

GREEN ENTREPRENEURS EUROPE



MODULE 2: LESSONS FROM NATURE

Option 2 Waste = Food



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**BUSINESS
IN THE
COMMUNITY**

This booklet is developed for the project "Green Entrepreneurs Europe".

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WELCOME!

This 'Green Entrepreneurs Europe' 'Lessons from Nature' module is designed to help prepare today's young people to take responsibility for the life choices they make. We believe that taking responsibility for our surroundings, for who we are and what we are going to do will help us to discover the possibilities for personal and professional development. A willingness to engage in activities and new ventures is a defining factor of what we call "green entrepreneurship."

For teaching the 'Lessons from nature' part of the GEE course, you have a choice of modules. This module is based around the concept of waste = food. Your other options are: an 'overview' module, 'diversity gives strength', 'plastics' (2 day course) and 'sustainable towns & cities'.

The Green Entrepreneurs Europe course will be taught in 5 different European countries. It has been developed to encourage crosscurricula links, allowing teachers from different subject areas and indeed cultures to collaborate. It is aimed at Secondary Schools. It is pitched at KS3 but could be adapted to KS4/ KS5.

Over the next few pages you can find the lesson plan for this 'Lessons from nature' module. Assessment for learning techniques are integrated into the learning pack. Required resources and ideas for differentiation can be found at the end of the booklet.

Legend



Students guided by teacher



Students working independently.



Reflection



Exploration through senses/ feelings



Video



Research



Safety



Knowledge



Skills



Competencies



MODULE 2: LESSONS FROM NATURE

MODULE CONTENT

Welcome to the cycle of activities included in the "Lessons from Nature" module. **Complete in: 1 school day or equivalent.**

In this module, students will build on the skills and concepts covered in the introductory module 'what might change'. Students will go outside to discover how materials cycle through nature. They will be introduced to the concepts of cradle to grave and its alternative: cradle to cradle. They will critically analyse the success of recycling our waste through an interactive game. Students will take part in a Citizen Science project: 'Earthworm watch', following a Scientific methodology to discover the different Earthworm species and their importance. Students will collect and analyse their school's food waste generated over lunch, discussing ways of making their canteen greener. Through videos students will be introduced to existing green entrepreneurial solutions to food waste. Finally, students will have the opportunity to look at existing green products for ideas and inspiration.

CONNECTIONS WITH OTHER MODULES

Previous module (1-What might change?): students reflected on their own ecological footprint and learnt the key terms: entrepreneur, linear economy, circular economy.

This module (2- Lessons from nature): students use the key terms and make comparisons between the natural economy and the human economy. Students reflect on what we can learn from nature, by taking part in citizen science project: Earthworm Watch. Students start to learn about circular products in existence and think about how they can make existing products more 'circular'.

Next module (3-Changing perspectives): students learn how to create a business plan and apply this to analysing existing green companies and their products.



INTRODUCING NATURAL CYCLES

PART 1: INTRODUCTION



10 minutes Re-cap key words. Write 'entrepreneur' 'linear economy' and 'circular economy' on the board. Students write definitions on post-its in small groups/ pairs and stick on board.
Afl: sensible definitions on post its



20 mins Invertebrates: explain that you've come outside to investigate how things are done in nature. Give students nutrient cycle labels and explain that they need to find examples of some of these. Demonstrate how to search for invertebrates safely and ethically. Students can look under logs, on tree trunks and on plants. Students should be able to find examples of: soil, producers, primary and secondary consumers and detritivores.
Afl (observation) students have safely collected invertebrates.



10 mins Nutrient cycles Students create a nutrient cycle out of the laminated cards, adding in any real examples they have found. May need support from teachers.
Afl: students have created a circle and can explain interactions..

Photo: Yanika Hennig



10 mins Thinking activity: students given an artificial object to do a *cradle to grave* analysis, eg plastic bottle: starts off as fossil fuel in ground, is extracted, transported to a refinery (in vehicles which run on fossil fuels), transported to a production plant, transported to a bottling factory, transported to a distributor, transported to a shop, transported by the customer, ends up in bin. Once students have identified the life cycle of a the item, they draw a simple flow diagram in their booklets to show the process.
Afl students draw/ write flow diagram in their booklets



RECYCLING- THE ANSWER?

Ask students to think about alternatives to throwing items in the bin...leads onto the topic of recycling.

15 mins Recycling game Context: explain to the students that they are going to play a game to model how recycling works. Explain that no recycling is 100% efficient. We will assume that 50% of the material in a plastic bottle can be recycled.

Recycling game: working in groups of around 5, students split into different roles. Labels/ tabards are provided to groups. Student 1 is the 'consumer', student 2 is the 'recycling plant', student 3 is 'landfill'. These 3 students stand in a line 4-5 paces apart. Student 1, the 'consumer' is given 8 ball-pit balls (or other items that could represent particles). When the teacher says 'go', another student takes half the balls from the 'consumer' and runs to the 'recycling plant' person and gives it to them. Another student takes the remaining 4 balls from the 'consumer' and gives them to the 'landfill' person. This is round one. In round 2, one of the 'runners' takes the 'recycled' particles from the recycling plant person and runs them back to the consumer. Two runners takes 50% of the balls (now 2) to the 'landfill' person and 50% to the recycling plant etc. The cycle continues until the 'consumer' is left with no balls. It is a good idea to do a practice-run with the students walking it through and then when they understand how it works, letting them race each other in teams.



Photo: Yanika Hennig

5 mins Reflection: Students reflect on what this activity demonstrates. As no current fossil fuel recycling is 100% efficient, the process merely delays the time that the material takes to go landfill. So this is the 'doing less bad', rather than 'doing good'.

Afl think, pair share



EARTHWORM WATCH



10 mins Consequence wheel (optional activity): start with a scenario, eg if we continue burning fossil fuels then.....spiral the consequences from this eg climate change and all it's affects; running out of natural resources- and the effects of that, emissions and the effects of them on health, environment etc.

Afl: students draw consequence spiral in booklets.



Image: Canva.com



1 hour Earthworm investigation: discuss what happens to waste in nature. Where does it go? Take part in a citizen science project



Earthworm watch (<https://earthwormwatch.org/get-involved>). Students dig two soil pits, collecting the earthworms they find. They ID the earthworms and record various information about the habitat. If short on time, half the class could dig in one area and the other half to dig in another. They can then pair up to compare their data and fill in the recording sheets. Time should be allowed to upload results to website- or set as homework.



Afl: completion of practical task. Worms are correctly identified.



(40 mins- over lunch) Lunchtime investigation: Students stand in the school canteen and collect all the food waste that their fellow students throw away (in shifts so children still get their lunch). It's a good idea to have 2 separate containers or more if a lot of waste is produced: one for cooked food waste and one for uncooked. The waste is then weighed.



10 mins- 1 hour depending on depth of analysis. Analysing

lunchtime investigation: How much food waste was produced? How much would be produced in a week/ year? What could we do with this waste instead? (Assuming the school doesn't already compost on-site). Students could draw graphs from their data, extrapolating for a month/ year. They could collect food waste all week to give them more data. They could also make posters to put up in the canteen to highlight their findings.

Afl: students can describe their findings. Some students able to explain in detail and apply results to different contexts.





GREENING THE CANTEEN

30 mins Optional activity: Establish a class wormery, see:

- ▶ <https://www.youtube.com/watch?v=ordM5TWyFLw>. This would be a great task to come back to in future weeks to see how things are progressing with students documenting the changes.

5 mins Watch Ecovative video (<https://www.youtube.com/watch?v=zw2O1PhrzA0>) . Demonstrates how food (mushrooms) can be

- ▶ transformed into packaging, and then becomes part of the food chain again, when composted.

5 mins Watch entocycle video.

- ▶ (https://www.youtube.com/watch?v=PR99xebr_bs)

5-10 mins Discussion Follow this, a brief discussion about can be done with food waste, e.g. send it away for industrial composting, composting on site & selling compost/ using compost for plant growing, keeping livestock, e.g. pigs & chicken to eat food waste...



Afl: discussion & write suggestions on lfn page in booklet

30 mins Class mind map: how can we make our canteen green?

Lead discussion on the food at your school. How could it be greener? Give groups an object each to discuss (e.g. a drinks can, plastic bottle, crisp package, food waste, packaged salad, plastic cutlery, napkin, salt/ ketchup sachets etc). If students are struggling



some alternate ideas are: plastic bottle, make from cornstarch or similar biodegradable (ideally compostable) packaging; bottle re-fill scheme or drinks dispenser, buying concentrated flavouring and adding tap water; growing fruit/ veg onsite or teaming up with local food producers; for foods like packaged salads: keeping in large tubs and serving on plates/bowls.

Afl: groups produce mindmaps

To support the above activity, you may also want to organise the following:

Green product examples: show students examples of real green products. Some you may already have easy access to: eg cotton bags, biodegradable packaging peanuts (many products are now packaged in them, the way to check is to put them in water: they fully dissolve), pencils/ notebooks that used to be a CD case/ car tyres etc, cornstarch compost bin bags. Some companies will also



send free samples to schools, we had success with: *Vegware* (compostable food packaging), *Spare fruit* (they use deformed fruit that doesn't meet supermarket grade and dry it into fruit crisps) and *Grocycle* (a kit for growing mushrooms from coffee grounds).



10 mins Look at 'Spare fruit' case study- see case study section on website. A company that buys fruits that are too small or deformed for the shops and makes 'crisps' out of them.

Afl: which 'lesson from nature' principal does this follow? What else would they need to do to be a circular product (packaging etc).

Throughout this afternoon of discussion and thinking, students should be encouraged to write any ideas they may have for a potential green business, or just concepts or ideas that inspire them in their booklet.



5- 10 mins Plenary Graffiti wall; give students post-it notes or similar for students to reflect on what they enjoyed the most, something they have learnt and if there are any improvements to the day that they would recommend.

RESOURCES *all paper resources are in the Learning materials section of the GEE website, under 'resources'. For ID keys, the FSC ones are recommended- purchase online. See also 'resources'.*

- **Nutrient cycles:** Invertebrate collecting equipment: tubs, spoons/ paintbrushes, sweep nets if using, ID keys, nutrient cycle cards
- **Thinking activity:** artificial items, eg watch, calculator, plastic bottle
- **Recycling game:** Per group: 8 x balls, 3 signs saying consumer/ recycling plant/ landfill
- **Earthworm investigation (see website for instructions & equipment list).** Also on: <https://www.earthwormwatch.org>
- **Lunchtime investigation:** sturdy (leak-proof) boxes/ buckets to put food waste, plastic gloves, scales/ hanging weighing scales.
- **Wormery:** large container, eg large plastic tub with lid with small holes drilled in. Newspaper, rotted garden compost, sand/ sandy soil and your kitchen waste.
- **Green product examples:** a variety of 'green' products, eg cotton bags, biodegradable packaging peanuts, cornstarch compost bin bags, 'I used to be a CD' type products. Contact companies for freebies.



MODULE 2: DIFFERENTIATION

DIFFERENTIATION

Key words recap

Support: students work in groups and support each other to decide on the definitions. Refer students back to their booklets and the diagrams of the circular/ linear economy.

Thinking activity

Support: if groups/ whole class struggling then this could be done as a class/ group activity, eg everyone uses the same example and talk through together the lifecycle of for example a plastic bottle.

Extend: students can be given an object containing several materials, eg plastics, metal to increase the challenge.

Earthworm watch

Support: the second part of the investigation- identifying the deep living Earthworms is more challenging. You could support individuals, set up groups to ensure there a mixture of abilities, or have the lower ability students dig and analyse the top layer and the higher ability to the analyse the deeper living worms.

Analysing lunchtime investigation

Extend: encourage students to evaluate the study and suggest improvements- potentially running the investigation again. e.g. if food is prepared on-site, what about the food waste from the preparation? Would it vary seasonally- e.g. might more fruit and salad be eaten in the summer, is food waste higher in the summer when it's hotter?

Discussion

Support: run this as a group activity so more creative students can support the less creative ones, and everyone can contribute ideas. Groups can be prompted by questioning, eg what other material could the product be made out of? Could the product be re-used?

Extend: students think about the rest of the lifecycle of the product. What about the packaging? Advertising? Transporting the item to the shop?



MODULE 2 EVALUATION & REFLECTION

REFLECTIONS

At the end of this module, students should make sure that they have added new vocabulary and terms to their glossary page.

Encourage students to start writing down any ideas or inspirations they have for their own businesses in their booklets.

LEARNING OBJECTIVES

By the end of the module 2, students will:



explore, identify and explain how nature creates things, draws energy, and treats waste.



start to make comparisons between systems in the living world and how industry can be redesigned following natural principles.



be able to describe the difference between conventional recycling, which simply delays the conversion of resources into waste, to natural recycling where that entire resource becomes a new product/ resource with zero waste.



have taken part in a citizen science project to investigate the interactions between the living things in the environment.

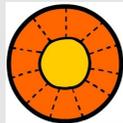


have acquired the skills and be inspired to work on their own business idea.

NATURAL PRINCIPLES



WASTE = FOOD



**RUN ON SOLAR
INCOME**



MULTIPLE BENEFITS