

Making products that are supportive of better water systems in Africa

The Sustainable Manufacturing and Environmental Pollution (SMEP)
Programme

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Sustainable
Manufacturing and
Environmental
Pollution
Programme



The SMEP Programme

The theme of plastic Pollution

Industrial pollution

Impacts on water



Plastic pollution

4 impacts in the oceans



**Plastic and chemical pollution
(land-based)**



- About 8-12 million tons of plastic end up in the ocean (about 3-6% of annual plastic production)
- Six patches of ocean + hidden pollution
- Toxic chemicals such as phthalates, flame retardants and bisphenol-A

Food system



- About 51 trillion microplastic particles are found in the oceans
- Ingestion of microplastics by edible fish and other species

Marine fauna and flora



- More than 640,000 tons of abandoned fishing nets are on the ocean
- Ghost fishing gear poses a threat to mammals, turtles and seabirds through ingestion, suffocation and entanglement.

Oceans Economy



- Damage caused by plastic waste:
- Aesthetic/Usage Value of Coastal Tourism and Sport Fishing Destinations
- Shipping, ports and coastal infrastructure
- It is more expensive to clean than to prevent
- 91% of consumers say they are concerned about plastic waste issues (UNEP, 2020)

PLASTICS - Post-UNEA 5.2: The road to 2024 towards a UN treaty to tackle plastic pollution and marine litter

Key elements:

An intergovernmental negotiating committee, starting in 2022 and to be completed by the end of 2024

An internationally legally binding instrument to end plastic pollution, including in the marine environment

An agreement to establish a scientific and policy panel on chemicals and waste and to prevent pollution

A wide range of approaches, sustainable alternatives and technologies to address the full life cycle of plastics, including the circular economy

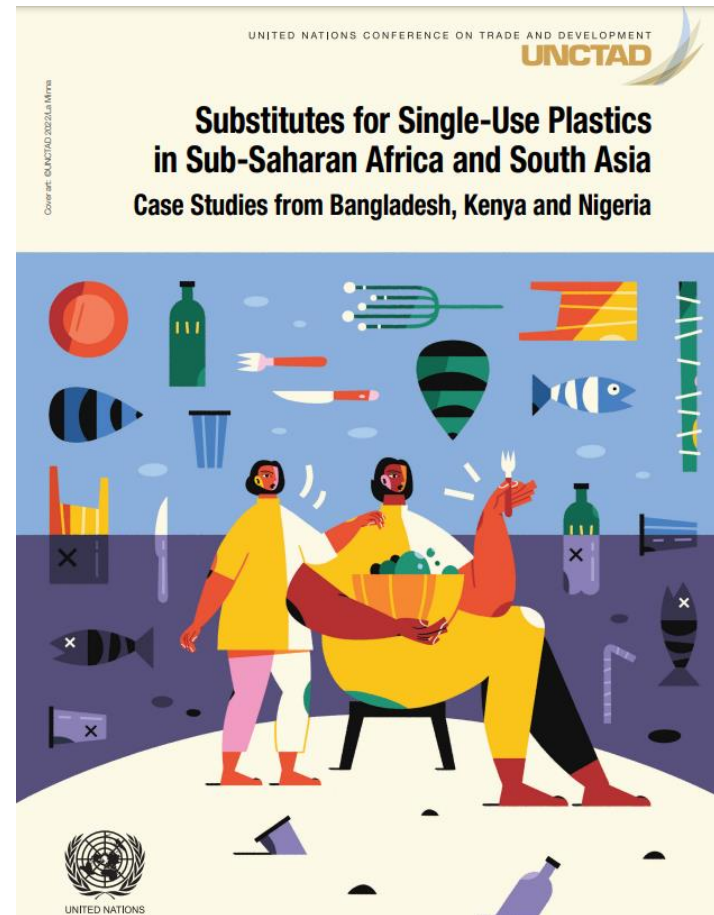
Alternatives / "best plastics": bioplastics, biodegradable plastics

Substitutes: Natural, mineral, marine and waste-based materials (Jute, aluminum, clay, glass, hemp, etc.)

The Solution: Combination of Alternatives + Substitutes + Best Design (Less Plastic Consumption) + Better Management of Plastic Waste (Services)

PLASTICS - Where most of the value is wasted...

Focus on single-use plastics (SUP) and promote material substitutes



UNCTAD (2022) Substitutes for Single-Use Plastics in Sub-Saharan Africa and South Asia

Promoting Plastic Substitutes – Illustrative HS codes list

HS SUBHEADINGS FOR NON-PLASTIC FEEDSTOCKS AND END-USE PRODUCTS SELECTED FOR BANGLADESH, KENYA AND NIGERIA

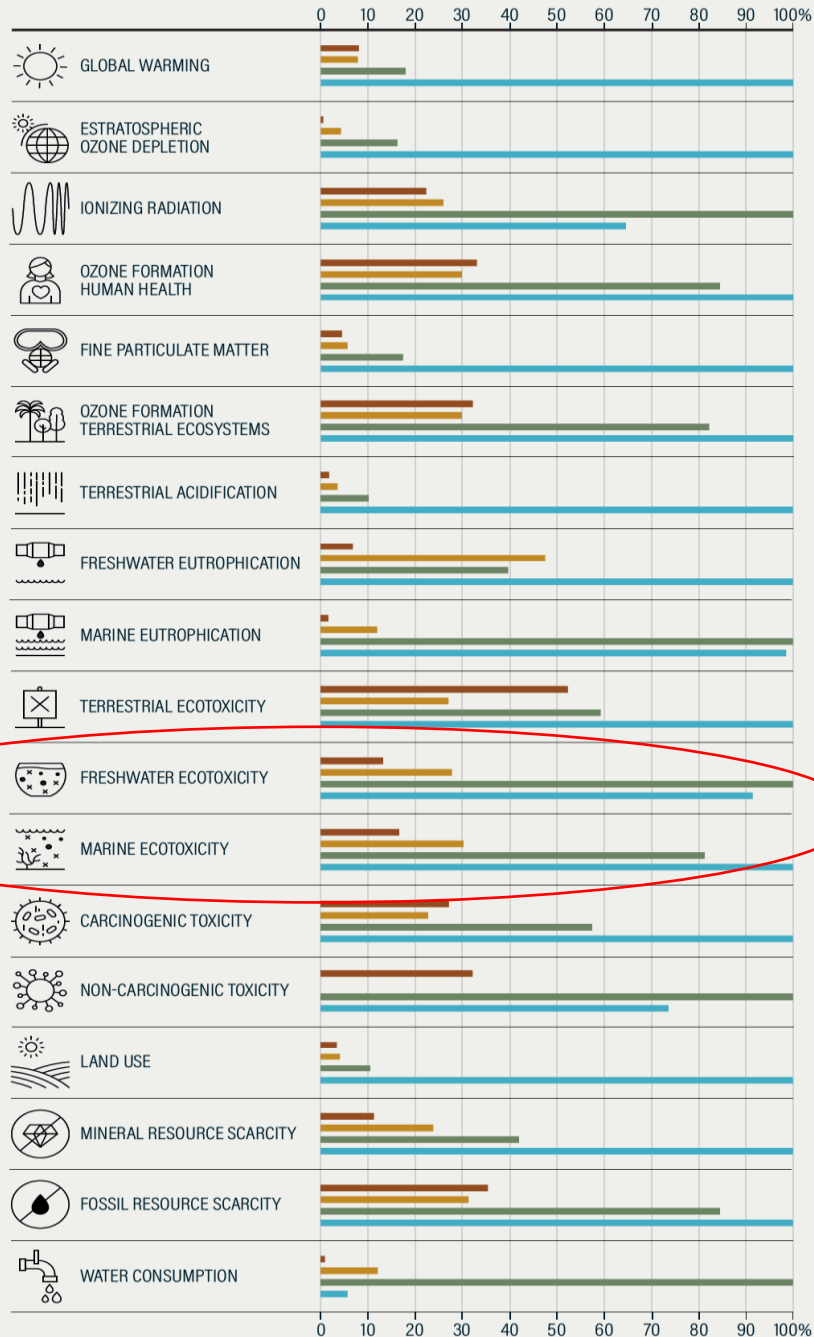
SUBSTITUTE PRODUCTS	FOOD CONTAINERS AND SINGLE-USE ACCESSORIES	Containers: banana/plantain leaf	4602.19	Basketwork, wickerwork and other articles, made directly to shape from plaiting materials or made up from goods of heading 4601; articles of loofah; Of Other vegetable materials
		Containers: coconut husk	4602.19	Basketwork, wickerwork and other articles, made directly to shape from plaiting materials or made up from goods of heading 4601; articles of loofah; Of Other vegetable materials
			4819.10	Cartons, boxes and cases, of corrugated paper or paperboard
		Containers: paper	4819.20	Folding cartons, boxes and cases, of non-corrugated paper or paperboard
			4823.69	Trays, dishes, plates, cups and the like, of paper or paperboard; Other
		Straws: paper	4823.90	Other paper, paperboard, cellulose wadding and webs of cellulose fibres, cut to size or shape; other articles of paper pulp, paper, paperboard, cellulose wadding or webs of cellulose fibres; Other
		Straws: wheat fibre	4602.19	Basketwork, wickerwork and other articles, made directly to shape from plaiting materials or made up from goods of heading 4601; articles of loofah; Of other vegetable materials
	GROCERY BAGS/PACKAGING	Cotton	6305.20	Sacks and bags, of a kind used for the packing of goods; Of cotton
		Hemp	6305.90	Sacks and bags, of a kind used for the packing of goods; Of other textile materials
		Jute	6305.10	Sacks and bags, of a kind used for the packing of goods; Of jute or of other textile bast fibres of heading 5303 (excluding flax, true hemp and ramie)
		Paper	4819.30	Sacks and bags, having a base of a width of 40 cm or more; of paper, paperboard, cellulose wadding or webs of cellulose fibres
			4819.40	Other sacks and bags, including cones; of paper, paperboard, cellulose wadding or webs of cellulose fibres
	LIQUID CONTAINERS	Glass	7010.90	Carboys, bottles, flasks, jars, pots, phials, ampoules and other containers, of glass, of a kind used for the conveyance or packing of goods; preserving jars of glass; stoppers, lids and other closures, of glass; Other
			7612.90	Aluminium casks, drums, cans, boxes and similar containers (including rigid or collapsible tubular containers), for any material (other than compressed or liquefied gas), of a capacity not exceeding 300 litres, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment; Other
		Aluminium	7615.10	Table, kitchen or other household articles and parts thereof; pot scourers and scouring or polishing pads, gloves and the like; Of aluminium
			7616.99	Other articles of aluminium; Other

PLASTICS –HS codes

	Feedstock / Products	HS Code (2020)	Export Volume (USD Billions, 2018)	Average Import Tarrif (Brazil, China and USA)
Plastic Materials	Plastic: Polyethylene	3901	57.72	8.88
	Plastic: Polypropylene	3902	22.45	8.86
	Plastic: Polystyrene	3903	9.93	9.00
	Plastic: Polyvinyl chloride (PVC)	3904	11.93	7.89
	Plastic waste and scrap	3915	4.68	10.25
	Plastic: Polyethylene terephthalate (PET); viscosity number of 78 ml/g or higher	390761	8.04	7.92
	Plastic: Polyethylene terephthalate (PET); other	390769	2.41	7.92
Mineral Products	Aluminium	7601	20.50	4.72
	Aluminium waste	7602	6.68	1.50
	Glass	7001	2.92	5.67
Natural Fibres - Dedicated Crops	Coconut husks	5305	1.85	5.49
	Cotton	5201	8.88	15.76
	Hemp	530210	0.01	6.00
	Jute	530310	0.04	6.50
	Paper & cardboard	481190	1.49	14.22
	Sisal	560721	0.03	4.30
		560729	0.03	8.87
Natural Fibres - Agricultural By-Products	Areca leaves/Banana leaves	140190	0.08	6.40
	Wheat husks	1213	2.45	12.00

	Feedstock / Products	HS Code (2020)	Export Volume (USD Billions, 2018)	Average Import Tarrif (Brazil, China and USA)
Plastic Products	Drinking straws	391732	0.60	8.12
	Takeout/takeaway containers and plates for food	392310	2.99	10.30
	Grocery and other bags	392321	3.99	10.33
	Bottles (PET)	392330	2.52	9.17
	Takeout/takeaway containers and plates for food	392410	2.47	10.64
Food Containers & Single-Use Accessories	Containers: banana/plantain leaf; coconut husk;	460219	0.15	9.09
	Straws: wheat fibre	481910	5.91	18.67
	Containers paper	481920	3.08	18.67
		482369	0.77	19.50
	Straws: paper	482390	1.62	17.74
Grocery Bags/Packaging	Cotton	630520	0.11	19.07
	Hemp	630590	0.58	18.40
	Jute	630510	0.09	22.50
	Paper	481930	0.35	19.50
		481940	1.48	19.50
Liquid Containers	Glass	701090	12.92	8.86
		761290	0.77	8.87
	Aluminium	761510	0.89	11.37
		761699	1.82	9.31

IMPACTS PER LIFE CYCLE STAGE OF ALTERNATIVE BAG TYPES



WHAT DO LIFE-CYCLE AND TECHNO-ECONOMIC ANALYSES REVEAL?

A screening life-cycle assessment of various feedstocks was carried out for four product categories: (i) plastic grocery and other bags; (ii) takeout/takeaway containers for food and beverages; (iii) plates, straws and cutlery; and (iv) bottles and sachets for water and other beverages. Results for grocery bags are illustrated in the figure beside. After further techno-economic analysis, a number of promising feedstock materials were identified (table below).

CATEGORY	PROMISING ALTERNATIVE MATERIALS
TAKEAWAY CONTAINERS	PAPER
GROCERY BAGS	PAPER OR SISAL
PLATES	COCONUT HUSKS
STRAWS	WHEAT STEM
BOTTLES	GLASS OR ALUMINIUM
SACHETS	NO VIABLE OPTION AVAILABLE

Materials excluded were wood, wool, bamboo and stainless steel, for their poor overall environmental performance, and polylactic acid used for bioplastics, for the lack of appropriate composting facilities.

In Kenya, as in many developing countries, SUP products are often much cheaper than non-plastic alternatives. Additional regulatory and fiscal measures favouring plastic substitutes may be needed to bridge price gaps.

KEY

- PAPER BAG
- JUTE BAG
- COTTON BAG
- WOOL BAG

NOTE

In the impact assessment graphics, 100% represents the product with the largest environmental footprint for each impact indicator. The indicators of the alternative products are presented as fractions of that maximum for each impact category, i.e., the larger the bar, the greater the potential impact of each alternative compared with the option that has the greatest potential impact.

Life cycle assessment of plastic substitutes

It is important to know that what replaces plastic **can also have consequences** on the environment and water!

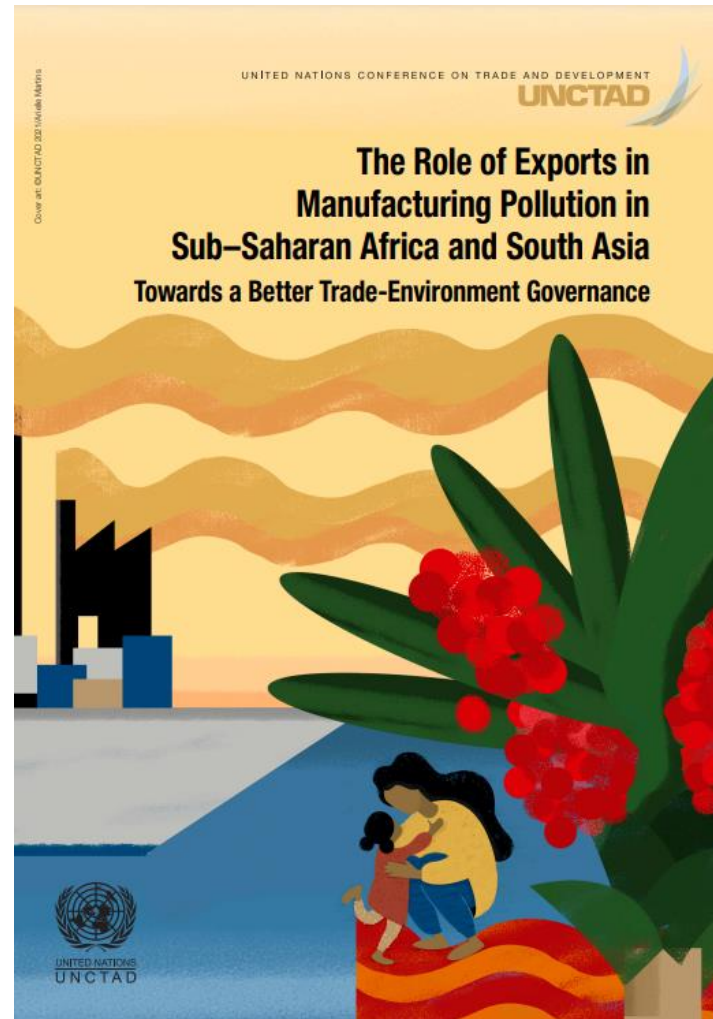
Source: SMEP Country Case Kenya

Organisation/ Project Name	Consortium Members/ Partners	Description of Project	Geography
Blue Skies Pty Ltd.	Waitrose & Partners	Blue Skies aim to establish a multi-stakeholder Research and Development Hub, which addresses single-use plastic in the agri-business to the point-of-sale value chain. The hub will initially address single-use plastic in disposable workwear and agri-film.	Ghana
Chinhoyi University of Technology (CUT)	Kudiwa Waste and Energy Solutions	Utilising plastics waste as a feedstock, Chinhoyi University will be establishing a manufacturing facility for plastic roof tiles with solar power features to address household energy needs.	Zimbabwe
The Council for Scientific and Industrial Research (CSIR) – South Africa	Elizade University, Nigeria	CSIR will undertake research and development into bio-degradable mulch film to replace Polyethylene (PE) mulch used in the agriculture value chain, tailoring biodegradation rates to climatic and soil conditions.	Nigeria
The Flipflop Project	Coastal Oceans Research and Development – Indian Ocean (CORDIO) East Africa; Northumbria University, School of Design; University of Portsmouth	The Flipflop Heritage Boats Project aims to establish a closed-loop waste management centre for the Lamu archipelago. This is linked to a heritage boat building centre, that aims to scale up plastic boat building in the region.	Kenya
Gaia Biomaterials	Kompost-it; Alnet; Sustainable Seas Trust	Gaia will undertake research and development into alternative biodegradable solutions for fishing nets, also working alongside regional fishing industry associations to ensure user acceptability, thus tackling the challenges of ghost nets in the marine environment.	South Africa, Tanzania & Kenya
International Synergies Limited (ISL) Limited	Maxwell Stamp Limited	ISL aim to address plastics pollution reduction through industrial symbiosis and will research, identify, and develop innovative reuse solutions for local uptake.	Bangladesh
PA Consulting	Global Access Diagnostics Ltd (GAD); PulPac	PA Consulting will research and develop compostable lateral flow test cassettes applying dry moulding of cellulose fibres obtained from sustainable sources as an alternative to single-use plastic.	To be confirmed
RiverRecycle Limited	Beach Clean Up Ghana Ltd.; Ambitious.Africa	RiverRecycle will implement a patentable remediation system to collect plastic waste in rivers, utilising this as feedstock to end products, specifically plastic boards and pyrolysis oils.	Ghana
University of Cambridge	Nepal Communitere; Field Ready	The University of Cambridge will establish multiple small-scale plastics remanufacturing units, producing building and construction products suitable for local construction requirements.	Nepal
University of Warwick	Environmental Sustainability Associates Limited (ESAL); De Montfort University (DMU); Chatham House (CH); GIVO; Zero Waste Goods Limited (ZWGL)	The University of Warwick will implement a technology-enabled plastic waste management system, processing waste plastics into flake products and pyrolysis oils.	Nigeria



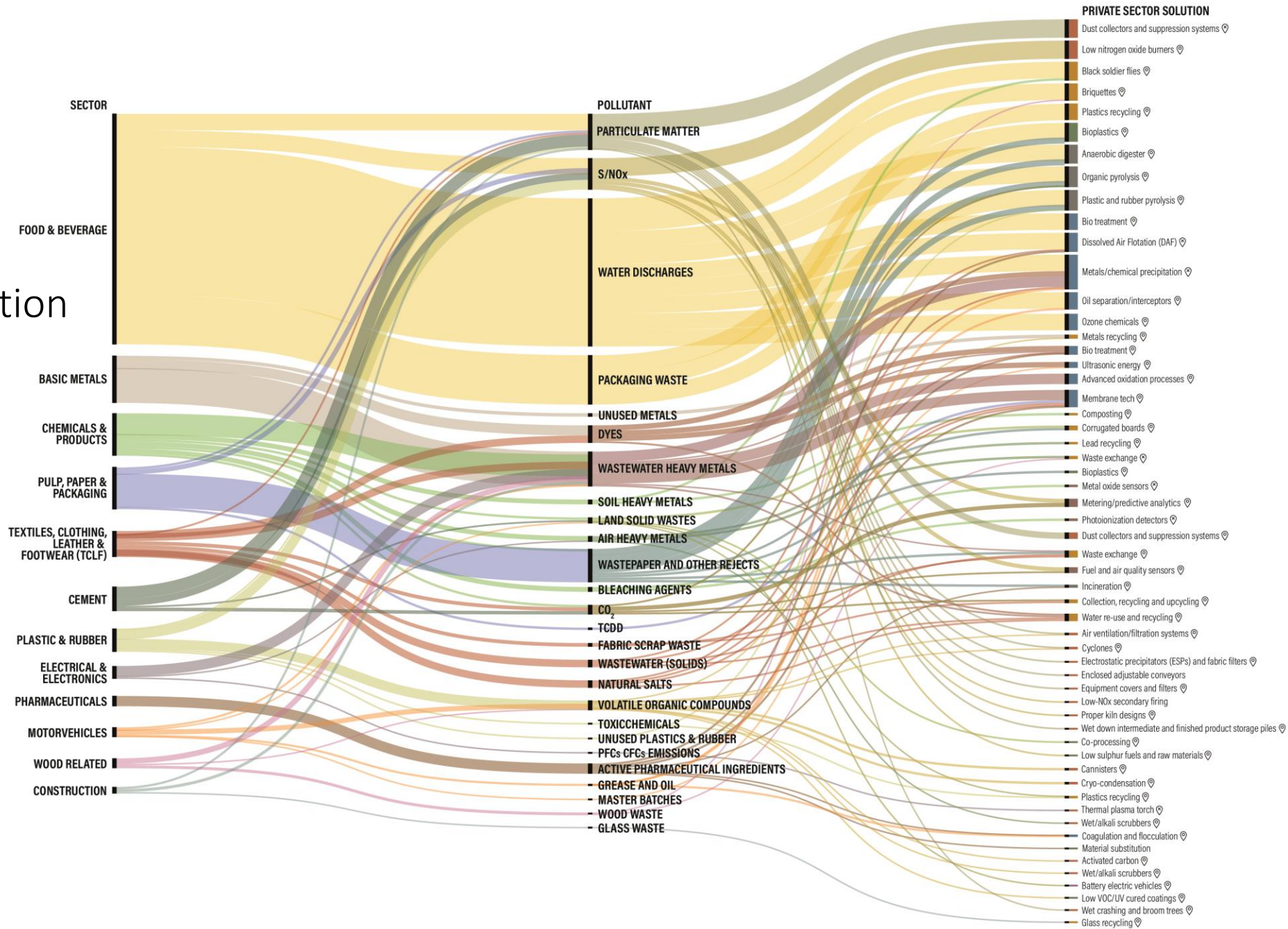
5 millions de livres sterling (GBP) de soutien aux projets Source: Programme SMEP FCDO-CNUCED Smeprogramme.org (Approvisionnement en plastique)

Industrial pollution – shadow of exports



UNCTAD (2021) The role of Exports in Manufacturing Pollution in Sub-Saharan Africa and South Asia

Industrial Pollution as a shadow of exports





Example of a tannery site – Leather production is highly polluting, producing large amounts of wastewater



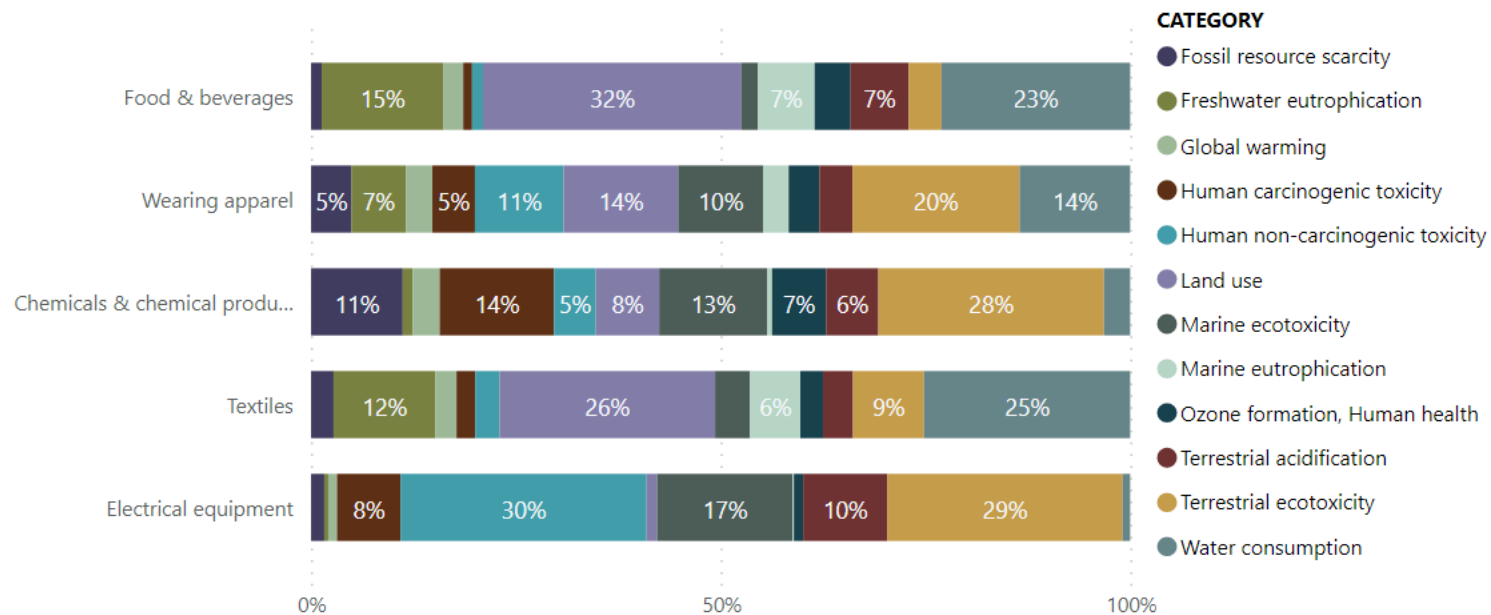
CATEGORY

Gate-to-gate

- ^ ☐ South Asia
 - ☐ Bangladesh
 - ☐ Nepal
 - ☐ Pakistan
- ^ ☒ Sub-Saharan Africa
 - ☐ Democratic Republic of the Congo
 - ☐ Ethiopia
 - ☐ Ghana
 - ☒ Kenya
 - ☐ Nigeria
 - ☐ Rwanda
 - ☐ Senegal
 - ☐ U.R of Tanzania
 - ☐ Uganda
 - ☐ Zambia

- ✓ Select all
- ✓ Fossil resource scarcity (kg oil eq)
- ✓ Freshwater eutrophication (kg P eq)
- ✓ Global warming (kg CO₂ eq)
- ✓ Human carcinogenic toxicity (kg 1,4-DCB)

SECTOR



**** Normalized values**

Database References:

<https://www.trademap.org/> // <https://simapro.com/> // <https://www.exiobase.eu/>

SMEP – Upcoming activities in Sub Saharan Africa

- Plastic pollution training for East African Community governments (Kenya)
- Tanneries officials training on best practices (Kenya)
- Results of textiles & food and beverage calls imminent.



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