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> for teachers

Almost half of the European Union's (EU) land is farmed. Europe needs its farmers to meet the challenge of supplying us with safe, nutritious food and to protect the countryside and environment. Farmers are the first to realise the need to care for our natural resources — after all, farmers rely upon them for their day-to-day living. They manage the countryside for the benefit of us all. They supply 'public goods' — the good care and maintenance of our soils, our landscapes, ecosystems and habitats, and a great diversity of fauna and flora. Farmers are not rewarded for these services so they need the EU's support to provide them, which they receive in the form of public funding.

The CAP began in 1962 and in the early years it encouraged farmers to use modern machinery and new techniques, including chemical fertilisers and plant protection products. The policy was effective and food productivity greatly increased, but in recent years the emphasis has changed. The CAP reforms of 2013 focus more on the environment, with an increased percentage of funds now allocated to sustainable farming methods. Today farmers keep ecological focus areas such as buffer strips and wildflower meadows in farmed areas so that biodiversity can be maintained. While such areas might reduce the overall output of the farm, sustainable farming practices like these benefit soil quality and support ecosystems and wildlife habitats, biodiversity and the environment. The reformed CAP also provides special support for organic farming and the productive use of forests and woodland.

This module will help students explore:

- how farmers and the environment can be adversely affected by climate change and how the EU enables farmers to be part of the global fight to mitigate the changes brought about by global warming (see **worksheet 'Agriculture and the challenges of climate change'**);
- how farmers work to protect nature and safeguard biodiversity (see **worksheet 'Safeguarding biodiversity in agriculture'**);
- how environmentally sustainable farming which uses natural resources prudently is essential for our food production and for our quality of life — today, tomorrow and for future generations (see **worksheet 'Sustainable farming'**);
- how we too have a role in protecting the environment, supporting biodiversity and combating food waste (see **worksheet 'Take action on food waste!'**).

The module's project suggestion is a visit to an arable farm.

Additional resources

- EU agriculture map
- CAP factsheet
- Glossary

AGRICULTURE AND THE CHALLENGES OF CLIMATE CHANGE

Did you watch the TV weather forecast this week? Most of us decide what to wear according to the forecast. For the farmer, the weather really matters, as agriculture is more weather and climate dependent than many other sectors.

1. **Circle any of the adverse climate-related events that have taken place and affected farming and food production in your country in the last decade.**

Floods	Winter storms	Falling crop yields, crop failures	Heat spells, lack of summer rain
Rising sea levels	Change in growing season	Soil erosion	Animal health and welfare issues
Drought	Habitat loss	Water shortages	Increase in pests and alien species

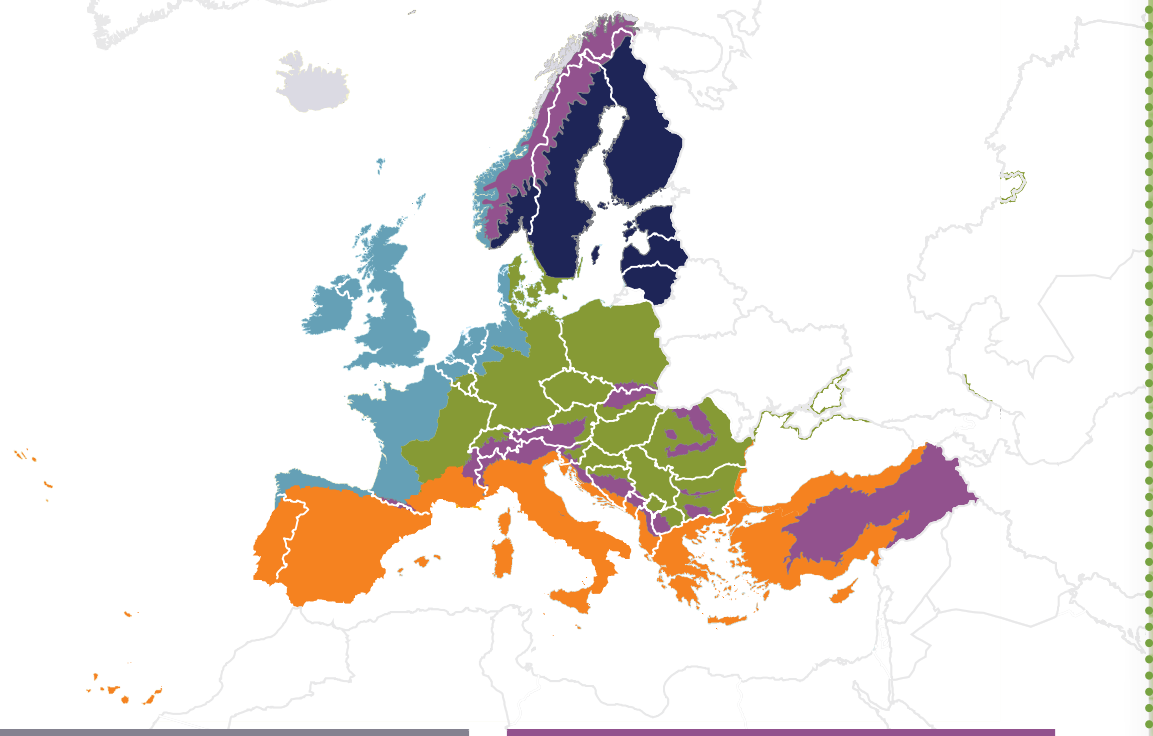
2. With a partner list some of the weather and climate events (see Exercise 1) that can impact the different elements of farming below.

AGRICULTURE IS IMPACTED BY CLIMATE CHANGE				
Crops				
Livestock				
Soil and landscape				
Groundwater and sea level				
Seafood and shellfish				
Biodiversity and ecosystems				
Farmer, family and income				

It may be interesting to also think about how climate change affects EU regions differently. What are likely to be the main impacts for farmers where you live?

See the map on the next page for more information on how climate change is affecting the EU.

The impact of climate change in Europe



Arctic
Temperature rise much larger than global average
Decrease in Arctic sea ice coverage
Decrease in Greenland ice sheet
Decrease in permafrost areas
Increasing risk of biodiversity loss
Intensified shipping and exploitation of oil and gas resources

North-western Europe
Increase in winter precipitation
Increase in river flow
Northward movement of species
Decrease in energy demand for heating
Increasing risk of river and coastal flooding

Coastal zones and regional seas
Sea-level rise
Increase in sea surface temperatures
Increase in ocean acidity
Northward expansion of fish and plankton species
Changes in phytoplankton communities
Increasing risk for fish stocks

Northern Europe
Temperature rise much larger than global average
Decrease in snow, lake and river ice cover
Increase in river flows
Northward movement of species
Increase in crop yields
Decrease in energy demand for heating
Increase in hydropower potential
Increasing damage risk from winter storms
Increase in summer tourism

Mountainous areas
Temperature rise larger than European average
Decrease in glacier extent and volume
Decrease in permafrost areas
Upward shift of plant and animal species
High risk of species extinction in Alpine regions
Increasing risk of soil erosion
Decrease in ski tourism

Central and eastern Europe
Increase in warm temperature extremes
Decrease in summer precipitation
Increase in water temperature
Increasing risk of forest fire
Decrease in economic value of forests

Mediterranean region
Temperature rise larger than European average
Decrease in annual precipitation
Decrease in annual river flow
Increasing risk of biodiversity loss
Increasing risk of desertification
Increasing risk for fish stocks
Increasing water demand for agriculture
Decrease in crop yields
Increasing risk of forest fire
Increase in mortality from heat waves
Expansion of habitats for southern disease vectors
Decrease in hydropower potential
Decrease in summer tourism and potential increase in other seasons

3. The EU works to support farmers to take 'decisive action' on climate change by using water and soils more sustainably, to produce green energy and protect biodiversity. But where do you stand in regard to climate change and safeguarding the earth's resources? Let's play **take a stand!**

Place two posters, an 'I agree' and an 'I disagree' poster, on walls at opposite sides of the classroom. A volunteer reads a statement and each of you place yourself, in response to the statement, at either side of the room. The volunteer asks a few students from each part of the room why they stood there. Everyone is free to move location if convinced by the points raised, but must explain why they have been persuaded to move.

- To ensure we can feed future populations we need to focus more on sustainable production.
- Organic farming methods may be the most sustainable way of farming, but they won't be able to feed a world population of 9 billion by 2050.
- We need to grow food more efficiently rather than cut down trees and forests for agriculture.
- We should depend less on imported food and focus more on local farmers for food security.
- We need to eat more seasonally to participate in protecting the environment, despite not being able to buy certain fruit, like strawberries, all year round.

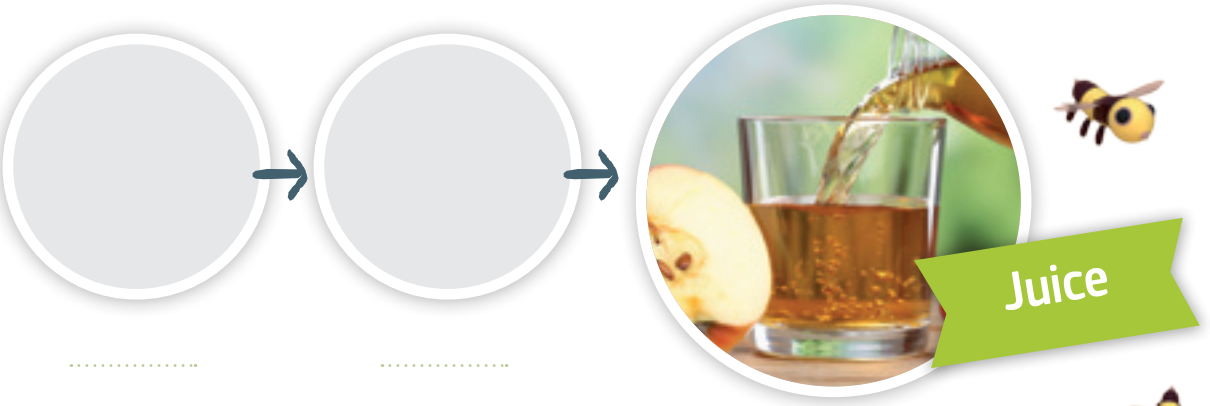
SAFEGUARDING BIODIVERSITY
IN AGRICULTURE

Imagine a world without strawberries or chocolate. Most plants cannot set seed without being pollinated by receiving pollen, usually from another flower, with the aid of a wild pollinator. If the cacao flower wasn't visited by a tiny fly we wouldn't have chocolate, so even the humble fly has an important role to play!

1. **a)** Unjumble, draw and label the missing links in this food cycle.

Apples – Pollinators – Processing

Sun *Water* *Fruit trees* .....



....

b) Can you work out the food cycles of these two foods?

- Hazelnuts
- Tomatoes

2. Crops rely on insect pollination so we need biodiversity in agriculture to grow products for consumption. It is estimated that one out of every three mouthfuls of our food depends on pollination taking place. Across the world species are being lost, indeed in the EU around 40% of bee and hoverfly species are in decline. Without biodiversity and insects, farmers would have to hand-pollinate crops at a cost of billions a year.

With the support of the EU, farmers in Europe are increasingly practising 'greener' or more sustainable agriculture, safeguarding biodiversity, protecting wildlife habitats and working to save our pollinators by:

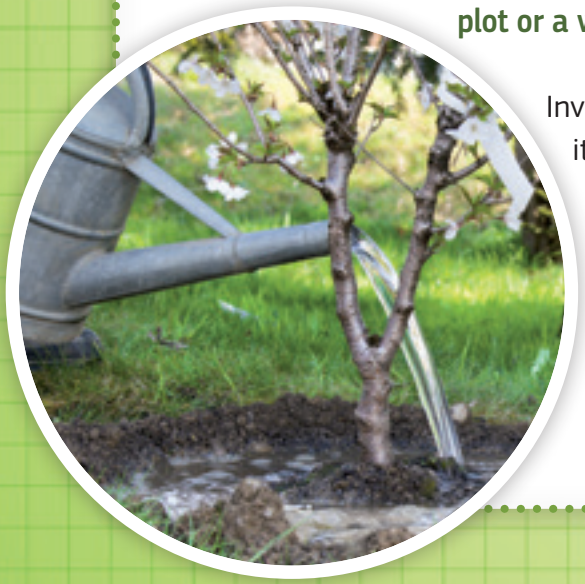
- maintaining native habitats such as hay meadows, grass pastures, bogs, hillsides and ponds;
- better management of pesticides;
- restoring wildflower-rich landscapes and hedgerows;
- sowing a diverse range of native seeds and plants for crops.

a) Suggest practical greening practices that farmers can use so that biodiversity can be maintained.

b) Imagine you are a beekeeper. You rent your beehives to farmers to assist in pollination of crops. Create an advertisement for the farming section of a local newspaper offering your honeybees for rent to pollinate the plants in crop fields.

c) If anyone knows a beekeeper why not invite them to class to explain the fascinating work of bees and beekeeping?

3. Brainstorm some actions for biodiversity that the class could undertake. How about planting a tree or creating a pollinator plot or a wildflower habitat in or near the school?



Investigate what you might do, think about how to do it and then write an email to your headteacher/director inviting him/her to the classroom to hear your suggestions and proposals.

SUSTAINABLE FARMING

'Treat the earth well.
It was not given to you by your parents,
it was given to you on loan by your children.'

Native American saying

1. Work with a partner and decide what this saying means. Name and explain an action that you could undertake to show that you care for the environment. Share your suggestions with the class.

2. Almost half of the territory in the EU is farmed. Farmers not only produce high-quality and nutritious food for us, they also protect nature and care for the environment while doing this. The EU helps farmers to become 'greener' and to farm in a sustainable way. Sustainable farming, such as organic farming, uses natural resources wisely and is essential for our food production and our quality of life — today, tomorrow and for future generations.

Can you finish matching the natural resources cared for by farmers in the list below and give a reason why each is a sustainable or 'greener' farming practice?

NATURAL RESOURCES	MANAGED BY FARMERS FOR US	REASON
Soil	Rotating crops	*Protects soil structure from erosion and pests, adds nutrients*
Land and landscape	Maintaining permanent grassland Leaving field boundaries uncultivated	
Air	Planting a range of crops and using certified seeds	
Plants	Planting and maintaining trees	
Animals	Feeding on open grass pasture and moving the livestock between paddocks frequently	
Water	Reducing use of chemical fertilisers and pesticides Using organic, farmyard and green manures	
Minerals/nutrient (e.g. nitrogen and phosphate)	Creating ponds, avoiding run-off into rivers and streams from fertiliser and from livestock effluent	
Biodiversity and wildlife habitats	Maintaining hedgerows and not cutting during bird nesting season	

3. **Organic farming is a sustainable farming practice which protects the land, biodiversity and the environment. Hold an Ask the experts session to explore sustainable farming practices.**

Two or three volunteers from the class become sustainable farming 'experts'. The experts and the rest of the class run online searches for 15 minutes on the topic. The class concentrates on creating questions to ask the experts. After 15 minutes of research, the experts sit at the front of the classroom to answer the questions from the 'audience' and to discuss the issues raised.

A useful starting point for research might be **http://ec.europa.eu/agriculture/organic/index_en.htm**

Here are examples of questions that can be asked.

- What is organic farming?
- What are the top five countries for organic farming?
- What are the most common organic products?

4. **Having explored issues involved with sustainable farming, why not invite a local farmer into the classroom to talk about his/her work as well as sustainable farming methods in general and their role in protecting the environment?**

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TAKE ACTION ON FOOD WASTE!

Today's farmers have three important roles to play: producing our food, managing the countryside for us and keeping rural communities alive. In the EU we enjoy food security thanks to the abundant, affordable and high-quality food produced by our farmers. However, around 90 million tonnes of food is wasted each year in the EU — from production, distribution and consumption. A staggering 40 % of this comes from consumption (retail and households), with the majority of the food thrown away being fresh vegetables, fruit, milk and bread. Why do you think we waste that much food?

1. **When we throw away food we are not just wasting the food, but also the work of the farmer and the earth's resources such as the energy, fuel, time and water that went into growing, harvesting, storing, packaging, transporting, marketing and cooking the food.**

This short EU video **http://europa.eu/!nu84bb** suggests it's time for us to take action on food waste!

Start by keeping a record for a week of all the food you discard and throw away in your school.

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a) Use a chart like this one.

FOOD THROWN OUT — CLASSROOM RECORD

	TYPE AND AMOUNT OF FOOD WASTE	WHY IT WAS THROWN OUT	WHERE IT WAS THROWN
Mon.	*One carton of milk* *An apple* *Bread*	*Out of date* *Unwanted* *Mouldy*	*Down the sink* *Compost bin* *Waste bin*
Tues.			
Wed.			
Thurs.			
Fri.			

b) At the end of the week discuss the type and amount of foods discarded.

c) Discuss better ways to shop for food, ways to avoid food waste and how to deal with the foods we haven't eaten.

d) Divide the class into two workgroups to create two posters, one to display in school and one at home called '10 tips to reduce food waste'.

→ You'll find some ideas to help you get started in this flyer: **http://europa.eu/!rh48fT**

2. Food can also be wasted at the processing stage and in supermarkets. As customers we are 'picky' shoppers and won't buy misshapen vegetables. Although fresh and delicious, millions of kilos of fresh vegetables are thrown away before they even reach the vegetable shelf in supermarkets because they are irregular or have an unusual shape.

Imagine you work in the marketing department of a large supermarket chain. Write an article for the food section of the company's free magazine explaining why the company is going to trial the sale of misshapen or 'wonky' vegetables in the store for the next 6 months.

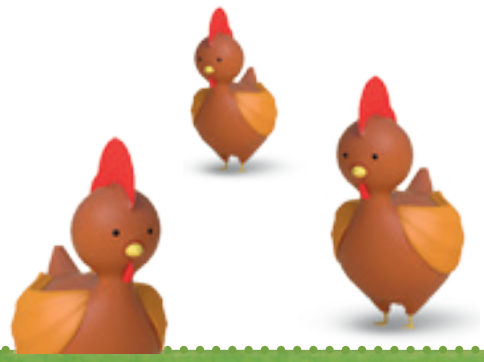
The environment is everything around us. In Part 1 you'll explore local ecosystems and investigate how all of the living things there (plants, animals and organisms) interact with each other and their non-living environments (weather, earth, sun, soil, climate and atmosphere). In Part 2 of the project you'll visit an arable farm. There you will see how farmers work for us, not just in producing healthy food but also protecting nature and safeguarding the environment and its biodiversity.

Part 1

Working in groups of three **become eco-reporters** for a 2 m^2 area in the school grounds, on the street or in a nearby park. Discover and record everything you can about your plot, the soil structure, what lives in this ecosystem, what grows there and all the living and non-living things that depend on one another. Each area should be as different as possible in terms of its biodiversity (e.g. an area in a flower bed, under trees, grass area, in the shade, near a pond).

Sunlight, water, air, food (nutrients) and a habitat are what all life requires. Record the insects and pollinators in your habitat — these will probably include bees, which are the most recognisable pollinators! Photograph the invertebrates that you find and use identification guides to research them.

As a group, choose the main theme of your habitat, how you will record your findings and what kind of charts and graphs you'll use to present your results.



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Part 2

Using what you have learned **prepare for a visit to an arable farm**. Brainstorm the questions you'll ask and the habitats and ecosystems you expect to find at the farm. Headings might include: type of crops grown; sowing and rotation practices; machinery used; and market for the crop. Select volunteers to ask the questions during the visit.

Take your camera on your visit to prepare for a photoessay on your return. Identify the environmental protections the farmer has put in place. The EU supports its farmers in managing the environment while producing high-quality food. Note how pollution is prevented and fertilisers are spread. Is the farmer involved in any environmental schemes to protect and enhance biodiversity on the farm? For example, are field margins left uncultivated, wildlife habitats maintained, biodiversity encouraged and sprays avoided?

When you return to class use the photos that your group has taken to create a photoessay. Decide on your theme and select and edit a series of photographs so that they are arranged to tell the story of your theme and through this how the EU can help its farmers to preserve natural resources. Add captions to your slideshow photoessay and present it to your 'audience'.

Did you know that around 85 % of European crop plants rely, at least in part, on pollination via insects, such as wild bees, honeybees and hoverflies?