



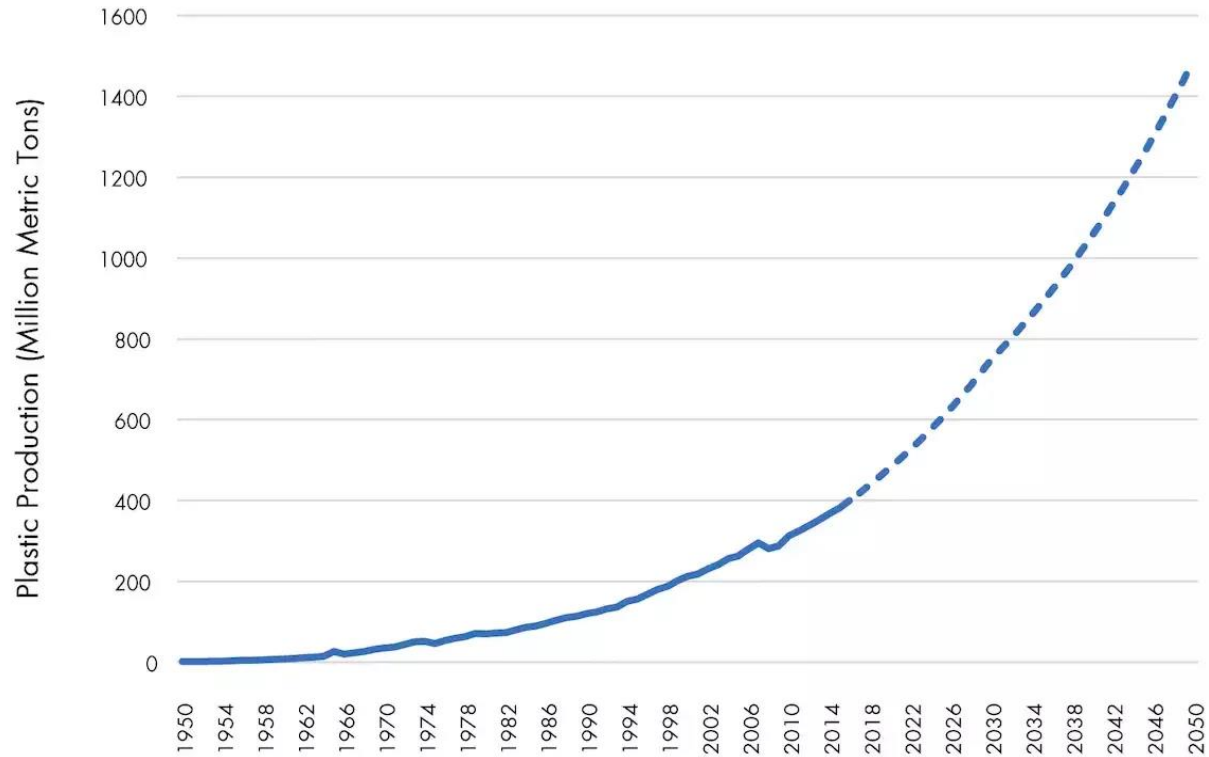
Monterey Bay  
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# Decoding Plastic Pollution: A Scientific Overview

**Margaret Spring** | she/her | Chief Conservation and Science Officer  
A Primer on Compliance and Enforcement Issues for Plastics Pollution | 1.31.2024

# Plastic is being produced at an unmanageable pace.



- Global plastic production has increased **230-fold** since 1950.
- Industry projects production will almost **quadruple** by 2050.
- About **12 million tons** of plastic make their way into the ocean every year.

# Plastic pollution is an ocean problem.

- Found in most marine habitats on Earth.
- Most sea turtle, marine mammal, and seabird species are impacted.
- Microplastic and associated chemicals travel through the marine food web.



Image: [Naja Bertolt Jensen / Ocean Image Bank](#)

# Plastic pollution is a people problem.



Image: [Vincent Kneefel / Ocean Image Bank](#)

Plastic pollution disproportionately impacts vulnerable people and communities, at all stages of a plastic product's life cycle.

# Most plastic is from fossil sources, with impacts to:

- Environment
- Society
- Health
- Climate
- Economy



Jim Bowen, "[Baton Rouge Refinery](#)" via [CC](#)

# Whose problem is it?



- Everyone's: solutions are needed around the world.
- The problem goes beyond poor waste management in other countries.
- **Need to address the source:** countries and corporations producing and exporting a record volume of plastic.

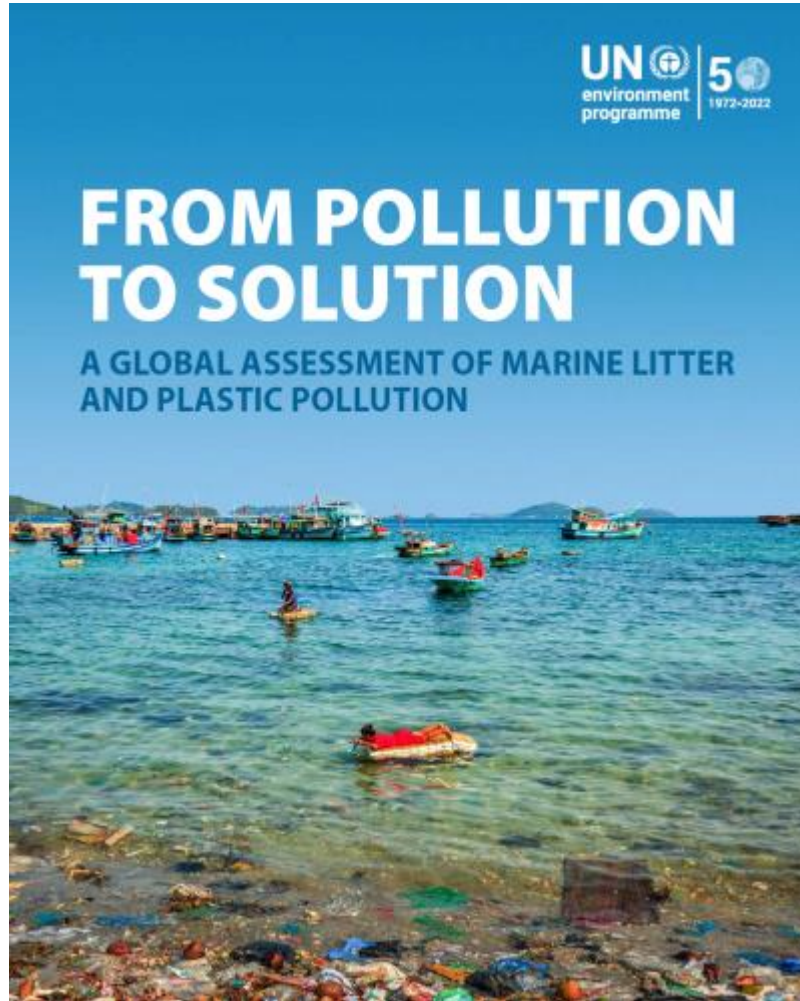
**NEGLECTED:** environmental justice impacts of plastic pollution

## Global scale human health and equity crisis drives renewed urgency.

- Human health hazards taking center stage.
- Voices from most impacted communities getting stronger.
- More scrutiny on toxic chemicals in plastic products.



# 2021 UNEP Report Key Findings



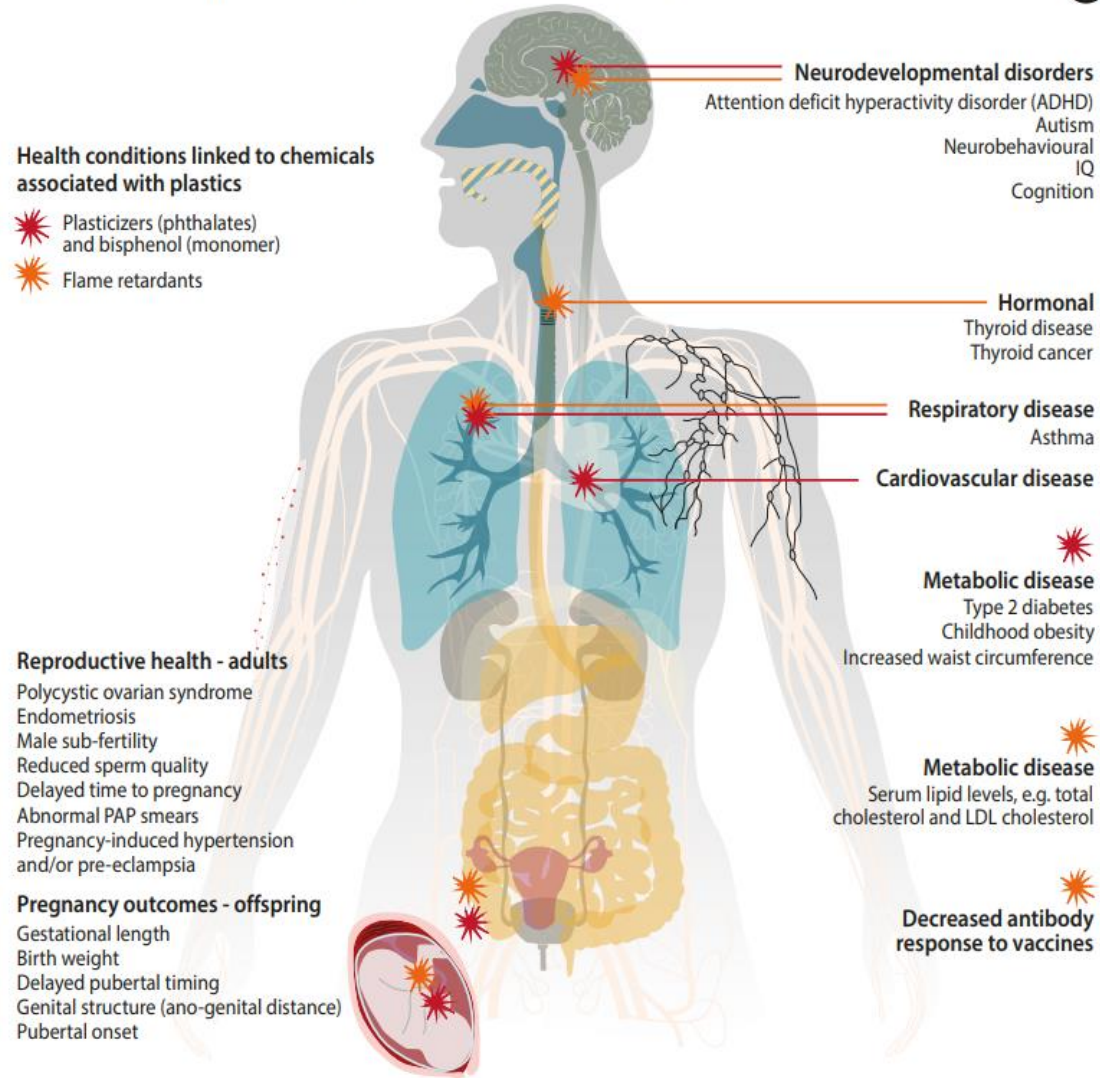
- Emissions of plastic waste into aquatic ecosystems are projected to triple by 2040
- The release of chemicals associated with plastics through leaching into the marine environment is receiving increasing attention, as some of these chemicals are substances of concern or have endocrine disrupting properties.
- By 2040 plastic leakage into the oceans could represent a US\$100 billion annual financial risk



# Health Impacts of Plastic-associated Chemicals

## Human health impacts of exposure to plastic-associated chemicals

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Sources: UNEP 2021; Landrigan et al. 2020.

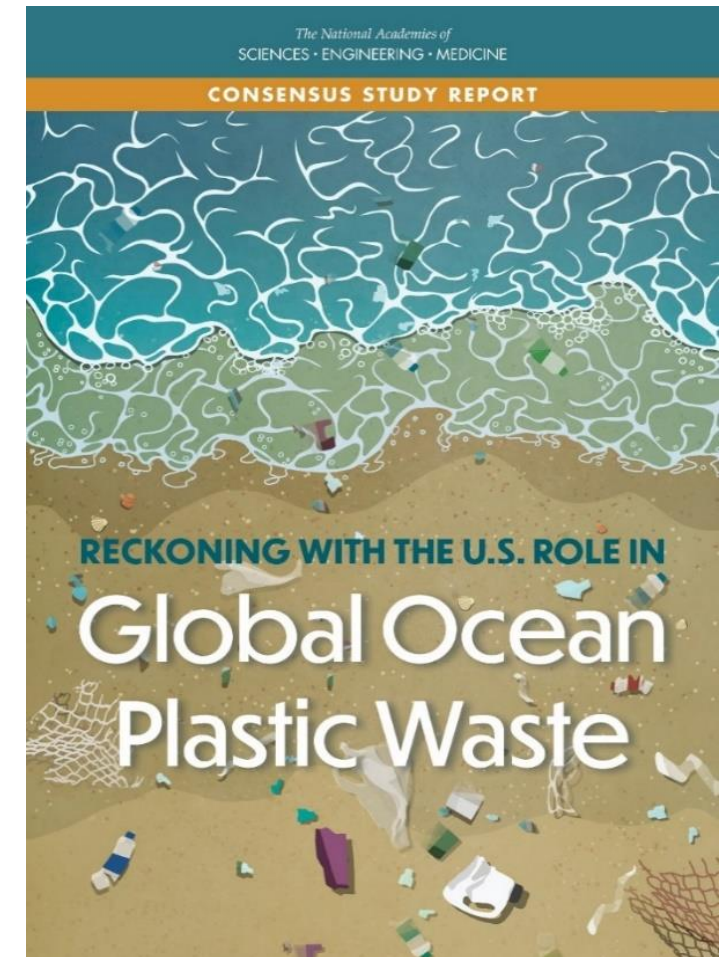
Illustrated by GRID-Arendal/Studio Atlantis

Figure 3c: Human health impacts of exposure to plastic-associated chemicals

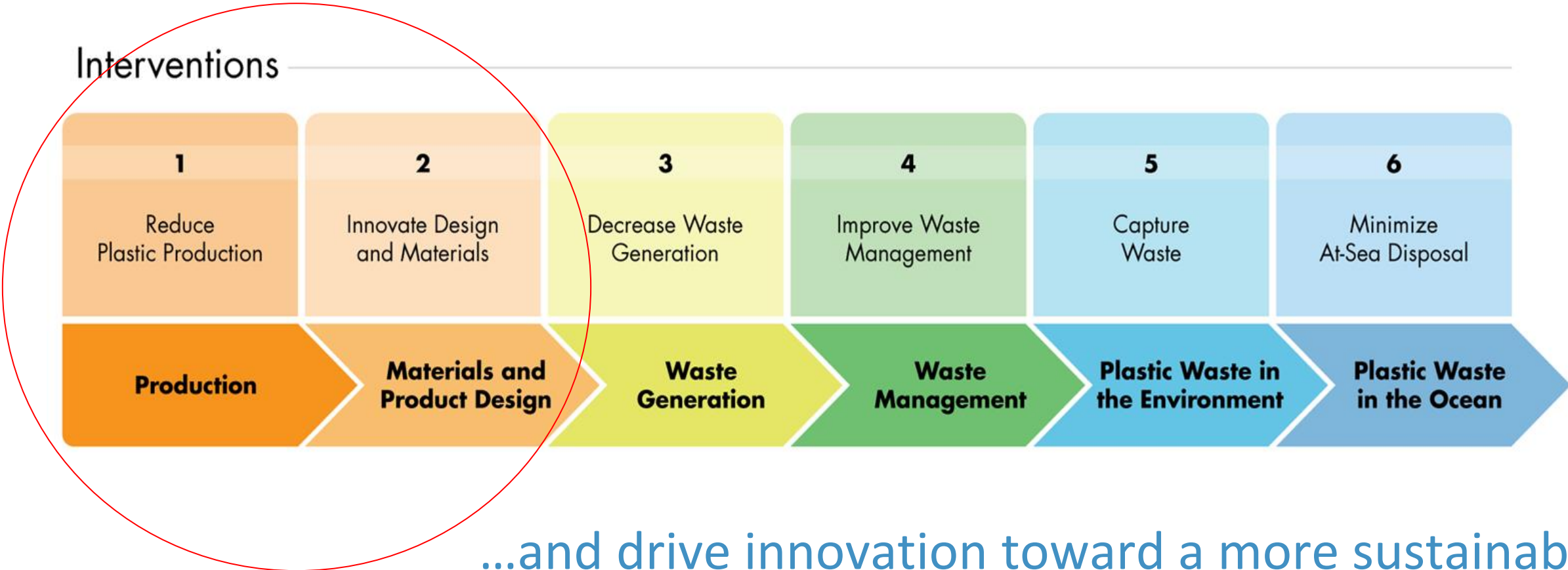


# 2022: U.S. plays significant role in plastic pollution problem.

- In 2016, the U.S. was the world's top generator of plastic waste. The average American discarded **290 pounds**.
- The U.S. is in **top 12 contributors** of plastic waste leakage into coastal environments.
- The U.S. recycling infrastructure can't handle all our plastic waste. So we export much of it to other countries.



Calls for action *at each stage* to reduce plastic waste entering the environment and ocean.



...and drive innovation toward a more sustainable and equitable future.

# 2023: Minderoo-Monaco Commission on Plastics & Human Health



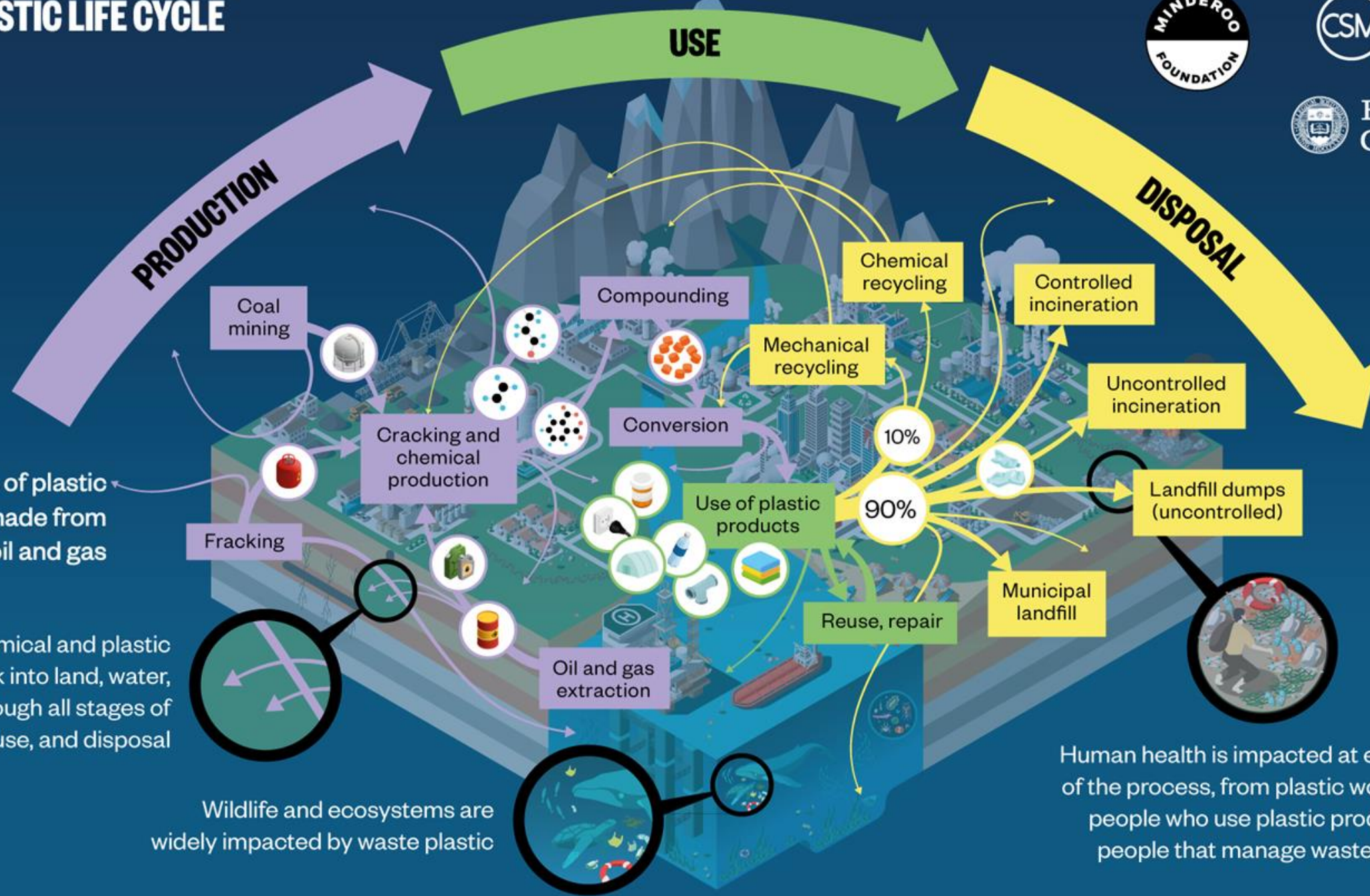
**Philip J. Landrigan** , Hervé Raps, Maureen Cropper, Caroline Bald, Manuel Brunner, Elvia Maya Canonizado, Dominic Charles, Thomas C. Chiles, Mary J. Donohue, Judith Enck, Patrick Fenichel, Lora E. Fleming, Christine Ferrier-Pages, Richard Fordham, Aleksandra Gozt, Carly Griffin, Mark E. Hahn, Budi Haryanto, Richard Hixson, Hannah Ianelli, Bryan D. James, Pushpam Kumar, Amalia Laborde, Kara Lavender Law, Keith Martin, Jenna Mu, Yannick Mulders, Adetoun Mustapha, Jia Niu, Sabine Pahl, Yongjoon Park, Maria-Luiza Pedrotti, Jordan Avery Pitt, Mathuros Ruchirawat, Bhedita Jaya Seewoo, **Margaret Spring**, John J. Stegeman, William Suk, Christos Symeonides, Hideshige Takada, Richard C. Thompson, Andrea Vicini, Zhanyun Wang, Ella Whitman, David Wirth, Megan Wolff, Aroub K. Yousuf, **Sarah Dunlop**



# THE PLASTIC LIFE CYCLE



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99% of plastic is made from coal, oil and gas

Chemical and plastic particles leak into land, water, and air through all stages of production, use, and disposal

Wildlife and ecosystems are widely impacted by waste plastic

Human health is impacted at every stage of the process, from plastic workers, and people who use plastic products, to people that manage waste plastic

# COMMISSION MAIN FINDINGS



Current practices for the production, use and disposal of plastics cause great harms to human health and the global environment. **They are not sustainable**

The **10,500 chemicals in plastics** include carcinogens, neurotoxicants and endocrine disruptors. These toxic chemicals are responsible for many of plastics' harms.

Any strategy for control of plastics' hazards must address these chemicals

Health-related costs of plastic production exceeded **\$250 billion each year globally.**

In the USA alone, the costs of disease, disability and death caused by three plastic chemicals - PBDE, BPA and DEHP - exceed **\$920 billion annually**

The harms caused by plastics disproportionately affect vulnerable populations – the poor, people of colour, Indigenous populations, and the world's children

Plastic's harms can be prevented using the same highly cost-effective strategies that governments and UN agencies have used to prevent air and water pollution and protect humanity against other clear and present dangers

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# RECOMMENDATIONS ON REDUCING PLASTIC POLLUTION



**A global cap on plastic production** needs to be a key component of the Global Plastic Treaty

Implementation of this cap needs to be guided by targets and timetables and supported by national commitments.

The Global Plastic Treaty needs to include a provision banning or severely restricting manufacture and use of unnecessary, **single-use plastic items**

The Global Plastic Treaty needs to prescribe minimum global standards for **Extended Producer Responsibility (EPR)**

EPR rules make plastic manufacturers legally and financially responsible for the safety and end-of-life management of all the materials they make and sell.

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# RECOMMENDATIONS ON REDUCING PLASTIC TOXICITY



The Global Plastics Treaty must extend beyond microplastics and marine litter and address the more than 10,500 chemicals incorporated into plastics.

## **Health-protective standards for plastic-associated chemicals need to be established under the Global Plastics Treaty**

These standards need to require independent toxicity testing of :

- all polymers and plastics chemicals in current use and
- all new polymers and plastics chemicals for before they can enter markets.

The Global Plastics Treaty needs to include provisions for reducing the complexity of plastic products.

Plastics need to be redesigned and simplified to facilitate reuse, remanufacturing and recycling.

The goal is to retain plastics in the economy for as long as possible

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# THE GOOD NEWS



We can fix the plastics' crisis

Our success in controlling air and water pollution provides a roadmap

A comprehensive, legally binding Global Plastics Treaty will be key

The impediments to controlling the plastics' crisis are not technical

They are legal, economic, and political

It is our moral and ethical duty to overcome these impediments and to act courageously to protect our children's health and preserve our planet.

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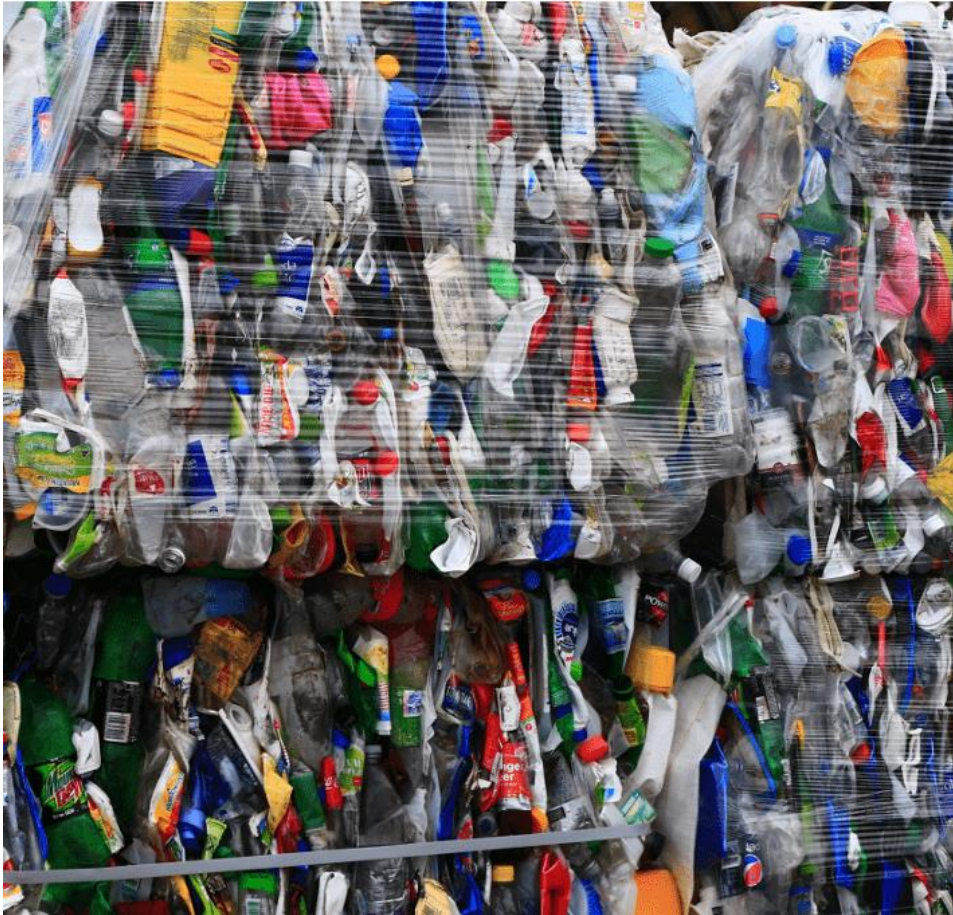
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# 2023 UNEP Report: Chemicals in plastics pose a risk

- More than 13,000 chemicals have been identified as associated with plastics and plastic production
- 7,000 have been assessed for their hazardous properties
- More than 3,200 identified as substances of potential concern.



*FYI: Related but separate process –*  
“Science-Policy Panel on chemicals, waste and pollution prevention”



- “SPP” called for by UNEA Resolution in 2022.
- Contribute further to the sound management of chemicals and waste.
- Strengthen scientific basis of policies.
- Contribute to more effective and sustainable approaches to protecting human and environmental health.
- Provide scientific expertise to policymakers.

## *FYI: Related but separate process*

# 2023 Global Framework on Chemicals (“Bonn Declaration”)

- The new global framework sets concrete targets and guidelines for key sectors across the entire lifecycle of chemicals.
- Outlines roadmap for countries and stakeholders.
- Calls for the prevention of illegal trade and trafficking of chemicals and waste.



# 2024: Major issues for science at global plastic negotiations

- Definitions
- Production cap/limits
- Chemicals and polymers of concern
- “Problematic” plastic
- Marine Sources
- Equity/Just Transition
- “Solutions” - EPR, Reuse/Refill, Cleanup, Recycling, Substitutes and Alternatives
- Trade & transboundary movement of waste
- Transparency, tracking, monitoring, labelling
- Existing pollution
- Science Body/ Review/ Advice
- Financing and Tech Assistance
- Awareness-raising, education, research



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Environment  
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**Intergovernmental negotiating committee to develop  
an international legally binding instrument on plastic  
pollution, including in the marine environment**

**Third session**

Nairobi, 13–19 November 2023\*

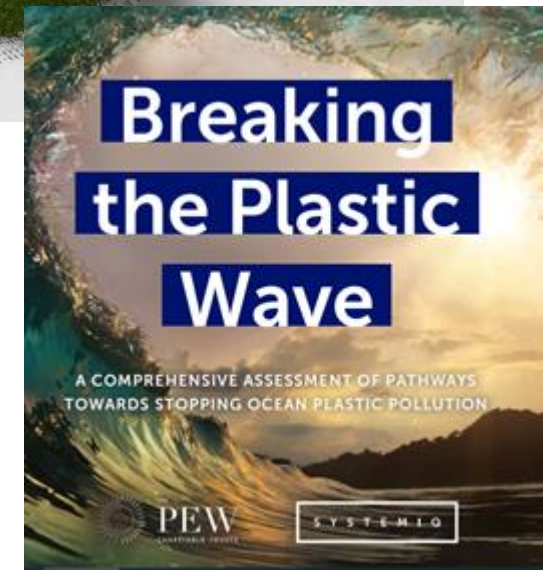
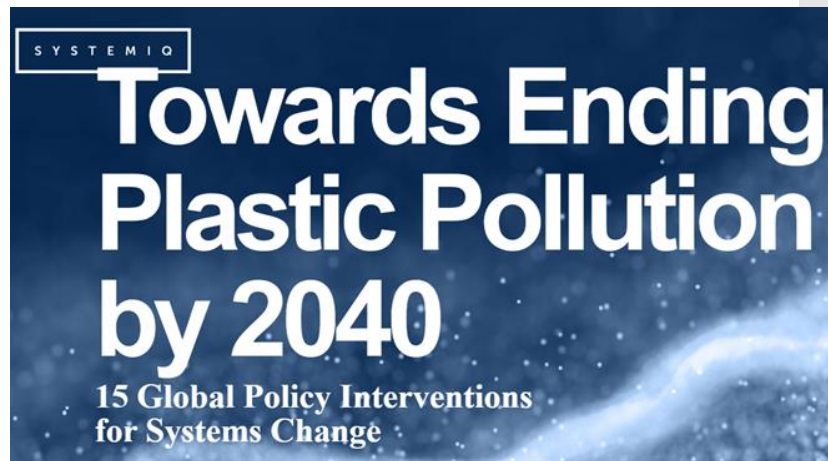
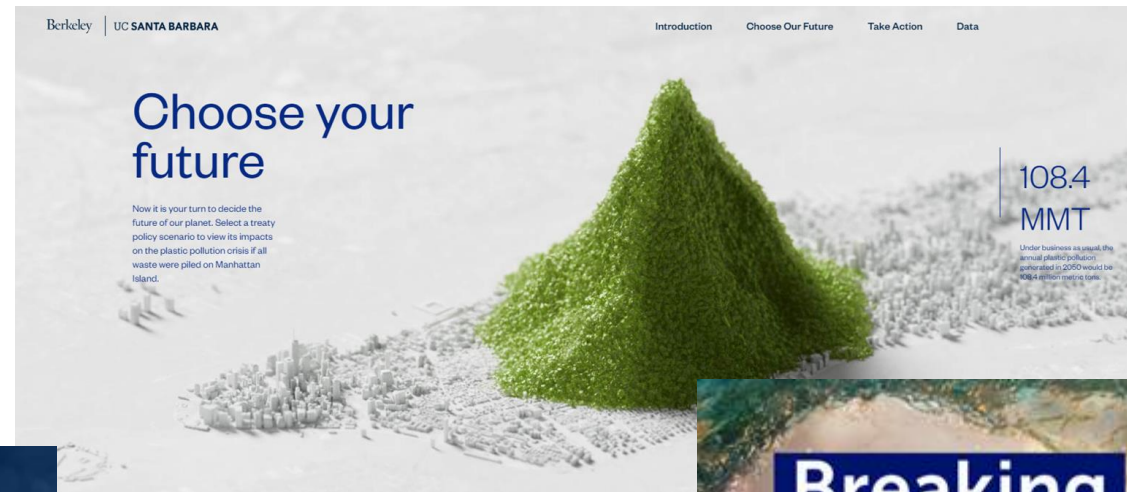
Item 4 of the provisional agenda

**Preparation of an international legally binding instrument on  
plastic pollution, including in the marine environment**

**Zero draft text of the international legally binding  
instrument on plastic pollution, including in the marine  
environment**

# Science-based tools model impact of policy choices (not yet on health)

## Modeling the Path to Zero Plastic Waste: Tools in Support of the UN Global Plastics Treaty



*UCSB/UCB, SystemiQ, Pew, World Bank, Global Plastic Action Partnership*



Thank You!

# Resources

- [NEGLECTED: Environmental Justice Impacts of Marine Litter and Plastic Pollution](#)
- [Reckoning with the U.S Role in Global Ocean Plastic Waste](#)
- [From Pollution to Solution: A global assessment of marine litter and plastic pollution](#)
- [The Minderoo-Monaco Commission on Plastics and Human Health](#)
- [Chemicals in Plastics- A Technical Report](#)
- [Global Plastic Policy Tool](#)
- [UCB & UCSB: A Treaty to End Plastic Pollution Forever](#)
- [Breaking the Plastic Wave](#)
- [Monterey Bay Aquarium Act for the Ocean: Plastic Pollution](#)