

FASHION NON REFLECTS THE FUTURE OF TEXTILES

THE
FUTURE
OF TEXTILES

Exhibition produced by
the Swedish Institute



CLOTHES FOR A SUSTAINABLE FUTURE

The Swedish fashion industry is in a development phase in which a transition to more sustainable and circular business models is as natural as it is necessary. It's an exciting time, when research, innovation and cross-disciplinary collaborations are paving the way for a fashion industry that can set an example for the rest of the world. *Fashion revolution* is about the challenges – but also about the possibilities – that are changing the fashion industry to help save our environment.



A CIRCULAR ECONOMY

The fashion industry is dominated by a linear structure that is sometimes described with the words 'take, make, dispose'. A linear business model entails a huge waste of limited resources and is unsustainable from an economic, human and environmental perspective.

It's important to transition to a circular economy, in which every link in the value chain is connected in a closed-loop cycle, and the added value is preserved for as long as possible, while the amount of waste is reduced.

Several examples show we are already well on the way. The Swedish research group Swerea IVF helps companies create circular models and measures the resulting quality and financial advantages.

Re:textile also deals with research and innovation with the aim of creating a circular

textile industry. In 2017 Re:textile launched, in collaboration with fashion company Lindex, the pilot project Re:design – a collection of upcycled products redesigned in Borås, Sweden.

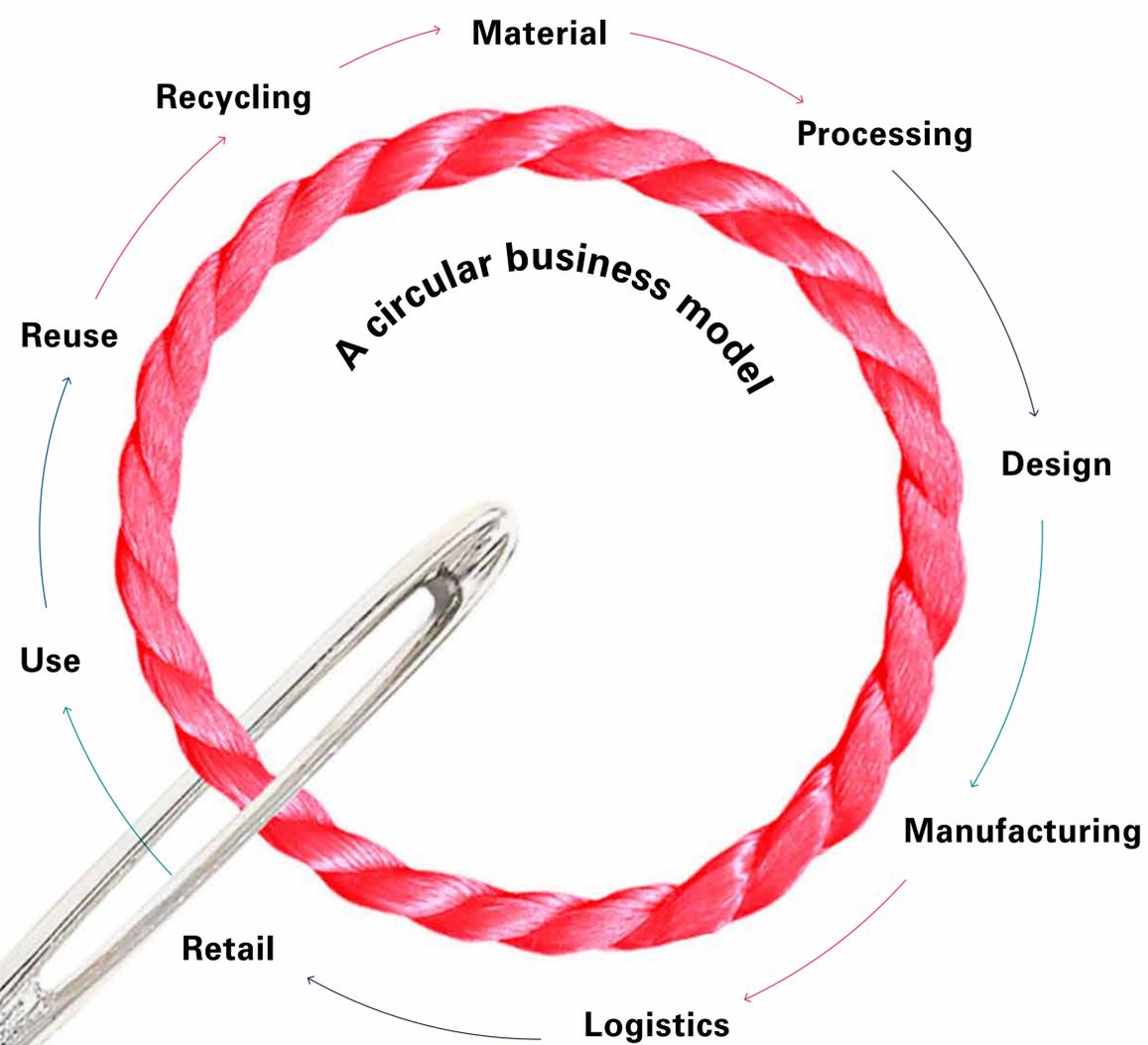
In Houdini Sportswear's range about 53 per cent of the products have a circular life cycle, and a large proportion of their range consists of recycled or renewable fibres that are either entirely recyclable or biodegradable.

Houdini Sportswear has produced a line of 100 per cent compostable long underwear. The material, called Activist TreeMerino™, is a combination of Tencel and Merino wool, whose fibres are both renewable and biodegradable.

Raw material extraction Processing Design Manufacturing Logistics Retail Use Disposal



A linear business model



The transition towards a circular business model has begun. More and more companies see the benefits of a system that does not deplete limited resources.

FAST FASHION

Fast production of trendy clothing sold at low prices led to the expression 'fast fashion'. The trend started sometime in the 1950s, when chains such as Swedish H&M were established.

The phenomenon, which is based on a linear business model, is traditionally about quick sales and rapidly shifting trends, without necessarily giving any consideration to whether the garments will last or can be recycled.

Among leading actors in fast fashion in Sweden, such as H&M, Lindex and Kappahl, sustainability is nowadays high on the agenda. An important shift in attitude can be discerned, with companies viewing sustainability as a financial opportunity instead of an obligation.

To make fast fashion more sustainable, in Sweden emphasis is placed on the need

for cooperation, new technology and innovation. Mistra Future Fashion is a cross-disciplinary research programme with the vision of introducing new ways of thinking.

One of its projects, Circular Design Speeds, focuses particularly on the speed of fashion. The central idea is that we use different materials depending on the garments' projected lifespan. In the future, 'fast' fashion may come to be even faster – made from biodegradable materials such as fibres from forests – whereas its antithesis, 'slow fashion', is designed to be used for as long as possible.

In collaboration with the Filippa K brand, the project is developing 100 per cent circular fashion garments, and the most important insights gained are shared with the industry.

The holistic design process tested in the research project Circular Design Speeds results in products sold by the project's collaboration partner, Filippa K. The coat shown here is made of recycled wool.





*A pumice sweater stone
can be used to remove
pilling and offers an
environmentally friendly
alternative to dry cleaning.*

LIFESPAN

A garment's lifespan makes a great difference to its environmental impact. In Sweden, we buy on average 50 new garments per person per year, and almost one third of that is never used.

If a garment were to be used three times longer, its climate impact would shrink by a full 65 per cent. Choosing second-hand removes a full 70 per cent of a garment's climate impact.

A garment's technical lifespan, however, is determined long before it reaches the store. Since up to 80 per cent of a garment's total environmental impact is determined in the design phase, there is potential to make a great difference right at the drawing board in the selection of material and suppliers.

For Swedish brands such as Filippa K and Gudrun Sjödén, product life is a key concept in their sustainability work. Since 2014,

Filippa K has operated by the motto that 'sustainability leads the way to growth'.

The so-called Front Runners – garments developed in accordance with 12 criteria, such as sustainable materials, transparent supplier chain, recoverability and minimal emissions – lead the way for the rest of the brand's collections.

The company also provides mending and rental, as well as the sale of second-hand Filippa K garments – all in an effort to give the garments as long a life as possible.

This dress from Filippa K, with a design and quality that lasts, can be worn for generations.







FIBRES

Clothes are traditionally made from natural fibres, synthetic fibres or a blend of the two. Natural fibres are often assumed to be more environmentally friendly since they are renewable and biodegradable, but the reality is more complicated. For example, the cultivation of natural fibres may require huge amounts of water, chemicals and energy.

According to the Higg Materials Sustainability Index (MSI), leather and natural fibres such as silk, cotton and wool have the greatest environmental impact in the short term – on the other hand, they are often durable, which evens out the aggregate climate impact if we look at the garments' total lifespan.

Synthetic fibres, a type of plastic that is usually extracted from fossil oils, give rise to extensive carbon dioxide emissions during incineration, and are broken down

extremely slowly in nature. To phase out the use of fossil materials, active efforts are under way to develop and produce better alternatives – such as the cellulose-based material Lyocell.

The innovation project 'Establishing locally cultivated textile in Sweden' (ENTIS) aims to re-establish and strengthen the Swedish textile industry by investigating how sustainable, biobased textile production can be facilitated by textile fibres from forest raw material or recycled biobased textiles. Sixty actors from different industries participate in the project, which was initiated by BioInnovation, a programme to develop innovative materials, products and services based on renewable raw materials.

The Swedish Tierra brand has developed a jacket entirely free of fossil sources. The Deterra® is made of 100 per cent biobased material from sources such as beans, corn and nuts.



This knitted dress, made of 100 per cent paper from Swedish forests, is produced by Smart Textiles at the University of Borås, in collaboration with a number of Swedish companies within the project Design for Recycling. The project is part of the Swedish strategic innovation programme BioInnovation.





Phytalephas microcarpa Ruiz et Pav.

Des. v. Wagner

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COTTON

Cotton is the most common raw material in the Swedish fashion industry. Cotton farming is one of the world's most chemical-intensive forms of agriculture, one that also requires enormous amounts of water and land area. As the earth's population grows, so do the demands on agricultural production to feed everyone, and the dilemma arises whether to produce cotton or food.

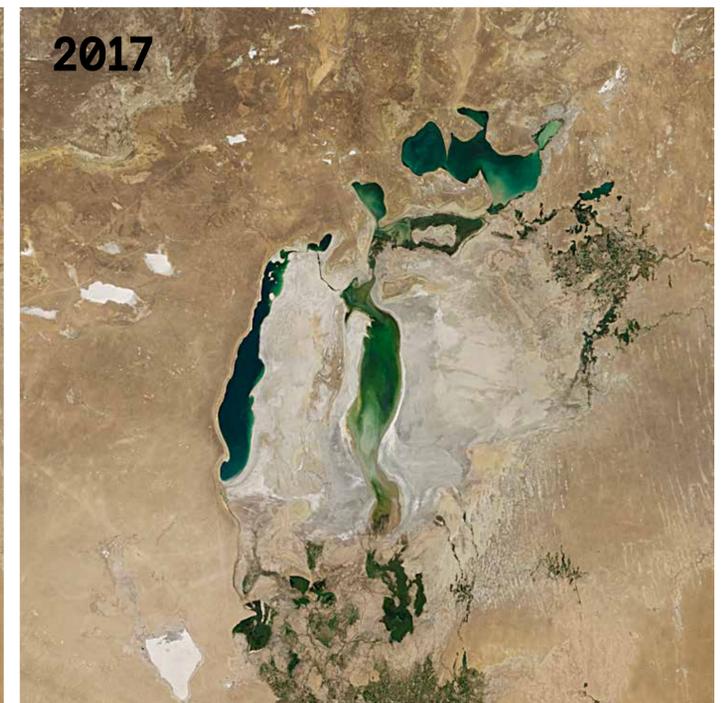
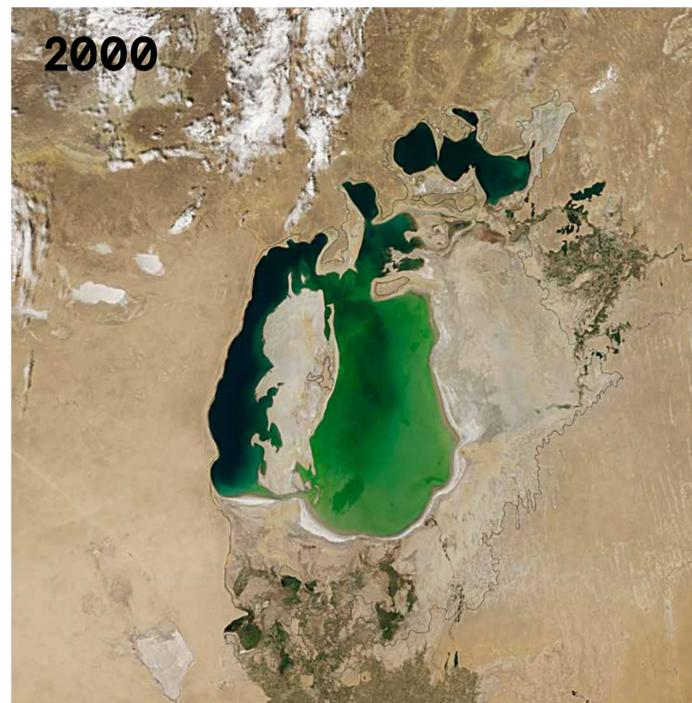
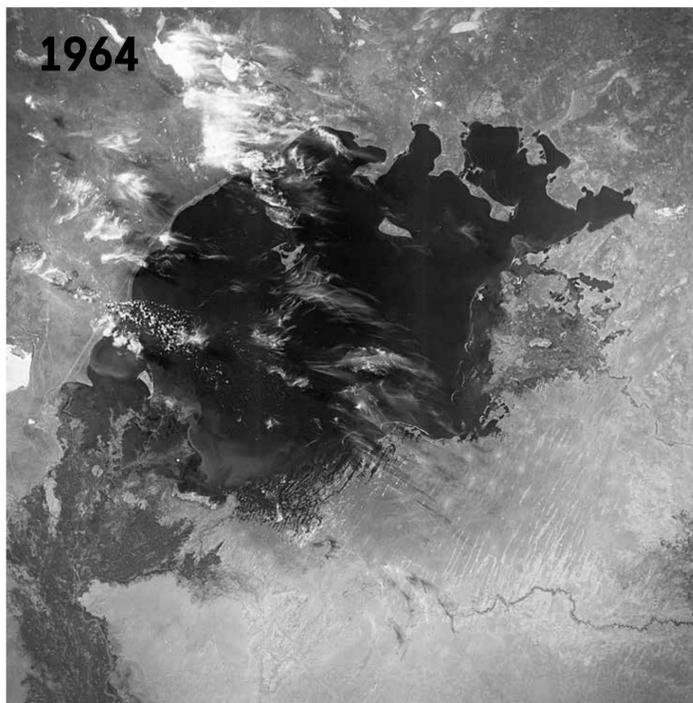
Finding alternative fibres to conventional cotton is one of the fashion industry's most urgent challenges and it requires efforts on many levels. The aim should be no less than to transition to cotton that is organic and certified in accordance with both environmental and social requirements, such as GOTS (Global Organic Textile Standard) – and to develop alternatives to cotton.

Organic cotton is increasingly common in Swedish brands. In 2017 Velour launched the world's first jeans certified by the Nordic Svanen ecolabel. Since 2012, all Nudie Jeans are denim products made from 100 per cent organic cotton.

Many Swedish brands, such as Lindex, Uniforms for the Dedicated, Mini Rodini and Boob, sell GOTS-certified clothing. The New Wave Group sells clothing, such as promotional apparel, that is both Svanen-labelled and GOTS-certified. H&M has set a target that by 2020 all cotton used in its products must come from sustainable sources: organic, recycled or from Better Cotton Initiative (BCI).



Spraying of cotton accounts for 11 per cent of agriculture-related pesticides. The chemicals then spread far and wide, even across nation borders.



Fifty years after its water sources were diverted to supply cotton farms with water, the Aral Sea is virtually gone. Some estimates suggest that the lake is just 10 per cent of its original size.





Since 2012, all Nudie Jeans denim products are made from 100 per cent organic cotton and are produced under socially responsible conditions on a transparent production chain. The company also provide mending, resale of second-hand items and recycling of worn-out products.

WATER AND CHEMICALS

Both fibre cultivation and dyeing require large quantities of water and chemicals. It takes 2–4 kilograms of chemicals, and 10,000–30,000 litres of water, to produce one kilogram of textile.

Waste treatment plants are often unable to fully treat the waste water emanating from the textile industry. The polluted water has devastating consequences for both people and the environment. Numerous reports suggest that the drinking water in the areas near to textile plants is unusable.

Many Swedish companies require that suppliers purify their water emissions in sewage systems before the water is released into watercourses. The Swedish textile industry took action at an early stage to phase out hazardous chemicals in its production processes.

Traditional cotton farming involves insecticides, and the dyeing process is equally pro-

blematic. Even when the cotton is organic, the garment may still be dyed with carcinogenic colouring agents. Usually the dyeing is done to the finished woven fabric, which requires significantly more water, chemicals and colouring agents; however, new technology that will transform the dyeing processes is on its way.

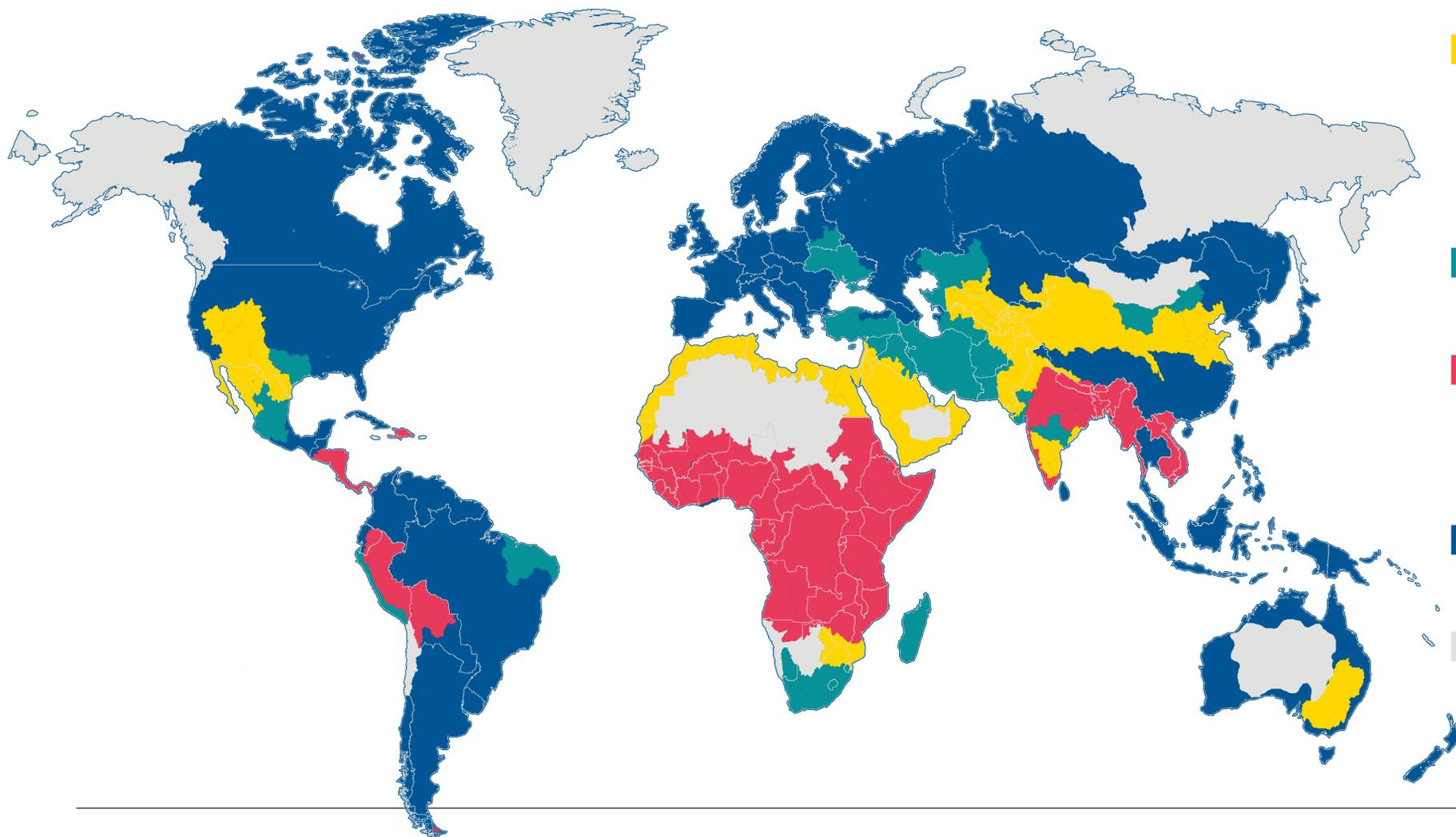
Swedish company We aRe SpinDye dyes materials such as synthetic textiles before they are woven into fabric. By means of 'spin-dyeing', water use can be reduced by 75 per cent and chemical use by 90 per cent. Moreover, the energy consumption and the environmental footprints in the form of carbon dioxide emissions are significantly lower. The method is currently used by brands such as Fjällräven and Odd Molly.

The classic Fjällräven knapsack has been produced in a special version, the Re-Kånken, made from a single thread from eleven recycled plastic bottles. It is dyed using SpinDye technology, which radically reduces the consumption of water, energy and chemicals.



FACTS

AREAS OF PHYSICAL AND ECONOMIC WATER SCARCITY



- Physical water scarcity**
Water resources development is approaching or has exceeded sustainable limits. More than 75 per cent of the river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition – relating water availability to water demand – implies that dry areas are not necessarily water scarce.
- Approaching physical water scarcity**
More than 60 per cent of river flows are withdrawn. These basins will experience physical water scarcity in the near future.
- Economic water scarcity**
Human, institutional, and financial capital limit access to water, even though water is available locally to meet human demands. Water resources are abundant relative to water use, with less than 25 per cent of water from rivers withdrawn for human purposes, but malnutrition exists.
- Little or no water scarcity**
Abundant water resources relative to use, with less than 25 per cent of water from rivers withdrawn for human purposes.
- Not estimated**

Source: A Comprehensive Assessment of Water Management in Agriculture/ International Water Management Institute

ENVIRONMENTAL IMPACT

Raw materials stage

Water, energy, chemicals, and ethical practices in raw material production

IMPACT AREA	MAGNITUDE OF IMPACT	BIGGEST DRIVERS
Water	High	Irrigation methods, e.g., choice between conventional cotton versus more sustainably sourced cotton.
Energy	High	Using recycled plastics/fibres, e.g., replacing virgin polyester.
Chemicals	High	Amount and frequency of fertiliser and pesticide use.
Waste	Very low	
Labour practices	Medium	Low level of wages. Prevalence of child labour.
Health & safety	Medium	Safeguarding safety standards.
Community	Very low	
Ethical practices	High	Guaranteeing animal welfare; extensive land use, consideration of use for food production.

Processing stage

Both the environmental and the social footprints have a large impact in the processing phase

IMPACT AREA	MAGNITUDE OF IMPACT	BIGGEST DRIVERS
Water	High	Water use in dyeing. Water use in cleaning, rinsing of fibers.
Energy	Very high	Share of renewable energy use. Energy efficiency of equipment.
Chemicals	Very high	Lack of waste water treatment in dyeing. Chemicals for fibre treatments.
Waste	Medium	Waste of fibres/fabrics (e.g., roll ends, off-cuts, samples).
Labour practices	Very high	Low level of wages, non-compliance to labour laws, gender inequality; worker wellbeing, bonded and child labour.
Health & safety	Very high	Building safety. Chemical exposure of workers.
Community	Low	
Ethical practices	Low	Prevalence of corruption.

Source: Pulse of the Fashion Industry 2017

MICROPLASTICS

Polyester is currently the most common raw material for textiles on a global level. Just like other synthetic fibres, the oil-based material releases microplastics, which represents a huge environmental challenge.

All fabrics shed, and synthetic fibres will release microplastics when they are washed. The fibres continue via water treatment plant filters, which only trap the larger particles, out into nature.

The worldwide goals defined in the UN's 2015 sustainable development agenda refer to a zero vision. Currently, however, the textile industry lacks the knowledge required to make the necessary changes.

Therefore, we need actors such as the research programme Mistra Future Fashion, which in collaboration with Swedish brands

H&M, Filippa K and Boob Design, and researchers from Swerea IVF, has conducted a research study to analyse the relationship between the properties of polyester fabrics and microplastics shedding. The project has concluded that fabric cutting should be done using ultrasound and that micro-particles should be removed in the production phase.

The GuppyFriend washing bag is a German innovation sold by Swedish brands like Filippa K and Houdini Sportswear. It prevents microplastics from ending up in our lakes and oceans, and due to its soft texture, there is less loss of fibres – which extends the life of your garments.



**STOP!
MICRO
WASTE**

GUPPYFRIEND
Washing Bag



**STOP!
MICRO
WASTE**

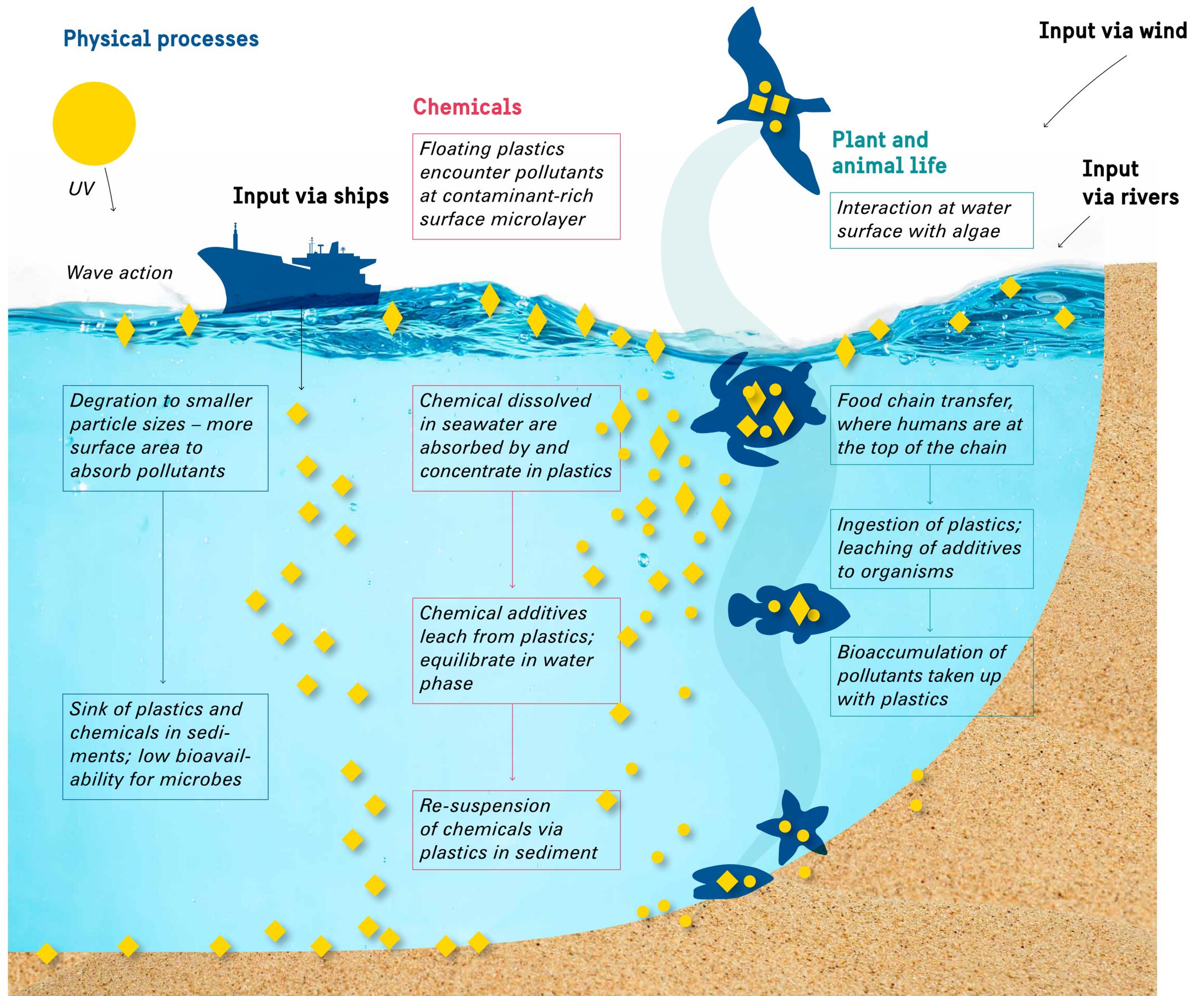
for a plastic free nature

Microfiber Filter Solution

**STOP!
MICRO
WASTE**

Sources of marine microplastics and the various physical, chemical and biological processes affecting microplastics in the marine environment

- ◆ Macroplastics >5mm
- ◆ Microplastics <5mm
- Chemical pollutant



Source: Ogunola OS, Palanisami T (2016) Microplastics in the Marine Environment: Current Status, Assessment Methodologies, Impacts and Solutions. J Pollut Eff Cont 4: 161. doi:10.4172/2375-4397.1000161

ENERGY AND TRANSPORT

Energy consumption in the textile industry is high and is present at every stage of a garment's lifecycle. Polyester, for example, demands an enormous energy input during its production, whereas with cotton most of the energy is consumed during the wet process.

Energy is also consumed for the finished garment. Partly because we wash, dry and iron our clothes, but particularly because we travel to and from the store. Fully 22 per cent of a garment's total climate impact is caused by consumers' travel, and most of this travel is done by car. Supplier-related transport, on the other hand, accounts for only one or two per cent of a garment's total climate impact.

Emissions of carbon dioxide from the fashion industry are expected to increase by over 60 per cent by 2030 – a figure that clarifies how the switch to renewable energy is expected to be the single most effective change toward reducing a garment's climate impact. Improved energy processing in the fashion industry is viewed as potentially valuable for the world economy.

Just how much energy is consumed makes a huge difference, but equally important is the type of energy used.

COOPERATION AND TRANSPARENCY

Transparency is a key concept and an important driving force for change in the textile and fashion industry. Insight into different industry actors' sustainability work is important to enable us to understand what the most critical areas of the value chain are. This insight in turn creates the conditions for change.

Demand for more coordinated, comparable and reliable sustainability information is growing. While many individual brands and actors have made major progress in the area to date, applying 'best practice' on a cross-industry level internationally requires an even greater collective effort.

Swedish H&M is an industry-leading brand in sustainability issues, involved in a number of research projects and initiatives. They are a partner of the Global Fashion Agenda group, which works to create a unified agenda for key environmental, social and

ethical problems. The group wants to achieve a common understanding of the industry's most critical problems, and focus interventions on achieving the greatest possible impact.

As one of the original members of the Sustainable Apparel Coalition, H&M also works to promote the issue of transparency. With the help of Swedish experts, this organisation developed the Higg Index – a holistic self-evaluation tool used to measure social and environmental impact at all stages of the value chain.



TEXTILE RECYCLING

Globally, we consume about 62 million tonnes of clothing per year, and only 20 per cent is re-used or recycled. The fact that the textile industry has no functioning waste management entails an ongoing risk of major resource shortages and environmental problems.

Recycling of textiles is usually divided into mechanical and chemical processes. In mechanical recycling, so far blended materials have presented a great challenge.

Regarding chemical recycling of cotton, currently most of the activity takes place on the laboratory level. On the other hand, polyester recycling is taking place full-scale in Asia and is expected to be scaled up globally in the coming years.

In Sweden a great deal of research is being done in textile recycling. In 2017, Mistra Future Fashion presented the results of

a six-year research project called Blend Re:wind that has developed a process for chemical recycling of cotton and polyester fibre blends.

The Re:Mix project, initiated in 2016, aims to develop the technical methods required to separate nylon and elastane out of fibre blends in used textiles.

In 2017, the Lindex clothing chain launched its Re:Design collection of upcycled garments developed in collaboration with Re:textile at the University of Borås, Sweden. The kimono seen here is made from Lindex Better Denim garments from previous seasons, which have been redesigned in Borås.

SUSTAINABLE CONSUMPTION

As consumers we play a major role in facilitating a circular fashion economy. We increasingly call for more sustainable fashion and more transparency in the value chain. The better informed we are, the greater the pressure we can exert on companies to act sustainably.

Let your garments live a long life

The single best thing you can do for the environment is to wear your clothes for longer periods, or make sure someone else takes ownership when you are finished with them. Invest in items you will really use. Choose materials that will last a long time and have strong environmental characteristics, such as viscose, Modal and Lyocell. Synthetic fibres are also good if you can wear the garment for many years. Material recovery is also easier, in certain cases, with synthetic fibres.

Guidance from ecolabelling

Choose garments that are certified in accordance with established ecolabelling, such as Global Organic Textile Standard (GOTS), EU Ecolabel and Fairtrade – preferably labels that entail standards of both environmental and social responsibility. Ask the brands how and from which materials their garments are made.

Choose second-hand

The circular fashion economy includes an increasing number of business models that offer alternatives to buying newly produced fashion. Choose second-hand as often as you can, as it entails an extremely significant environmental gain, and rent or borrow garments you will only use occasionally.

Do not drive to the store

Consider carefully how you travel to the store. Fully 22 per cent of a garment's total climate impact is caused by consumers' travel, and most of this travel is by car.

Take proper care of your clothes

Mend, maintain and store your clothes properly. Follow the care recommendations and laundering instructions – and launder less in general. Airing or spot-cleaning stains is usually sufficient. Air-dry your clothes instead of using the energy-guzzling tumble dryer. To prevent microplastics from spreading into the environment, a laundry bag like the GuppyFriend can make a critical difference when you wash garments made from synthetic fibres.

Recycle

Do whatever you can to ensure that your clothes do not end up in the rubbish. Items you no longer use can be sold, donated, lent to others, exchanged for new clothes, or – as the last recourse – recycled. Make sure the garments go back into circulation.



Houdini works to prolong the life of their products, offering repairs, rentals and second-hand sales.