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Teaching material on Ecological Footprint

LEARNING UNIT 6

OTHER CONSUMPTION

AGE GROUP 2 (14-18 YEARS)

Version 2 | June 2020

This material is part of a course on Ecological Footprint for students.

The course consists of the following modules for two age groups:

Age group 1 10-13 years	Age group 2 14-18 years
General Introduction	General Introduction
Mini Hectare Workshop	Mini Hectare Workshop
Food	Food
Housing	Housing core Housing additional
Mobility	Mobility
Other Consumption	Other Consumption
Background information (one for both age groups)	

You are here

All the material can be downloaded for free at **www.e-co-foot.eu** in different languages.

calculator.e-co-foot.eu is an online tool that allows students to log their daily activities and trace the Ecological Footprint of their habits. Group functions for teachers make it suitable for a warm-up or later check-up-session.

elearning.e-co-foot.eu is an e-learning package with selected content from the lectures. E-learning can be used for blended learning of this course, as homework or as training and competence check after in-class lectures.

IMPRINT

akaryon GmbH, Austria www.akaryon.eu
Plattform Footprint, Austria www.footprint.at
Colegiul „Vasile Lovinescu" Fălticeni, Romania www.agricolfalticeni.ro
Eötvös Loránd University (ELTE), Hungary savariakemia.elte.hu
Environmental Education Center (K.P.E.) Pertouliou-Trikkeon, Greece https://blogs.sch.gr/kpepertoul/

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LEARNING UNIT 6

THE ECOLOGICAL FOOTPRINT OF CONSUMPTION

TEACHING MATERIAL FOR AGE GROUP 2 (14 – 18 YEARS)

The purpose of this lesson is to help students to understand: a) what the Ecological Footprint of key consumption categories is; b) what its impact on the environment and humans is c) how we can reduce it.

Short Overview

Course duration: 45 minutes for presentation and 30 minutes for exercises
If the Learning Units LU1 "General Introduction to the Ecological Footprint" or LU2 "Mini-Hectare Workshop" have been taught, Chapter 1 ("Introduction") may be omitted.

This Unit consists of:

- PDF document with description and introduction: ecofoot_Consumption_Teachingmaterial_agegroup2
- PowerPoint presentation: ecofoot_Consumption_Presentation_agegroup2
- Exercises – Homework: ecofoot_Consumption_Exercises_agegroup2
- Leaflet: EcologicalFootprint_Consumption_Leaflet_agegroup1&2

Brief description of the Learning Unit:
This unit consists of two parts, the basic and the additional lesson. In the first one, other categories of consumption, apart from nutrition, housing and mobility, will be presented, namely electronic and home appliances, paper and furniture, clothes and shoes, holidays, sports and hobbies, pets. Subsequently, the students will learn five general ways to reduce the Ecological Footprint of consumption, as well as some ways to reduce the Footprint of each consumption category. This part will be completed with the five most important things we can do to reduce our Ecological Footprint in general. The teacher who has more time available may also deal with the additional part of this unit, which includes more information and tips for action regarding our Ecological Footprint of consumption.

Setting: classroom

Basic lesson (45 min.)	Estimated duration minutes
1. Introduction	5
2. Icebreaker	6
3. Overview on Footprint of consumption	2
4. The Ecological Footprint of electronic devices and domestic appliances	2
5. The Ecological Footprint of paper and furniture	2
6. The Ecological Footprint of clothes including shoes	2
7. The Ecological Footprint of holidays	2
8. The Ecological Footprint of sport and hobbies	2
9. The Ecological Footprint of pets	2
10. What can you do: 5R	18

11. What can we do?	2
12. Exercises and Homework	30

Options for an additional lesson of 45 min. (focus on special topics):

Choose **3-4 areas of specialisation** for the second LU:

Additional info and tips for action regarding...	Estimated duration minutes
The Ecological Footprint of domestic appliances	20
The Ecological Footprint of electronic devices	15
The Ecological Footprint of furniture	12
The Ecological Footprint of clothes and shoes	10
The Ecological Footprint of sport and hobbies	12
The Ecological Footprint of durable goods	5

Items:
Sheets of paper or a notebook, pens or pencils, a PC or a laptop, internet connection, a beamer.

Connection to subjects: geography, biology, chemistry, physics, mathematics, science, environmental sciences, national language, English as foreign language, other foreign languages, religion, project lesson (country specific subjects)
E-learning: https://elearning.e-co-foot.eu/

Sequence:

The spoken text of the teacher is in blue colour. The explanations of what the teacher does are written in black.

1. Introduction

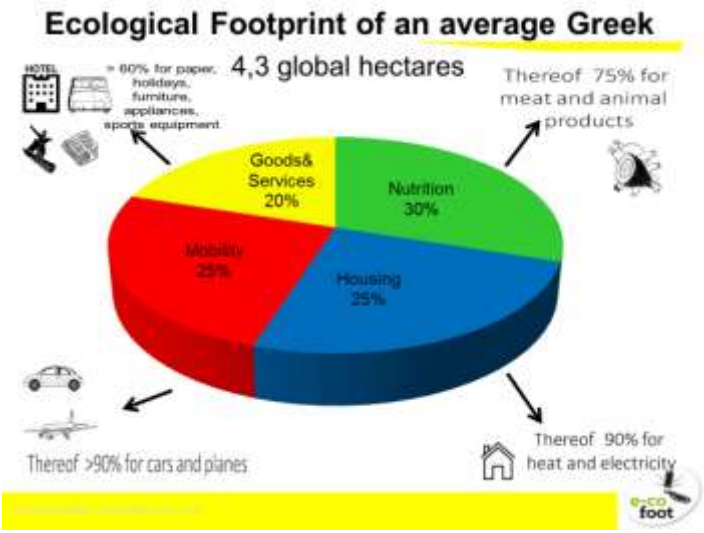
- We humans need to **consume** in order to survive. Everything we humans consume requires **resources**. These resources have to be produced by nature and therefore require certain **areas of land**.
- This land is **limited** because we live on a limited planet. In fact, we can only use **25%** of the Earth's surface! The usable area is called bioproductive area.

- **The Ecological Footprint measures the areas we need** in different areas of life: for housing and the consumption of heat and electricity, for mobility (e.g. for driving and flying), for nutrition (the things we eat and drink) and for the many other things we use (paper, electronic devices...).
- There are different types of area we use to produce these things: farmland, pasture, built up areas for industry, houses and roads, forests, oceans and other waters. The Footprint contains all these areas, but also takes into account the CO_2 emissions we produce.
- We must drastically reduce the emissions of CO_2 and other greenhouse gases very soon, otherwise **global warming** cannot be stopped. The consequences for life on the planet will then be drastic. CO_2 can be stored. This is done by oceans and lakes, but also by plants which absorb it, transform it and use it for their own growth. To a certain extent, **trees can bind CO_2**, i.e. remove it from the atmosphere.
- The Ecological Footprint therefore also **includes the area of forests that would be needed to bind CO_2 emitted by human activities**. This area can be up to half of the total Ecological Footprint, so it is very significant!

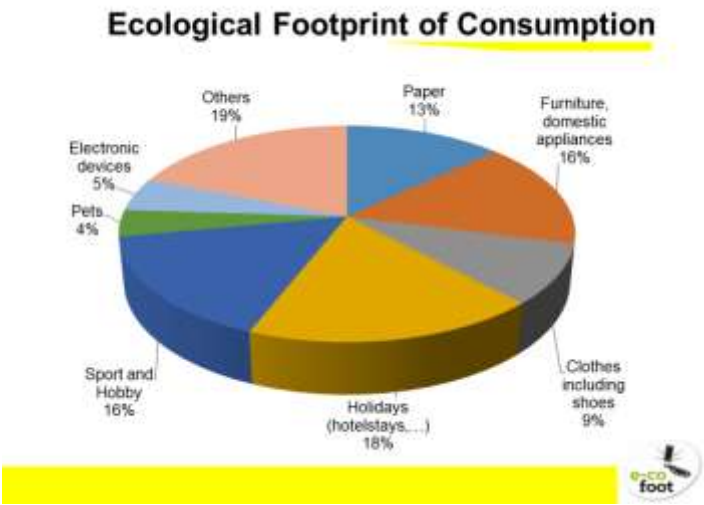
2. Icebreaker

Teacher: "In this learning unit, we are going to talk about consumption and overconsumption of goods by people and what the situation on our planet is today. Let's have a look together at the following slides…."
The students watch the PowerPoint, the aim is to cause a "storm of emotions".
Teacher: "How do you feel now? What are the emotions in your heart that were generated by the slideshow?". The teacher collects answers like "I feel surprised / shocked / worried / disappointed / guilty". He/she asks the students to analyze the reason why they feel like this, expecting to take answers, such as: "I feel surprised / shocked because I realized how many goods we use / how consuming is our society", "I feel worried / concerned about the future of our planet because we people overuse it", "I feel guilty because I am one of the people responsible for the current alarming situation of the earth due to overuse". If the students have difficulties in expressing their emotions, the teacher helps and directs them.
"So, as we know and we saw, a great number of people consume more than they should. Where do the raw materials for all consumer goods come from? From Earth, you're right! So, by overconsuming, people overuse resources of the Earth.
Have you "realized" some of the different categories of consumption?"
Expected answers would be: "Electronic devices / clothes / shoes / holidays / sports / paper / plastic / furniture "Very nice. Now, let's look together into each of these categories analytically."

3. Overview on the Footprint of consumption



Consumption makes up a big part of the Ecological Footprint in Greece with a share of 20%.



This part of the Footprint is mainly caused by the consumption of **paper, furniture, domestic appliances, electronic devices, holidays, sports and hobbies equipment, clothes including shoes, as well as the ownership of pets**.

In Greece, the composition of the consumption Footprint is:

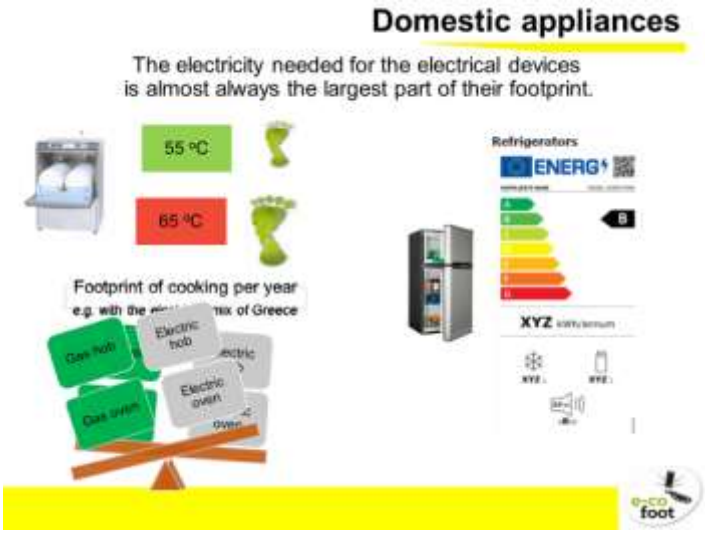
Main categories	Percentage
Paper	13%
Furniture, domestic appliances (without energy use)[1]	16%
Clothes including shoes	9%
Holidays (without transport)[2]	18%
Sport and Hobby	16%

[1] The energy use of domestic appliances and electronic devices is part of the Footprint of housing. The Footprint of consumption covers the Footprint caused by the production and disposal of the devices.

[2] The transport to and from the holiday destination is not covered by the Footprint of consumption, but by the Footprint of mobility. The consumption Footprint of holidays deals with the Footprint caused by accommodation, touristic infrastructures and activities.

Pets	4%
Electronic devices (without energy use)	5%
Others	19%

4. The Ecological Footprint of electronic devices and domestic appliances



Teacher: "One part of consumption is that of electrical domestic appliances. How many of you have a refrigerator, a freezer, a dishwasher, a washing machine, a tumble dryer, a cooker or a microwave oven at home? Please, raise your hand. How many of you have four kinds of them or more?" The teacher collects students' answers and he/she probably concludes that most of them are positive in both questions.

"Ok. These are called large domestic appliances. I can see that all of you have a lot of them in your house. Now, how many of you have a blender, a mixer, a toaster, a kettle, a hairdryer, a coffee maker, a vacuum cleaner or an iron at home? Raise your hand again. How many of you have four kinds of them or more?"

In these questions again the most probable is to have a lot of (if not all) positive answers.

"These are called small domestic appliances. So, all of you have a lot of them in your house. The same happens in millions of houses, not only in yours. We use a lot of electrical appliances, no matter how old we are."

Teacher: "Please consider people who lived 150 years ago, did they use electrical domestic appliances?

Students' possible answers: No, they didn't have any. They didn't have electricity at all.

Teacher: "You're right. At those times, even the word "electrical appliance" was unknown. Can you imagine that? However, today, due to the rapid development of technology, they have become an essential part of our everyday lives, we cannot live without them. But why are we so dependent on such devices?

Students' possible answers: Because they are useful/they save us a lot of our valuable time/they make our life easier.

Teacher: "That's true. Yet, on the other hand, according to scientific studies, it has reached alarming levels, it has become an addiction. Let's all think and wonder "Do we really need so many appliances?", "How much energy do they need?", "What happens to them after we have used them?", "What are the consequences for our budget and the environment?"

At this point, a brief conversation may be caused by these questions.

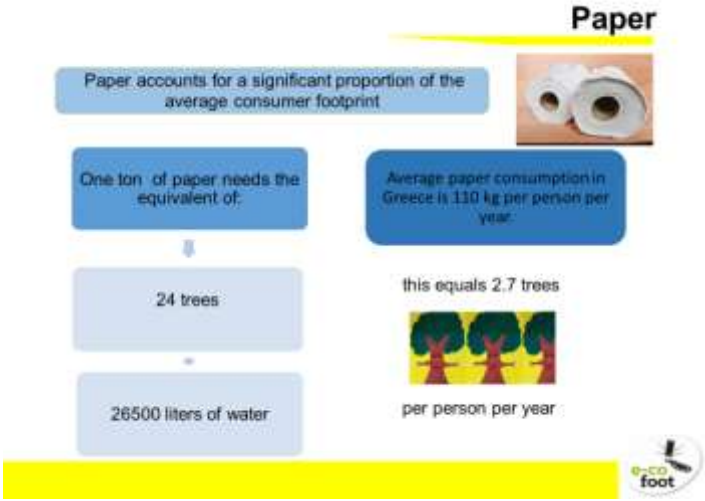
Teacher: "These appliances affect our Ecological Footprint in two ways: 1) To PRODUCE them, we need materials and energy and these both have a Footprint. Also, the waste disposal and recycling of these devices create a Footprint (think of the pictures we saw at the beginning!)
2) When we USE them, we also need energy to run them. Depending on how many devices we own, how often we use them and how they are constructed (how much energy they need to run, that is, how "energy efficient" they are), the Footprint can vary a great deal. For both the bigger and smaller devices which are not energy efficient, the Footprint caused by the energy we need to run them, is most of the times bigger than the one necessary to produce them." For an efficient device like a modern laptop or mobile phone the production and the internet network might have a higher Ecological Footprint than the electricity while using the device.

Teacher: "The Ecological Footprint of consumption also includes electronic products and applications. Which ones do you know"? Pupils name examples of electronic devices existing in every household e.g.: mobile phone, computer, screen, TV, radio, speaker, microphone, camera, video camera, electronic alarm clock, portable USB memory module.
Teacher: "Also, many electronic devices can be found in applications used for information and entertainment, as well as in complex telecommunication networks.
What do you estimate, how big is the Ecological Footprint of the PRODUCTION of electronic devices? Is it very big, medium or very small compared to other areas of the Footprint?" …Pupils estimate…
Teacher: "The Ecological Footprint of electronic devices compared to the total Footprint of an average Greek is usually overestimated. So, the good news for you pupils is that your smartphones have a small Ecological Footprint! Modern mobile phones need very little material and even the rare earth metals in the mobiles are not as rare as their name makes us believe. But still, the waste created by these devices has to be considered. So, it is important to use the devices as long as possible.
Of course, one of the most important issues about electronic devices that should concern us, even more than their Ecological Footprint, is the harsh and dangerous working conditions of people who work in the factories producing them. They include low basic wages, large amounts of overtime, in order to have adequate income on which to live, very high work intensity, unfair calculations of work time, lack of any social and injury insurance and exploitation even of children. "

5. The Ecological Footprint of paper and furniture

Teacher: "Another part of consumption is that of paper. Can someone tell us from which materials the paper is made of? That's right: paper is made of wood. How many of you use paper in your daily life?

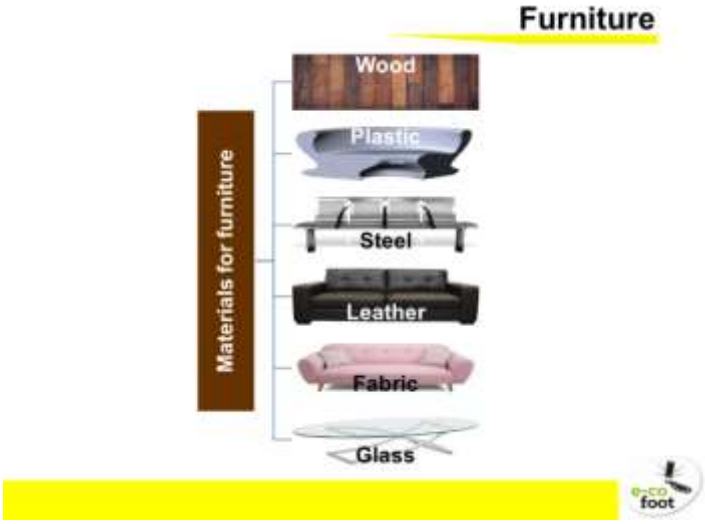
Please, raise your hand. The majority of pupils raise their hands. "We use a lot of paper in our everyday lives – can you think of things we use often that are made of paper?" The teacher collects answers. Pupils name examples of paper usage as books, notebooks, packages, printing paper, bill, kitchen roll paper and toilet paper.



Teacher: "Do you know how many trees we have to cut in order to produce one ton of paper?" The teacher collects pupils` answers.
One ton of paper, in order to be produced, requires the equivalent of:

- 24 trees (12 m in height and 15 – 20 cm in diameter) and
- about 26500 liters of water

Paper accounts for a significant proportion of the average consumer Footprint. In Greece, the average consumption is 110 kg per person per year.



Teacher: "What else is made of wood?" Students give their answers, most of them will be pieces of furniture. "That's right, furniture is – mainly – made of wood, apart from other materials like plastic, steel, leather, fabric and glass."

Teacher: "So, furniture as well as the different types of paper we use every day are (mainly) made of wood. How many trees are there on our planet – what do you think?" The teacher collects some numbers and writes them on the blackboard/flipchart. Teacher: "Well, these are all good guesses, but there are 3 TRILLION trees on Earth. Do you have an idea how many zeros this number has? It has 12!" The teacher writes "**3.000.000.000.000"** on the blackboard/flipchart. Teacher: "This sounds like a lot. But at the same time, we humans need so much wood for our furniture, books, packages and so on, that we cut about 15 billion trees each year. This is a number with 9 zeros, so 15.000.000.000. If a tree is cut, it takes a lot of time to grow again. So even if wood is "renewable", that means that it can grow back, it takes decades for a tree to grow tall. Just take a look at this video (and pay attention to the number of years on the screen's left upper corner): https://www.youtube.com/watch?v=RjnKAWxCK3k
"Can you imagine by how much forest has been reduced since the beginning of human civilization? The world's number of trees has fallen by 46%, nearly a half, since the beginning of human civilization. So, a major problem forests are facing is deforestation (e.g. in regions like the rainforest in Southern America) – and not only because we need paper. Animals and plants depend on forests and gradually die out because they don't have enough space to live (this is called "loss of biodiversity"). Trees are also very important for our climate: As we heard before, they can store carbon dioxide in their leaves and trunks. There is too much carbon dioxide in the air because of human activities (e.g. the burning of fossil fuels, e.g. driving a car, flying a plane…). It causes our climate to change in a dramatic way".

6. The Ecological Footprint of clothes including shoes

Teacher: "Another part of consumption is that of clothes including shoes. We all use clothes and shoes in our everyday life. Do we use the same clothes for each season?" The teacher collects students' answers and he/she probably concludes that all of them use different clothes each season.
Teacher: "Ok. How often do you buy clothes and shoes?" In these questions the most probable answers are that students buy a lot of clothes and shoes.
Teacher: "If you buy new clothes or shoes: What are the reasons to buy them?" Possible answers: The old ones are not fashionable anymore; They are torn/broken/too small; I don't like them anymore; I want to have new things… Teacher: "So there are many reasons. We do not really need all of them. Even torn clothes could be repaired.

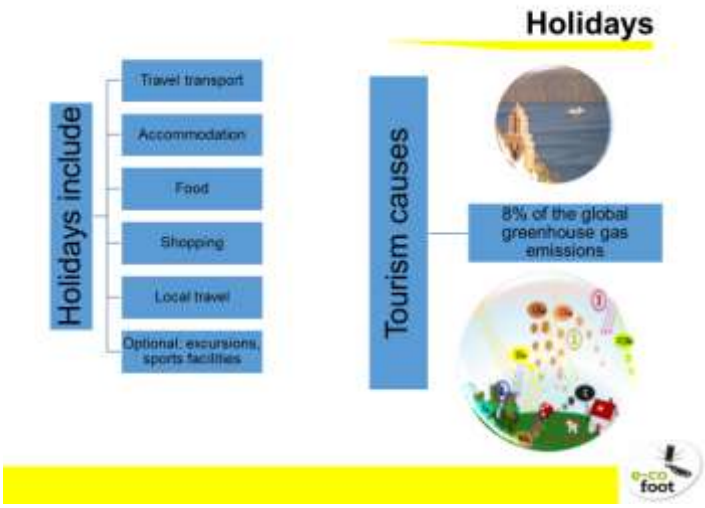
60 billion kilograms of fabric is the annual global textile production and 20 billion pairs is the annual global shoe production. Each year 11 million tons of textiles and 300 million pairs of shoes are trashed and thrown away. Of course, this production and disposal is constantly increasing. In recent years, the rapidly changing trends and low prices have allowed people to consume more.

What does it take to make clothes and shoes?". The teacher collects students' answers.

Teacher: "The Ecological Footprint of clothes is a combination of the land, water, chemicals, resources and emissions embodied in our clothing. It includes growing the fibres, manufacturing the garment, washing it, and then finally disposing of it.

The textile industry has a large Ecological Footprint because it needs a lot of water, emits large amounts of carbon dioxide equivalents, pesticides sprayed on cotton and the chemicals used to dye, fade and stonewash clothes pollute the air, waterways and workers' lungs. The cotton industry uses 25% of the world's pesticides and herbicides."

7. The Ecological Footprint of holidays



Teacher: "Can you tell me one of the most pleasant moments that you have had during the year?" The teacher collects students' answers and he/she probably concludes that most of them are during holidays.

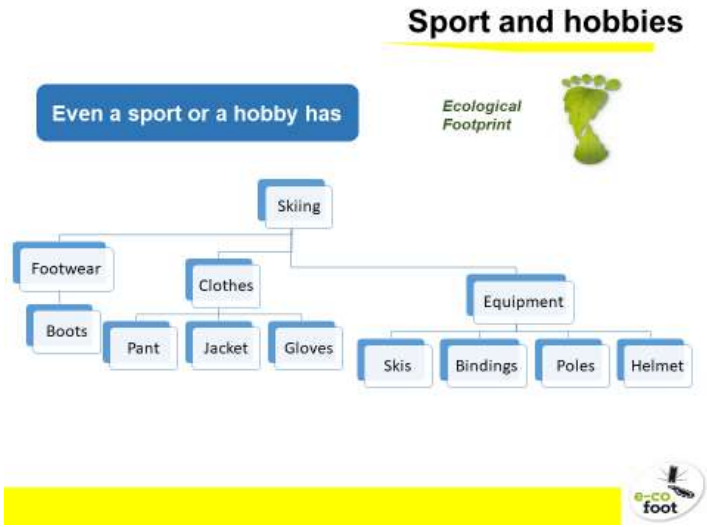
Teacher: "Another part of consumption is that of holidays. Can someone tell us what a package of holiday includes?" Students' possible answers: transportation, accommodation, food.

Holidays generally include:

- Travel Transportation
- Accommodation
- Food & shopping
- Local travel
- Excursions
- Sports facilities

"Which of the above do you think have the biggest impact on Ecological Footprint?" Students' possible answers: transportation, accommodation. Teacher: "It is true that the biggest Footprint is caused by the means of transportation we choose to go on holidays with, especially if we fly. Mobility is part of the Footprint of mobility (covered in the LU5) and not part of the Footprint of consumption. But when we go on holidays, we also create a Footprint by using different types of accommodation (a luxurious wellness hotel has a very different Footprint than a tent or a small hotel room!), by consuming water (especially drinking water in arid areas) and by creating waste and sewage. Even the kind of our extra diet (very often more meat, dairy products or fish) and the type of activities (cultural and sports) that we choose to do has a significant impact on the Ecological Footprint during our holidays."

8. The Ecological Footprint of sport and hobbies



Teacher: "Another part of consumption is that of sports and hobbies. How many of you are active in sports or have a hobby?" The teacher collects students' answers and he/she probably concludes that most of them are positive in this question.

Teacher: "What do we need to be able to enjoy the sport we love?"

Students' possible answers: Stadiums, arenas, sports clothing, footwear, equipment…

Teacher: "More specifically, what does someone need to practice ski for example?"

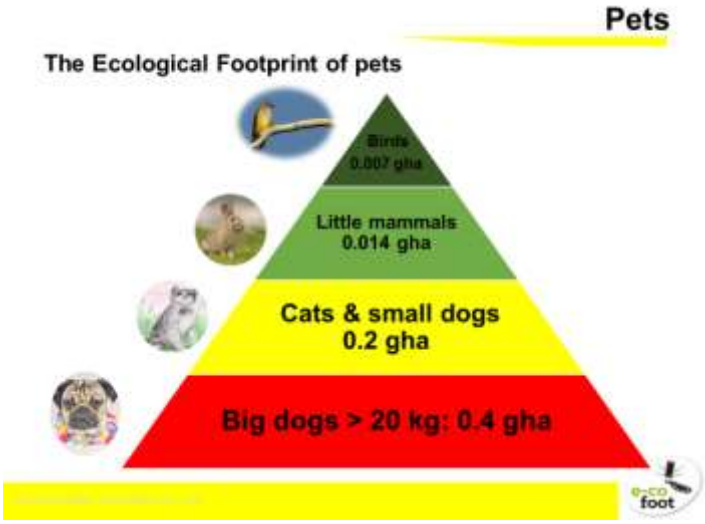
Students' possible answers: Boots, pants, jacket, gloves, skis, bindings, poles, helmet…

Teacher: "Very well! Have a look at the slide. Do you realize now how many items we need just for one sport?! Imagine for all! All of them belong to three major categories. Generally, the sporting goods industry includes sports clothing, footwear and equipment. It is a huge global industry that has grown considerably over the years. There are all sorts of new and improved products which are often very cheap and have a short life, e.g. they are thrown away when they are not "in" anymore or when they break apart.

In addition to the active engagement in sports, there is also an indirect one which consists of watching sporting events. Billions of people sit in front of the television or go to events, bars and other venues to watch athletes, from children to highly talented professionals, play the sports they love. Sport events are the biggest global media events. Stadiums, arenas and tracks are maintained, renovated, demolished and built from scratch to conduct various sports. These occupy vast areas, especially if you add the parking space to park the spectators' cars. Infrastructure built and maintained for these sporting events is part of the Grey Footprint. Your activities to take part at the event (travel, consumption etc.) count towards your personal consumption Footprint."

9. The Ecological Footprint of pets

Teacher: "A large percentage of people around the world choose to have one or more pets at home. How many of you have one or more pets at home? Please raise your hand." The teacher collects students' answers and concludes that some students have pets at home. "Pets are very common: For example, households in the European Union have hundreds of millions of pet animals: the total number of dogs is about 85 million, and those of cats is some 75 million."



Teacher: "Like humans, our pets need food, shelter and toys. Which kind of food do pets eat normally?" Possible answers: meat, corn, pet food…Teacher: "What do cats and dogs eat?" Students respond: Meat. "Yes, cats eat mainly meat, and dogs eat meat and other foods. And meat has a very big Ecological Footprint, because the animals we humans eat or our pets eat need to be fed with food that has to grow somewhere. This is why the Footprint of meat is so high. A study found that dogs and cats are responsible for 25 to 30% of the environmental impact of meat consumption in the United States.
On the slide you can see the differences of the Ecological Footprint of different types of pets. As you can see, the annual Ecological Footprint of a big dog over 20 kg is 0,4 gha. A medium-sized dog under 20 kg has the same Footprint as a cat. This is about 0,2 gha. Birds have a very small Ecological Footprint of around 0,007 global hectares.
Finally, the Ecological Footprint of a small mammal is 0,014 global hectares."

10. What can you do: 5R

What can you do → 5R:

1. **Refuse:** things that you don't really need and produce garbage
   Refuse plastic bag usage, disposable plastic, printed bills and brochures, cheap furniture, clothes and shoes with unusual colors (fashion is changing fast)
2. **Reduce:** the number of things that you cannot refuse
   Paper usage, clothes, shoes, furniture, mobile, electronic devices
3. **Reuse:** use things again for the same or for a different purpose, repair
   Clothes, shoes, furniture, sports equipment by using second hand goods
4. **Recycle:** what you cannot refuse, reduce, or reuse
   Glass, plastic, aluminum, paper. Buy recycled paper.
5. **Rot:** compost the rest materials
   Vegetable food, wood chips, sawdust from spruce timber, pets' crap (with wood pellets)

Teacher: "We can reduce the Ecological Footprint of consumption by using the rule of 5R. The rule of 5R sums up the five actions that we have to implement and the name of each action begins with the letter R. These actions are:
Refuse: What do you really need? Refuse plastic bag usage, disposable plastic, printed bills and brochures, cheap furniture, clothes and shoes with unusual colors (fashion is changing fast)
Reduce: How much of it do you need? Paper usage, clothes, shoes, furniture, mobile, electronic devices
Reuse: What things can you reuse? Clothes, shoes, furniture, sports equipment
Recycle: what you cannot refuse, reduce, or reuse. Glass, plastic, aluminum, paper. Buy recycled paper.
Rot (compost) the rest. Vegetable food, wood chips, sawdust from spruce timber, pets' crap (with wood pellets)
So now let's form groups of 6 to 10 people. You all have 10 minutes to think about what could be done to reduce the Footprint in all these areas we discussed. If you think about it a little bit, it is not so difficult to come up with ideas that reduce the Footprint without us having to "sacrifice" anything truly important. We still can have holidays, furniture, electronic devices and clothes, use paper, do sports and have hobbies AND have a small Footprint – if we are willing to make a few adjustments and generally use LESS of these things.
So, which ideas do you have to refuse, reduce, reuse, recycle or rot/compost things in the areas:

- Domestic appliances
- Electronic devices
- Furniture
- Paper
- Clothes/shoes
- Holidays
- Sport and hobbies
- Pets

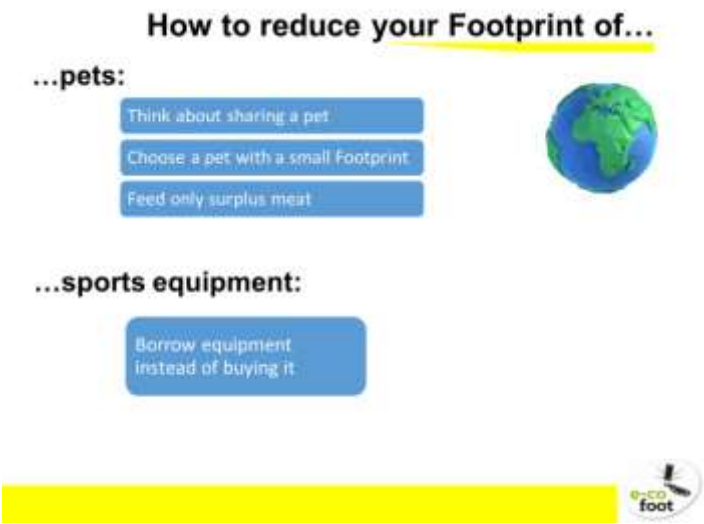
E.g.: What can we do to use fewer domestic appliances, furniture, clothes? Collect as many ideas as possible. One person in the group writes the ideas down and presents them in class afterwards. Then we will see how many ideas each group has got. The group with the most ideas that have the highest impact on the Ecological Footprint, wins."

After 10 minutes, the teacher collects the answers for the different areas from each group and writes them on a flipchart/blackboard, sorted by area. Additionally, the teacher notes how many plausible answers each group has and congratulates the group that found the most ideas. To see more specific tips for the different areas, the teacher can also have a look at the additional units, where all sorts of possible measures for each area are collected.

Teacher: "You found great ideas, thank you! The most important measures to reduce the Footprint of Consumption are going to be presented below:
One thing we all can do is to save paper:

- Follow the golden rule: Think before you print! The next time you are about to print, ask yourself the golden rule of saving paper: Do I really need to print this? Avoid printing out single line e-mails or unnecessary copies of documents.
- Use both sides of a sheet of paper. This tip is a really easy way of reducing your paper consumption by 50%.
- Instead of using paper, we can use digital technology such as electronic mail, internet and document scanners, e.g.: Read newspapers and books in their digital versions. Recycle the paper you have and buy recycled paper products. Place a sticker on your post box that says "No advertisements, please!". Collect the paper you use and then reuse where possible (print again on the other side if you printed on one side only or use it for notes).

Use things – electronic devices, domestic appliances, furniture, clothes and shoes, sports equipment, as LONG AS POSSIBLE and if they are broken, see if it is possible to REPAIR them. To be able to use them for a long time they should be of HIGH QUALITY – if they are produced cheaply, they won't last long. Be sure to really like and need the things you buy. Buy second hand items. Talk to your parents about this: That way you and they can save money in the long term AND the environment!



Pets: Think about sharing pets and getting pets, choose ones that only have a small Footprint (that don't need meat) or feed them only surplus meat that is not consumed by humans.
Sports equipment: Borrow equipment instead of buying it – it is often also cheaper!

11. What can we do?

"There are five Footprint rules to successfully shrink the Footprint in the other areas as well":
The teacher lists the 5 "F" using the PowerPoint slide:

"If you take the 5 F to heart and implement it, then you and your children and all the people on Earth will have a bright future! In this sense – always remember what you have learned today for your consumption in your future!"

Exercises and more

12. Exercises

12.1 The Ecological Footprint of consumption: categories

https://learningapps.org/display?v=pxf6rbc8a18
Read, listen, watch and match the categories of consumption.
Duration: 10 - 12 minutes

12.2 Crossword

Optional: E-game https://learningapps.org/display?v=pzs28u72v19
Answer the questions to solve the crossword puzzle.

13. Homework

13.1 Paper consumption

How much paper do we use, how much footprint does it have, how can we reduce it?

The idea is to identify solutions to reduce our paper consumption!

13.2 Energy inspectors

We instruct students to measure the energy consumed in their home in two weeks. For the next two weeks, they record consumption, avoiding the waste of energy. Finally, they calculate the difference and translate it into earned money. Finding how much money is saved in two weeks, they can calculate the annual savings.

II Additional lesson

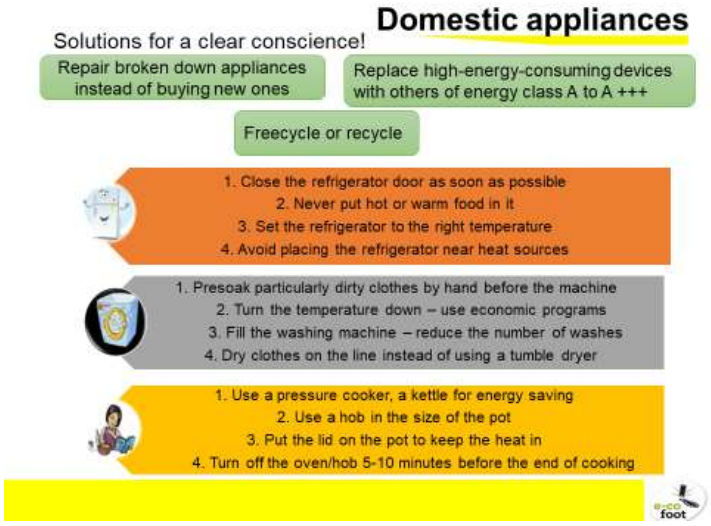
1. Focus on the Footprint of domestic appliances

Teacher: "In our days, large appliances consume nearly only 1/3 of the energy as they did compared to 20 years ago. This happens because the manufacturers of large appliances respected the regulations which obliged them to declare the energy class of each. What does "energy class" mean, do you know?" The students answer if they have heard of this term.

"Energy classes range from category A (best, the most efficient) to G (worst, the least efficient) which shows us how much energy an appliance may consume in a year. As you can assume, appliances of energy class A consume less energy, so they are more environmentally friendly.

However, the energy consumption of small appliances is growing very fast. In fact, it has more than doubled since the 1970s. Unfortunately, there is no energy labeling for small devices, although the manufacturers are obliged to declare it, as well. This is the main reason for the increase of energy use. Thus, the users, not knowing these appliances' energy consumption, do not realize how big their ecological footprint is and how negative their impact on the environment is.

High energy consumption costs us a lot of money. But, apart from this, it has also a great ecological footprint and contributes to climate change. Household appliances are responsible for most of the electricity consumption of households. They consume energy both when they are produced and when they are used by people…



As we have seen, all home appliances together spend a lot of energy, so use them wisely! Can you think of some simple ways in which we can reduce the ecological footprint of our appliances?"

The teacher writes students' answers on the board. If they find it difficult to answer, (s)he helps them by reminding them what has been mentioned until now.

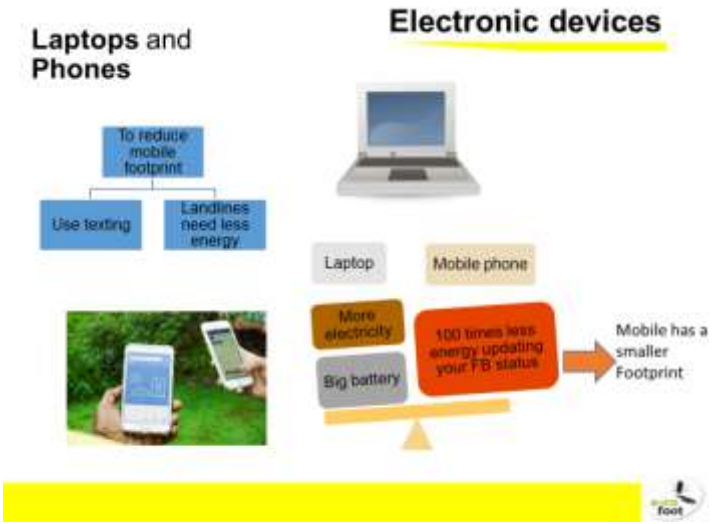
- "Repair broken down appliances instead of buying new ones". In this way, you avoid the production of a new one.
- Nevertheless, if your device is high-energy-consuming, replace it with another of energy class A and preferably A + to A +++. The efficiency of an appliance of class A+++ compared with a similar one of class A can be impressive.
- Have your domestic appliances maintained often, so that they function well.
- Freecycle (give away an appliance you don't need any more to someone who needs it) or recycle

- As for small appliances: buy only what you really need and, when possible, do the same task with a manual utensil (e.g. use a manual grater to grate vegetables instead of an electrical one).
- When using the refrigerator:
  - Close the refrigerator door as soon as possible
  - Never put hot or warm food in it
  - Set the refrigerator to the right temperature
  - Avoid placing the refrigerator near heat sources
- When using the washing machine:
  - Presoak particularly dirty clothes by hand before the machine wash
  - Turn the temperature down – use economic programs
  - Fill the washing machine – reduce the number of washes
  - Dry clothes on the line instead of using a tumble dryer
- When cooking:
  - Use devices such as a pressure cooker, a kettle for energy saving
  - Use a hob in the size of the pot
  - Put the lid on the pot to keep the heat in
  - Turn off the oven/hob 5-10 minutes before the end of cooking

If we all apply these rules, it will not cost us anything; on the contrary, they will save you money in the long run!"

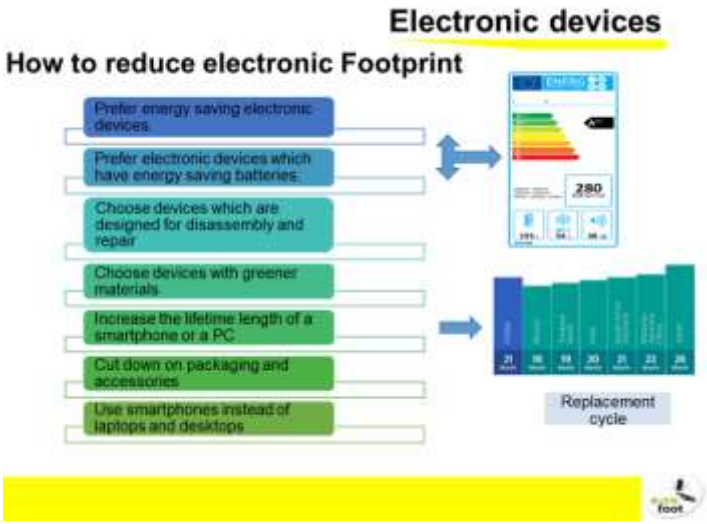
2. Focus on the Footprint of electronic devices

Teacher: "Now let's focus a bit on electronic devices we all use every day. As I said before, apart from the Ecological Footprint caused by the manufacturing of the above products, here we also have to take into account that during their use they have a constant demand on electricity. Of course, this Ecological Footprint is often small, due to the low electricity required for their operation. So I repeat: The good news is that your smartphones have a relatively small Ecological Footprint compared to other consumption goods or the energy use of other devices!"



Today, there are billions of Internet users around the world who can use applications such as the email. Among these, 46% have access to the Internet both from their computers and their mobile phones. This is very important, since mobile phones are much more environmentally friendly as they use less power in operation mode and much smaller and better batteries. A typical example is that updating your Facebook

status from a mobile phone consumes about 100 times less energy than if you did the same activity from a desktop computer.
Therefore, if 100 million people used mobile phones instead of desktop computers to browse the Internet for one hour a day, energy savings would be equivalent to annual greenhouse gas emissions of 430,000 cars approximately. It should also be mentioned that laptop computers have a much smaller footprint than desktop computers.
But still, we should mention that even an email has an Ecological Footprint. It is created by the power of Data Centers and the power spent by computers in order to send, filter, and read messages. Since millions of people stream and download a lot of data, this amounts to a lot of energy and a big Footprint.
If we want to reduce the Ecological Footprint of communication, it is better to send a message instead of phoning. Stream videos or songs in lower quality and, if you watch them often, download them instead of streaming them over and over again."



Some ways for reducing the Ecological Footprint of electronic devices are:

- Prefer electronic devices of at least energy class A on the energy efficiency scale.
- Prefer electronic devices which have energy saving batteries.
- Prefer devices designed to be taken apart and repaired. Do not select others which have integrated batteries or are glued shut, because if they break down, the only choice is to throw them away and buy new ones. (for example: Fair Phone)
- Choose devices with greener materials, consulting the information given in the website: http://www.ethicalconsumer.org/ethicalreports/mobilesreport/environment.aspx
- Increase the lifetime of a smartphone or a PC. Worldwide, the average time of smartphone change is 21 months. We could buy a new smart phone every 48 months instead, or use it till it breaks.
- Cut down on packaging and accessories, use old chargers for new phones if compatible and avoid buying unnecessary accessories.
- Use smartphones instead of laptops and desktops, as they spend less energy for their operation."

3. Focus on the Footprint of furniture

Teacher: "Could you mention some of the production phases of furniture in which greenhouse gases are produced or resources are used?" Students' possible answers: manufacture, packaging, transportation of the furniture.

The production and use of furniture cause greenhouse gases produced during their life cycle, as shown below:

- production of raw materials
- manufacture of the product
- packaging
- transportation of materials and finished products
- phase of use
- disposal at the end of its life cycle.

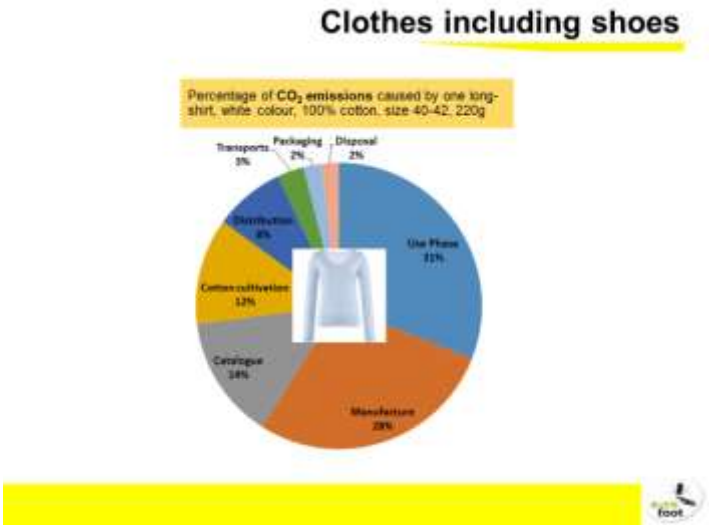
Teacher: "All along the product cycle, furniture produce a Footprint. So how can we reduce our Footprint of furniture use?

1. Prefer durable furniture.
2. Wood can be reused with little care: maintain the old furniture instead of throwing it away. Look for furniture that's durable and fixable thus increasing the time it takes to end up in the landfill. Durable furniture that lasts a long time can be transported from person to person.
3. Prefer furniture made with reclaimed materials. Reclaimed wood usually comes from old furniture, houses or other craft items ready for a friendly reincarnation, engraved wood or scraps of a factory. Some recovered woods also come from logs that sink into the bottom of the rivers as they were taken to the sawmill. Furniture made from reclaimed wood is a great example of resource efficiency.
4. Choose certified wood products. One of the most important threats to our planet is deforestation. However, there are ways to use wood from woodland that is constantly being refreshed. This kind of wood production is called "sustainable" and the furniture produced from such timber is all certified by sustainable production. We buy wood products from stores that we know that their suppliers are certified for their timber coming from sustainable forests. Certified wood has less Ecological Footprint than other furniture materials such as plastic and metal.
   Forest Stewardship Council (FSC) is a great standard of certification that controls clear-cutting and promotes good working conditions.

5. Free cycling. If you don't need some pieces of furniture, give them to someone who wants them. There are organizations and pages on the internet that bring together people who want to get rid of items with people who need them. Even if your style changes and the kitchen table, for example, is no longer attractive to you, a good table will almost always be appealing to someone else. This reduces consumerism with an immediate positive impact on the environment.

6. Prefer furniture produced by local industries thus reducing the transport Footprint.
7. Invest in multifunctional furniture (one for many uses) with a long life. They need fewer square metres and thus less space (possibly reducing the housing Footprint).
8. Choose furniture that is recyclable and easy to disassemble. More and more furniture is made of recycled plastics and metals. Recycled materials require less processing and fewer pores. They can easily be separated, sorted into their components and recycled at the end of their useful life."

4. Focus on the Footprint of clothes and shoes



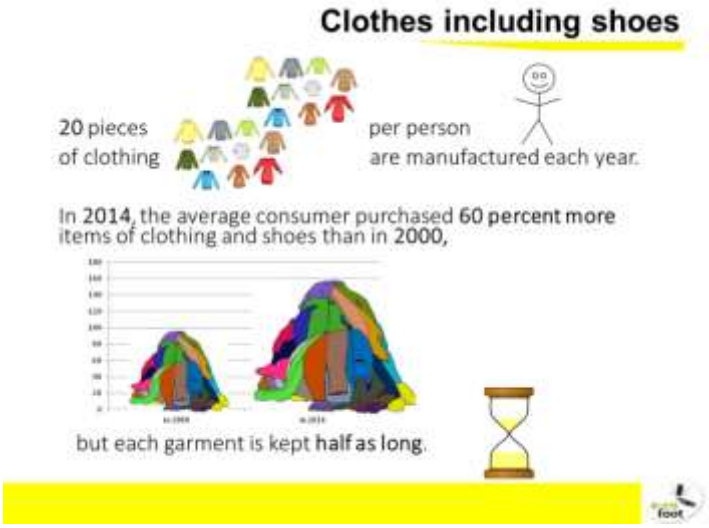
Teacher: "The CO2 emissions of a cotton t-shirt are caused in its entire lifecycle, from cotton cultivation to the end of the product's life. As you can see in the chart, the use phase produces the highest CO2 emissions, mainly caused by the washing of the clothes (which should be done with the lowest possible temperature), followed by CO2 emissions caused by the manufacturing process and the cotton cultivation."

Roughly 20 pieces of clothing per person are manufactured each year. In recent years, the rapidly changing trends and low prices have allowed people to consume more. The average consumer was, in 2014, purchasing 60 percent more items of clothing and shoes as compared to 2000, but each garment was kept half as long.

The textile industry is the third largest consumer of water in the world, apart from paper and oil industries. It takes as much water to make one cotton shirt as it takes for one person to drink for 2½ years (2700 liters)!

The shoe manufacturing process is a chemically intensive process. Ethylene Vinyl Acetate, a material commonly found in the midsole of running shoes, can last for as long as 1,000 years in a landfill. So, like clothing waste, shoe waste largely occurs and is 100 percent avoidable by recycling them."

So, what can we do to reduce our clothing and footwear Footprint?"



The teacher collects students' answers and then, together they make a list of what they can do to reduce the Ecological Footprint of clothes and shoes:

- Refuse to follow the "fast fashion" that has increased the number of fashion seasons from 2 to 50 -100 micro seasons for one year.
- Reduce clothes and shoes you buy. Buy good quality clothes and shoes, keep them longer, wash them slightly less often and dry them outside.

- Reuse, buy secondhand, give away or swap things you don't wear any more rather than dump them.
- Recycle them when they're worn out.

As far as shoes manufacturers are concerned, the things they can do are:

- Use materials with a lower environmental impact, reduce the weight of components where feasible, reduce energy consumption, replace solvent-based chemicals with water-based ones, optimize the transportation load and use more environmentally friendly means of transport.
- Companies need to measure the environmental, social and labor impact of their products and services and acknowledge the areas which can be improved.

5. Focus on the Footprint of sports and hobbies

Teacher: "Sport, as we have said before, is a human activity and as such affects the environment and is affected by it. There is a two-way relationship between sport and the environment. The impact of the environment on sport is more visible and direct, as it affects the planning of certain sport events depending on the climate and the natural environment's suitability. Global warming has an unquestionable potential for long-term negative impact on sports in general and especially on winter sports. For example, skiing in Austria is an important part of winter tourism and an important income for people living in the mountain regions, which will decline in the future due to climate change. The impact of sport on the environment can be classified as short-term or long-term, direct or indirect. Short-term effects include, for example, noise or air pollution during the event, while long-term effects are those that persist even after the event, for example: loss of biodiversity due to infrastructure development or ecological imbalance in alpine areas due to skiing facilities. All the bioproductive area needed constitutes the Ecological Footprint. As we have mentioned, participation in a sport and watching sporting events has a significant impact on the natural environment. Sports, even if they promote health, can also degrade the environment on which good health depends.

All major sporting events leave great environmental Footprints by the use and misuse of natural resources. An enormous amount of trash is generated at sporting events, from packaging, plates and bottles to food waste. Resources like water and energy are used to keep playing fields lush and to power the games. Large amounts of carbon dioxide are emitted by travel to and from events by all stakeholders. Additionally, the accommodation of athletes and spectators has a Footprint.

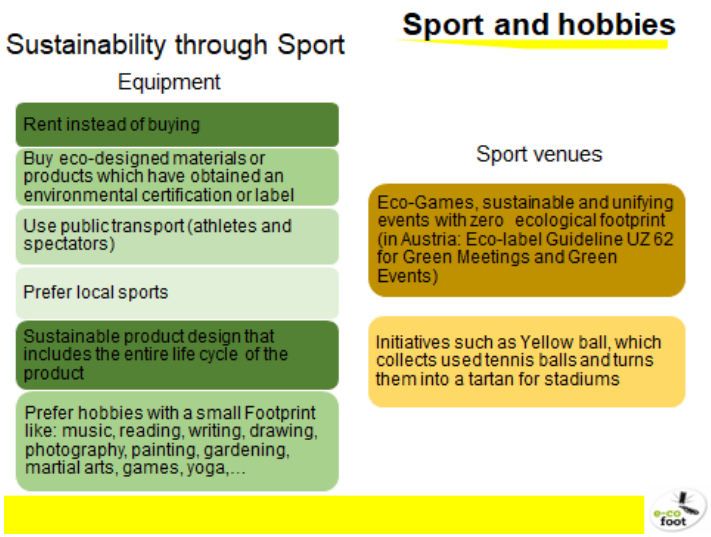
Every sporting event needs space in order to take place. Each construction of a playing area alters the natural ecosystem. For example, although skiing is a sport that is threatened by global warming, it has negative environmental effects. In order to engrave the slopes, sensitive alpine landscapes are disturbed. They are only granted a short period of recovery and therefore rarely fully recover. Furthermore, the water used for artificial snow is diverted from other uses like irrigation.

Golf courses consume large amounts of pesticides and water. Certain golf courses use up to 5,000 m^3 of water per day.

Parking lots for stadiums and arenas produce vast paved surfaces. The demand for such surfaces is constantly increasing.

Millions of tons of sports equipment, sports shoes, and apparel waste are generated annually worldwide. According to the value of the products sold, the sports clothes occupy 46%, the sports equipment 34% and the sports shoes 20%.

Over the years, the life cycle of sports products became shorter the disposal rates and waste increased.



Teacher: "As we have seen above, sports and hobbies have a great environmental impact, and a more sustainable way to engage with them should be promoted. What we can do first is to take advantage of the popularity of sports so there is awakening and environmental concern. What do you think we can do to reduce the Ecological Footprint of sports and hobbies?" Everyone discusses ways to reduce the Ecological Footprint of sports and hobbies.

The teacher summarizes and highlights the following ones:

"Where possible, it would be best to choose hobbies with a small Ecological Footprint, such as music, reading, writing, drawing, photography, painting, gardening, martial arts, yoga, games...

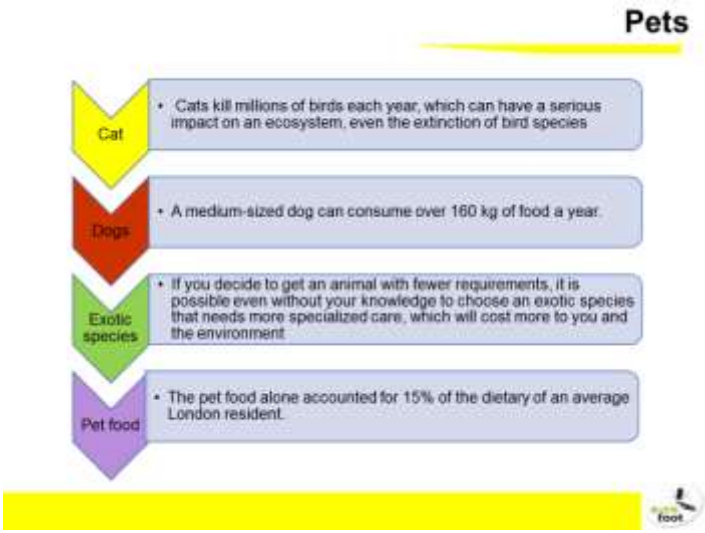
Because transport related to sports has a great Ecological Footprint, it would be good if athletes and spectators used public transport. Moreover, it would be good to prefer local spots for the water sports.

We can also rent equipment instead of buying it and in case it is not possible, buy eco-designed materials or products, which have obtained an environmental certification or label.

As far as sports facilities are concerned, legacy use (repair and usage of old stadiums), lightweight design of infrastructure or low impact temporary structure. For sports equipment, a sustainable product design that includes the entire life cycle of the product should be adopted.

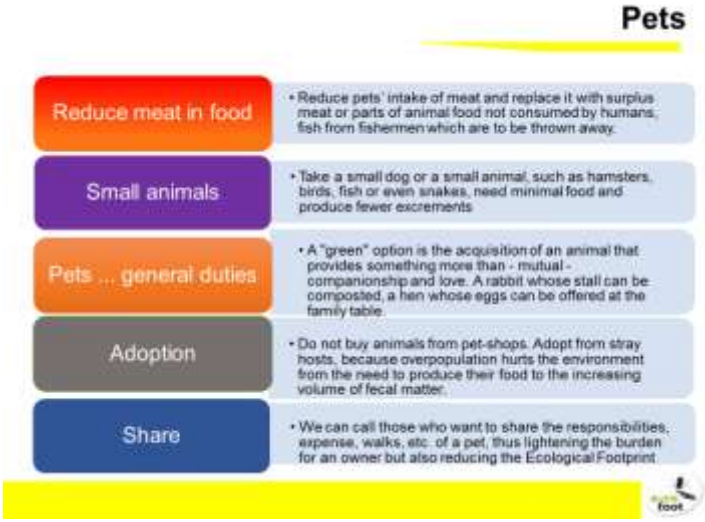
Movements such as Eco-Games, sustainable and unifying events with zero Ecological Footprint should be strengthened and disseminated. Also, initiatives such as the "Yellow Ball", which collects used tennis balls and turns them into tartan (rubber floor for mostly indoor sports fields) for stadiums should be extended to other sports equipment that can be turned it into something useful after their primary usage."

6. Focus on the Footprint of pets



Teacher: "The numbers of pets are enormous and have enormous environmental impact. Increased care of domestic animals also increases the demand for meat. The amount of pure meat that could also be consumed by humans and is used as pet food has grown considerably.
Meat production has a high Ecological Footprint, with the result that pets contribute greatly to climate change along with all other human activities. In addition, because dog and cat food tends to have more meat than average human diet, it means that dogs and cats consume about 25% of the total calories from animals in the United States. A medium-sized dog can consume more than 160 kg of food per year.
However, in some way, the pet food industry is relatively environmentally sound. The industry often uses surplus stocks from the people's food market, which would otherwise be disposed of in landfills or would be burnt. So, pet food reduces the waste and the environmental impact of the food market for humans. In addition, there is very little household litter from pet food - only 1% of pet food is discarded, compared with 30% of human food waste.

Smaller pets, such as hamsters (0.014 gha), canaries (0.007 gha) and goldfish (0.00034 gha), have a negligible impact on the environment.



Teacher: "Pets have been precious and essential companions for humans for many thousands of years. The big Footprint of pets is largely due to the kind of pets that people have (small pets or cats, dogs,

horses) and the way people feed them. However, despite the devastating environmental impact of our pets, fortunately there are solutions:

- First of all, people should reduce pets' intake of red meat and replace it with surplus meat or parts of animal food not consumed by humans, fish from fishermen which are to be thrown away. This is the most important measure to reduce the Ecological Footprint of pets (cats and dogs)!
- We can adopt rather than buy a pet. Many organizations host and/or breed at their premises kittens, puppies and other animals of all ages, which are given to those who are willing to take care of them. This helps to reduce their population, which means less need for arable land to produce food for the animals and fewer excreta. We can also make use of organic pet food: food that is all natural, free of chemicals and biodegradables and produced by processes that reduce pollution and harmful effects on the environment (no artificial fertilizer).
- Furthermore, the renouncement of a cat would also solve problems regarding the disposal of cat excrement. Unsupervised pet waste can contaminate our water ways, e.g. by cat litter containing toxoplasma. Whenever cats come out of the house, they kill butterflies, small birds or animals like mice and squirrels. Only in the state of Wisconsin, cats killed 39 million birds a year. This can have a serious impact on an ecosystem, even the extinction of bird species. For this reason, cat walks should be limited and controlled in areas with rich wildlife.
- A more environmentally friendly solution is the choice of animals with few requirements. Dogs and cats are not the only choices and certainly not the most "ecological". Other animals, such as hamsters, birds, fish or even snakes need little food, produce fewer excrements and are more frugal in their toys and accessories. But beware of exotic species that may need special care and environmental conditions. Choosing a small animal of our preference instead of a large one significantly reduces the Ecological Footprint as the requirements are smaller. We can also limit the number of pets to just one. Another alternative is the choice of an animal to offset the Footprint. For example, a hen can offer eggs. If trained, it can respond to calls and even enjoy the caresses of the owner!"

7. Focus on the Footprint of holidays

Teacher: "There are many things that individual travelers can do to reduce their personal holiday Footprint when they are planning a trip.

Travel transportation:

- Prefer to use the train, ship, or bus. Instead of flying to our destination, we should travel there by land based transport. This will not only reduce our Ecological Footprint significantly, but will also give us the opportunity to see some of the spectacular scenery that our journey has to offer.
- Avoid travelling by airplane because flights have the greatest impact on the environment as it is the main source of carbon emissions in our holiday Footprint. Long distance trips by airplane amount to not even 3% of all trips, but cause 17% of the harmful emissions connected to tourism. As carbon dioxide emissions in high altitudes intensify the greenhouse effect to a degree far greater than at ground level (the so-called RFI factor, Radiative Force Index), the impacts of air traffic on the climate are significantly bigger. Travelling by air has been growing in recent years due to low-price tickets offered by low cost airlines. This results in reduced use of trains, buses and cars even for relatively short distances.

Accommodation:

- Prefer small accommodations, or even try out camping with tents!
- Choose hotels which are certified with quality eco-label. Establishments awarded with eco-label certification meet a set of high environmental standards, such as environmental management, waste, energy and water management (washing and cleaning), ecological food and beverages, green activities and others.

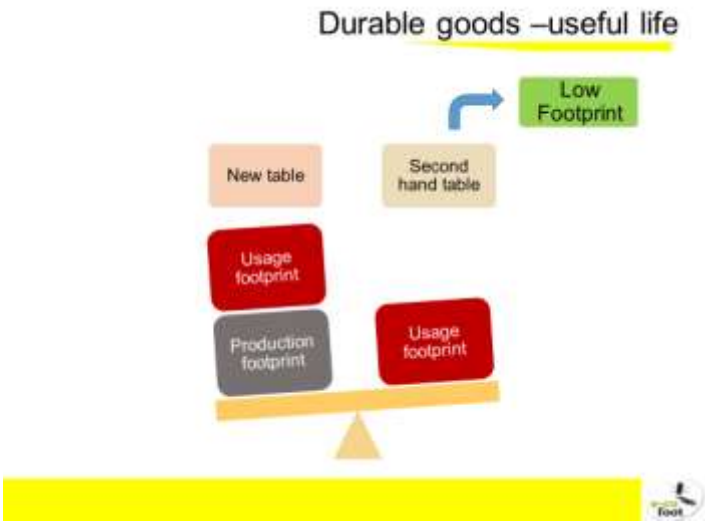
  An example of a quality eco-label Green Key
- Another conscientious action is to use bed sheets and towels for as long as possible, not asking for a daily change. Even better would be to take them from home. In this way, the hotel is burdened with less cloths to wash and iron. Every year, thousands of bed sheets and towels are washed with no reason in the hotels of the world and millions of litres of water and detergents are spent. This situation could improve with everyone's contribution.

Food & shopping: Prefer to eat in a tavern-restaurant serving local, organic or even vegetarian food. Shop at the local market, choose souvenirs or products of the nearby area, thus enhancing sustainable tourism that ensures that we minimize our Ecological Footprint while protecting local cultures and their economies.

Local travel – Excursions - Sports facilities:

- When you arrive at your destination, move around by public transport, boat and bicycle or on foot, something which allows you to enjoy the experience of travelling and the culture just as a local person.
- Prefer ecotourism which increases environmental awareness and sustainability, respects the environment and local communities.
- During your holiday, participate in volunteer programs about the environment, for example tree planting in areas of significant ecological value and in any kind of voluntary campaign related to the environmental protection.
- Avoid sports that consume a lot of energy or water, e.g. golf in arid environments or floodlit tennis. Prefer sports like running, mountain biking or beach volleyball instead.
- Avoid activities with off road vehicles (4x4), helicopters or small planes. Also avoid activities that have adverse effects on flora and fauna of the region (noise, excessive lighting, ruining nests)."

8. Durable goods – useful life?



Teacher: "A special challenge for durable goods is the "depreciation" of the Footprints. On closer inspection, the Footprint is, of course, generated in the year of construction (all resources and loads must be provided immediately!). However, full allocation makes little sense when it comes to personal allocation. When buying a table, for example, the first owner would have to carry the entire Footprint in the first year, the buyer of the used table will then no longer receive any. For this reason, the production Footprint is distributed pro rata over the years of use."

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Sources for all pictures can be found at the end of the PowerPoint slideshow.

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