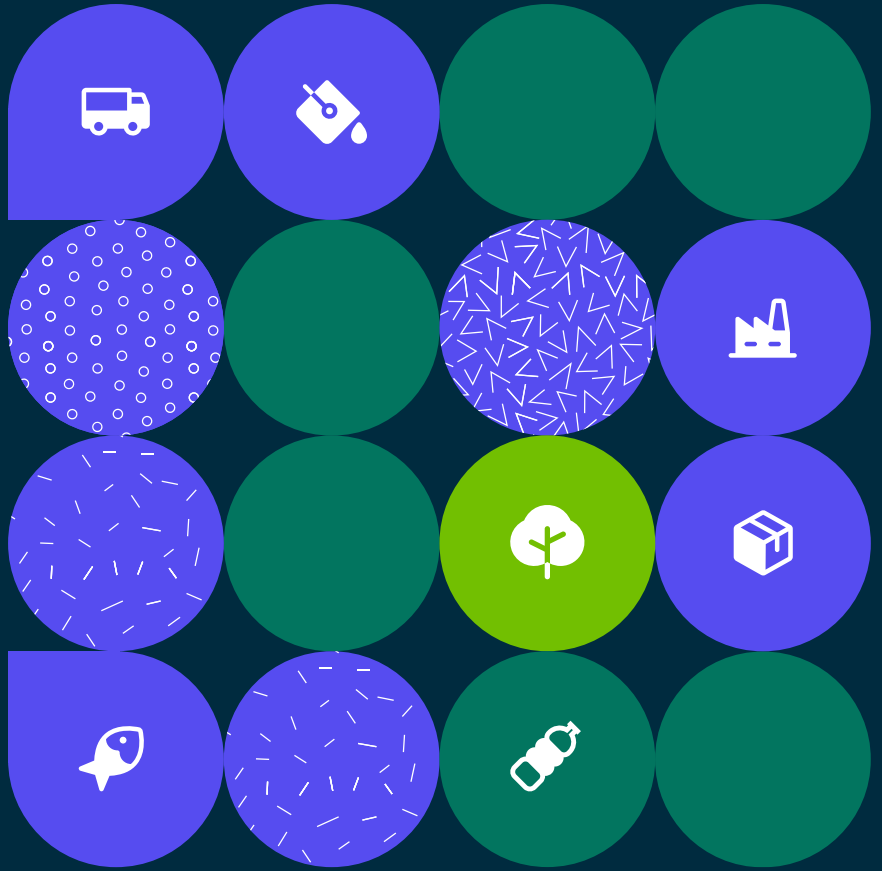
Plastic Footprint Network

Plastic Footprint Guidelines

# Module on macroplastic - textile

Version 1. November 2023



Convened by EA – Earth Action · www.plasticfootprint.earth

Introduction to the Plastic Footprint Network

**Leading organizations** have united within the Plastic Footprint Network to chart a new, more effective **path toward plastic pollution** mitigation.

The network's first priority was **unifying the framework** for measuring plastic leakage into a **single**, **science-based methodology** for organizations to accurately assess the environmental impact of their plastic use. Over **100 professionals** from **35 organizations** worked to establish the resulting **methodology**, which consists of **11 modules**, all optimized for usability and delivery of **actionable results**.

Objectives

## Unifying the methodologies and perspectives of leading scientists, experts, and global practitioners, PFN enables organizations to understand the full impact, or footprint, from the use of plastic in their companies, products, and services.

1. Update and unify plastic footprinting methodologies
2. Ensure the methodology is used consistently by practitioners
3. Disseminate and scale the use of plastic footprinting
4. Explore link with plastic credit schemes, and how to prevent greenwashing claims

# What will you find in this module?

The goal of this module is to establish a standardized method for assessing the impact of synthetic textile waste within the broader context of a plastic footprint. To achieve this goal, we will address the following three key questions:

1. What are the current insights and findings pertaining to the contribution of synthetic textile waste within the scope of plastic footprint assessments?

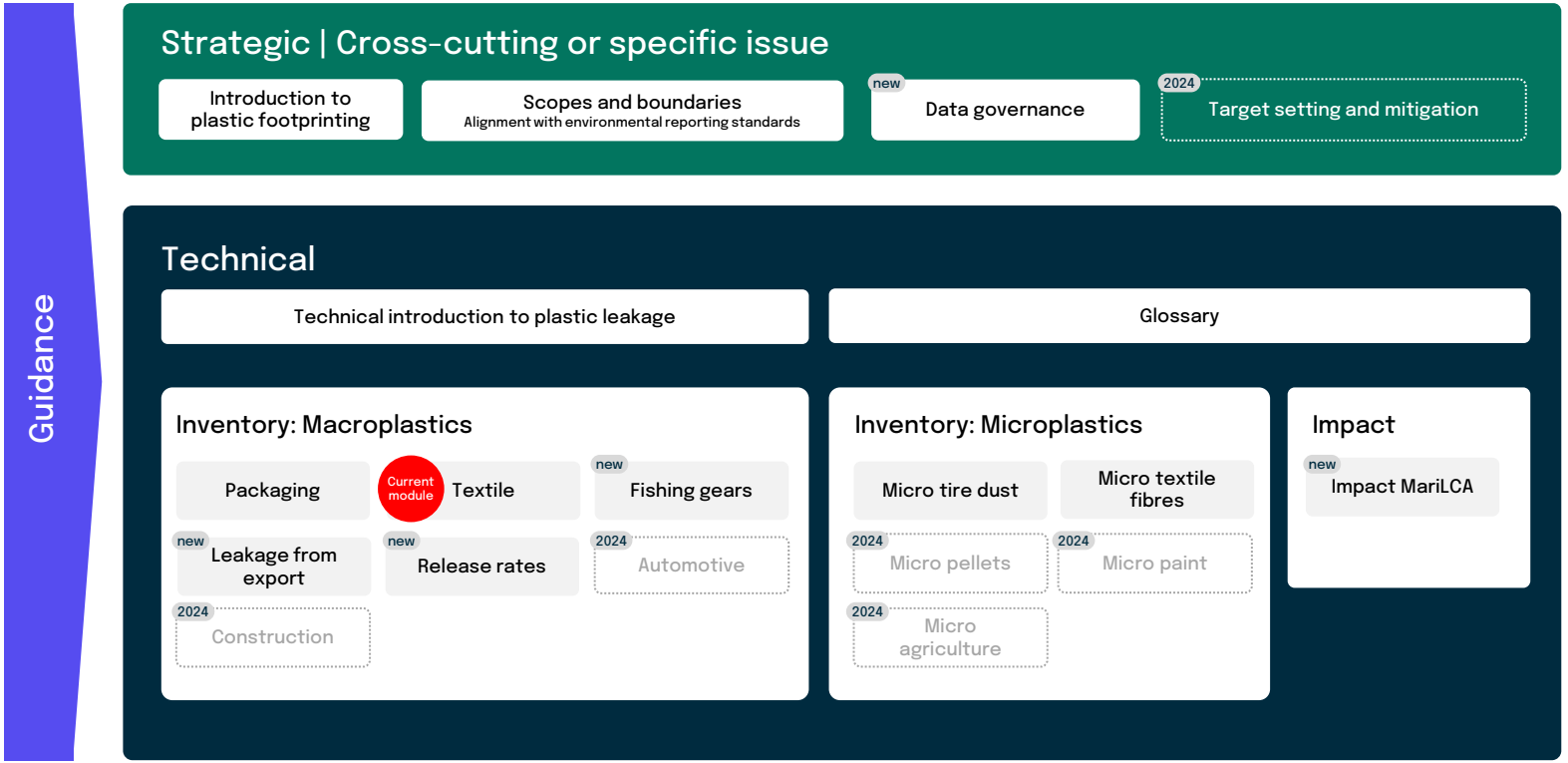
2. How can a well-structured methodology, drawing from existing literature and experiences, be effectively applied to evaluate the impact of synthetic textile waste in the context of a plastic footprint?

3. What secondary data sources are essential for conducting accurate estimations, and how can these inputs be integrated into the overall assessment process?

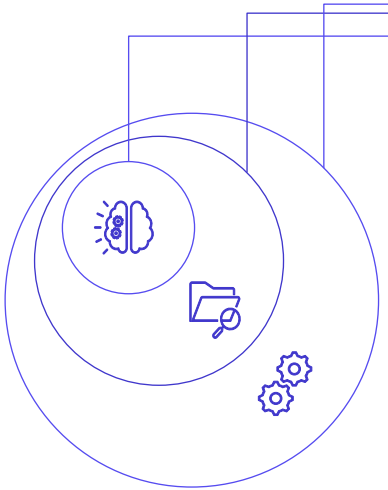
This module emphasizes the need for users to acquire primary data for a thorough and precise assessment of their synthetic textile waste contributions within their plastic footprint analyses.

At the end of this module, the users should know how to include textile products end-of-life in their plastic footprint assessment.

# Where does this module fit in the PFN landscape?



# Structure of each technical module



## 1 Methodological choice

High level overview and different methodologies available at the moment, which one(s) to use and when.

Target audience: busy reader, scientific journalist

## 2 System map and calculation routes

- The different elements to take into account during a plastic footprint.
- How these elements interact.
- The calculation routes to follow.

Target audience: scientist, experts

## 3 Key data & background assumptions

The secondary data needed to perform the assessment and the main assumptions for the modeling.

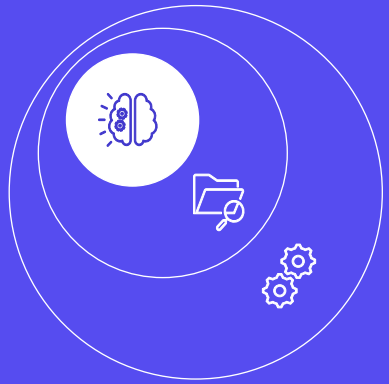
Target audience: scientist aiming at performing a plastic footprint.

**Reading keys:** Main take away | Supporting information | Key warning

Part. 1

# Methodological choice

The different methodologies available at the moment, which one(s) to use and when.

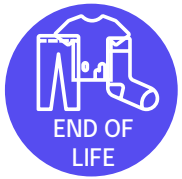


# An overview of leakage from textile

## Textile leakage into ocean and land


Leakage of microfibres during production


Leakage of microfibres during usage phase




Leakage of macroplastic originating from textile waste

This depends on the quantity of synthetic textile produced, and the local waste management.

⚑ Microplastic are not treated in this module.
For more information about this, please refer to the module on microplastic focusing on textile waste.

# How do textile pollute the environment?


## Leakage of microfibres during production & usage phase

Washing synthetic textile, both during industrial production and at household level, creates primary microplastics because of the abrasion and shedding of fibres.

These microplastics are then discharged in sewage water and could end up in the ocean or captured in the sewage sludge and end up in the soil.

For more details about this, please refer to the module on microplastic from textile.

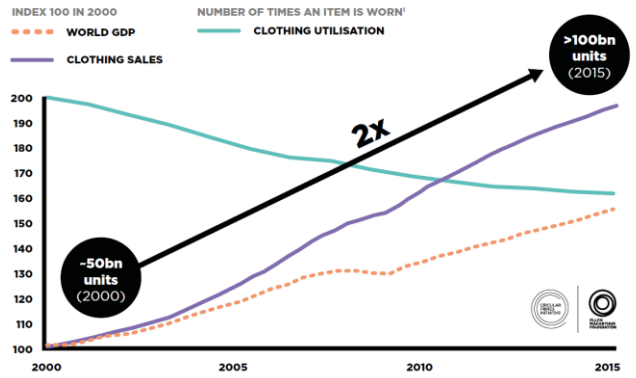

## Leakage of macroplastic originating from textile waste

Synthetic textile become macroplastic pollution when they are improperly disposed, which is to say, when they end up in unsanitary landfills or dumpsites, or they are uncollected or littered. It is estimated that **one garbage truck of textiles is landfilled or incinerated every second**.

The export of textile waste from the Global North to the Global South is a significant source of textile macroplastic pollution, as the Global south often lacks the waste infrastructure to properly manage or dispose of the textile waste. Thus, exported textile waste becomes a source of macroplastic leakage to the environment.

# How big is plastic pollution from textile?

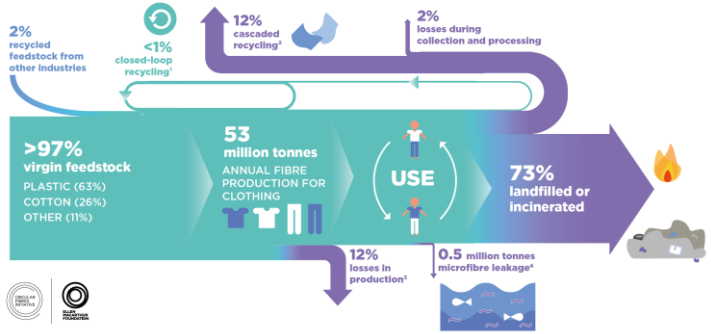
**FIGURE 1:** GROWTH OF CLOTHING SALES AND DECLINE IN CLOTHING UTILISATION SINCE 2000




Source: EMF (2019). A New Textiles Economy: Redesigning Fashion's Future

It is estimated that up to 53 million tonnes of clothes were produced in 2015. Because of this, 8.4 million tonnes of plastic may leak to the environment. These figures are bound to grow as we see that between 2000 and 2015 clothing production has doubled. Moreover, the lifetime of clothes has diminished over the same period, leading to clothes being disposed as waste faster than ever before. Combined with the growing production, this results in increasing textile waste.

**FIGURE 3:** GLOBAL MATERIAL FLOWS FOR CLOTHING IN 2015



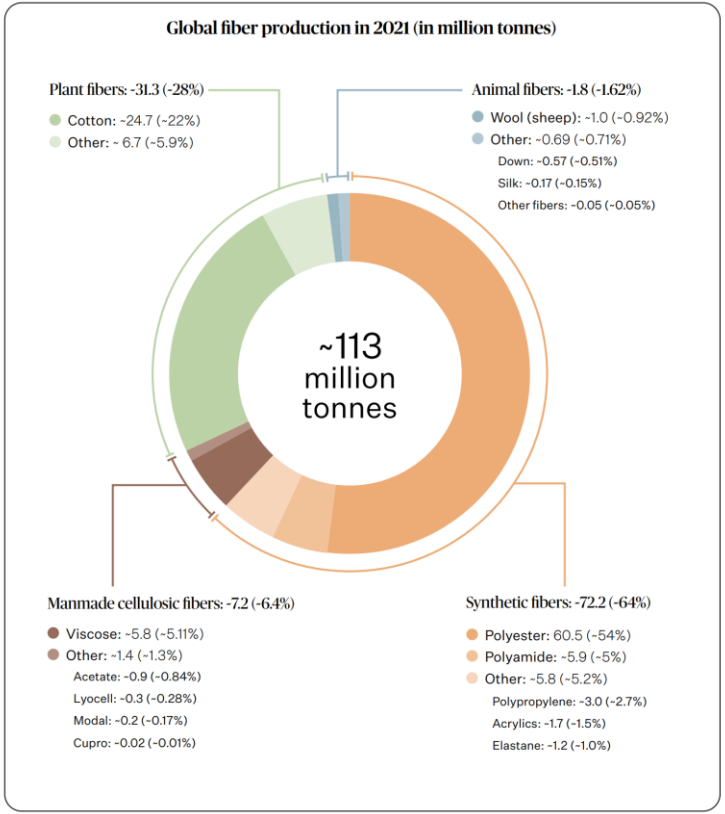

1 Recycling of clothing into the same or similar quality applications
2 Recycling of clothing into other, lower-value applications such as insulation material, wiping cloths, or mattress stuffing
3 Includes factory offcuts and overstock liquidation
4 Plastic microfibres shed through the washing of all textiles released into the ocean

Source: EMF (2019). A New Textiles Economy: Redesigning Fashion's Future

Today, textile is still mainly produced using virgin feedstock (up to 97%), and around 12% of the material is lost during the production (this amount can even go up to 30% depending on the country of production). In contrast, only a small portion of textile waste is recycled globally, and an even smaller one in a closed-loop manner. Most of it is landfilled or incinerated: this includes illegal dumpsites and open burning.

# Which polymers are used in the textile industry?

The apparel industry has steadily increased over the last two decades, and this is connected almost exclusively with an increase in the consumption of synthetic fibres, which now constitute around 64% of the fibres production. These fibres are mainly polyester (54%), polyamide (5%), polypropylene (2.7%), acrylic (1.5%) and elastane (1%).




Source: Textile Exchange (2022). Preferred Fiber & Materials Market Report.

# Useful definitions

## Mass

We identify the quantity of plastic of interest through a mass. For synthetic textile waste, the mass is the total weight of textile produced multiplied by the share of synthetic in it.

## Plastic leakage to the environment

Plastic leakage is defined as the plastic leaving the technosphere (human environment) and accumulating in the natural environment.

## Loss

The loss is the quantity of plastics that leaves a properly managed product or waste management system. In this case, this is the mass of textile waste which is mismanaged, i.e. uncollected, littered or improperly disposed (unsanitary landfills, dumpsites and open burning). The fraction of mismanaged waste on the total waste mass is a ratio called Mismanaged Textile Waste Index (MTWI).

## Release

The quantity of plastics that ultimately leaves the human environment for the natural environment is said to be releasedIn this case, this is the fraction of mismanaged waste which is released to waterways and oceans.

# Recommended methodological approach

Methodology to apply in case the product is a textile product, or the company is a textile producer, distributor, etc…

### Primary data needed:

- Total weight of synthetic textiles produced annualy
- Countries and shares where products are sold

### Primary data good-to-have:

- Composition (%) of synthetic fiber polymers per textile item

All secondary data are provided in this module

### Secondary data needed:

- Mismanaged textile waste index MTWI (regional)
- Release rates (global)

The percentage of synthetic should ideally be primary data and product-specific, but in case this is missing, average percentages can be used.

MWI for textile are difficult to compute because of lack in data for the topic. Perform a literature review to find info about your country, and if nothing is available, use the MWI of the region your country is in (provided in this tool).

Release rates should be adapted to the geography and should vary according to the type of mismanaged waste (uncollected, dumpsite, etc). If this is not possible, use 10% as a global value.

### Steps:

1. Collect primary data: the amount of textile produced, countries shares, and if possible synthetic share in textile.
2. Compute mass: Apply the synthetic percentage to obtain the weight of synthetic textiles that are produced (apply the polymer shares if available, for more granularity in the result).
3. Compute lost mass: Apply the regional MTWI to the quantities that are sold in each country to get the lost mass of textiles in the environment.
4. Compute released mass: Multiply the lost mass with the release rate to get the leakage to ocean (by country and possibly by polymer).
5. **Leakage from export: Go to module leakage from export to add the mismanaged and released quantities coming from export of textile waste**

important

$$MTW = \sum_{Country} M_{textiles}(t) * Synthetic\_share(\%) * MTWI_{region}(\%)$$

$$Leak_{ocean} = \sum_{Country} M_{textiles}(t) * Synthetic\_share(\%) * MTWI_{region}(\%) * RR\ (\%)$$

Generally speaking, always prefer primary data if available but be sure they are reliable. In case of doubt, use secondary data.

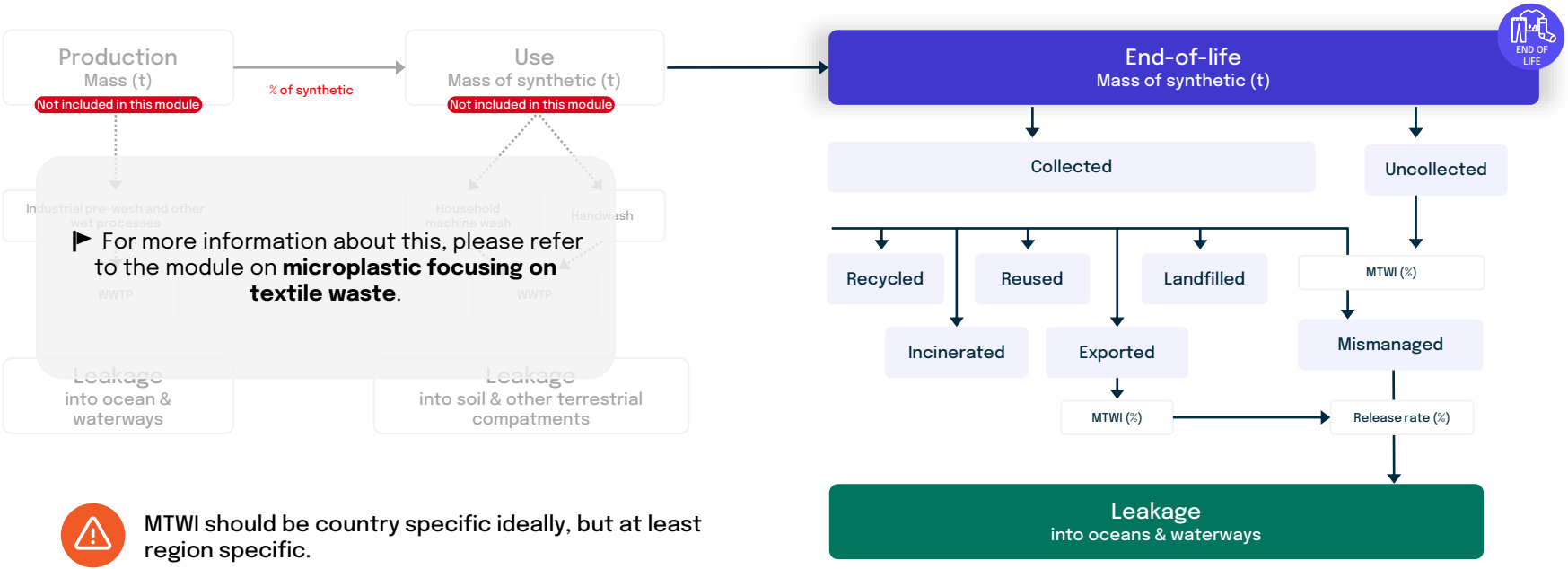
Part. 2

# System map & calculation routes

The different elements to take into account during a plastic footprint. How these elements interact? Which calculation routes to follow?

# System map

The path of textile, from production to final release




MTWI should be country specific ideally, but at least region specific.

It is very important to look at the fate of exported textile waste as it contributes greatly to the mismanagement and final leakage into ocean.

# Calculation routes for leakage at end-of-life

$$MTW = \sum_{Country} M_{textiles}(t) * Synthetic\_share(\%) * MTWI_{region}(\%)$$

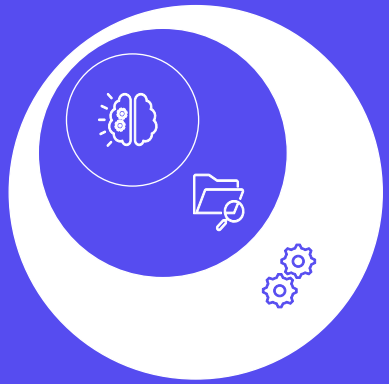
$$Leak_{ocean} = \sum_{Country} M_{textiles}(t) * Synthetic\_share(\%) * MTWI_{region}(\%) * RR\ (\%)$$


| Symbol | Description | Unit | Value | Reference | Additional comments |
|---|---|---|---|---|---|
| $M_{textiles}$ | Mass of textiles produced | Tonnes | From primary data | | |
| $Synthetic\_share(\%)$ | Percentage of synthetic textiles out of total quantity produced | % | From primary data if available. Otherwise, 64%. | Textile Exchange (2022). Preferred fiber and material market report. | |
| MTWI | Mismanaged Textile Waste Index | % | From external module --- | Based on World Bank What a Waste database, improved version by EA. Textile-specific data available for certain countries in PLASTEAX. | |
| RR | Release rate to ocean and waterways | % | From external module --- | | To be aligned with module on RR. |
| MTW | Quantity lost in the environment | Tonnes | Calculated | | |
| $Leak_{ocean}$ | Quantity released to ocean and waterways | Tonnes | Calculated | | |

Part. 3

# Data

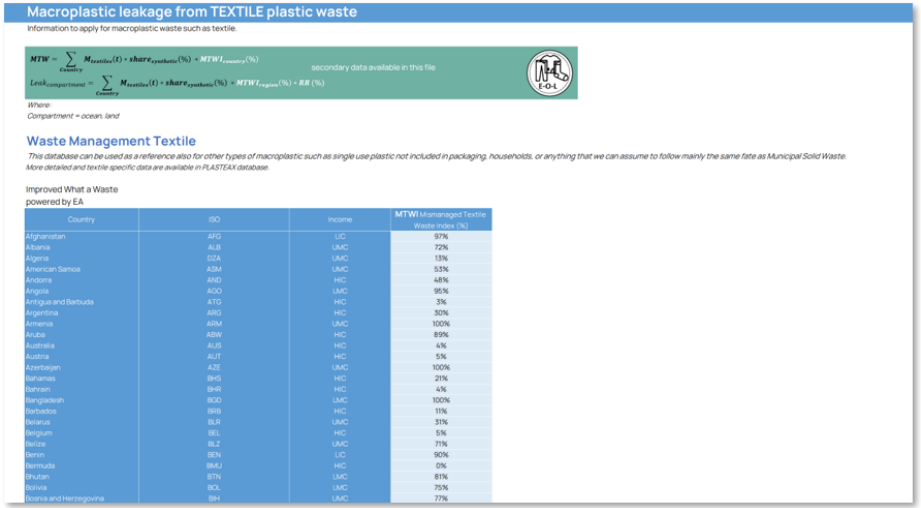
The secondary data needed to perform the assessment.



# Textile waste management

There is a lack of data on textile waste management and having access to textile specific information requires big effort and sometimes is not possible.

The user can find data that can be used for textile in the excel file with data . These data are built using the generic dataset What a Waste (dataset on Municipal Solid Waste), and they are therefore relevant also for other type of plastic waste that we can assume to follow mainly the same fate as Municipal Solid Waste.



Macroplastic leakage from TEXTILE plastic waste

Information to apply for macroplastic waste such as textile.

$$MTW = \sum_{country} M_{textiles}(t) \cdot share_{synthetic}(\%) \cdot MTWI_{country}(\%)$$

$$Leak_{compartment} = \sum_{Country} M_{textiles}(t) \cdot share_{synthetic}(\%) \cdot MTWI_{region}(\%) \cdot RR\,(\%)$$

secondary data available in this file

Where:
Compartment = ocean, land

Waste Management Textile

This database can be used as a reference also for other types of macroplastic such as single use plastic not included in packaging, households, or anything that we can assume to follow mainly the same fate as Municipal Solid Waste. More detailed and textile specific data are available in PLASTEAX database.

Improved What a Waste
powered by EA

| Country | ISO | Income | MTWI Mismanaged Textile Waste Index (%) |
|---|---|---|---|
| Afghanistan | AFG | LIC | 97% |
| Albania | ALB | UMC | 72% |
| Algeria | DZA | UMC | 13% |
| American Samoa | ASM | UMC | 53% |
| Andorra | AND | HIC | 48% |
| Angola | AGO | LMC | 95% |
| Antigua and Barbuda | ATG | HIC | 3% |
| Argentina | ARG | HIC | 30% |
| Armenia | ARM | UMC | 100% |
| Aruba | ABW | HIC | 89% |
| Australia | AUS | HIC | 4% |
| Austria | AUT | HIC | 5% |
| Azerbaijan | AZE | UMC | 100% |
| Bahamas | BHS | HIC | 21% |
| Bahrain | BHR | HIC | 4% |
| Bangladesh | BGD | LMC | 100% |
| Barbados | BRB | HIC | 11% |
| Belarus | BLR | UMC | 31% |
| Belgium | BEL | HIC | 5% |
| Belize | BLZ | UMC | 71% |
| Benin | BEN | LIC | 90% |
| Bermuda | BMU | HIC | 0% |
| Bhutan | BTN | LMC | 81% |
| Bolivia | BOL | LMC | 75% |
| Bosnia and Herzegovina | BIH | UMC | 77% |

Textile-specific data are being developed and will be available soon in the PLASTEAX database.

# References


1. EMF (2019). A New Textiles Economy: Redesigning Fashion’s Future
2. Textile Exchange (2022). Preferred Fiber & Materials Market Report
3. Peano, L., et al. (2020). Plastic Leak Project - Methodological Guidelines, Quantis and EA. v1.3.

# Our commitment to continuous improvement

The Plastic Footprint Network's successful collaboration is built on pillars of:

- Open
- Non-competitive and productive dialog
- Leveraging science and supporting ongoing research
- Broadly empowering global stakeholders (product manufacturers, brand owners, Treaty negotiators, regulators, consultants, NGOs, etc) to effectively do their part to address the plastic pollution crisis.

Given corresponding commitments to transparency and continuous improvement, we welcome and encourage your feedback and input on this document so that the methodology can continue to be enhanced and refined.

Thank you for supporting the work of the Plastic Footprint Network.

Contact us at: contact@plasticfootprint.earth

Our mission is to continuously advance Plastic Footprint Methodology, ensuring it remains at the forefront of sustainable practices and promoting its widespread adoption. By empowering companies to rigorously assess, enhance, and transparently report their plastic footprints, we aim to make significant strides in mitigating the plastic pollution crisis.

# Plastic Footprint Network

Specific mentions for this presentation:
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***Martina Gallato**, EA*

The Plastic Footprint Network
is convened by EA – Earth Action

This working group was led by:

earth action & south pole

With the participation from:

Anthesis, ClimeCo, evea, Seven Clean Seas, DECATHLON, Quantis, SYSTEMIQ

PFN secretariat is led by

earth action & south pole

Scientific Committee

Anthesis, earth action, SYSTEMIQ, Quantis, south pole, MarILCA, CIRAIG, Polytechnique Montréal, Minderoo Foundation, WWF

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Illustrations by German Kopytkov

# Plastic Footprint Network

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