



Photo by Essi Karell

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has been developed by:

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5.1 Aspects of Sustainability in the Textile and Clothing Sector



SusTexEdu



Funded by the
Erasmus+ Programme
of the European Union

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This educational material was developed within Erasmus+ funded project [Education Partnership of Textile and Clothing Sector Materials & Sustainability \(SusTexEdu\)](#).

The aim of the project was to research and develop education related to the textile and clothing industry and textile materials, sustainable development and the circular economy.

Project coordinator: Metropolia UAS

Partners: Hogent (BE), Mome (HU), Omnia (FI), TTHK (EE), TTK UAS (EE), University of Borås (SE)

Funding: [Erasmus+](#)

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About this learning unit

▼ CONTENT DESCRIPTION

- ❖ Key terminology of sustainability and sustainable development
- ❖ Characteristics of sustainability in the textile and clothing industry
- ❖ Different dimensions of sustainable development
- ❖ The UN's 17 sustainable development goals and their connection to the textile and clothing industry

▼ LEARNING OUTCOMES

After completing the unit, the student:

- ❖ Understands and can present key terms of sustainable development
- ❖ Can describe and explain the characteristics of sustainable development in the textile and clothing industry
- ❖ Knows the 4 dimensions of sustainable development
- ❖ Understands and knows how to create connections between the UN sustainable development goals and the textile and clothing industry

▼ STUDENT WORKLOAD

The learning unit corresponds to one (1) ECTS, approximately 27 hours.

What does sustainable development mean?

Assignment:

The next 10 minutes

Think independently or with another student:

What comes to mind when you think of the words: sustainability, sustainable development and responsibility?

Write down your thoughts and present them to the group in a joint discussion.



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Definition of sustainable development

Sustainable development refers to the development of society and the economy in such a way that the needs of current generations are met without jeopardizing the ability of future generations to meet their own needs.

[EU comission](#)

Sustainable development is global, regional and local continuous and controlled social change, the goal of which is to secure good living opportunities for current and future generations. This also means that the environment, people and the economy are taken into account equally in decision-making and operations.

[Ministry of the Environment of Finland](#)



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... definition of sustainable development

Sustainable development refers to locally, regionally and globally guided change, the goal of which is to preserve and guarantee good life opportunities for current and future generations.

Guaranteeing future needs and good living conditions requires that in decision-making and operations, within the limits set by nature's carrying capacity and the preservation of diversity, the environment, people and the economy are equally taken into account, both on a local and global level.

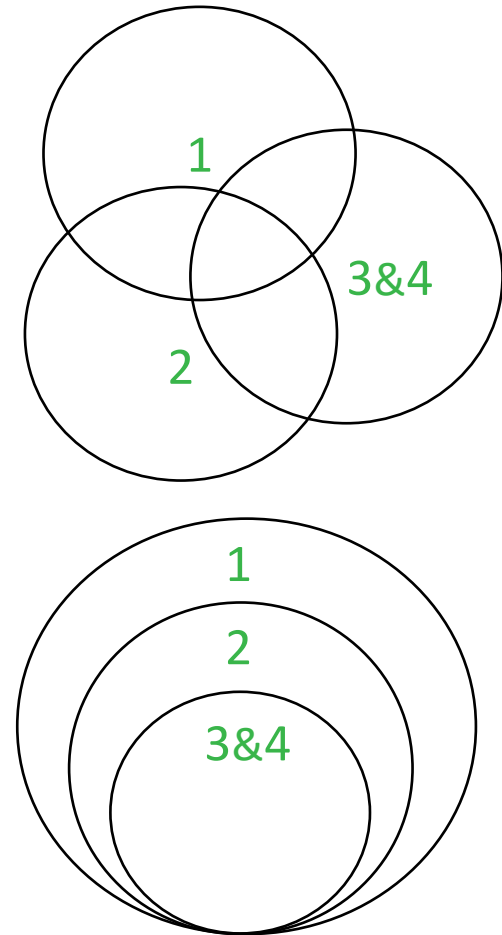
Sustainable development is indeed a goal that intersects many different perspectives, which is divided into **four different dimensions: ecological, economic, social and cultural sustainability.**



Dimensions of sustainable development

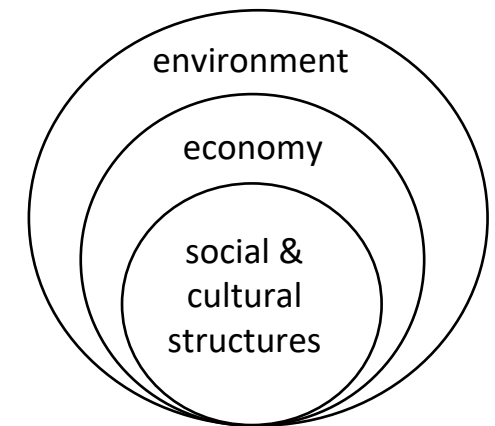
The 4 sustainable dimensions can be considered in different viewpoints, as in the images on right.

1. Environmental sustainability
2. Economical sustainability
3. Social sustainability
4. Cultural sustainability, usually considered to be part of social sustainability



1. Environmental sustainability

- ❖ Environmental / ecological sustainability is one of the four dimensions of sustainable development and at the same time its basis. Its prerequisite is the transformation of the world of values and attitudes to include the intrinsic value of nature, and the adaptation of human economic and material activities to the renewal and sustainability of nature and the environment.
- ❖ The goal of ecological sustainability is to preserve the diversity of plant and animal species and the functioning of ecosystems and to use natural resources sustainably. People's well-being and its dimensions (social, cultural, economic) are based on ecological sustainability.



2. Economic sustainability

- ❖ Economic sustainability means balanced, sustainable growth that is not based on long-term indebtedness or the overuse or destruction of capital, such as natural resources.
- ❖ A sustainable economy is a prerequisite for the central functions of society and the promotion of national well-being. Economic development is sustainable when the earth's resources have time to renew themselves faster than they are used.
- ❖ A sustainable economy includes reasonable use of non-renewable natural resources, use of renewable natural resources, waste minimization and efficient recycling. A sustainable economy is especially the basis of social sustainability, and the promotion of social sustainability in turn prevents difficulties arising in the changing world economy.



3. Social sustainability

- ❖ Social sustainability refers to the transfer and development of well-being conditions from one generation to the next. Its goal is to reduce inequality in the well-being and participation of individuals. Socially sustainable development requires the equality and equality of the members of society as well as the realization of basic rights and the basic conditions of life.
- ❖ Population growth, poverty, insufficient food and health care, gender inequality and deficiencies in the organization of education are examples of global social sustainability challenges.



4. Cultural sustainability

- ❖ Cultural sustainability guarantees the development and preservation of cultures from one generation to the next. From the point of view of cultural heritage, cultural sustainability means nurturing and passing on languages, traditions and customs, valuing diversity and respecting all rights.
- ❖ In addition to nurturing cultural heritage, the goal of cultural sustainability is to promote coexistence between different cultures. Therefore, the promotion of peace, human rights and cooperation are also a significant part of cultural sustainability.



Examples of dimensions of sustainable development in the textile and fashion industry

Assignment:

Think with a pair or in a small group about examples of what kind of phenomena/stages of the life cycle the different dimensions of sustainable development are realized or are challenging in the textile and clothing sector.

Write down your thoughts and present them to the group in a joint discussion.



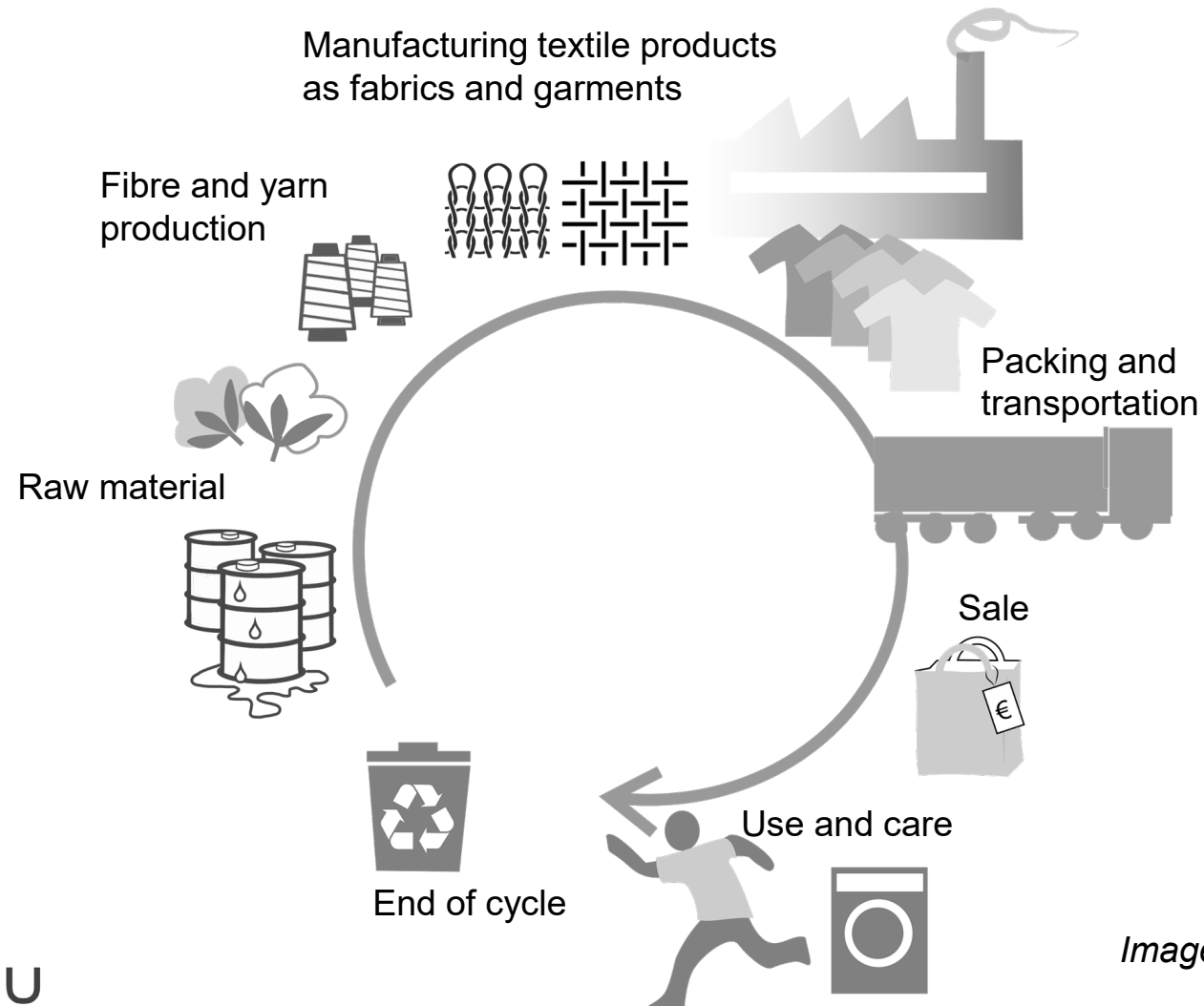
The life cycle of textile and clothing products

1. Fibre and yarn production (planting, collecting, spinning, dyeing, finishing)
2. Fabric production (weaving, knitting, nonwoven, dyeing, finishing)
3. Product manufacturing, finishing and packing
4. Transportation*
5. Sale
6. Use and care
7. End of life cycle: reuse, recycling or disposal by incineration or landfill

*Transportation and storage must be taken into account between all stages of the life cycle.



... the life cycle of textile and clothing products



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Materials

- ❖ All fibres have some negative effects on the environment
- ❖ The effects concern e.g.
 - use of natural resources; cultivation, irrigation, fertilizers, pesticides
 - fibre and yarn production methods
 - fabric manufacturing methods
 - dyeing and finishing methods, chemicals used
 - working conditions of employees
- ❖ Issues to consider, when choosing materials e.g.:
 - virgin fibres - recycled fibres
 - renewable or non-renewable fibres – new fibre innovations
 - fibre blends – solid materials
- ❖ Issues to remember, when choosing materials e.g.:
 - accessories, their suitability
 - ... and overall quality to increase the life time of the textile



Design & Manufacturing

- ❖ Design: the suitability to the intended use and markets, visual and technical quality, sustainability in material choices and outlook of the product.
- ❖ Pattern making and layout: fit, functionality, minimization of cutting waste
- ❖ Technical design and production: functionality and durability of structures, visual quality of sewing work
- ❖ The manufacturing company: working conditions, workforce, energy and water consumption, emissions to the environment, security of delivery, quality, pricing



Transportation and storage

Opportunities and challenges:

- ❖ Transporting more materials/products at a time decreases the environmental load and costs of the transportation, but increases the storage.
- ❖ Short distance between work stages of the production process decreases the environmental load.
- ❖ Simple local production is easier to monitor, but may meet challenges in pricing and in standard of collections, especially in demanding fashion markets.



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Sale

- ❖ A slower cycle of collections enables manufacturing to order and smaller stocks - products do not get unsold.
What happens to the unsold?
- ❖ The effect of slow pace on production volumes sets however challenges to the pricing.
Why is that?
- ❖ Retail also needs reliable marketing, which meets the target group.



Purchase, use, care and disposal

There are several ways to help as a consumer.

Assignment:

Think with a pair or in a small group about the consuming habits of your generation. How is it now, and what could be done better for reducing the consumption?

Write down your thoughts and present them to the group in a joint discussion.





EU strategy for sustainable and circular textiles

- ❖ Textiles are to be made more durable, repairable, reusable and recyclable, tackle fast fashion and speed up innovations in the sector.
- ❖ The new strategy includes requirements for more ecological design of textiles, clearer sharing of information and a digital product passport. In addition, companies are required to bear their responsibilities and act to minimize their carbon and environmental footprints.





...EU strategy for sustainable and circular textiles

Design

- ❖ EU: the goal is to make textile products last longer by setting design requirements for textile and clothing products.
- ❖ Up to 80%* of the environmental impact of a product's life cycle is defined in the design phase.
- ❖ Textiles must be more durable and easier to repair and recycle.
- ❖ A minimum requirement is set for the amount of recycled material in the products.
- ❖ The product information of textile products is clarified and the digital product passport tells about the product's environmental factors.





Recycling and waste reduction

- ❖ In the renewed **EU Waste Framework Directive**, the focus is on textile and food waste.
- ❖ According to the European Environment Agency, the message of used textiles outside of Europe has tripled in the last two decades. Fast fashion produces a huge amount of hard-to-recycle textile waste in the form of overconsumption.
- ❖ The EU aims to stop the overproduction and overconsumption of clothes.
 - New ways are looked for to make producers responsible of their products even after the sale.
 - The new measures also aim to prevent the destruction of unsold and returned textiles and limit the export of textile waste.





REACH

- ❖ **The REACH Regulation** provides for the registration, evaluation, authorization procedures and restrictions of chemicals, as well as information in the supply chain. REACH stands for **R**egistration, **E**valuation, **A**uthorization and restriction of **C**hemicals.
- ❖ REACH standards for textiles regulates the use of dangerous chemicals known as Substances of Very High Concern (SVHC). The content of SVHC in textile products sold in the EU must be no more than 0.1% of the total product weight. SVHCs may exhibit various hazardous properties, including:
 - Carcinogenicity (the ability to cause cancer)
 - Mutagenicity (the ability to induce genetic mutations)
 - Toxicity to reproduction (harmful effects on fertility and unborn children)
 - Bioaccumulation (the tendency to accumulate in living organisms and move up the food chain).



Microplastics

- ❖ About 8% of European microplastics released to oceans are from synthetic textiles. The majority of them are released the first few times textiles are washed. Fast fashion accounts for particularly high levels of such releases because fast fashion garments account for a high share of first washes, as they are used for only a short time and tend to wear out quickly due to their low quality.
- ❖ In 2023, the European Commission adopted a [REACH restriction](#) on microplastics intentionally added to products and a proposal for a regulation on preventing plastic pellet losses to the environment. These actions will directly contribute to reaching the 30% reduction target for microplastic releases set out in the [Zero Pollution Action Plan](#)
- ❖ The Commission has been committed to fighting against microplastics pollution already in the [European Green Deal](#) and the [Circular Economy Action Plan](#).
- ❖ The EU is developing concrete ways to reduce microplastic emissions into waterways with the help of labels, standards, certificates and regulation.





EU's Green Claims directive

Greenwashing

- ❖ Consumers' skepticism towards the responsibility claims of business has increased due to the spread of misleading or "overly optimistic" claims in marketing
- ❖ The EU has proposed a new directive **Green Claims**, which is expected to be approved by the European Parliament by the end of 2024, and member states to be adopted it within the next two years.
- ❖ In the future, general sustainability claims based on offsetting emissions or other environmental effects, such as "carbon neutral", "climate neutral", "climate positive" or "net zero" are prohibited in business communications.
- ❖ Only promises and claims based on reliable scientific evidence utilizing the latest technical knowledge will be accepted, e.g. claims such as "this T-shirt is made from 5 recycled plastic bottles" are only allowed if the company can verify it.





Corporate sustainability due diligence

Respect for human rights

- ❖ In May 2024, the Council of the EU approved the long-awaited EU Corporate Sustainability **Due Diligence Directive** (CSDDD or the Directive).
- ❖ The aim of this Directive is to foster sustainable and responsible corporate behaviour in companies' operations and across their global value chains.
- ❖ The new rules will ensure that companies in scope identify and address adverse human rights and environmental impacts of their actions inside and outside Europe.



Characteristics of sustainability in the textile and clothing industry

Ecological, economic and social sustainability:

- ❖ Appropriate communication
- ❖ Corporate and social responsibility
- ❖ Economically profitable operation
- ❖ Energy efficient, material and environment saving production methods
- ❖ Sustainable design strategies incl. responsible material choices suitable for their intended use



Environmental impact

Assignment:

How can you reduce the environmental impact of your own activities as both professionals in the fashion and textile sector (products and services) and as consumers?

Discuss in small groups, present the key goals.



Terms related to sustainable development

Biodiversity

Biodiversity is all the different kinds of life you'll find in one area; the variety of animals, plants, fungi, and even micro-organisms like bacteria. Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life.

Cleantech

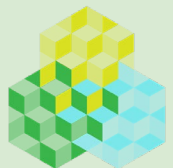
A technology, product, service, process or closed system that promotes the sustainable use of natural resources. It maximizes material, water and energy efficiency both financially and technologically and at the same time reduces emissions to water, air and land.

Ecological footprint

The size of the land and water area that is needed to produce food, material, and energy consumed by a person or a group of people and to process waste. According to the WWF, humanity's ecological footprint already exceeds the earth's sustainability capacity by 25 percent.

Environmental handprint

Environmental handprint describes the environmentally positive factors by which resource efficiency is improved and environmental burden is reduced while producing a product, providing a service or running business more competitive than before.



...terms related to sustainable development

Carbon neutrality

A product, company, municipality or state that produces only as much carbon dioxide emissions as it can bind, carbon neutral.

The carbon footprint of a carbon neutral product is zero throughout its entire life cycle.

Climate change

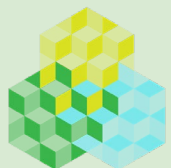
Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions. But since the 1800s, human activities have been

the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas.

The sharing economy

The sharing economy is a peer-to-peer (P2P) economic model. It facilitates acquiring, providing, or sharing access to goods and services.

Sharing economies have existed throughout history, but in modern times the sharing economy is experiencing a revival with the support of community-based online platforms.

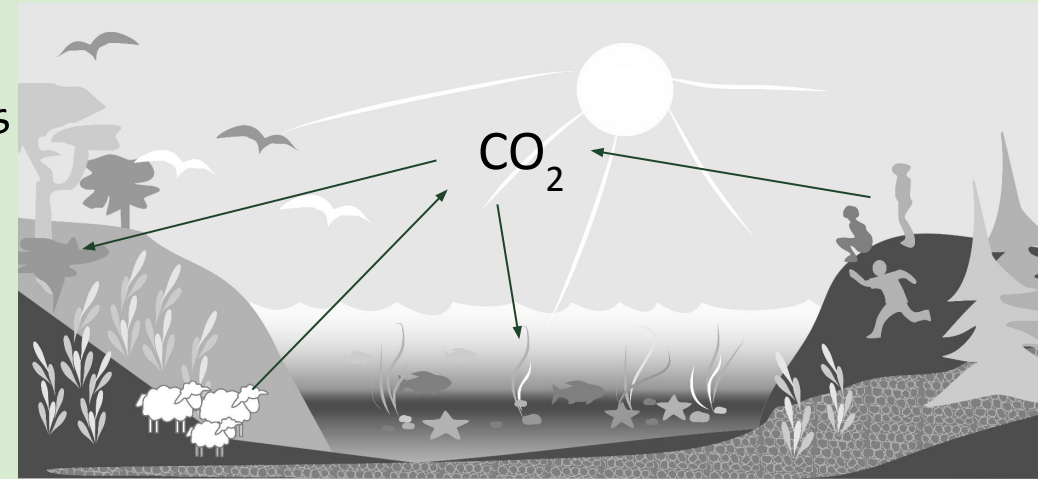
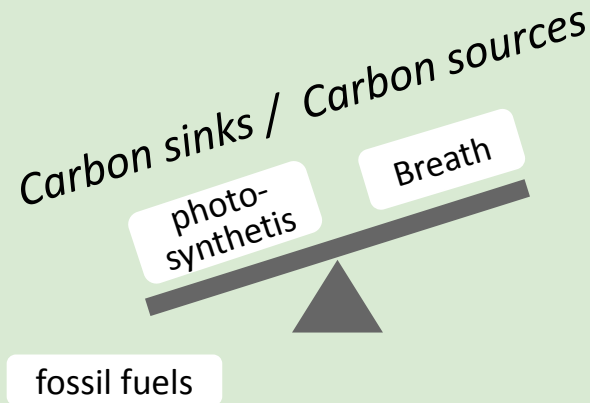


...terms related to sustainable development

Carbon cycle

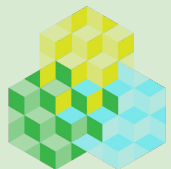
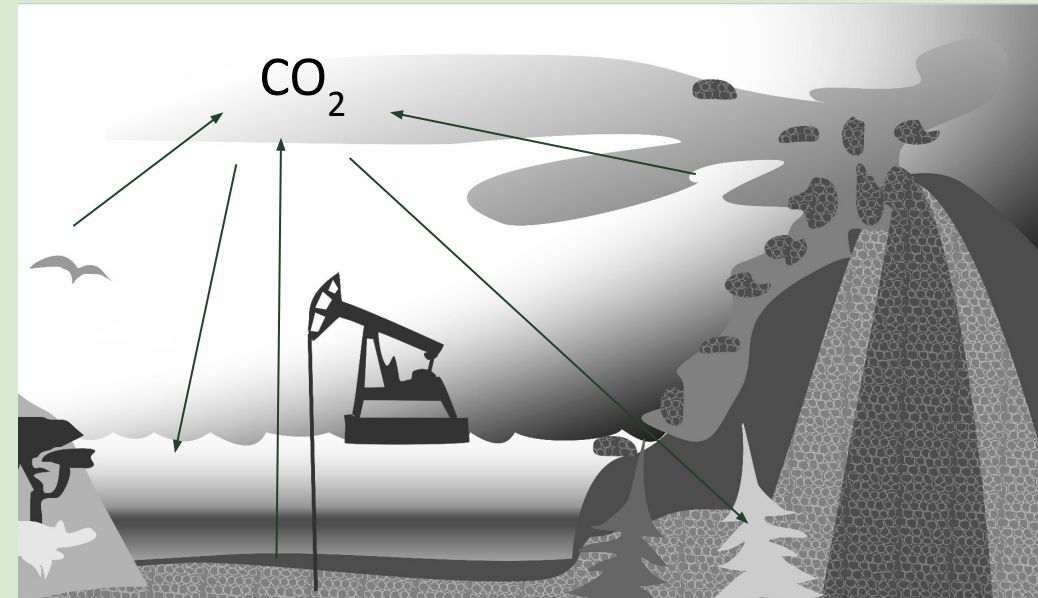
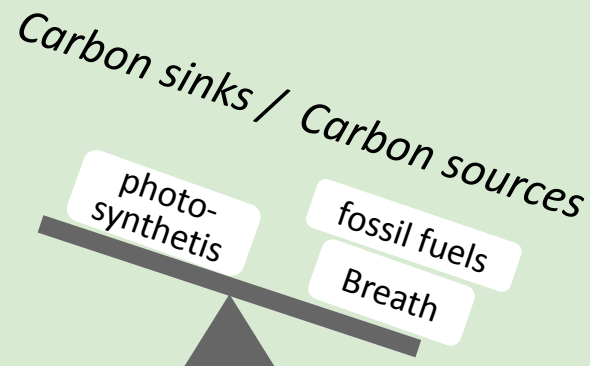
Fast carbon cycle

- Carbon dioxide in the air and organic compounds of organisms
- Carbon sinks bind carbon by photosynthesis (forests, seas)



Slow carbon cycle

Fossil fuels are long-term stores of carbon



...terms related to sustainable development

Circular economy

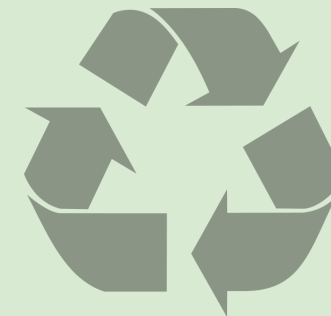
The circular economy is about to replace the linear economic system that is based on consuming materials and discarding them after use.

The circular economy is a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting.

(Look also; recycling; upcycling; downcycling)

Environmental ecology

Environmental ecology is the branch of biology which studies the interactions among organisms and their environment. Objects of study include interactions of organisms with each other and with abiotic components of their environment.



...terms related to sustainable development

Ecosystem

An ecosystem is a community of living organisms (plants, animals and microbes) in a particular area. The term `eco' refers to a part of the world and `system' refers to the coordinating units. Shortly, an ecosystem is a chain of interactions between an organism and its environment.

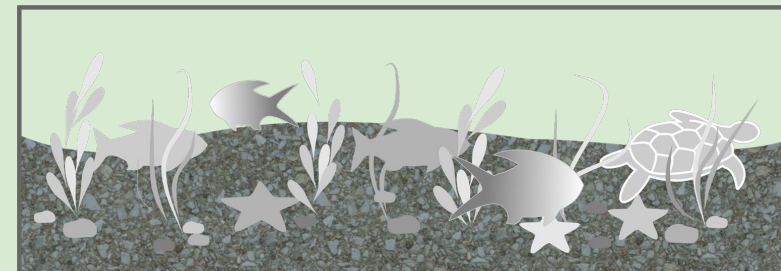
Ecosystem services are divided into three classes: production services, regulatory and maintenance services, and cultural services. The most concrete of these are the production of food and raw materials.

Nutrient cycle

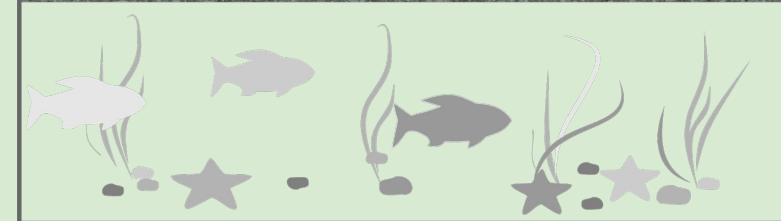
Nutrient cycling ensures the circulation of useful nutrients necessary for life in the ecosystem so that they are not wasted. Wasted nutrients such as phosphorus and nitrogen eutrophication for example to waters.

Image by SusTexEdu

ecosystem



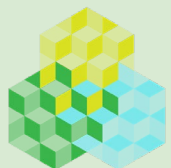
community



population



individual



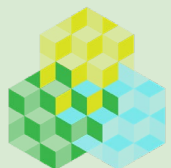
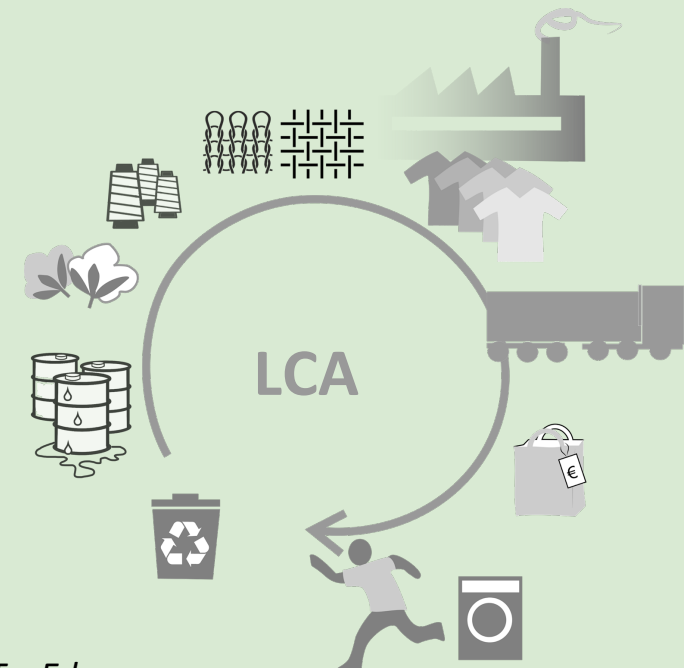
...terms related to sustainable development

Life cycle assessment (LCA)

Life cycle assessment is used to study complex value chains in order to understand their environmental impact.

It is an important decision-making support tool used by political decision-makers, authorities, companies and researchers to identify and mitigate critical environmental impacts caused by human activity. LCA is an ISO-standardized, well-established analysis method that can be used to

simultaneously determine several environmental impacts caused by the entire life cycle of a product or service.



...terms related to sustainable development

Resource wisdom

The ability to use different resources (natural resources, raw materials, energy, products and services, facilities and time) judiciously. Resource wisdom promotes well-being and sustainable development.

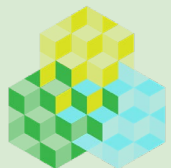
Side streams

In the manufacturing process of the main product, various by-products are often generated, such as waste heat. These by-products are called side streams, which should also be reused.

Earth's overshoot day

Calculated, the day of the year when humans' ecological footprint exceeds the Earth's annual ability to produce renewable natural resources and process greenhouse gas emissions caused by the use of fossil fuels.

In 2024, the world's Earth's overshoot day was 1st of August.



...terms related to sustainable development



Reuse

Reusing means using the material or product as it is.

Recycling

Recycling refers to reusing the material of the product either as raw material for the clothing or other industries. It means a process where materials are collected and transformed into new products, otherwise, these products would be disposed of in the trash.

Primary or closed-loop recycling converts a material into more of the same material. Level 2 transforms discarded products into other items,

even if they are made of the same material. At level 3, the material can be chemically broken down and produce something completely different from the original.

Upcycling

Upcycling is converting of useless material into a new form of better quality or greater value. At that time e.g. production surplus, by-products or scraps are utilized instead of becoming waste.

Downcycling

Downcycling means converting valuable materials into less valuable ones. This improves the usability of the original material. Although turning a shirt into yarn is possible.



...terms related to sustainable development

Zero waste

- For decreasing the amount of waste is seen to require both producer, political and community responsibility.
- International definition of zero waste: "The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health."
- In production the design is seen to have the primary impact on the amount of cut waste and re-usability of the product.

Extended producer responsibility (EPR)

Extended producer responsibility is an environmental policy approach in which the producer's responsibility for the product is extended to the stage after the consumer stage of the product's life cycle.

[Extended Producer Responsibility – OECD](#)

Triple bottom line

People, planet, profit. Social (including cultural), ecological and economic sustainability corresponds to the dimensions of sustainable development. Triple bottom line also corresponds to the dimensions of sustainable development.

[The European Investment Bank](#)



...terms related to sustainable development

Assignment:

1. Take a look at Sitra's future glossary and select and copy 5 terms you think are central to the textile and fashion sector. Think about the reasons for your choice.
2. Take a look at the Sustainable Review glossary and select and copy 3 terms that you think are central to the textile and search for equivalents in your language and explanations for the terms.

[Sitra – Sustainability Dictionary](#)

[Sustainable Review](#)



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Agenda 2030

- ❖ Agenda 2030 is an action program agreed by UN member states in 2015, which guides the promotion of sustainable development in the years 2016–2030.
- ❖ Agenda 2030's action program for sustainable development is a universal political document binding on all states of the world. It contains 17 broad sustainable development goals, each of which contains its own sub-goals.
- ❖ Agenda 2030 aims to eliminate extreme poverty and sustainable development, where the environment, economy and people are taken into account equally. Enabling equal development and securing the living conditions of future generations are at the center of all goals. The goals are strongly linked to each other, and none of them can be achieved at the expense of the other. The active participation of the state, decision-makers and individual citizens is needed to achieve the goals.

[UN.Agenda2030](https://www.un.org/sustainabledevelopment/)



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Agenda 2030, the global goals for sustainable development



Agenda 2030 goals in the textile and clothing sector

Assignment:

Discuss with a pair or in a small group how the goals of Agenda 2030 are combined with the activities of the textile and clothing industry. Choose at least 2 goals of the Agenda.

Look for examples of phenomena, challenges or solutions.

Present the results of the discussion to the group in a joint discussion.



Learning materials

European Environment Agency. [Sustainability](#)

UN. [Agenda 2030](#)

Ellen MacArthur Foundation (2023). [Circular economy introduction.](#)

[EU Strategy for Sustainable and Circular Textiles \(europa.eu\)](#)

[A European Green Deal \(europa.eu\)](#)

[Sustainable Fashion Glossary](#)

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Visit [the project website](#) to see all the intellectual outputs of the project.



Photo by SusTexEdu in the University of Borås



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