



# Solving the Plastic Waste Crisis in Urban Waterways



BMZ, Ellen MacArthur Foundation, GIZ, ISWA, KfW, UNESCO  
World Water Week, 29 August 2017, 14.00-15.30, Stockholm

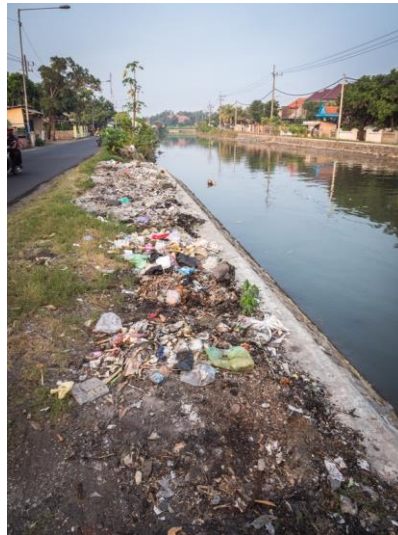


## Topic

- How to reduce the input of plastic waste into urban canals, rivers and the ocean?



Households with no  
waste collection service



Informal / illegal dumping  
close to the water



Diaper in urban canal



## Agenda

- **14:00 – 15:00 Inputs / presentations**
  - Franz-Birger Marré, BMZ – opening remarks
  - Dr Sarantuyaa Zandaryaa, UNESCO
  - Dr Costas Velis, ISWA
  - Klaus Gühr, KfW
  - Dr Mats Linder, Ellen MacArthur Foundation
  - Dale Walker, Ellen MacArthur Foundation
- **15:00 – 15:25 Interactive discussion with panel and audience**



Plastic waste  
in coastal environment



# Dr Sarantuyaa Zandaryaa, UNESCO

“Microplastics in freshwater environments  
– An issue of emerging concern”



# **Microplastics in freshwater environments**

## **An issue of emerging concern**

**Sarantuyaa Zandaryaa, PhD**  
**UNESCO**

**Division of Water Sciences - International Initiative on Water Quality (IIWQ)**

# The Sustainable Development Goals (SDGs)

## A global commitment to address emerging pollutants to improve water quality



**6 CLEAN WATER AND SANITATION**  
Ensure availability and sustainable management of water and sanitation for all

**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**  
Ensure sustainable consumption and production patterns

**3 GOOD HEALTH AND WELL-BEING**  
Ensure healthy lives and promote well-being for all at all ages

**15 LIFE ON LAND**  
Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

**SDG 6 – Water**  
**Target 6.3**  
*... improve water quality by*

**SDG 12 – Production & Consumption**

**SDG 3 - Health**  
**Target 3.3 ... combat water-borne diseases...**  
**Target 3.9 ... reduce deaths and illnesses from hazardous chemicals, air, water and soil pollution**



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International  
Hydrological  
Programme



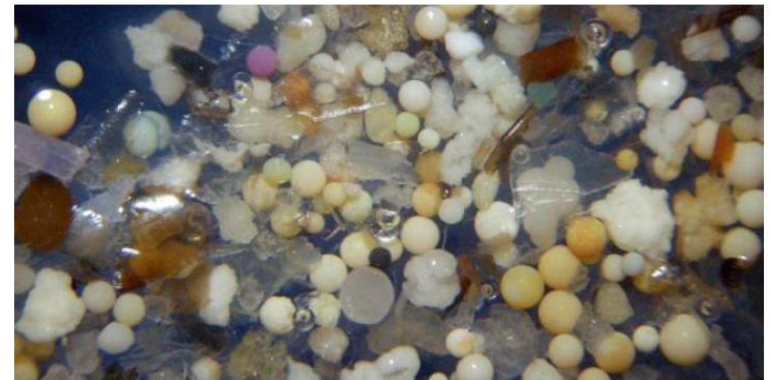
International  
Initiative on  
Water Quality

# Microplastics in freshwater environments

## An issue of emerging concern

Microplastics in freshwater environments is an issue of emerging concern due to their:

- Small size ( $< 5$  mm)
- Environmental persistence (do not degrade)
- Potential bioaccumulation



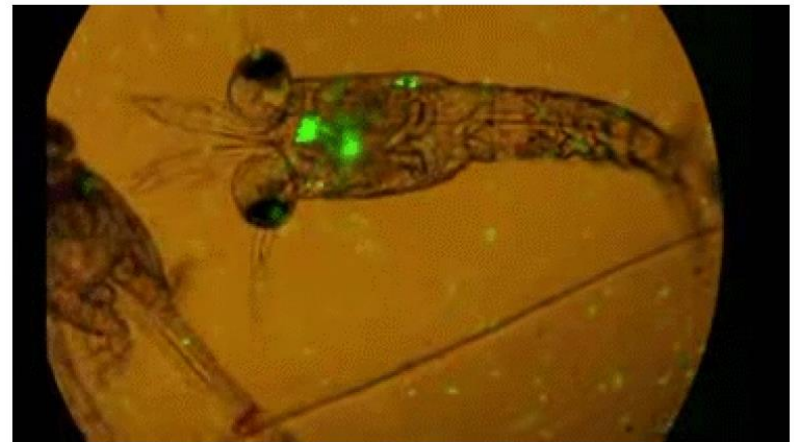
***Microplastics pull from the Rhine.***  
(Image Credit: University of Basel / Thomas Mani)

# Microplastics in freshwater environments

## An issue of emerging concern

Microplastics enter the food chain

- Ingested by freshwater and marine aquatic organisms
- Potential risks to human health and biota (*absorption of pollutants and leaching of chemicals/pollutants, transport of pathogens, etc.*)



**Microplastics ingested by the plankton** – the little green dots are pieces of plastic coloured with fluorescent dye.

*(Credit: filmed by Verity White, through a microscope at Plymouth Marine Laboratory, UK)*





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# UNESCO case study Microplastics in freshwater environments

Implemented under **UNESCO International Initiative on Water Quality (IIWQ)**  
**Project on *Emerging Pollutants in Wastewater Reuse in Developing Countries***

in collaboration with **Plastic Soup Foundation** (Dr Michiel Roscam Abbing)

Funded by Sweden

**PLASTIC SOUP**  
FOUNDATION



Sida



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# UNESCO International Initiative on Water Quality (IIWQ)

## UNESCO case study on Microplastics in freshwater environments

A preliminary assessment of the occurrence of microplastics in wastewater and freshwater systems, based on a literature review of available scientific data and research studies

- All regions of the world (Asia, Africa, Europe, North America, South America)
- 16 countries
- 31 research studies
- Freshwater resources (lakes, rivers, urban streams, etc.)
- Wastewater



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# Microplastics present in freshwater environments

## Canada:

Lake Huron  
Lake Ontario

## USA:

Laurentian Great Lakes  
Urban rivers in Chicago  
Rivers in California

## Mexico:

Gulf of Mexico

## Uruguay:

Freshwater fish

**Austria:** River Danube

**Germany:** Rhine, Main rivers

**France:** River Seine

**Italy:** Lake Garda

**Netherlands:** wastewater

**Switzerland:** Lake Geneva

**UK:** River Thames

## Russia:

Wastewater (St.  
Petersbourg)

## Mongolia:

Lake Khuvsgul

## China:

Yangtze River  
East China Sea estuary

## Tanzania:

Lake Victoria



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# Microplastics in Lake Khuvsgul, Mongolia

- A remote area
- Low population density
- Inhabited by small local communities
- Seasonal touristic activities



Lake Khuvsgul, Mongolia



SWEDEN



# Microplastics present in freshwater environments

## A need for a global holistic action

### Enhancing and promoting research to:

- improve scientific understanding on risks to human and ecosystems
- identify main sources and pathways, accumulation,

**Developing monitoring and regulatory mechanism** (wastewater, freshwater systems, biota)

### Building human and technical capacities

- Training and education
- Laboratories and monitoring techniques

### Raising awareness

- Consumers
- Decision-makers, water professional, private sectors, NGOs



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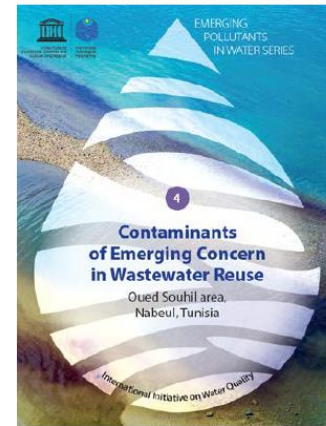
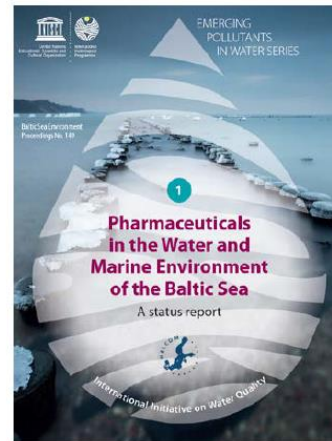
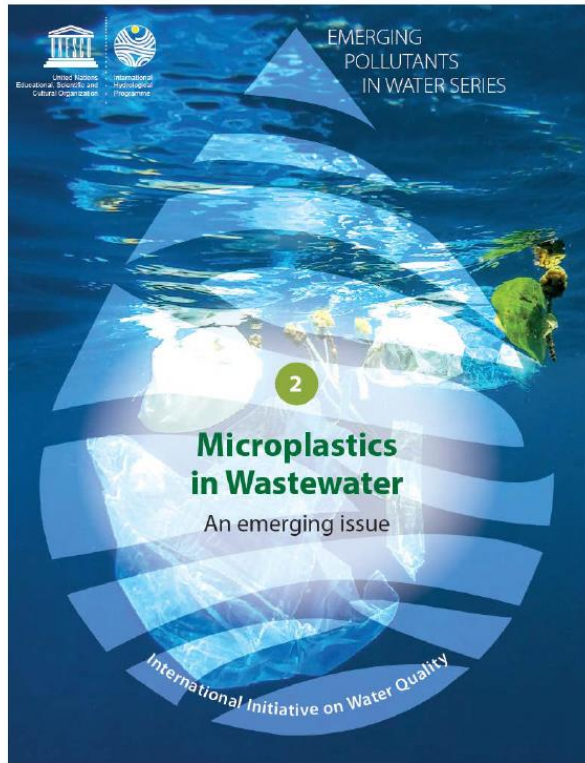
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# UNESCO *Emerging Pollutants in Water Series*



and  
more...



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<http://en.unesco.org/emergingpollutants/strengthening-scientific-research-and-policy/case-studies>

English Français العربية हिन्दी 中文

UNESCO  
"Building peace in the minds of men and women"

ABOUT US THEMES COUNTRIES PARTNERSHIPS JOIN US RESOURCES

Home » International Initiative on Water Quality (IIWQ)

### International Initiative on Water Quality (IIWQ)



Water quality is intrinsically linked with human health, poverty reduction, gender equality, food security, livelihoods and the preservation of ecosystems as well as economic growth and social development of our societies. Water quality problems represent a major challenge in both developing and developed countries. Technical, institutional, policy initiatives to improve access to safe water and sanitation are essential for sustainable development.

UNESCO-IHP IIWQ supports resources in making progress scientific and policy-relevant research and knowledge generation and dissemination and best practices among researchers in both developing and developed countries.

Home » Emerging Pollutants in Water and Wastewater

### Emerging Pollutants in Water and Wastewater



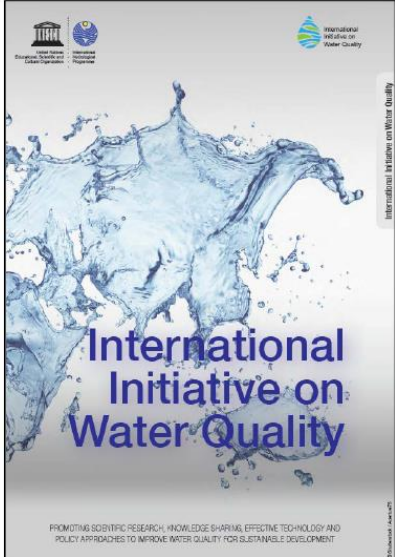
New and emerging pollutants present a new global water quality challenge with potentially-serious threats to human health and ecosystems. Good quality water is essential to sustain human well-being, livelihoods and a healthy environment for the post-2015 sustainable development.

The project, implemented under UNESCO-IHP International Initiative on Water Quality (IIWQ), aims to address this urgent need and support UNESCO Member States to strengthen their scientific, technical and institutional capacities for water quality management.

Strengthening Scientific

<http://en.unesco.org/waterquality-IIWQ>

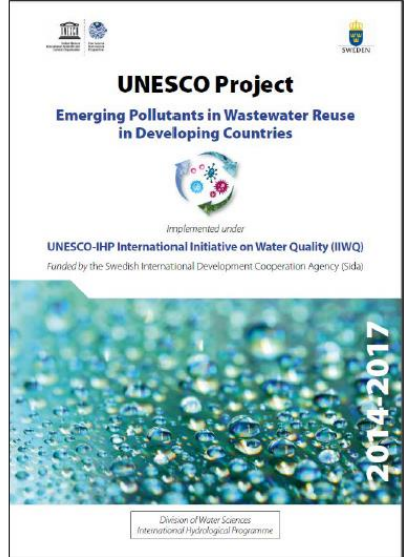
<http://en.unesco.org/emergingpollutants>



UNESCO  
International Initiative on Water Quality

## International Initiative on Water Quality

PROMOTING SCIENTIFIC RESEARCH, KNOWLEDGE SHARING, EFFECTIVE TECHNOLOGY AND POLICY APPROACHES TO IMPROVE WATER QUALITY FOR SUSTAINABLE DEVELOPMENT



UNESCO Project  
Emerging Pollutants in Wastewater Reuse in Developing Countries

Implemented under  
UNESCO-IHP International Initiative on Water Quality (IIWQ)  
Funded by the Swedish International Development Cooperation Agency (Sida)

2014-2017

Division of Water Sciences  
International Hydrological Programme



## International Initiative on Water Quality

**Sarantuyaa Zandaryaa** ([s.zandaryaa@unesco.org](mailto:s.zandaryaa@unesco.org))

**UNESCO**

Division of Water Sciences – International Hydrological Programme





# Dr Costas Velis, ISWA

“Can sound waste and resources  
management prevent marine litter?”

# An ISWA Global Partnership on Marine Litter

WORKING AT SOURCE – PREVENTING PLASTIC WATERWAYS POLLUTION

Dr Costas Velis – ISWA Task Force Leader



Solving the Plastic Waste Crisis  
in Urban Waterways  
29<sup>th</sup> August 2017  
Stockholm - FH 307



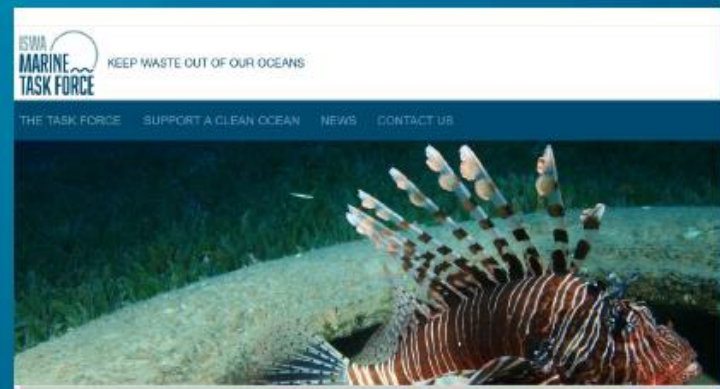
ISWA  
MARINE  
TASK FORCE

A photograph of a pile of crushed, multi-colored plastic waste (including red, blue, and yellow fragments) lying on a sandy beach. The background shows a blurred ocean with waves under a clear sky.

# TIME FOR A LONG-TERM SOLUTION

We need to turn off the tap and stop plastic waste at the source - before it reaches our oceans in the first place.

# ISWA MARINE TASK FORCE



<http://marinelitter.iswa.org/>





## OUR MISSION STATEMENT

*“Sound waste management is the key to reducing marine littering.*

*Our aim is to explore and clearly establish the link between*

*sound waste management, and*

*the prevention of plastic waste reaching our oceans”*

# ISWA MARINE LITTER TASK FORCE

## A GLOBAL PARTNERSHIP

- Perfectly placed to drive these critical approaches on the international arena
- Highly committed to playing a major part in creating solution to the plastics marine pollution at source

## EVIDENCE-BASED INTERVENTION AT SOURCE

- By providing critical knowledge for the identification of mitigating interventions
- By finding effective preventive solutions where the material comes from (emitting sources, hot spots)



Join our efforts!



## THE ISWA PERSPECTIVE

ISWA's vision is to create a world where no waste exists.  
Our mission is to promote and develop sustainable and professional waste management worldwide.



## AN INTERNATIONAL ORGANISATION

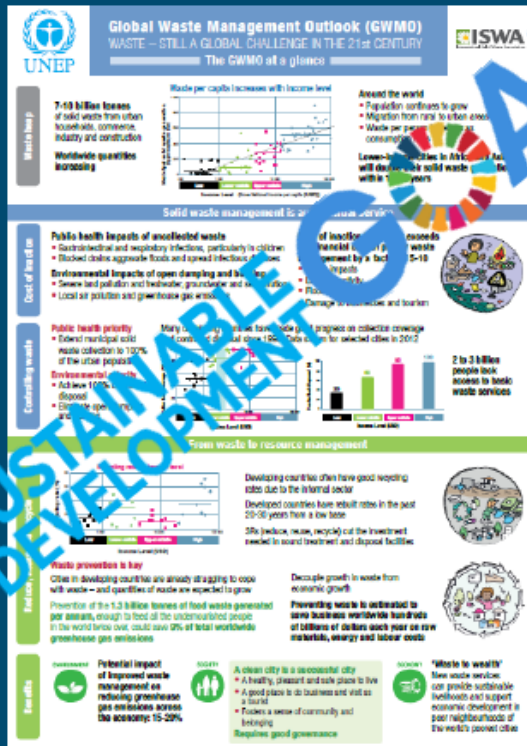
41 national association members  
170 organisational members

Supporting academic rigour – informing hands-on best practices and developments

## MAJOR INTERNATIONAL COLLABORATIONS







## SOLUTIONS CUSTOMISED TO LOCAL CONDITIONS

- Enormous socioeconomic spectrum across the planet
- Lack of infrastructure – significant externalities – informal recycling sector
- **2 billion** without sound waste collection
- Littering and fly tipping – (law enforcement?)
- Contribute to **SDGs: also #14**



**PROJECT CORE GROUP**

Dr Costas Velis, *Task Force Leader*

Ms Gunilla Carlsson, *Communications Coordinator*

Mr Håkan Rylander, *Collaborations Coordinator*

**MAIN CONSULTANTS**

Mr Dave Lerpiniere

Ms Maria Tsakona



## 4 FOCUS SOURCE AREAS 2 SOCIO-ECONOMIC STATUS

- **Cities**
  - High HDI (Human Development Index)
  - Low HDI
- **Ports**
  - High HDI
  - Low HDI
- **Rivers**
  - High HDI
  - Low HDI
- **Dumpsites**
  - Low HDI
  - High HDI (Landfills)

## WATERWAYS AND RIVERS:

key to solving plastic waste marine litter crisis



## 'Jakarta Rivers' trash clean up'

<https://forum.expatriado.org/threads/jakarta-rivers-trash-clean-up.680/>

## 'Jakarta seeing results with cleaner rivers'

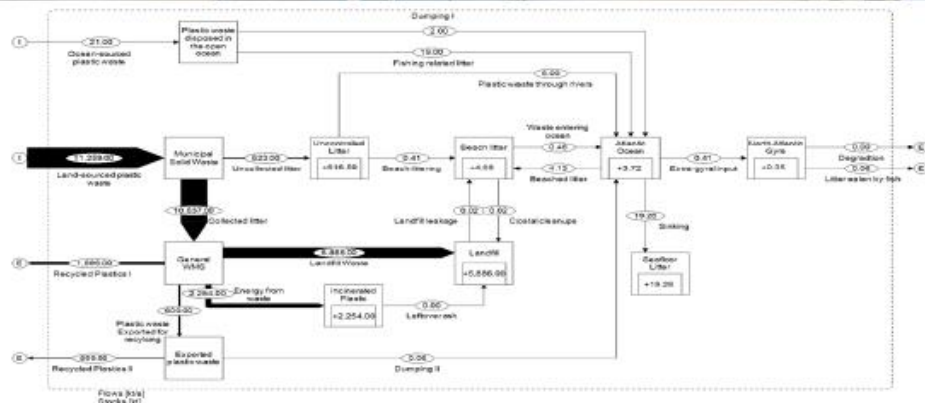
<http://www.thejakartapost.com/news/2016/05/23/jakarta-seeing-results-with-cleaner-rivers.html>





## DATA & EVIDENCE-BASED

- Systems, cross-sectors and intra-disciplinary approach
- Systematic review of scientific literature
- Materials – People – Sources – Pathways – Transformations – Final sinks (fate)



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TASK FORCE



The diagram features a central large light blue circle containing the text "Plastics marine litter". Surrounding this central circle are four smaller light blue circles, each overlapping the central one. The top circle is labeled "Cities", the left circle "Rivers", the bottom circle "Ports", and the right circle "Dumpsites".

# Plastics marine litter

Cities

Rivers

Dumpsites

Ports

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## WE LOOK FOR EVIDENCE: (documented in publications)

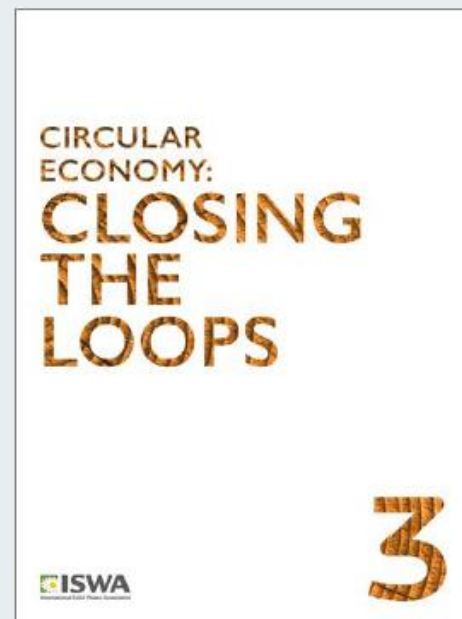
- **ON:** Most important sources (hot spots), materials, pathways, transformations and sinks
- **ON:** effective intervention points, effective SWM solutions in preventing the material flows, best practices, case studies where the sector has led and delivered positive and measurable change on the ground.
- **EMPHASIS:** on grey literature (things we may miss in the academic journal publications)

# SOLUTIONS FOR FUNDING BASIC INFRASTRUCTURE



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# SOLUTIONS FOR CIRCULAR ECONOMY



IT'S ABOUT  
PEOPLE.  
NOT WASTE.



## CLOSING DUMPSITES (Synergies with)



### Let's Close the World's Biggest Dumpsites!

Dumpsites spread pollutants across our atmosphere and our oceans, they damage the health and violate the human rights of the hundreds of millions of people who are living on or around them. That is why, over the coming years, closing dumpsites will be a top priority of ISWA. ISWA will set clear examples of how to close dumpsites in a sustainable manner and offer support and help to countries and cities looking to take the positive step to do so. This website aims to be a resource hub not only to those looking to close dumpsites, but to all stakeholders who share our goal to #closedumpsites



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TASK FORCE





UN Ocean  
Conference  
New York  
June

World Water  
Week  
Stockholm  
August

ISWA World  
Congress  
Baltimore  
September

Life Below  
Water 2017  
Malmö  
October

ISWA  
European  
Group  
Brussels  
Oct/Nov.



## 2017 EVENTS

# ISWA MARINE TASK FORCE

Thanks to Partner and Supporting organisations



# ISWA MARINE TASK FORCE

## Contact us:

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TF Communcations – Gunilla Carlsson  
[gunilla.carlsson@sysav.se](mailto:gunilla.carlsson@sysav.se)





# Klaus Gühr, KfW Development Bank

“Strengthening integrated waste  
management in cities to reduce waste  
leakage into waterways”



# Dr Mats Linder, Ellen MacArthur Foundation

“Moving towards a New Plastics Economy  
– upstream solutions against plastic  
leakage into waterways”

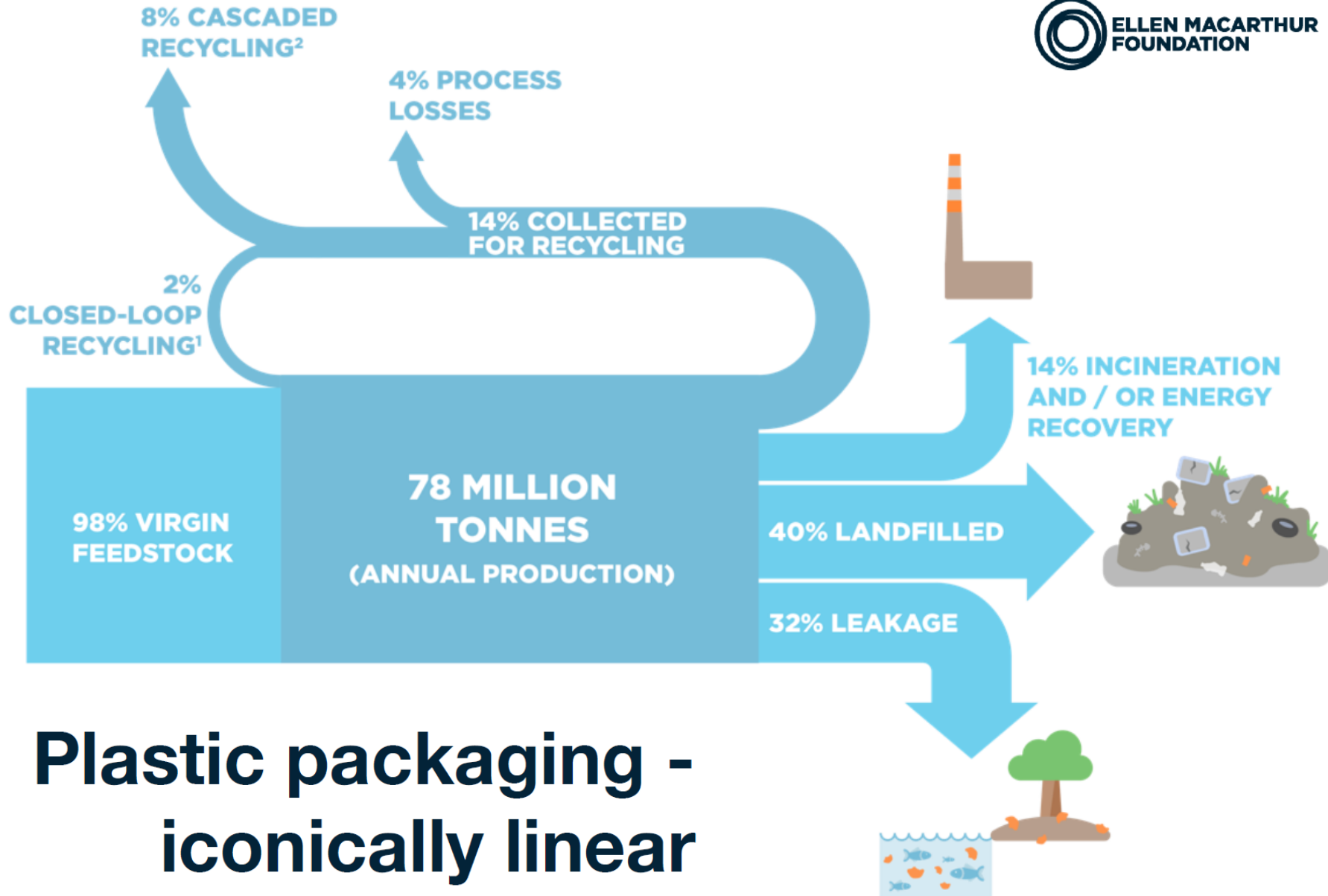


# The New Plastics Economy

Catalysing action

Mats Linder



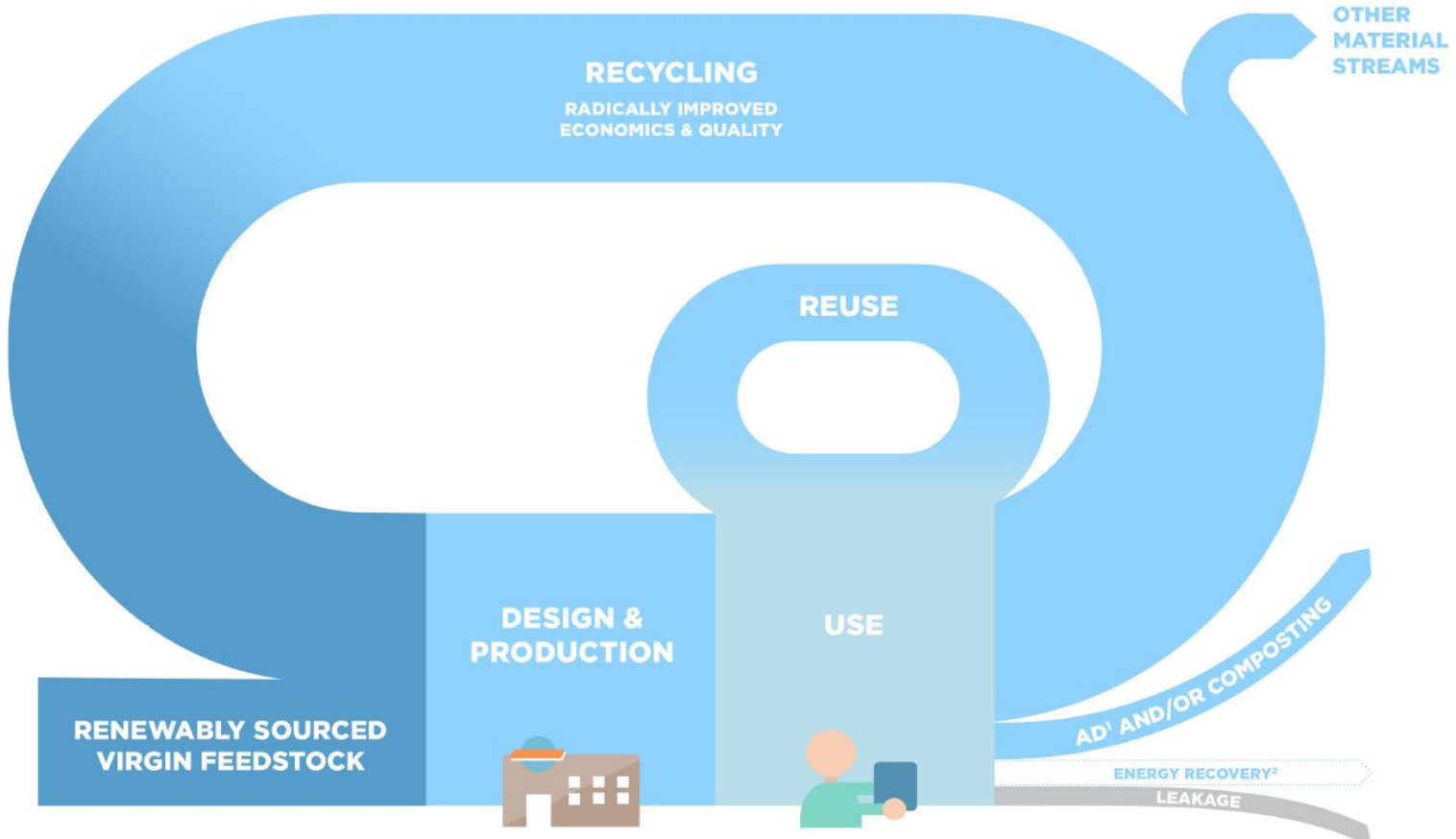


# Plastic packaging - iconically linear

# The New Plastics Economy



## 1 CREATE AN EFFECTIVE AFTER-USE PLASTICS ECONOMY

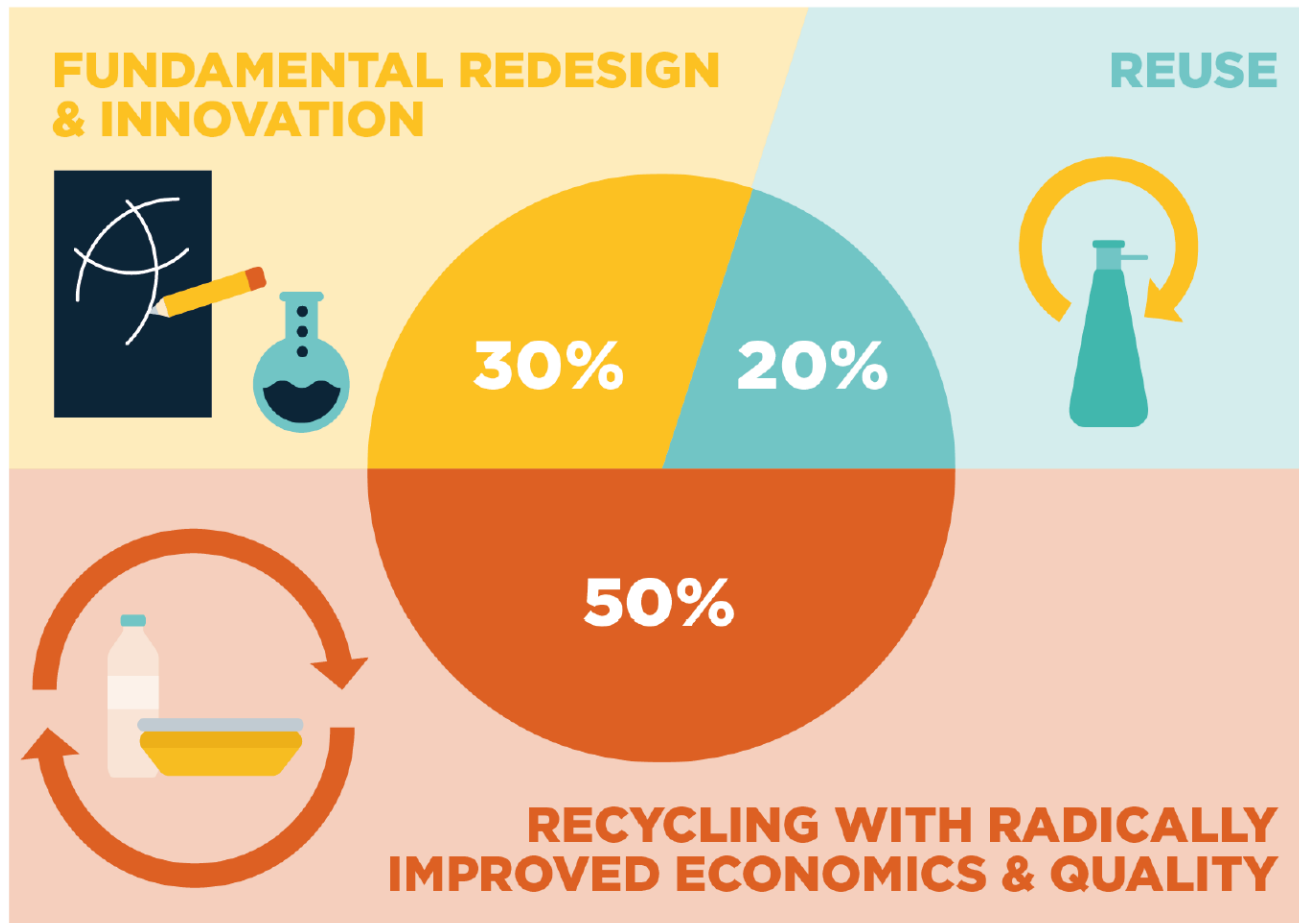


## 3 DECOUPLE PLASTICS FROM FOSSIL FEEDSTOCKS

## 2 DRASTICALLY REDUCE THE LEAKAGE OF PLASTICS INTO NATURAL SYSTEMS & OTHER NEGATIVE EXTERNALITIES



# Three strategies to transform the global plastic packaging market





# Dale Walker, Ellen MacArthur Foundation / World Economic Forum

“Urban Biocycles – wastewater valorization  
in a circular economy”



# ELLEN MACARTHUR FOUNDATION

## URBAN BIOCYCLES

29 August 2017

Core  
Philanthropic  
Partner:

**SUN** Institute  
Environment & Sustainability  
Initiated by Deutsche Post Foundation

Global  
Partners:



DANONE

Google

H&M

INTESA  SANPAOLO



PHILIPS



RENAULT



Unilever




# RESTORATIVE AND REGENERATIVE BY DESIGN



**In the biosphere value can be abundant and powered by the sun.**

**This requires three things:**



**1. Maintaining the integrity of natural systems (which are complex and interdependent).**

## 2. Returning nutrients appropriately to the soil.



### **3. Preventing toxic materials from entering the system and accumulating.**

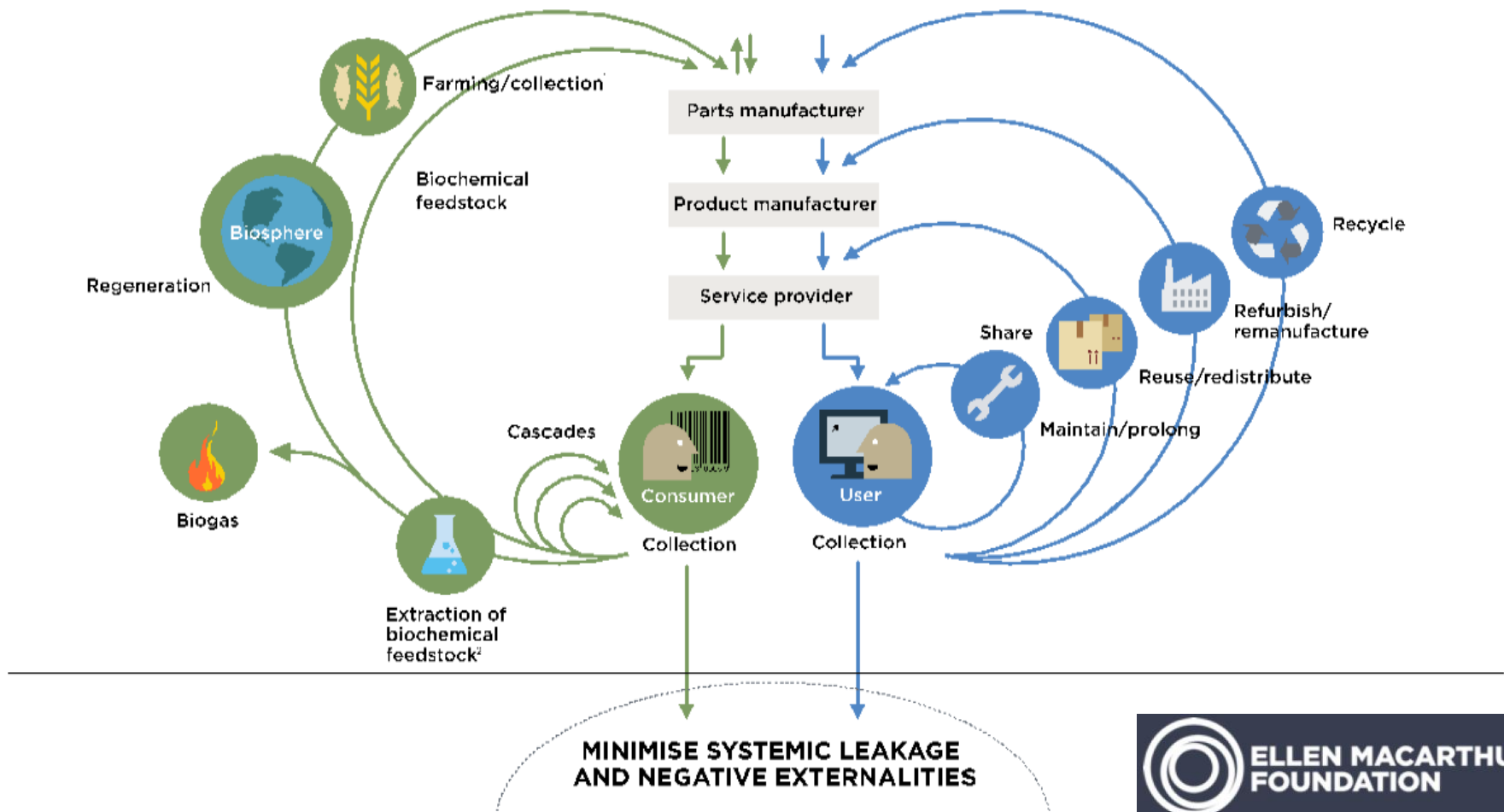




# THE CIRCULAR ECONOMY



Renewables *flow* management      **Regenerate**      **Substitute materials**      **Virtualise**      **Restore**      Stock management



# URBAN BIOCYCLES



# BIOHUBS

integrated energy recovery  
and photovoltaic system

cafe-house

architectural, social and economic integration

multiproduct algae  
photo-bioreactors



# REDEFINING WASTE



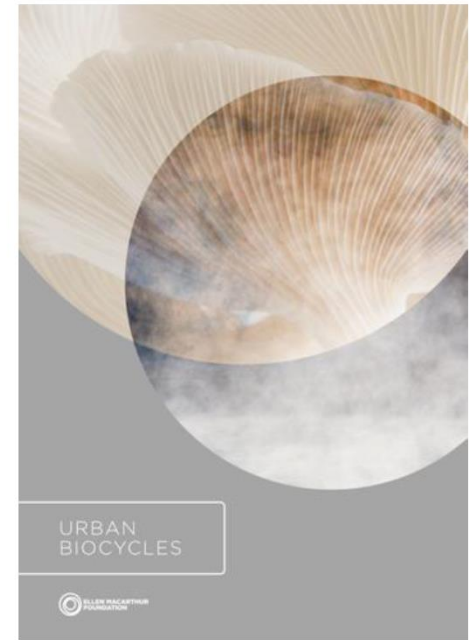
Photo credit: [CAFNR](#) via [Visual Hunt](#) / CC BY-NC

# A SYSTEM THAT WORKS



# PROJECT MAINSTREAM

## PROJECT MAINSTREAM:





# Discussion

Which synergies of collaboration exist between the water, sanitation, waste and packaging sectors to create a system that keeps plastics in the economy and out of waterways and the sea?





Als bundeseigenes Unternehmen unterstützt die GIZ die Bundesregierung bei der Erreichung ihrer Ziele auf dem Gebiet der internationalen Zusammenarbeit für eine nachhaltige Entwicklung.

Herausgeber:  
Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

Sitz der Gesellschaft  
Bonn und Eschborn

**Sector project „Concepts for sustainable  
waste management and circular economy“**

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## Responsible

Pascal Renaud, advisor

Ellen Gunsilius, project leader

## Pictures

Slides 1-3 & 55: Sidoarjo Regency, Indonesia,  
July 2017, © GIZ/Joachim Stretz

In cooperation with



On behalf of

