The Future of Our Seas: Garbage treasure at sea?

Judith van Leeuwen, Environmental Policy Group
Tim de Rooij, MAM graduate
The plastic Story
The Plastic Age

- Plastic age?
- Marine environment
- Sky is the limit
- Baby shoes
- Negative effects
- Knowledge gaps
- Pollution
- Health
5 gyres

Home of ‘The Great Pacific Garbage Patch’
- Estimated 3.2 million tonnes of trash
- About the size of Texas by some accounts
- Located between Hawaii and California

Research trips between Bermuda and Azores document floating garbage
- Soup of micro-particles similar to the ‘Great Pacific Garbage Patch’

44% of all seabird species documented with plastic in or around their bodies

Plastics have entangled birds and turned up in fish bellies

Searchers for Malaysia Airlines Flight 370 have found ocean garbage instead of crash evidence

GYRES
Whirlpools of water trapping huge collections of trash in their currents
More Plastic facts or guesses?

- About 8 million tons of plastic enters the ocean every year (Jambeck et al., 2015).
- 5% of the plastic that gets into the Ocean on a yearly base ends up in the plastic soups.
- At least 5.25 trillion pieces of plastic are currently in the oceans (Eriksen et al., 2014)
- Micro plastic particles in 2014 ranges from 15 to 51 trillion particles, weighing between 93 and 236 thousand metric tons, which is only approximately 1% of global plastic waste estimated to enter the ocean in the year 2010 (IMARES)
- An estimated 269 K tons of plastic from 5.25 trillion particles globally, of which an astounding 92% were particles smaller than a grain of rice, or micro plastic (5 Gyres)
- A third of this plastic is concentrated in the infamous Great Pacific Garbage Patch (Cózar et al., 2014).
More Plastic facts or guesses?

- 80% of the garbage comes from land-based sources and 20% from ships (unsubstantiated)
- 5 Countries account for 60% of the plastic pollution in the Ocean: China, Indonesia, the Philippines, Thailand and Vietnam
- Plastic does not break down biologically
- The quantity of floating plastic in the North Pacific accumulation zone at 140 thousand metric tons (feasibility study TOC)
- Indirectly affects our own health
- Estimated 13 Billion of damage the plastic cost to marine industry.
- Estimated that 50% of the plastic on this planet is used only once before being thrown away.
- Transports invasive species and toxic substances over great distances. Plastics are magnets for toxic chemicals.
"It Can Be Done"
Boyan Slat
My experiences

- Two expeditions with the Ocean Clean up
  - North Atlantic Ocean
  - North pacific Ocean
North Atlantic Expedition

Manta trawl

Ocean clean-up app

results
North Pacific ‘Mega’expedition

Trawls mantra and mega

Balloon
Plastic soup, island, continent??
What we mostly caught

Manta trawl

Mega trawls
Winner!!
What plastic is missing?

- What floats what sinks?
Plastic and marine life

- Plastics most dangerous for marine life?
Some of the fishes we caught
Health

- Ocean plastic adsorbs toxic chemicals (including PCBs and DDTs), increasing their concentration by a million (Mato et al., 2001).

- These persistent organic pollutants enter and bio-accumulate in the food chain, resulting in an even higher concentration of pollutants in fish (Tanaka et al., 2013), including species consumed by humans.

- Health effects linked to these chemicals are: cancer, malformation and impaired reproduction (Takada, oceanhealthindex.org).
Use of plastic within our food packaging

- Canned foods and soda cans
- All BPA-containing plastics
- Certain tooth sealants
- Certain BPA-free plastics (which can contain similar endocrine-disrupting chemicals)
- Thermal printer receipts and paper currency (because paper bills are often stored next to receipts in wallets)

- BPA and its health risks
- Different types of plastic Codes?
Critics to The Ocean Cleanup

- Bycatch
- Priority?
- Distraction other issue?
- Tsunami effects
The plastic Story
The Tragedy of the Commons

Imagine an open pasture shared by multiple cattle owners. Each owner increases their herd to maximize their benefit. With an unregulated resource this is "logical" since the benefit is enjoyed by the individual and the impacts are shared by all. This leads to the ultimate overgrazing of the pasture.

Shared Resource  

Sustainable Use  

Depleted Resource

The Commons

40 acres [16 hectares]
1,320 ft² [400 m²]

20 Cows
Carrying Capacity

20+ Cows
Tipping Point

Atmosphere  CO₂ 400 ppm?

The Tragedy of the Commons applies to numerous environmental, economic and social phenomena and has particular relevance to greenhouse gas regulation related to global warming.

Aims for regulation

- Land-based sources
- Micro
- Western/developed countries
- Knowledge gaps
- Short-term, clean-up and prevention
- Offshore source
- Macro
- Asian/developing countries
- Regulation/policy
- Long-term transition to circular economy
Does research into
- Distribution of ocean plastic
- Plastic in personal care products
- Value of plastic
- Converting plastic into fuel
- Myths of biodegradable plastic

Regional Sea Program
Global regulations for shipping

- **International Convention for the Prevention of Pollution from Ships (MARPOL)**
  - Bans dumping of all forms of plastic
  - Port Reception Facilities
Challenges for global regulation

- Time-consuming and expensive negotiations
  - Agenda setting
  - Negotiation & Adoption
  - Many stakeholders and stakes/interests

- Time-lags in implementation
  - Ratification

- Implementation issues
  - Capacity to implement is often lacking
  - Difficulties with enforcement
Governmental responses

- Regional Sea Conventions

- EU
  - Changes Ecolabel
  - Waste Legislation & Circular Economy Package
    - EU ban on free plastic bags (1 January 2016)
    - EU plastic recycling targets

- US Microbead-Free Waters Act – ban on micro plastic in cosmetic products as of 1 July 2017
National and local governmental responses; plastic bags

- Ban;
- Tax;
- Partial tax or ban (municipal or regional levels)

June 2014
Governmental action in sum

- Governments have to deal with a lack of knowledge about the plastic pollution problem.
- They are responding only slowly. Little sign of coordinated effort through inter-state collaboration.
- Reservations about the possibilities and effectiveness of inter-state collaborations.
- Response mainly comes from developed countries.
- Focus on plastic bags and personal care products.
Are there others that act?
Non-state Initiatives
NGOs
NGO strategies

- Awareness raising & Education
  - Beat the microbeat campaign
  - Waste Free Oceans tv
  - Beach clean-ups

- Funding research
  - Plastic Soup Lab of the Plastic Soup Foundation
  - Publication of research reports
A global movement around plastic ocean pollution?

Plastic Soup Foundation’s Beat the microbead campaign

- 79 NGOs from 35 countries
- Beat the Microbead App
- Looking for the Zero; zero plastic inside logo
A global movement around plastic ocean pollution?

Ocean Clean-up

- Develops clean-up method
- Generates funds
  - Expeditions
  - Large scale clean up operation
A global movement around plastic ocean pollution?

Plastic pollution coalition

- “global alliance of individuals, organizations, businesses and policymakers”
- THE 4Rs PLEDGE: Refuse, Reduce, Reuse, Recycle

Parley for the Oceans

- “the pace where creators, thinkers and leaders come together to raise awareness”
  - Parley Corporate Partner Guidelines
  - Events
  - Video’s
Changing NGO strategies

- Large scale **mobilization and empowerment** of individuals (consumers) using social media
- Disclosing information and creating **transparency** about plastic products and industry
- **Partnering** with other NGOs, industry and government to find concrete business cases
Varied (proactive?) industry responses

- International Council of Cruise Lines policy goal of zero discharges of MARPOL Annex V solid waste products (2001)
- 2011 Declaration for Solutions on Marine Litter by Plastic Industry and organizations
- Voluntary ban on plastic free personal care products from Dutch companies (first announcements in 2012)
Industry-led Partnerships

Waste free oceans foundation

- Fisheries sector, public authorities and the international plastics industry
- Support of European Commission
- Awareness and education
- Fishing for litter
  - KIMO International in NL and UK
Industry-led partnerships

Interface Net-works

- local residents collect discarded nets and those are fed back into the carpet supply chain
- “by working together in close partnership, Interface and Zoological Society of London are creating a solid business solution”

- Local partners
- 66 tonnes of discarded fishing nets
- 230,000 meals for local families
Creating value from plastic

- Investing in plastic recycling facilities
- Development of products based on ocean plastic
  - Interface
  - Adidas Shoe
  - Method and Ecover
  - G-star
  - Dopper
Non-state initiatives: in sum

- Supporting scientific research
- Consumer awareness and empowerment
  - Mostly US, UK, Netherlands
- Product development
  - Personal care
  - Clothing
  - Low value plastic products
- Clean-up operations
  - Fisheries
  - Beaches
Non-state initiatives: in sum

- There are too many to count!
- Initiated by various types of non-state actors
  - NGOs create pressure and support
  - Pro-active companies show leadership
- Plastic waste is a resource of value
- Consumer (em)power(ment)
- New markets for recycled ocean plastics for high value plastic products
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- Do these initiatives support a long-term transition to a circular economy for plastic?
  - For micro and macro plastics
  - For all sources of plastic pollution
  - In all areas of the world

- What is the role of government, NGOs, companies, citizens in this transition and the future circular economy?