degrade”

Dr Vikas D Dighe, Scientist ‘D’ and Head, National Institute for Research in Reproductive Health, Indian Council of Medical Research (ICMR)

Dr Vikas D Dighe gave a talk on Endocrine Disrupting Chemicals (EDCs) and their impact on human health. He gave an interesting account of several association studies of EDCs on human and



animal health in India. He gave a detailed account of the sources of EDCs in our day-to-day use. These are encapsulated in Table 1:

Endocrine Disruptor	Sources
BPA	Plastics and Thermal receipts
Phthalates	Plastics and Fragrances
PCBs	Electrical coolant
PBDEs	Flame retardants
Lead	Drinking water, paint, gasoline
Mercury	Burning coal, seafood
Dioxin	Formed in industrial processing
DDT/DDE/DDD	Pesticides
Arsenic	Drinking water, animal feed, herbicides, fertilizers
Cadmium	Tobacco smoke, fertilizers
Atrazine	Herbicide
Alkylphenols and p-Nonyl-phenol	Detergents, additives

He also narrated the adverse effect of EDC exposure on human health, which are enumerated as follows:

- Prostate, breast and other types of cancer
- Birth defects and pre-mature birth
- Thyroid disruption
- Neurological issues
- Kidney disorders
- Asthma
- Immune suppression
- Metabolic disorders
- Female reproductive Obesity
- Cardiovascular diseases
- Diabetes
- Alterations in pubertal development
- Transgenerational and epigenetic effects

He also reiterated the fact that the most important factors in EDC exposure are: the latency from exposure, age at exposure, the importance of mixtures, and non-traditional dose-response

dynamics. He further mentioned in detail the effect of EDCs on male and female reproductive processes as well as causation of cancer due to EDC exposure as depicted in Figures 5a and 5b.

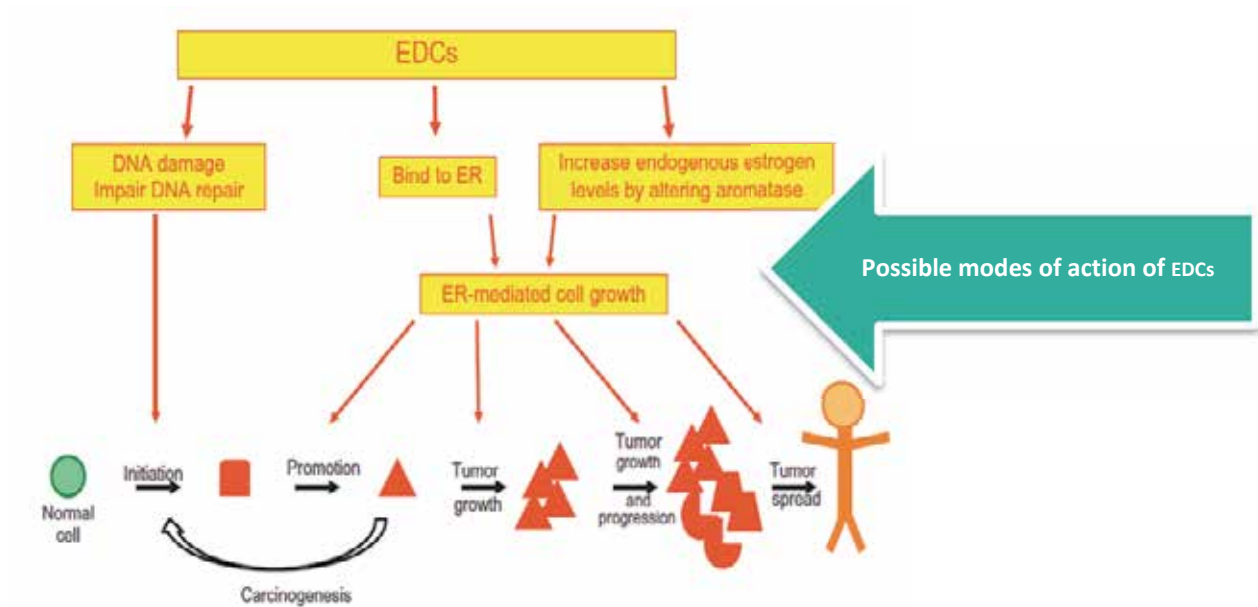


Figure 5a: Possible modes of action of EDCs

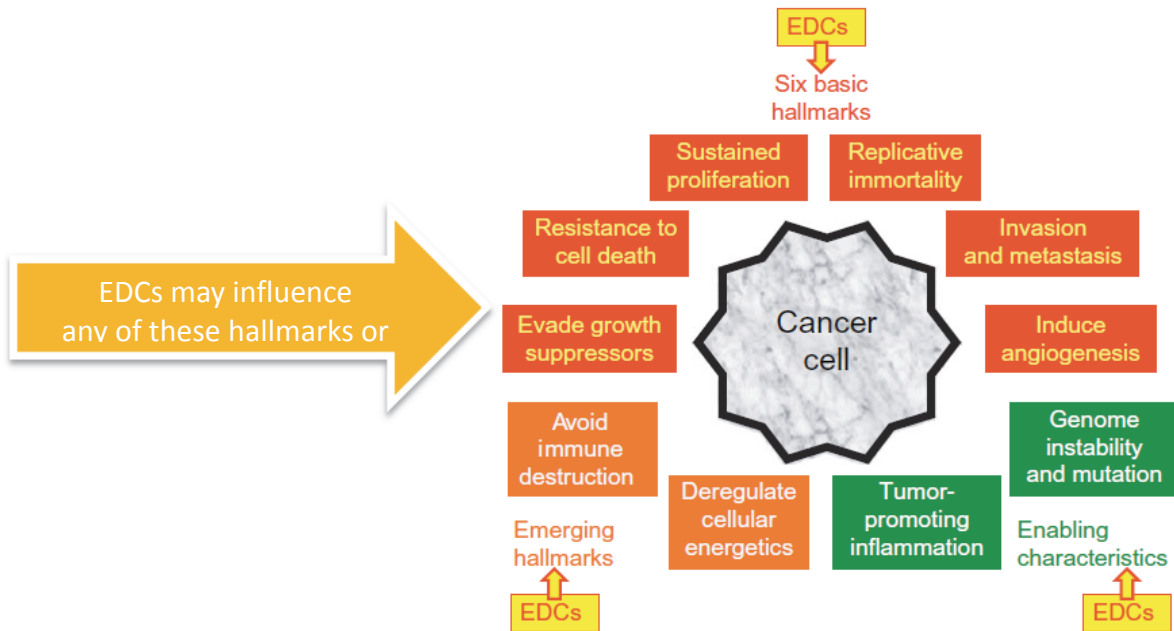


Figure 5b: Cancer of reproductive tissues due to EDCs

Source: Endocrine Disruption and Cancer of Reproductive Tissues
 Philippa D Darbre and Graeme Williams

He further mentioned the three strands of evidence that fuel concern on EDCs are:

- The high incidence and the increasing trends of many endocrine-related disorders in humans;
- Observations of endocrine-related effects in wildlife populations;
- The identification of chemicals with endocrine-disrupting properties linked to disease outcomes in laboratory studies.

Dr Dighe also pointed that there are a few directives in this regard, however, it is important to strengthen the knowledge of EDCs and develop improved testing facilities for identifying EDCs and methods for evaluating evidence. It is extremely vital to reducing exposures and thereby, the vulnerability to disease. This can be accomplished by creating enabling environments for scientific advances, innovation, and disease prevention.

“Disease risk due to Endocrine Disruptor Chemicals (EDCs) may be significantly underestimated in India”



Ms Prapti Verma, Research Associate, MGC, thanked the panelists and participants for a very interactive session and opened the floor for a question and answer session. The participants

interacted with the speakers and posed pertinent questions on the burning issue of plastics and chemicals, thus, posing unprecedented damage to the marine environment.



Session II



Dr Girija Bharat, Founder Director, Mu Gamma Consultants Pvt. Ltd, moderated the second session of the thematic track event and emphasized on Goal 14 of SDG, that is, 'Conserve and sustainably use the oceans, seas and marine resources'. She mentioned that it is the chemistry, currents, temperature, and life in the oceans that drive global systems and make the Earth habitable for us all. The key to sustainable living, therefore, rests on careful management of the ocean resources.

She also mentioned that over three billion people depend on the marine and coastal biodiversity for their livelihood and marine fisheries alone directly or indirectly provide employment to over 200 million people. However, due to over usage of ocean resources, more than 40% of the world's oceans are heavily affected by pollution, depleted fisheries, and loss of coastal habitats.

Research studies reveal that ocean health is declining with changes and losses in the structure, function, and benefits obtained from marine systems. These pose serious threats to the ecosystem.

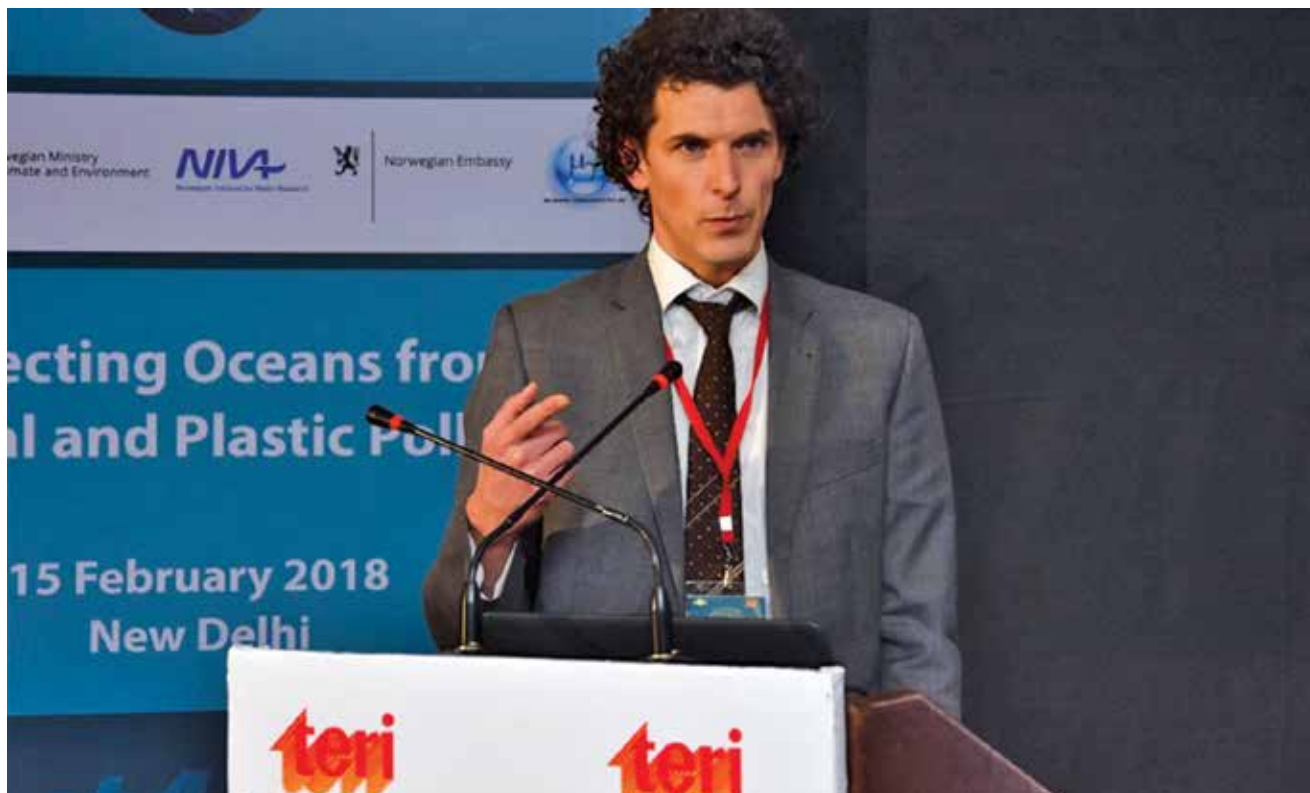
In order to combat these issues and promote ocean sustainability, innovative solutions that prevent and mitigate detrimental impacts to marine environments are essential. She mentioned that the United Nations has designated the years 2021 to 2030 as the 'Decade of Ocean Science for Sustainable Development' to boost international coordination and cooperation in research and scientific programmes for better management of ocean and coastal zone resources and reduce maritime risks.

She expressed a deep sense of satisfaction on how issues of protecting the marine species and supporting the people who depend on oceans are being noticed at the highest levels by global leaders and corrective measures are being undertaken accordingly. However, this being an international issue, close collaboration among countries is required and she looks forward to collaborating with the Norwegian Ministry of Environment and Climate Change, NIVA, NEA on making a difference for better future. With that note, she invited the distinguished speakers to deliver their presentations.



Mr Eirik H Steindal, Researcher, Norwegian Institute for Water Research (NIVA)

of exemption as many of the exempted POPs are being indiscriminately used without any



Mr Eirik H Steindal, Researcher, Norwegian Institute for Water Research (NIVA), delivered a talk on the 'International Commitments on Chemicals and Plastic Pollution'. He began his presentation mentioning that we are all connected with each other through the international conventions such as the Stockholm Convention, Basel Convention, Minamata Convention on Mercury, and the Sustainable Development Goals.

Elaborating on the Stockholm Convention, he stated that this convention is intended for protecting human health and the environment from POPs, entered into force in 2004 with 182 Parties. It has, so far, listed 34 chemicals and 3 are presently under review. He further mentioned that some of the legacy POPs are declining, while some new ones are in line. Many countries are struggling to put in place their respective National Implementation Plans (NIPs). He further mentioned that there is an implication



regulatory prohibition. He brought to the notice of the audience the findings in a new report that flame retardants used in plastics in a wide range of electronic products is putting the health of children exposed to them at risk. He reiterated the fact that circular economy is facilitating in recycling of POPs.

Speaking about the Minamata Convention, he mentioned that this convention was all about

regulating Mercury from ‘cradle to grave’. The first meeting of the Conference of the Parties to the Minamata Convention on Mercury (COP1) was held in Geneva in September 2017. It has been ratified by 88 Parties and comprises 128 signatories. It is now open for amendments regarding the products, processes, and emission sources.

“Circular economy is a new driver for change”

The Second Meeting of the Conference of the Parties to the Minamata Convention on Mercury (COP2) is expected to convene in November 2018 in Geneva. More Parties are also expected to join at a later point in time. However, the challenge lies in its implementation. It is important to note that

this is a positive effort and will pave the way for guidance on release and thereby inputs for the oceans. All these developments would pose a major shift in global (illegal) trade.

Next, he spoke about the international commitment on plastics: The Basel Convention and SDG 14. Target 1 of this SDG is: “By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution”. He also brought the attention of the participants to



the resolutions of the UN Environment Assembly (UNEA), the world's highest-level decision-making body on the environment. In the Nairobi session held in December 2017, the overarching theme was pollution. The third session of the UN Environment Assembly (UNEA-3) adopted 11 resolutions submitted by Member States. The delegates adopted, by consensus, a negotiated Ministerial Declaration, through which they agreed to address the pollution of air, land and soil, freshwater, and oceans.

The other international initiatives are UN activities, such as: Global Partnership on Marine Litter (GPML) which has three overarching goals for protecting oceans and marine life. He also mentioned that ‘The Clean Seas Campaign’, launched in January 2017, aims to increase global awareness of the need to reduce marine litter. This is a global UN Environment initiative to reduce marine litter for which Norway will provide financial support to UN Environment’s work.

Summarizing his talk, he mentioned that ‘Global problems require global solutions’. Therefore, stronger international collaboration is warranted for solving the problem. He also mentioned that global conventions provide a framework for



essential technical and financial support. However, there are challenges with implementation and

exemptions which need to be dealt with a deeper understanding of the dynamics prevalent in respective countries. He also stated that circular economy is a new driver for change, which can be leveraged towards better management of chemical and plastic waste.

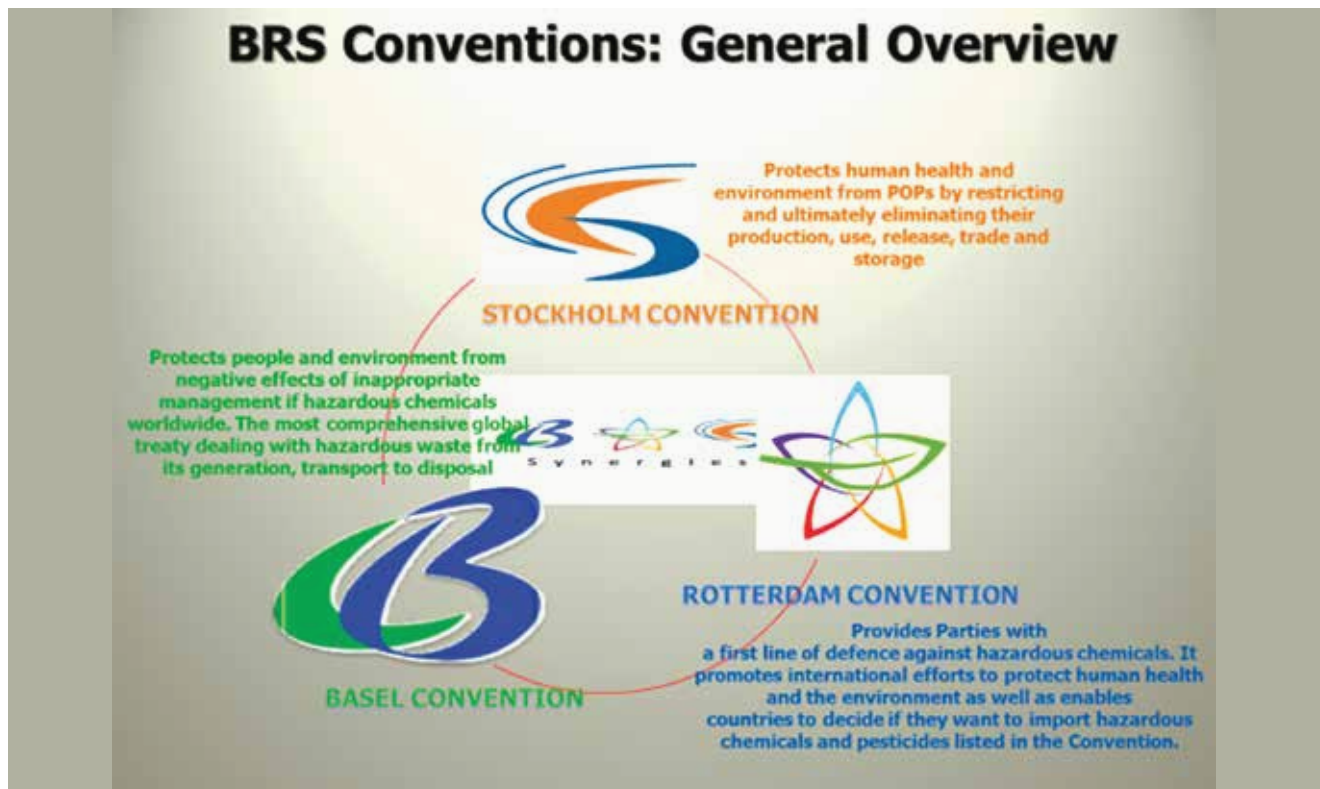
Mr Eirik Steindal emphasized on the fact that Norway and India have a great potential for closer collaboration within research and policy development on pollution issues

Dr Asha A Juwarkar, Ex-Chief Scientist and Head, Ecosystem Division, NEERI; Ex-Coordinator, Stockholm Convention Regional Centre on POPs for Asia Region, Currently Sr Consultant with Mu Gamma Consultants Pvt. Ltd.

Dr Asha A Juwarkar provided an overview of the 'Status of Stockholm Convention Implementation in India' in her presentation. She gave a bird's eye view of the three important conventions, the Basel Convention, Rotterdam Convention,

and the Stockholm Convention, and particularly discussed about the Stockholm Convention and chemical management under its ambit. She mentioned how the Stockholm Convention had made it obligatory for the signatory countries on the following aspects of management of POPs:

- Programme and project development and project management;
- Resource mobilization and partnerships;
- Conference and workshop planning, logistics, and reporting;
- Budgeting and financial management;
- Provision of technical advice and information relating to the respective conventions;
- Preparation of technical and non-technical documents;
- Outreach and communication;
- Information technology;
- International and national law as they pertain to chemical products and wastes;
- Technical training



Further, she gave a detailed account of the various POPs which were adopted during the various COP Summits. She also elaborated on the activities under the National Implementation Plans (NIPs). The NIP was prepared and covered the initial 12 POPs. It identified several priority areas for effective implementation of the Convention. The Government of India has initiated major projects with GEF-UNIDO, enumerated as follows:

- Environmentally Sound Management and Final Disposal of Polychlorinated Biphenyls (PCBs) in India
- Environmentally Sound Management of Biomedical Waste in India
- Development and Promotion of Non-POPs Alternative to DDT

“There is a strong need to develop protocols and technical manpower along with analytical tools to address the issue of plastic pollution”

Dr Juwarkar deliberated about the Stockholm Convention related recent developments in India, which are as follows:

- The Ministry of Environment, Forest and Climate Change (MoEF&CC) issued a draft

notification vide dated 29 August 2017 on regulation of POP rules for public consultation.

- The purpose of the notification is to prohibit manufacture, trade, use, import and export of the following POPs/chemicals. The rule may be finalized soon:
 - o Chlordecone;
 - o Hexabromobiphenyl;
 - o Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octa-BDE);
 - o Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial penta-BDE);
 - o Pentachlorobenzene;
 - o Hexabromocyclododecane; and
 - o Hexachlorobutadine

Dr Juwarkar highlighted on the responsibilities and opportunities in management of POPs in India and summed up her presentation by mentioning that management of POPs in environmentally-sound manner is essential to protect human health and the environment. She emphasized on the need for more research to help MoEF&CC in taking informed decisions. She reiterated the fact that collective effort is required to ensure effective implementation of the Stockholm Convention.



Mr Satish Sinha, Associate Director at Toxics Link, New Delhi



Mr Satish Sinha gave a talk on the status of Minamata Convention preparation in India. He also gave an introduction about his organization, Toxics Link, a not-for-profit, non-governmental organization, engaged on environmental issues relating to toxics, chemicals, and waste for over 15 years. He also mentioned that Toxics Link prepared the first mercury assessment report for India in 2004 with the United Nations Environment

Programme (UNEP) and has played an important role in phasing out mercury from health care sectors, besides contributing to the Minamata Convention preparation process in India.

He gave a glimpse of mercury pollution and stated that Methyl mercury is its most toxic form due to be a neurotoxin. It bio-accumulates and biomagnifies and affects fetus. It has long range transport and hence, is a global pollutant and requires global action. There has been an incident of Minamata disease in Kodaikanal in India.

Mr Sinha being actively involved in the Minamata Convention processes in India, gave an interesting account of the journey India thus far. He gave an overview of the Minamata Convention and the important milestones (Figure 6) in recognizing mercury as a chemical of global concern. MC envisages to protect human health and environment: From the anthropogenic emissions; and from mercury compounds. The Minamata Convention has 144 signatories and has been ratified by 88 countries. It contains 35 Articles & 5 Annexes.

Main steps of the negotiations process

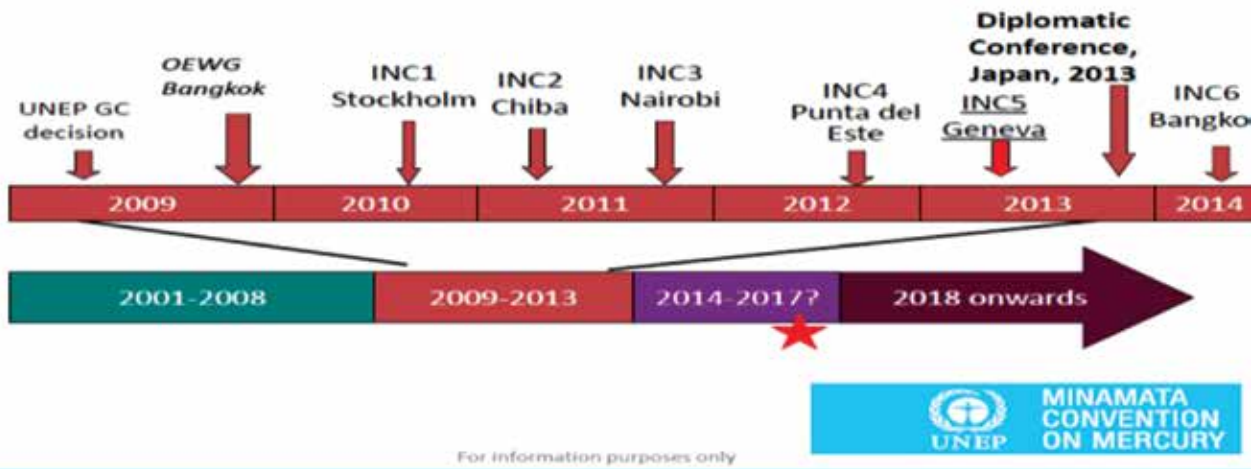


Figure 6: A timeline of the Minamata Convention negotiation process

He gave the current status of Mercury pollution in India as follows:

- Mercury and mercury compounds are freely traded in India (Figure 7)
- The inventory /stockpiles are not known
- Phase out from Chlor-Alkali plants is under process, except the DCM plant in Kota, Rajasthan
- Regulation for mercury containing lamps in E-Waste Rules, 2016
- Use of Mercury is prohibited in cosmetics under the Cosmetics and Drugs Act, 1940
- Phase-out from health care sectors
- Methyl mercury chloride and Phenyl–mercury acetate has been banned in pesticides
- Mercury emission standards for thermal power plants has been set
- Mercury emission standards for municipal waste, hazardous incineration, and biomedical waste incineration is set
- Mercury use in Ayurveda and traditional practices (exempted in Minamata Convention)

Mr Sinha concluded his speech by stating the challenges involved in management of Mercury, such as:

- To prepare an action plan to phase out of mercury-added products by 2020;
- Required shift to alternates and setup protocols and systems to address all issues related with such shifts;
- Regulation on free trade of mercury;
- Facilities for mercury storage;
- The Treatment, Storage and Disposal Facilities (TSDF) in India are not equipped for mercury-bearing waste;
- Management of mercury-contaminated sites,
- Need for a National Implementation Plan (NIP) to control mercury emission.

“National implementation plan to deal with mercury should stress on control of mercury emissions”

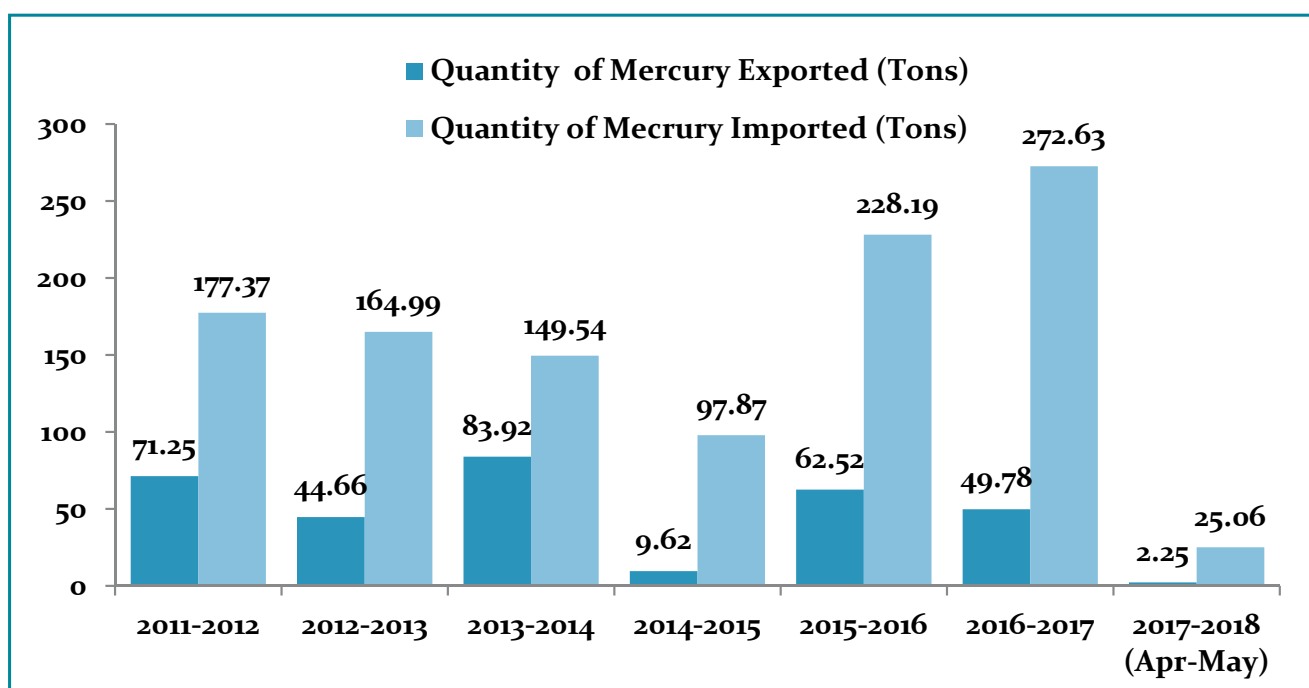


Figure 7: Export-Import of Mercury in India

Dr Luca Nizzetto, Research Scientist, Norwegian Institute for Water Research (NIVA)



topic: 'State of the knowledge on marine chemical pollution and its drivers'. He brought up the quote of Arthur C Clarke: "How inappropriate to call this planet "Earth" when it is clearly "Ocean". With that, Dr Nizzetto mentioned that during most of the 300,000 year long history of our species, human beings were insignificant animals with no more influence on their surrounding environment than gorillas, flies or jellyfish. He stated that this applies to the marine environment where it is only during the last 500 years that humans started a systematic exploration of its geography and resources. And it is only during the last few decades that unsustainable exploitation of marine resources has begun. Modern fisheries, anthropogenic alteration of climate, and biogeochemical cycles have left a tangible human fingerprint in the homeostasis of the global ocean.

Dr Luca Nizzetto gave an insightful talk on the



Figure 8: Scientific Exploration of Oceans

He further stated that human activities mostly take place in a relatively narrow line at the interface between land masses and the oceans: coastal areas and continental shelf. Anthropogenic drivers that lead to ocean contamination can be grouped in three categories --- i. Material Engineering; ii. Combustion Process; iii. Agro-chemistry. These activities result in releasing chemical substances to the environment. As emissions rate are boosting up and many substances can impact biota and human health even at extremely low concentrations (such as Dioxins to provide an example).

Scientific exploration (Figures 8 and 9) of ocean pollution is a new area of research 10 years that scientist has started a systematic exploration of Ocean pollution. The problem of plastic debris in the ocean is on a steady rise. He discussed results of some of his studies on PCBs (polychlorinated biphenyl), DDTs, and marine monitoring. He expressed his thoughts regarding contaminants of emerging environmental concern which is due to the consumption choices and lifestyles, thereby releasing an extremely complex cocktail of substances exotic to the marine environment. These are personal care products we use in our daily life, pharmaceuticals, and antibiotics that pass through our metabolism and find their way to the sea from rivers and direct discharges in coastal areas.

To sum up the deliberation, Dr Nizzetto called the various stakeholders to take concerted action in reducing marine pollution caused due to emerging contaminants and plastic wastes.

“Every time and everywhere we search for a contaminant in the Ocean... we find it!”



Figure 9: Laboratory analysis of samples collected from the oceans

Mr Nathaniel Dkhar, Associate Fellow, TERI, proposed a ‘Vote of Thanks’ to the panelists for the very informative discussion on the chemical and plastic pollution and its impact on the oceans. He also thanked the participants for making the session very interactive with their active participation.



Annexure I: Agenda of the event



WSDS 2018 | Thematic Track

'Waste Management'

Title: Protecting Oceans from Chemical and Plastic Pollution

Date: 15 February 2018 | Time: 13.30-15.30 Hrs

Venue: Amaltas, India Habitat Centre, New Delhi

Chair	Dr S K Sarkar, Distinguished Fellow and Sr Director, TERI
Session I (13.30 -14.30 Hrs)	<ul style="list-style-type: none"> • Welcome and opening remarks: <ul style="list-style-type: none"> o Dr S K Sarkar, Distinguished Fellow and Sr Director, TERI-5 mins o Ambassador Nils Ragnar Kamsvåg, Royal Norwegian Embassy-10 mins • Global challenges regarding chemicals and plastic pollution a Land-Ocean interaction perspective by Prof Thorjørn Larssen, Research Director, Norwegian Institute of Water Research (NIVA)-15 mins • Norway and EU policy initiatives on chemicals and plastic pollution mitigation by Anne Marie Mo Ravik, Norwegian Environment Agency-10 mins • Endocrine disrupting chemicals – Status in India -Dr Vikas Dighe, Scientist, ICMR-10 mins • Question & Answer Session-10 mins
Session II (14.30-15.30 Hrs)	Moderator by Dr Girija K Bharat, Founder Director, Mu Gamma Consultants Pvt. Ltd. <ul style="list-style-type: none"> • Minamata and Stockholm Convention: International status by Mr Eirik H Steindal, Researcher, NIVA -15 mins • Status of Stockholm Convention implementation in India by Dr Asha Juwarkar, MGC, Ex-Chief Scientist and Head, NEERI - 10 mins • Status of Minamata Convention preparation in India, Mr Satish Sinha, Associate Director, Toxics Link- 10 mins • State of knowledge on marine chemical pollution and its drivers by Dr Luca Nizzetto, Research Scientist, NIVA - 12 mins • Question & Answer Session -10 mins • Vote of thanks - Mr Nathaniel B Dkhar - 3 mins

Annexure II: Profile of the Speakers



Ambassador Nils Ragnar Kamsvåg

Ambassador Nils Ragnar Kamsvåg was appointed Norwegian ambassador to India in 2015.

Mr. Kamsvåg has served as ambassador to Serbia, Macedonia and Montenegro (2010-15), as Representative to the Palestinian Authority and as Ambassador, Middle East and North Africa, in the Ministry of Foreign Affairs.

Ambassador Kamsvåg joined MFA in 1981. In addition to varied positions in MFA, he has been posted to Beirut, Rome, Brussels, Beijing, Jerusalem and Belgrade. From 1990 to 1993, he was Director of Public Affairs in Norsk Hydro.

Mr. Kamsvåg has an MA in History from the University of Oslo.



Dr S K Sarkar

Dr S K Sarkar is Distinguished Fellow and Senior Director at TERI. He heads the Natural Resources and Climate Programme and is associated with TERI since September 2014. He is a Doctorate in Economics (1991) from the State University of New York, Stony Brook, New York. During 1998 till 2003 Dr Sarkar worked as Senior Fellow, TERI, and during 2005-2007 as Director, Division of Regulatory Studies and Governance in TERI.

Dr Sarkar is an IAS officer (retired) 1979 of West Bengal Cadre. He is a former Secretary to the GoI in the Ministry of Water Resources and in the Department of Personnel and Training. He served other Ministries such as Finance Ministry and Defence in the Government of India, and worked in various capacities with Government of West Bengal. He also worked as consultant with the Asian Development Bank and with the World Bank/PPIAF (Public Private Infrastructure Advisory Facility).

Dr Sarkar has got several publications to his credit, has authored and edited books on infrastructure issue and has presented a number of important papers in several conferences.

He taught a course on “Public Policy” in the Kabul University (2007), Afghanistan, and also teaches at TERI University.



Professor Dr. Thorjørn Larssen

Professor Dr. Thorjørn Larssen is a Research Director at Norwegian Institute for Water Research. He is an environmental chemist by training, with broad research interests, a wide project portfolio and more than 90 papers in the international literature. Key research interests are within applied environmental science, including interactions between the natural environment and pressures from human activities, behavior pollutants in the environment and interactions between pollutants in different environmental media. Published work includes biogeochemistry of main elements, mercury, POPs and emerging contaminants in the environment, pollution impacts on eco-systems and human health and links between climate change and impacts of contaminants. Professor Larssen is also Adjunct Professor in Environmental Chemistry at the University of Oslo. He has been awarded a prize for international cooperation from the Chinese Academy of Sciences.



Ms. Anne Marie Mo Ravik, Senior Adviser, Norwegian Environment Agency

Ms. Anne Marie Mo Ravik is Senior Adviser at the Norwegian Environment Agency, International Section. By education, she holds a MSc in chemical engineering. Ravik has long and broad experience from the Norwegian Environment Agency, including permitting for the industry sector, compliance monitoring and international cooperation projects.



Dr Vikas Dighe, Scientist 'D' and Head, NIRRH, ICMR

Dr. Vikas D Dighe is currently a Scientist 'D' and Head, National Center for Preclinical Reproductive and Genetic Toxicology, of National Institute for Research in Reproductive Health (ICMR).

He obtained Bachelor's degree BVSc and AH from Nagpur Veterinary college, and did his Post graduation from Indian veterinary Research Institute (IVRI), in the discipline of Animal Biotechnology and Doctoral Degree from IVR. His research area is Reproductive Toxicology and Endocrine Disruptors and Human Health

He has received the Mid carrier Scientist award constituted by Indian Society of Veterinary Immunology and Biotechnology Year 2017 and also received the Overseas Training fellowship at Oregon National Primate Research Center (OHSU) Beaverton, Oregon USA, in the area of "Assisted Reproductive Technologies (ARTs) in non-human primates, Stem cell derivation and characterization, Epigenetic reprogramming of ES cells and Derivation of Specific pathogen free Monkey for biomedical research.

He was awarded Indian Veterinary Research Institute-Junior Research Fellowship (1997-1999) and Indian Council of Agriculture Research Merit Scholarship (1992-1997). He has publications 25 Research Papers in International, National and Book Chapters and is presently handling 9 research projects.



Dr Girija K Bharat, Founder Director, Mu Gamma Consultants Pvt. Ltd., Gurgaon

Dr Girija K Bharat is also a Senior Consultant with the World Bank, USAID and TERI. She has over 25 years of experience in conducting research on Water Supply and Sanitation, Water Quality Assessment, Water Resource Management and Environmental Management. She was a Fellow and Area Convenor of Water Resources Division of TERI. Prior to joining TERI, she has also been a Scientist in Central Institute of Mining and Fuel Research, CSIR and Associate Professor in Chemistry in Tripura University.

She has a Ph.D. in Chemistry (Water Quality) and has authored 55 book chapters, policy briefs, articles and published research and technical papers in reputed national and international journals, Global Sustainable Development Reports 2015 and 2016. Recently she has been instrumental in bringing out the 'State of Urban Water and Sanitation in India report', 'Water Policy for Georgia' as part of the activities of USAID funded G4G project.

She is an alumni of IIT, a Presidential Scholar at George Mason University, Virginia, USA, member of American Chemical Society and a member of Iota, Sigma, Pi-an honor society for women in Chemistry in the US.



Eirik H. Steindal

Eirik H. Steindal is a Research Scientist at the Norwegian Institute for Water Research. Steindal is a biologist by training and has been working nearly twenty years with environment and development issues. In his previous position as a Senior Adviser at the Norwegian Environment Agency he coordinated monitoring activities, coordinated the agency's work on the Minamata Convention and acted as a deputy head of the Norwegian delegation. Steindal has been Norway's representative in the expert group on persistent organic pollutants and mercury, under the Arctic Council. Steindal has working experience from UN Environment, national and international NGOs, environmental consultancy and at the UN expert laboratory, the Institute of Environmental Studies, VU University, Amsterdam. His core research interest is within applied science, policy development and multilevel governance on chemical and waste issues, with a focus on Multilateral Environmental Agreements.



Dr Asha Juwarkar

Dr Asha Juwarkar was the Chief Scientist and Head of the Eco-System Division at NEERI. She was the Coordinator of Stockholm Convention Regional Centre on POPs for Asia Region. She is currently a Sr Consultant with Mu Gamma Consultants Pvt Ltd.

Her research career spanning 33 years include Phytoremediation/bioremediation of degraded lands using biotechnological approach, Eco-friendly treatment processes such as High Rate Transpiration System (HRTS) and Wetland system for domestic and industrial wastewater management, Novel approaches for mitigation of soil polluted with metals, hydrocarbons, pesticides etc., She has been instrumental in formulation of the National Implementation Plan for POPs sponsored by UNIDO. Expertise in sound management of PCB's, PBDE's and Dioxins & Furans. She is also a Fellow of The National Academy of Sciences, India. She has over 100 research and technical publications and book chapters. She is also the recipient of Indira Priyadarshani Vrikshamitra Puruskar , among many others.



Satish Sinha is Associate Director at Toxics Link.

Satish has been associated with this research based policy advocacy group since 2003 and has been leading a team trying to effect change both at policy and grassroots level. His knowledge and expertise on environmental issues, especially in areas of municipal, hazardous & medical waste management, food safety & chemicals and POPs, has helped in taking these critical issues forward in the country. He has worked extensively on the policy and legal aspects of E-waste and has also co-authored "E Waste" published by TERI. He has in-depth knowledge on the informal recycling sector in India.

Prior to joining Toxics Link he held an important assignment of Director FICCI-CARE Gujarat Rehabilitation project post the Gujarat earthquake of 2000. He brings along rich and diverse management experience with him having served with the Indian Air Force for over 20 years in various responsible positions.



Dr Luca Nizzetto

Dr Luca Nizzetto is Senior Scientist at the Norwegian Institute of Water Research (NIVA) in Oslo, Norway and holds a position at Masarik University in Czech Republic. His expertise is on the analysis of drivers, sources, fate, distribution and impacts of chemical contaminants and microplastic in the environment. He runs international research projects on different areas including terrestrial, freshwater and marine pollution, microplastics in agricultural and fresh water systems. He is the coordinator of the project EDIFY (Endocrine Disruptors in Indian Food): a Norwegian-Indian cooperation. At WSDS Dr Nizzetto co-organizes the Thematic Track Panel: Protecting Oceans from Chemical and Plastic Pollution.

Annexure III: Photo Gallery











The Thematic Track event titled: '**Protecting Oceans from Chemical and Plastic Pollution**' during the World Sustainable Development Summit-2018 was hosted by The Energy and Resources Institute (TERI), Ministry of Climate Change and Environment of Norway, Norwegian Embassy in New Delhi, Norwegian Institute of Water Research (NIVA), Mu Gamma Consultants Pvt. Ltd. (MGC). The Proceedings encapsulate the discussions and deliberations during this event.

This event was aimed to address land-based pollution sources and processes that result in transport and release of chemicals and plastic waste to the Ocean. The deliberations also focused on the role of transnational capacity building around international conventions to reduce emission and transport of pollution to the Oceans. By improving the knowledge-base, sharing experiences and discussing sound policy and management options, the event aimed to contribute to setting the framework for a better waste management, reduced releases of hazardous chemicals, marine litter and microplastic pollution.

The coastal countries in both the “Global North and South” are relying on a healthy ocean for subsistence and growth. Hence, improved knowledge, stronger international collaboration, and sharing of best practices to deal with hazardous chemicals and plastic pollution, are pivotal elements to achieve a global sustainable development and protect our shared ocean ecosystem.