Co-funded by the European Union

LEARNING PARTNERSHIP FOR SUSTAINABLE SHORT FOOD SUPPLY

Module title	Module 1 - Short supply chains and environmental sustainability
Developed by	Anna Payr
Introduction	Actors in short food supply chains play a key role in promoting sustainable food production and consumption. This course helps us understand sustainability goals, map the ecological footprint of food production, processing, and transportation, and learn the principles of sustainable farming, breeding, and packaging. It also provides an overview of certification systems that help verify the sustainability of products and processes.
Duration	4 hours
Learning objectives	The aim of the module is to familiarize students with sustainability goals and the opportunities (methods, tools) offered by REL channels that support these goals. Students will thus be able to assess the indirect and environmental impacts of their own activities and take action to develop their businesses in line with sustainability considerations.
Module structure (chapter titles)	1. Sustainability goals 2. Footprints 3. Sustainable production and breeding, sustainable packaging 4. Certification systems

Chapter title	1. Sustainability goals
Competencies to be developed	*I recognize how sustainable development goals are achieved through the operation of individual REL channels.*
Core material	Sustainability is a principle that aims to ensure that economic, social, and environmental systems remain viable in the long term and are able to meet current needs without compromising the ability of future generations to meet their own needs. The three pillars of sustainability are: ● Economic sustainability: Maintaining the functioning of economic systems while taking into account the limitations of natural resources. ● Social sustainability: Promoting the well-being, equality, and justice of communities and societies

ensuring that everyone has access to basic needs (such as education, healthcare, and housing).

- Environmental sustainability: Conserving and using natural resources responsibly, protecting ecosystems, and combating climate change.

Sustainability is key to preserving the planet's resources and ensuring the quality of life for future generations. Unsustainable practices—such as excessive resource use, environmental pollution, and social inequalities—cause serious long-term damage to humanity and nature.

Simply put, sustainability means planning our actions today in such a way that they do not destroy tomorrow's opportunities.

Environmental sustainability includes protecting ecosystems, using resources efficiently, minimizing waste, and favoring renewable energy sources. Its goal is to protect the environment from climate change, biodiversity loss, soil erosion, water scarcity, and other global problems. Sustainability can be promoted at both the individual and community levels, for example by improving energy efficiency, developing environmentally conscious purchasing habits, and supporting the circular economy.

The UN Sustainable Development Goals (SDGs) are a 17-point global plan adopted by the UN in 2015. The goals seek to solve problems affecting the entire world by 2030, such as poverty, inequality, and climate change. The goals encourage countries, organizations, and individuals to work together to overcome global challenges and environmental problems.

A brief overview of the 17 UN Sustainable Development Goals, with goals related to REL channels in bold:

	1. No Poverty: End poverty in all its forms everywhere. This includes ending extreme poverty (income below $1.25 per day) and strengthening social protection systems. 2. Ending hunger: Ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. This goal focuses on improving global food supplies and increasing agricultural productivity. 3. Good health and well-being: Ensure healthy lives and promote well-being for all at all ages. This includes improving health systems and reducing infectious diseases. 4. Quality education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. 5. Gender equality: Achieve gender equality and empower all women and girls. This goal aims to end discrimination and strengthen women's rights. 6. Clean water and sanitation: Ensure access to clean water and sanitation for all, and sustainable management of water resources. 7. Affordable and clean energy: Ensure access to affordable, reliable, sustainable, and modern energy for all. This includes promoting renewable energy sources. 8. Decent work and economic growth: Promote sustainable economic growth, full and productive employment, and decent work for all. 9. Industry, innovation and infrastructure: Build resilient infrastructure, promote sustainable industrialization and foster innovation. 10. Reducing inequalities: Reducing inequalities between and within countries. This includes promoting social justice, ending discrimination, and promoting inclusion. 11. Sustainable cities and communities: Making cities and towns inclusive, safe, resilient, and sustainable. This includes improving transportation systems, reducing air pollution, and increasing green spaces. 12. Responsible consumption and production: Ensuring sustainable consumption and production patterns. This goal encourages more efficient use of resources and reduction of waste. 13. Action against climate change: Taking urgent action to combat climate change and adapt to its effects. This includes reducing greenhouse gas emissions and managing climate change risks.

	14. Protecting oceans and seas: Preserving marine ecosystems, reducing pollution, and promoting sustainable fishing. The goal is to protect the biodiversity of oceans and seas. 15. Protecting terrestrial ecosystems: Protecting terrestrial ecosystems, forests, wetlands, and biodiversity, and halting land degradation and desertification. 16. Peace, justice, and strong institutions: Promoting peaceful and inclusive societies, ensuring access to justice for all, and building transparent and effective institutions. 17. Partnerships for the goals: Strengthening global partnerships for sustainable development and promoting the sharing of financial resources, technological innovations, and professional knowledge. Short food supply chains (SFCs) contribute to the achievement of sustainability goals by reducing the environmental impact of food production, transport, and consumption, while providing social and economic benefits. ● Due to shorter transport distances, food delivered directly from local producers to consumers reduces greenhouse gas emissions (e.g., CO_2) from transport. ● Local markets and direct sales generally use less packaging, which reduces waste. ● REL channels often offer opportunities that support the participation of women and children, e.g. agrotourism. ● Short chains often support small-scale producers who are more likely to use sustainable, environmentally friendly methods, such as organic farming. ● The direct link between producer and consumer reduces food waste. ● Short supply chains directly support local producers and businesses, creating jobs and generating local income, thereby strengthening local economies. ● The development of local markets and consumer communities helps to build personal relationships and trust between people and strengthen communities. ● Short chains ensure that consumers have access to fresh, seasonal, healthy, and nutritious food that comes directly from producers. ● Consumers can meet producers directly, thereby gaining a better understanding and more conscious appreciation of food production processes and their sustainability implications.
Summary	Short food supply chains are a powerful tool for achieving sustainability goals, as they simultaneously reduce the ecological footprint, strengthen local economies, and increase social

	cohesion.
Sources	https://commission.europa.eu/strategy-and-policy/sustainable-development-goals/eu-and-united-nations-common-goals-sustainable-future_hu fidelity.co.hu https://www.ajbh.hu/-/ensz-fenntarthato-fejlodesi-celok-sustainable-development-goal-sdg-

Chapter title	**2. Footprints - What is the environmental impact of how food gets to the table?**
Competencies to be developed	*I can list solutions for using renewable alternative energy and reducing energy waste in production, processing, transportation, storage, and sales.*
Core material	Human activities have a complex impact on our environment, and in order to determine the environmental impact of a product, its entire life cycle must be examined. The environmental impacts of the entire life cycle of food show the impact that food production, transportation, consumption, and waste have on the environment. This analysis is called **life cycle assessment (LCA)**, and its purpose is to understand where we cause the greatest environmental impact and how we can reduce it. **The main stages and impacts of the food life cycle, and the problems that arise: Production (farming):** A lot of water, land, and fertilizer may be needed to produce food. Livestock farming causes significant methane emissions (e.g., cattle). Intensive farming can deplete the soil and pollute water. Greenhouse gas emissions, soil erosion, loss of biodiversity. **Processing:** Energy-intensive machines and chemicals may be used in food processing. This increases energy consumption, which generates resource demand on the one hand and high carbon dioxide emissions on the other. **Packaging:** Single-use plastic packaging generates waste that is often not recycled, resulting in plastic pollution and mountains of waste. **Transportation (during procurement and sales):** Transporting food requires fuel, emits carbon dioxide, and pollutes the air. **Storage and refrigeration:** Storing and refrigerating food also requires a lot of energy, and high energy consumption contributes to climate change. Losses also occur during storage, which increases food waste. **Waste management:** Food waste often ends up in landfills, where it emits methane as it decomposes, even though organic waste can be converted into valuable compost in the best case scenario. Food waste also causes waste generation. The entire life cycle of food has a huge impact on the environment, with the food chain responsible **for 20-30% of** global **greenhouse gas emissions**.

It is clear from the above that the issue **of energy consumption** is present throughout the entire life cycle, which is why it is extremely important to address it.

Carbon footprint

The carbon footprint shows the total amount of greenhouse gases emitted directly or indirectly during an activity. This can be the environmental impact of a person, a product, a company, or even a country. The smaller our carbon footprint, the less damage we cause to the environment.
Measuring your carbon footprint means calculating how much greenhouse gas (primarily carbon dioxide, but also methane and nitrous oxide) is emitted by a given activity, product, organization, or person over a given period of time. This is usually expressed **in carbon dioxide equivalents (CO_2e)**. Measuring your carbon footprint is not a one-time process. It is important to measure and compare results regularly to see how changes (e.g., increasing energy efficiency, using renewable energy sources) affect emissions. Measuring your carbon footprint helps you better understand which activities contribute most to your environmental impact, so you can take targeted steps to reduce it.

Ways **to reduce** energy use and **waste**, e.g.:

- economical fuel use (use of appropriate equipment and machinery, good planning of transport processes, shared transport)
- natural cooling methods, e.g., shading storage areas with plants
- traditional methods, e.g., storing vegetables in prisms, pits, making hay
- composting organic waste

Use of renewable energy, e.g.:

- use of solar energy (solar panels, solar collectors, home solar dryers, sun drying)
- Use of geothermal energy (for cooling, heating, machinery, or just piles, earth floors, etc.)

Offsetting your carbon footprint, e.g.

- planting plants (primarily trees) that bind CO2
- soil binds more CO2 if it is not disturbed/tilled, has plant cover, and has a healthy, diverse ecosystem

Water footprint

The water footprint shows how much water a product, service, activity, or person uses directly and indirectly. It consists of three parts:

- **Blue water**: Surface and groundwater used for irrigation, manufacturing, and other human activities.
- **Green water**: Rainwater stored in the soil that is used by plants.
- **Grey water**: The amount of water needed to dilute polluted water so that it is safe for the environment.

The water footprint helps us understand how much water is needed to produce, for example, a food item, a piece of clothing or an industrial product, and thus promotes sustainable water management.

	Ways to reduce your water footprint include, for example - Use of efficient irrigation systems (drip irrigation, optimized sprinkler systems, smart irrigation techniques: economical irrigation based on soil moisture sensors and weather forecasts) - cultivation of more sustainable alternatives to water-intensive crops, water-efficient crops - choosing varieties adapted to local conditions - soil moisture conservation (mulching, soil cover, minimal tillage, high organic matter content) - use of less water-intensive feed in animal nutrition (e.g., corn, soybeans) - use of alternative, less water-intensive feed (e.g., lurena, legumes, sorghum, legume straw as supplementary feed) - use of surplus, defective, and rejected goods as food waste - use of food industry by-products to supplement feed - reducing food waste - water recycling: e.g. reuse of grey water generated during processing for irrigation or other purposes - use of biological wastewater treatment systems - Installation of composting toilets **Ecological footprint** The **ecological footprint** shows how much natural resources (e.g., land, water) a person, community, or country needs to consume and absorb waste (e.g., carbon dioxide). It is measured in global hectares (gha), which represent the planet's biologically productive areas. The calculation of the ecological footprint takes the following factors into account: 1. **Consumption:** Energy, food, water, clothing, transportation, household goods, etc. 2. **Resource requirements:** The land and water area required to produce goods and manage waste. 3. **Emissions:** Carbon dioxide emissions from activities. The ecological footprint is a comprehensive indicator that measures the total use of natural resources. It includes both the carbon and water footprints. The goal is for this footprint to be smaller than the Earth's regenerative capacity.
Summary	The ecological, carbon, and water footprints all measure the impact of human activities on the environment from different perspectives. Energy consumption plays a key role, as the burning of fossil fuels results in a significant carbon footprint, and energy production often involves the use of large amounts of water. Together, these footprints help us understand how much our business is impacting the planet's resources and where we can become more sustainable.

Sources	greendependent.org gasztrohos.hu wwf.hu mtsz.hu Carbon footprint calculation: bocs.eu/karbonlabnyom-szenlabnyom-kalkulator aprolepes.hu https://mezotur.hu/zold-uzenet-a-trv-zrt-tamogatasaval-9-resz/ http://www.kothalo.hu/labnyom/ https://fna.hu/mittehetsz/okolabnyom

Chapter title	**3. Sustainable management, sustainable packaging**
Competencies to be developed	*I understand how REL sales can promote the use of sustainable farming methods.* *I am familiar with packaging-free and recycling options in REL. I know a few ways to reduce waste or food waste.*
Core material	**Sustainable farming** REL favors **local producers** who can sell their products directly to consumers. Producing for local markets encourages farmers to **use their land sustainably**, as they can see the impact of their work on their community and environment directly. In REL, consumers often **seek** out products that have been **produced using more sustainable, environmentally friendly methods**, such as organic or integrated farming. In order to meet consumer demands, producers may be more motivated to use sustainable methods such as soil conservation techniques (e.g., no-till farming, crop rotation) and reduced use of chemicals (reduction of fertilizers and pesticides). Farmers receive direct feedback from buyers, which can encourage them to adopt environmentally friendly production methods. REL promotes **relationships between consumers and producers**, which increases trust and transparency in products. Buyers often support farmers who use environmentally friendly methods. Through direct contact, consumers gain a better understanding of the benefits of sustainable farming and may be more willing to pay more for more sustainable products. **Reducing** or replacing **the use** of **fertilizers and pesticides** not only makes products healthier, but also improves soil health, which is key to successful cultivation, high-nutrient products, and overall sustainability.

On the one hand, biological preparations are available to replace pesticides, and on the other hand, by creating **complex habitats**, we can build and support a system that becomes a diverse, self-regulating, stable habitat, thereby drastically reducing the number and severity of plant protection problems.

REL enables farmers to grow **more diverse** plant varieties and products that are more resistant. This also promotes biodiversity instead of monoculture farming, as well as the use of landraces, native and special species and varieties.
The use of **landraces** is beneficial because these plant varieties have adapted to local environmental conditions (soil, climate) over a long period of time, making them more resistant to diseases and pests and requiring less chemicals and care. In addition, they support biodiversity, preserve local genetic heritage, and often produce better-tasting, more nutrient-rich crops. They are a more sustainable and environmentally friendly solution than modern varieties. We can propagate open-pollinated varieties ourselves and, in many cases, breed our own varieties that are specifically adapted to our environmental conditions over many years.

There are also many advantages to keeping **native animal breeds**, as these breeds have adapted to local environmental and climatic conditions over a long period of time. The advantages are as follows:

- **Better resistance**: Native breeds are often more resistant to local diseases and pests, requiring less veterinary intervention and medication.
- **Less care required**: They are well adapted to local feed sources and environmental conditions, so they are generally more cost-effective to maintain.
- **Sustainability**: They can be kept well under extensive farming conditions and have a smaller ecological footprint (e.g., through natural grazing).
- **Preserving biodiversity**: Keeping native breeds helps maintain genetic diversity, which is important for the future of agriculture and the natural environment.
- **Supporting local values and traditions**: Keeping native breeds preserves the traditions of rural cultures, as in the case of Hungarian gray cattle, Mangalica pigs, and Racka sheep.
- **Quality products**: Meat, milk, and wool from native animals are often of higher quality, have a more natural flavor, and are healthier.

Keeping native breeds is therefore not only an environmentally friendly solution, but also serves to protect local farming traditions and ecosystems.

Sustainability aspects of animal **feed**:

- feed should be produced locally (or as close as possible)
- feed production should also be sustainable (no GMOs!)
- feed should not compete with food intended for human consumption: e.g., grazing, by-products (e.g., bran) and food waste, utilization of surplus

- proper feeding reduces methane emissions from digestion, e.g., in cattle
- A balanced, healthy diet makes animals more resistant, thus increasing production efficiency and avoiding the need for medication.

Animal welfare is also becoming an increasingly important consideration, meaning that animals are healthy, happy, and able to express their natural behavior. Animal welfare is based on five basic needs:

- **Provision of basic needs:** Animals must always have access to food of sufficient quantity and quality and clean drinking water.
- **Prevention** of **pain, injury, and disease:** Regular veterinary care and a suitable environment are necessary to prevent injury and disease.
- **Appropriate environment:** Animals must be provided with a place that offers protection from the weather and sufficient space for movement.
- **Expression of natural behavior:** Animals should be given the opportunity to express their natural behavior, such as free movement, play, or nesting.
- **Avoidance of stress and fear:** Animals must be protected from unnecessary stress, noise, rough handling, and fear.

Important information:

- Animal welfare refers not only to the physical condition of animals, but also to their emotional state.
- Animal owners have a duty to ensure that animals' needs are met.
- Animals are sentient beings and therefore deserve respect and care.

This is the basis of responsible animal husbandry and empathy towards animals.
The organic/eco certification also ensures that farmers comply with animal welfare requirements. When selling eggs, it is mandatory to inform buyers about the farming method (marking on the egg or written notice).

Smaller-scale farming and REL allow more room for experimentation to find breeds and methods that are suited to local conditions.

REL also allows farmers to connect directly with other local producers and share their experiences with more sustainable farming methods. Community initiatives, such as local farmers' markets or community-supported agriculture programs, can help spread **eco-farming techniques**.

Sustainable packaging

Sustainable food packaging aims to reduce negative environmental impacts while preserving the freshness and safety of food. To this end, various materials and solutions are used that offer a more environmentally friendly alternative to traditional plastics.

The most sustainable packaging is no packaging at all. It is important to consider whether packaging is really necessary in each case. REL channels many

	offer **packaging-free** solutions. At local markets, shoppers can take products home in their own containers, while in shopping communities, box schemes, and community-supported agriculture models, vegetables and fruit can be sold to consumers in bulk. There are also special packaging-free stores where shoppers fill their own containers with any product they want. **Reusable** packaging, such as textile bags or reusable food containers, is becoming increasingly popular. (e.g. RAKUN) Reuse is also the goal of deposit-refund systems. Of course, reuse also has an environmental impact, as collection and cleaning have an environmental impact and require well-thought-out logistics. Glass, aluminum, and cardboard are durable, easily **recyclable** materials that can be used multiple times, resulting in less waste. When waste is collected selectively, it can be turned back into raw materials for packaging. Cardboard is not only recyclable, but also **compostable** and can be used as mulch on farms. Many new, innovative materials are appearing on the market that are made from natural materials (e.g., various plant starches, fibers, cellulose) and labeled as "biodegradable." However, there are a number of anomalies and problems associated with **biodegradable packaging materials**. These materials often only decompose optimally in industrial composting plants and often do not decompose completely in natural environments (e.g., soil, water). Some degradable materials break down into tiny particles (microplastics) that further pollute the environment. Their production is energy- and resource-intensive, often with a larger carbon footprint than conventional plastics. Biodegradable plastics are often mixed with conventional plastics and contaminate recycling processes. Many people mistakenly believe that these materials degrade quickly and completely under all circumstances, but biodegradable packaging is only environmentally friendly if it is supported by appropriate infrastructure (e.g., industrial composting) and waste collection is also addressed. If this is achieved, the advantage is that food waste also decomposes during the decomposition process and is not treated as waste but as a valuable raw material, further increasing the value of the compost produced. For long-term sustainability, it is important to prioritize **packaging-free solutions** and **reusable materials**.
Summary	The short food supply chain (SFSC) promotes sustainable farming practices by creating a direct link between producers and consumers.

	Sustainable packaging not only protects the environment, but also contributes to the development of a circular economy in which materials are reused over and over again. This benefits everyone in the long term, as it reduces plastic pollution, protects natural resources, and supports sustainable development.
Sources	biokultura.org, biodin.hu, maghaz.hu, rakun.hu, nak.hu, https://portal.nebih.gov.hu/-/amit-a-tojas-jeloleserol-tudni-kell https://agriculture.ec.europa.eu/sustainability/environmental-sustainability/sustainable-agricultural-practices-and-methods_hu

Chapter title	**Certification systems**
Competencies to be developed	*I understand how REL sales can promote the use of sustainable farming methods.* *I am familiar with packaging-free and recycling options in REL. I know a few ways to reduce waste or food waste.* *I can list solutions for using renewable alternative energy and reducing energy waste in production, processing, transportation, storage, and sales.*
Core material	**Organic certification** In the case of plants, **organic certification** means that the plant in question has been grown using natural, environmentally friendly methods and complies with the strict rules of organic farming. The most important principle is that an independent certification body checks the compliance of the entire production process, not just the quality of the end product, and that food or products must have the appropriate documentation for organic certification. Organic certification is carried out by independent certification bodies, which regularly inspect farmers' work to ensure compliance with the rules. The most important rules for cultivation are: • **No fertilizers or chemicals:** Synthetic fertilizers, pesticides, herbicides, or other chemicals cannot be used in the cultivation of plants (not even during seed treatment). Plant protection is carried out using natural methods, such as biological control or the use of natural-based agents. • **Use of organic materials for nutrient replenishment:** Soil fertility is ensured by organic materials (e.g., compost, green manure, animal manure) rather than synthetic fertilizers. • **GMO-free:** Organic crops must not contain genetically modified (GMO) raw materials, and cross-breeding with genetically modified crops is also prohibited. • **Sustainable farming:** Organic farming promotes soil and water conservation and biodiversity preservation. Throughout the entire production process, care is taken to avoid harming the environment and to farm sustainably.

- **Conscious farming practices:** When growing crops, natural cycles must be taken into account and adapted to the local environment. Crop rotation is mandatory to avoid soil depletion and the accumulation of diseases.

In the case **of animal-based foods**, **organic certification** means that the food in question (e.g., meat, eggs, milk) comes from animals that have been raised in accordance with strict organic farming standards. The standards also apply to the entire life cycle of the animals. The most important principles are as follows:
1. Natural feed: Animal feed is made from certified organic crops and must not contain any genetically modified organisms (GMOs).
2. Free range and welfare: Organic animals must be kept free range, with sufficient space to move around in a natural environment. Animal welfare is a priority, and animals are provided with appropriate living conditions (e.g., well-ventilated stables, natural lighting), professional care, and respectful treatment.
3. Use of medicines: Synthetic chemicals, antibiotics, or hormones may not be used regularly on animals. Antibiotics may not be used preventively or continuously, but only when necessary. Natural methods are recommended for maintaining health and treating diseases.

The **Basket Community Product Certification System (TMR)** is a tool that helps consumers choose more sustainable products. The system evaluates products based on five main criteria:

- **Strengthening the local economy**: The local origin of the product's production and raw materials.
- **Quality of cultivation**: Sustainability and environmental friendliness of cultivation methods.
- **Processing**: The method of processing the product, including the use of chemicals and additives.
- **Waste management**: The amount and management of waste generated during production and packaging.
- **Remote ecological impacts**: The global environmental impacts of the production and transport of the product.

Products are scored on a scale of 1 to 5 for each of the five criteria. The higher the score, the more sustainable the product. This helps consumers make informed decisions when shopping.

The **Responsible Gastronomy Foundation** aims to promote sustainable and environmentally friendly dining in Hungary. The organization's **Sustainable Catering Establishment Certification System** is designed for catering establishments that want to make their operations greener.

The main features of the certification system are:

	• **Use of local and seasonal ingredients:** Catering establishments should give preference to locally produced and seasonal ingredients, thereby reducing transport distances and their ecological footprint. • **Waste management:** It is important to minimize waste, use selective collection and composting. Catering establishments should strive to reduce the amount of waste and manage it appropriately. • **Energy and water use:** Sustainable catering establishments should pay attention to reducing energy and water consumption and using environmentally friendly cleaning products. • **Sustainable procurement:** Catering establishments should strive for responsible procurement, including the use of certified organic ingredients and support for local producers. Certified hospitality establishments enjoy benefits such as: • **Discounts:** Many suppliers offer discounts of 5-15% to certified restaurants. • **Increased visibility:** Certified establishments are featured on the Responsible Gastronomy website and social media platforms, as well as in the press, thereby increasing their visibility. The Responsible Gastronomy certification system therefore helps catering establishments to operate sustainably, while providing them with advantages in the market.
Summary	Food certification systems are important because they ensure that food products comply with certain health, environmental, and ethical standards. These systems help consumers obtain reliable information about the origin, quality, and production methods of products. They also protect the environment, ensure animal welfare, and promote sustainable farming. Certifications increase consumer confidence and contribute to the development of a fair market.
Sources	bio-garancia.hu, biokontroll.hu, kosarkozosseg.hu, gasztrohos.hu