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# BIODIVERSITY



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## 1. INTRODUCTION

### Debate topics

- Debate topic 1: Mowing too often should be prohibited in cities.
- Debate topic 2: It is better to keep bees in cities than in the countryside.
- Debate topic 3: Rosa rugosa should be destroyed in the wild.

### Definitions

**Biodiversity** is the variety and variability of life on Earth. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level.

**Extinction** is the termination of a kind of organism or of a group of kinds (taxon), usually a species

**An invasive species** is a species that is not native to a specific location (an introduced species), and that has a tendency to spread to a degree believed to cause damage to the environment, human economy and/or human health.

**An ecosystem** is a community of living organisms in conjunction with the nonliving components of their environment, interacting as a system.

### Introductory questions

1. Why is biodiversity so important and worthy of protection?
2. Why are so many species disappearing?
3. What or who threatens biodiversity in Estonia?

Look at the short video lecture:

<https://www.youtube.com/watch?v=dRSCsQOZKiw&t=1s>

## 2. INFORMATION CARD

### 1.1 Extinction

Most of the species which have ever lived on Earth are extinct and only a few of them are known to humans. What's more, even small share of those which currently inhabit the Earth – fewer than two million species – have been described. However, different estimates give the total number of species that inhabit the Earth as up to 10 million or, according to some researchers, as many as a billion. Unfortunately, most species die out before they become known to humans.

Species extinction is a natural phenomenon. Every year there are species which go extinct because they have reached the end of their life cycle. **But there is a process called a mass extinction, where in a short period of time more than 50% of species disappear.** In the last half a billion years, five such waves of extinction are known. The largest of these – the extinction at the end of the Permian era – took place 251 million years ago.

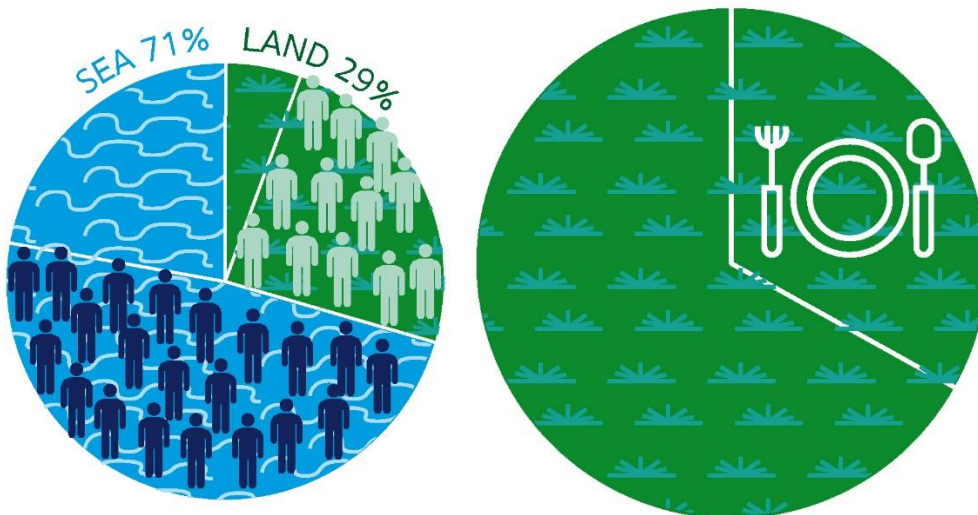
At that time, an escalation in volcanic activity, followed by a chain of disasters, is estimated to have wiped out 96% of marine species. Many have heard of the Chalk-Paleogene extinction of 65.5 million years ago, when three-quarters of species died, including the dinosaurs. An asteroid colliding with the Earth is considered to be the reason for this.

It is believed that the sixth wave of extinction has now begun. Evolutionary biologist Gerardo Ceballos's team has found that the extinction of species has accelerated more than 50-fold. This time the reason is human activity. We have arrived in the Anthropocene era – the age of man – where the main pressure on biodiversity is the loss of habitats due to excessive use of land and water resources, exploitation and direct destruction of species, environmental pollution, invasion of alien species and climate change.

## 1.2 Extinction of habitat

Man has reached every part of the world and has become the greatest threat to global biodiversity. Habitat destruction, transformation and fragmentation are caused by natural forests and grasslands being turned into agricultural land; the drainage of swamps; the construction of roads, cities and industrial centres; rivers being dammed for hydroelectric power plants; irrigation systems; disturbances to coral reefs; reckless fishing techniques; and much more.

**Figure 1 (left):** Three-quarters of the terrestrial environment and two-thirds of the marine environment are marked by strong human influence.

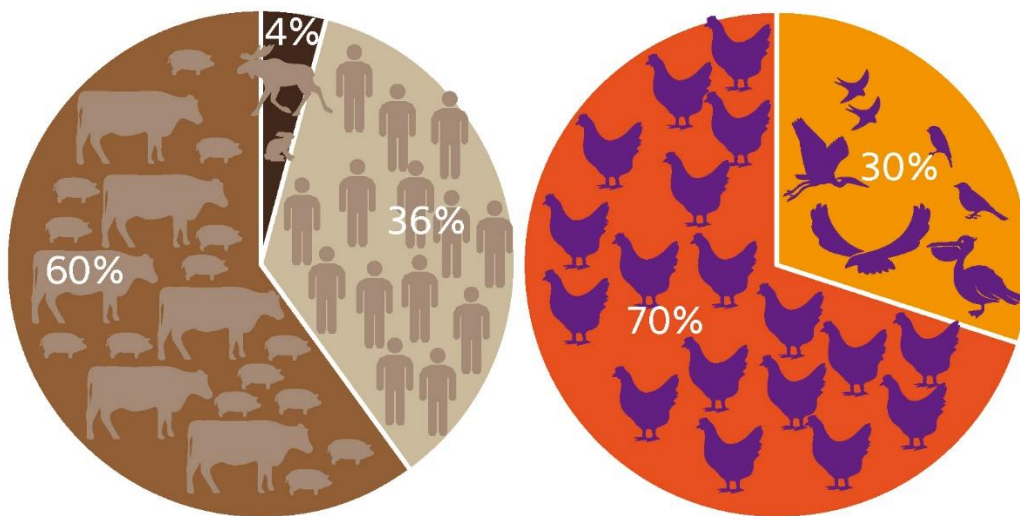


**Figure 2 (right):** One-third of land and three-quarters of freshwater resources are used for agriculture and livestock farming. Almost a quarter of all land has suffered a reduction in soil fertility.

### 1.3 The world of humans

Human activities have affected the world's biodiversity to such an extent that if current trends continue, there will be as many as one million species under threat, which is to say one in every eight species. For many of them, extinction can only be a matter of decades away. The UN biodiversity and ecosystem services IPBES report highlights that wildlife species abundance in terrestrial habitats have decreased by at least 20% over the last hundred years.

More than 40% of amphibian species, almost 33% of corals, more than a third of all marine mammals and 10% of insects are endangered. Since the 16th century, around 680 species of vertebrates have become extinct or endangered due to human activity, and more than 9% of the variety of domesticated breeds for food and agriculture has also declined.



**Humans and associated species have taken over the population on Earth.**

**Figure 1 (left):** Livestock comprises more than half of all mammalian biomass, while humans account for 36%. The share of wild animals is just 4%.

**Figure 2 (right):** Of all bird species, 30% are wild birds and 70% are poultry.

## 1.4 Threats to biodiversity in Estonia

The average level of threat to Estonian species is lower than the global average, but we also have species at high risk. To date, the status of around 14,000 species has been assessed, of which 6% are considered endangered and 3% close to being threatened. According to preliminary data, the situation is favourable for around half of the species.

A significant decline in biodiversity is mainly being seen in forests and meadows, but also in swamps. The extent of meadows in Estonia has fallen to just 5%. Forest management is also growing, resulting in poorer habitats. As a result, there are 60,000 fewer pairs of wild birds in Estonia's forests each year, while compared to 1980 there are as many as 25% fewer birds overall (Estonian Ornithological Society, 2017).

The abundance of other common species has also decreased. For example, there are still globeflowers and pussytoes, but finding and collecting them has become much more difficult.

Although forests cover more than half of Estonia, they are mainly managed by humans. Untouched or natural forests can only be considered to comprise around 2%. Nature reserves cover 18.8% of our land area, but this is lower than the European average (21%). And biodiversity must also be found in other areas that are not protected.

## 1.5 Alien species

Due to human activities, alien species have established themselves in habitats they would never otherwise have reached through natural means of transmission. The risk of introducing new species that are beneficial to humans is already known and we are aware of how to limit their spread. But the spread of alien species due to trade, transport, tourism and agriculture have become a global problem.

**Invasive species are alien species** which, with the help of people, whether intentionally or unintentionally, reach new habitats. These species do harm in a number of ways. They are a threat to habitats and to the abundance of native species and to food chains. Invasive species can be toxic to native species: among them are pathogens and parasites against which native species have no well-established defense mechanisms. Alien species can also alter the characteristics of an inanimate environment.

Alien species pose a threat not only to the natural environment but also to human activities. They can cause significant damage to agriculture, fisheries and tourism. They also include organisms that directly endanger humans. Every year, hundreds of new alien species arrive in Estonia with the help of humans. Most of them cannot survive in our conditions, nor do they form a threat to our nature. Around one-tenth adjust to their new circumstances and, of them, one-tenth in turn become invasive. As such, around one in every hundred species endangers the local biota.

New species are not always alien species: changed environmental conditions can lead to the natural spread of species to new areas. For example, **the jackal** recently arrived in Estonia.



## 1.6 The extinction of insects

It is believed that the reduction in insect abundance is even greater than that of vertebrate species. Unfortunately, this is trickier to assess: many insect species have yet to be described, insects are small and their numbers are difficult to estimate, and their abundance changes from year to year.

Australian scientists estimate that half of all insect species are abundant and that one-third are in danger of disappearing. While such conclusions are regarded as exaggerations by other scientists, the disappearance of insect species is nevertheless a reality. For example, in Flanders in Belgium, 30% of butterfly species disappeared during the 20th century, while in the UK, where insect monitoring has long been a tradition, more than 70% of butterfly species are in decline.

Amateur entomology enthusiasts from Krefeld in Germany have made a unique measurement of insect numbers. Since 1982 they have been collecting insects in 63 traps in exactly the same locations and in exactly the same way. All of these insects are retained, and the results are disheartening: in the last 30 years alone, the biomass of flying insects has decreased by 75%.

The main reason for the decline in insect species is environmental changes, such as forests being replaced by fields and cities, the rise in pollution and the use of insecticides in agriculture.

Insects make up almost two-thirds of all terrestrial species. They are a key source of food for vertebrates and are also major pollinators, of 75% of the plants we eat.

## 1.7 Urban nature

Cities and their numbers are growing around the world. **The United Nations estimates that half of the world's population is already living in cities, and that 70% will be doing so by 2050.** Urbanisation is particularly rapid in Asia and Africa, and this brings with its environmental problems. However, for decades now Western countries have been contributing to a cleaner and healthier urban environment.

Cities are often established in areas where the natural level of biodiversity is high; as such, many habitats disappear with the expansion of cities. And yet biodiversity in urban environments contributes to people's physical and mental well-being.

First and foremost, it is important to preserve what is already there, for example the meadows that are around Estonia's town and cities. Cemeteries, green areas and wasteland are also very diverse. It is important in-home gardens and green areas to avoid so-called 'impoverished' landscaping (e.g. lawns with thuja trees) and to ensure fewer paved surfaces. Green areas in urban nature are often dissected, which makes it difficult for insects to move around and find food. This is why every green area is important –even the edges of roads and scrubland.

By the way, the highest rate of biodiversity in Tallinn is found in Astangu, and more than 80% of protected bird species in Estonia can be found in Tallinn.

## 1.8 The problem with lawns

Botanist Aveliina Helm has compared mowed lawns to car parks in terms of their biodiversity. **Unfortunately, the rules in most local governments oblige lawns and grassy areas in all cities and municipalities to be mown to a height of no more than 15 cm.** These rules are slightly less restrictive in Rakvere and Viljandi, for example, where public spaces should be mown at least twice a year or as often as needed to maintain an aesthetically pleasing appearance. In addition, property owners are obliged to clean up fallen leaves.

Weekly mowing is only suitable for a few species, but in European countries there are many plants in nature that are used to being mown (or eaten) once or twice a year. These plants would enrich any garden, green area, grassland or meadow with life. Ordinary grass does not immediately become a flowering meadow, but at first some less used areas could be left unmown and other species could be sown.

The richness of species in home gardens can also be increased using mixed beds and through looser leaf clearing. For example, insects overwinter beneath fallen leaves and in spring the leaves can be composted. Leaves could be removed from the pathways or if diseases have damaged trees and shrubs.

So why are the rules so hostile to the environment? It is a matter of staying on track for a time. 20 years ago, untended gardens mostly meant landfill-like areas, but nowadays this is a rare phenomenon. In addition to mowing lawns, however, there are rules to ensure the safety of other city residents as well and every citizen can influence the decisions of their local governments.

## 1.9 Problems with the urban environment

Can there be problems with urban nature? What could anyone have against plants and animals? But it is a man-made environment, like a safe house into which nature brings uncontrollable savagery.

People's values often play a role in their perception of urban nature: birds and insects can seem unpleasant and frightening; parks can seem daunting at night. Changing the usual look of a city is not something most people find appealing.

However, there are also more rational problems, such as allergies to pollen or insect bites. Bird droppings damage buildings, while their nests block chimneys and vents. City foxes and other small carnivores and birds can spread diseases and carry and scatter garbage. In cemeteries, hares eat the flowers and plants left on graves – which is why, for example, the City of Helsinki orders hunters to hunt hares in city cemeteries.

Trees break up the ground and fallen branches and trunks threaten people, buildings and power lines. In the 1990s, when there was a lot of crime in Estonia, bushes in parks were cut back to avoid crimes being committed in their shadows.

However, with skilled urban planning, notification, ecological knowledge and proper landscape architecture, many of these problems may be avoided.

## 1.10 E-biodiversity

Estonia is an e-nation, and our biodiversity data are available online. The e-biodiversity portal (<https://elurikkus.ee>) brings together a number of biodiversity databases.

There you will find the Estonian atlas of the spread of plants, information on protected species and the nesting of birds, an all-Estonian marathon of nature observation results and more. All of these databases are located on the web platform PlutoF (in addition to the Ministry of the Environment's EELIS observation data) and are made available to the public.

E-biodiversity contains data on more than 29,000 species. In addition to specimens found in the wild, their condition, abundance, location and more, the portal also provides information on museum research collections and biobanks, research data, DNA observations and, for example, the nearly 10,000 herbarium sheets produced by Karl Ernst von Baer. Some data, such as those pertaining to exact habitats or nesting areas, may be classified.

The e-biodiversity databases are free to use, but should be referenced correctly. Estonian data are also available on the global biodiversity information GBIF portal ([www.gbif.org](http://www.gbif.org)).

## 1.11 The collapse of bees

At the beginning of this century there were reports from around the world that beehives were emptying overnight. Bees were simply disappearing: neither inside nor around the hives were there any dead insects. Sometimes only the queen was left in the hive with young workers. **This phenomenon came to be called ‘bee colony collapse’, ‘collapse syndrome’** and even ‘bee AIDS’. The highest number of such collapses has occurred in the USA, where in 2018 and 2019 some 40% of bee families died during the winter. However, 10-40% of bee colonies have perished in Europe as well. There are even areas where as many as 90% of hives have been left empty. The collapse of bee colonies has also occurred in Estonia, where families have disappeared, in particular shortly before the onset of winter.

The reasons for the collapse of bee colonies are not quite clear. It is believed that a bee family leaves when their hive is infected with viruses, bacteria or fungal mixtures. However, this is due to a decline in the resilience of the bees, which in turn has many complex causes, such as pesticides and other chemicals. Due to monocultural fields, bees are often actually hungry because they do not get food that is varied enough – in particular, they lack protein from different pollen. It is often a dry summer which precedes a collapse, in turn impoverishing the bees’ food options. In addition, exhaust gases and pesticides interfere with bees’ brain functions, which then affects them in searching for food. A lot of damage has also been done by varroa mite infestations.

Bees pollinate around a third of our food plants, and the value of this global ecological service is estimated at EUR 153 billion per year. In addition to honeybees, there are also wild bees which pollinate – and their numbers have also catastrophically decreased in places.

## 3. STORY CARD

### 2.1 The English lawn

The English lawn is the king of grasses - emerald green, dense and even. The lawn became a symbol of the aristocracy around the 16th century. Before the invention of lawn mowers in the 1830s, lawn care was enormously time-consuming and labour-intensive, so it could only be afforded by the wealthiest of nobles. A spacious lawn also showed that the landowner had an abundance of land: this area was not needed or actively used, for example, in food production.

A well-maintained lawn is still a status symbol and indicates that the owner is able to take care of it (or have their gardener do so). Such lawns have been beautifully planned and maintained for centuries, alternating grass with trees and flowers, which has also shaped people's sense of beauty.

So what is wrong with the English lawn? Unfortunately, in a biological sense it is like a desert. Only a few species are suited to grass, so only a few species grow in grass, which, moreover, can never bloom.

A decent English lawn should not be higher than a few centimetres. As such, soil piled up by earthworms is an unpleasant side effect, and the earthworms are poisoned (along with much of the rest of the soil). This in turn means that the lawn needs even more care, aeration and fertilisation, using a variety of pesticides, fungicides and insecticides.

## 2.2 Bosco verticale

In cities where every square meter is expensive and often already densely built upon, it is difficult to add greenery. Just as buildings strive for height, gardens, farms and even forests are now being built vertically. This is known as bosco verticale or 'vertical forest' after an apartment building in Milan of the same name.

Built in 2014, its two adjacent tower blocks feature balconies and terraces planted with 900 trees, 5000 bushes and 11,000 perennials. There are over 90 different species and they are meticulously chosen to withstand the wind gusts around the building, which stands 111 meters high.

The green building has also become a home to birds and insects. The apartment residents are happy to have a building with soothing greenery, and the temperature is much steadier and the air cleaner. Plants absorb carbon dioxide and produce oxygen, while also improving the city's overall carbon balance.

Bosco Verticale has received a number of architectural awards. Similar buildings are being constructed in other parts of the world, such as a complex with a vertical forest in Egypt.

Take a look of the video: [bit.ly/Bosco-Verticale-korterelamu](https://bit.ly/Bosco-Verticale-korterelamu)



## 2.3 Rosa rugosa

Although there are many wild rose hip species in Estonia, *Rosa rugosa* is the most prominent. Local species are modest (though similarly prickly) compared to *Rosa rugosa* with its shiny, dark green foliage and large, fragrant, pink flowers or bright red fruits.

*Rosa rugosa* originates from Eastern Asia. China and Japan have been cultivating it for thousands of years. It was introduced to Europe at the end of the 18th century and to Estonia in 1825. The vitamin-rich fruits of the rose hip plant taste great to many birds and animals, and so the seeds of the plant began to spread rapidly.

Rose hip fruits, or as we call them 'berries', are very rich in vitamins. In particular they contain a lot of vitamin C, and all rose hip varieties are valued medicinal plants. Their decorative value and resistance to frost, salts, droughts and pruning are the reasons why *Rosa rugosa* is popular in landscaping.

*Rosa rugosa* reproduces well with seeds and rootstocks and is a species resistant to our conditions. This is why it has established extensive shrubs in our coastal areas, where other plant species cannot grow. It is a dense, prickly rose bush which is impenetrable and difficult to border. In beach areas, *Rosa rugosa* bushes are earmarked for removal if they bother people. However, **Finland has decided that starting from 2023, *Rosa rugosa* may no longer be used in landscaping.**

## 2.4 The mink

The mink is a small predator with a dense coat and a flexible body. The habitat of the European mink once almost covered the Eurasian continent, but it is now one of the region's most endangered predators.

In Estonia, too, a hundred years ago, the mink was a common species which lived near streams and rivers and ate fish, frogs and insects. Unfortunately, many freshwater streams have dried up due to drainage systems, so proper food and living conditions for minks have vanished.

Due to their beautiful, dense fur, minks have also been subject to uncontrolled hunting. Fur was also the reason why the American mink was brought to European fur farms. The American mink is slightly larger and longer-lived than the European mink.

Animals which escaped from farms took over the few wild habitats of the European mink. A larger and stronger mink also mates with female European mink, but unfortunately there are no living offspring. This is how the European mink disappeared from our forests: the last wild mink died in 1996.

However, minks have not disappeared altogether from Estonia. The breeding centre for endangered species at Tallinn Zoo has kept and bred minks for decades, and a new mink population has been established on the isolated island of Hiiumaa. All of the American minks on Hiiumaa were hunted, and since 2000 more and more European minks have been brought to the island. The population is currently in good shape. Similar projects have been carried out elsewhere in the world.

## 2.5 Everyone is searching for cowslip

The Estonian Natural History Foundation and the University of Tartu's ethnography campaign 'Estonia is searching for cowslip!' won the main prize awarded to the best initiative in popularizing science by the Estonian Research Agency.

People were invited to join in to find and observe the flower types of cowslip, which is a model species from which conclusions can be drawn regarding other meadow plants. Cowslip also has two types of flowers, the proportions of which indicate whether the genetic diversity of the species is high enough. Almost 1700 observations were made in total, as part of which more than 200,000 flowers were observed. The data are being processed by scientists.

Searching for cowslip is a good example of amateur science, offering people the opportunity to participate in research. In the case of the natural sciences in particular, such amateur research plays a major role: it makes it possible to obtain extensive (observational) data, including data on environmental change. At the same time, participation is fun and generally quite simple. Estonia's largest amateur science project has been ongoing for 10 years, led by the Estonian Ornithological Society, which is winter garden bird-watching. It involves more than 2000 participants.

**Read more:** [www.nurmenukk.ee](http://www.nurmenukk.ee)



## 4. QUESTION CARDS

QUESTION CARD 1	QUESTION CARD 2	QUESTION CARD 3	QUESTION CARD 4
Can alien species be introduced into the wild? Under what conditions?	Is it better to live in the city or in the countryside in the future? Why?	Try to imagine a world without insects. Who could live in such a world and what he has to eat?	Can the lawn be mowed every week in the backyard? Under what conditions could this be done?
QUESTION CARD 5	QUESTION CARD 6	QUESTION CARD 7	QUESTION CARD 8
Maja Lunde's novel The History of Bees describes life without bees, so people have to climb up into the branches of fruit trees to pollinate the blossoms by hand. Could you find another way of pollinating fruit trees?	Do nature observations contribute to environmentally friendly behavior? How?	Nowadays people are more allergic to insect bites. What could be the reason for this?	Are ticks in the high grass endangering people? Why?



QUESTION CARD 9	QUESTION CARD 10	QUESTION CARD 11	QUESTION CARD 12
<p>Could there be more flower meadows in the cities? What plants could grow there?</p>	<p>Could the leaves be left unraked in the parks instead? Why?</p>	<p>Would you rather enjoy a beach holiday on a beach where the Rosa rugosa grows or not? Why?</p>	<p>Would it be a problem if large wild animals (i.e bear, wolf, elk) live in the cities? Why?</p>
QUESTION CARD 13	QUESTION CARD 14	QUESTION CARD 15	QUESTION CARD 16
<p>Is it possible to create a protected area for a species in the wild that is not inaccessible to alien species that threaten their live? Can you give examples?</p>	<p>The invasive alien species Sosnovsky's hogweed is dangerous and it is nationally repelled from 2006. For which reasons should some species be destroyed?</p>	<p>How is climate change affecting biodiversity in Estonia?</p>	<p>Why are rural areas sometimes more polluted than cities?</p>

## 5. WORKSHEETS

Topic
BIODIVERSITY
Resolution
Choose the debate resolution

Prepare a set of arguments and group them into those that are clearly PRO the resolution, AGAINST the resolution and those arguments that can be used by both sides. Enter them in the appropriate places in the table.

PRO	DEBATABLE	CON



Prepare arguments for the discussion. One group of students prepares arguments supporting the resolution, the other one has contradictory arguments. Use the proposed scheme.

**ARGUMENT NO. 1.**

Argument	Foreseen rebuttals of the other group	Answers to rebuttals

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## ARGUMENT NO. 2.

Argument	Foreseen rebuttals of the other group	Answers to rebuttals





## Worksheet for the public

Name and surname: ..... Class: ..... Team: proposition/opposition

During the debate, hear and observe carefully the speeches of the debates from the other team. Then, evaluate which speech convinced you the most and which areas of your opponents' speech should be improved.

1. In terms of **argumentation** (e.g. the quality of the arguments presented, credibility of the data and scientific evidence) in the rival team I was most convinced by the speaker No. ....

Reason:

.....  
.....  
.....

2. In terms of **the style of presentation and communication with the audience** (e.g. confident, persuasive, authentic and dynamic posture, moderate gestures, assertive voice variety, good eye contact with the audience, use of moderate humor, friendly and professional approach to all participants, effective use of body language) in the rival team I was most convinced by the speaker No. ....

Reason:

.....  
.....  
.....

Indicate the element of the rival team's performance that requires improvement. Justify your answer.

.....  
.....

Reason:

.....  
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.....



# Biodiversity

## Recommendations for teachers on using teaching materials

The educational package "Biodiversity" was developed within "Oxford debates for the education of young people in the field of mathematics and science" project.

It is a key material, facilitating the achievement of primary project goals, including increasing reasoning skills and interest in STEM, which in the future may result in taking up a scientific career.

When preparing students for the debate, one should not neglect the development of such skills as communication excellence, argumentation or public speaking. Students should improve their ability to persuade effectively, argue properly, reason accordingly and speak out correctly. Composition of texts, using rhetorical means in oral statements, speaking in accordance with the rules of language culture, text interpretation, public speaking and presentation of texts, discussions and negotiations are of equally high importance.

In order to achieve the abovementioned goals, the implementation of thematic educational packages should be preceded by classes dedicated to preparation for debating as such. This can be accomplished in consultation with teachers of other subjects and the class teacher. The development of basic communication skills can be included in the class teacher's work plan, and the prepared lesson plans can be used during regular classes. Auxiliary materials can be found in the following documents:

- Warm-up practice – [Frameworks for implementation of Oxford debates in STEM in school practice](#) ;  
This document includes the following exercises: active listening, public speaking and debating skills and lesson plans.
- [Methodological Guide for Teachers. ODYSSEY: Oxford Debates for Youths in Science Education](#)

### The teaching material pack includes the following:

- Student worksheet for drafting arguments,
- Information, story and question cards
- links to additional materials
- scientists' video.

Ideally, 2-3 hours should be taken per pack in order for the students to grasp the essentials of fact-based debating. The first lesson should focus on what debating entails (assuming that the



students have no experience of it). The second lesson should make use of the materials in one of the themed packs. For the second lesson there are two possible lesson plans - A) can be used if the students are already well familiar with the topic and/or debating, B) is more structured and better from starting from the very beginning. The third lesson should then include an actual debate. If you don't have enough time to give feedback on the debate during the lesson, you can do so during the following lesson.

Albeit the environmental topics within the materials are covered quite broadly, depending on your region you might need to give your student some additional information (links to newspapers, homepages, videos) regarding your own locally relevant topics. For example, the invasive species for biodiversity package in your region might be completely different or perhaps the energy can be produced by means other than the ones that have been covered in the materials (perhaps instead of oil shale in your region geothermal energy, oil or coal plays an important role).

Below you will find lesson plans you can use, adapting them to your group and your particular aims. Once the debates have been held, we look forward to your feedback on the themed packs and other materials. Enjoy some lively debating!

## Lesson Plan 1: Introduction to Debating

During the first lesson, the students are introduced to the format of debates. We recommend that you practise drafting arguments and thinking about likely counter-arguments and how to rebut them. The student worksheet included in the pack will be of help.

### Lesson aims:

By the end of the lesson, the students know:

- what debating is; and
- what an argument is.

By the end of the lesson, the students understand:

- how a debate is structured.

By the end of the lesson, the students are capable of:

- drafting, supporting and rebutting arguments.

### Lesson preparation:

- Remind yourself of what you learnt during your debate training.
- Print out the student worksheets.
- If you wish to, laminate the worksheets (so that they can be re-used if the students write on them with felt-tips).



## Lesson Plan 2, Option A: An Introduction to Biodiversity

For the second lesson you can prepare the materials of biodiversity. Remind the students of what they have learned so far in regard to them, explain the key terms and their definitions and set out the problem. You could also have the students watch the scientist's video lecture that forms part of the teaching materials. Look at the information, story and question cards together, which you will also find among the teaching materials. Point out that the students can use these cards, as well as their own notes, during the debate. You don't need to discuss the actual topic yet – simply provide an overview of the themed pack. At the end of the lesson, choose a specific topic for debate to continue with in the following lesson. As a home task, get the students to search for extra information. Links can also be added as part of the additional information for the topic in the e-school for them to investigate.

### Lesson aims:

By the end of the lesson, the students know:

- the key terms associated with the topic and their definitions; and
- the nature of and background to the problems.

By the end of the lesson, the students understand:

- the structure and use of the materials in the themed pack.

By the end of the lesson, the students are capable of:

- navigating their way through the materials in the themed pack.

### Lesson preparation:

- Prepare the video lecture (which you will find among the teaching materials).
- Print out the relevant information, story and question cards and cut them to size as indicated.
- Add links for the given topic to the e-school for the students to investigate at home.

## Lesson Plan 2, Option B: An Introduction to Biodiversity

Divide the class up into groups of three, who are then given topics for debate. Note: Keep one topic of debate as a spare – don't give it to the students.

### Activities prior to preparing for the second lesson (i.e. up to the home task):

Distribute the information and story cards among the students so that each group has one of each. Depending on the age of the students, familiarity with the topic etc you can decide on if



you a) give each group all the cards; b) decide to divide the cards between the groups; or c) give each group just a specific selection of cards. You as the teacher know your student's abilities the best. Depending on your students you can have them work on the cards as a group by discussing all the cards together (this is preferred) or even have them divide the cards between them.

The links provided in the additional material should also be made available to the students online ahead of the lesson. Get the students to familiarise themselves with the topic on their cards. Set them the following task:

*On your own, read your information and story cards. Read them through first, then take a look at some of the sources listed in the additional materials (such as watching a video or reading an article). Then note down the following about the card:*

- *What are the 2-4 most important facts on the card?*
- *Look at the topic of debate given to your group. Decide whether the facts you have noted down support the topic or rebut it.*

#### **During the lesson:**

Have the students sit in their groups. Give each student two minutes to introduce to their group their card and the facts listed on it. Here, the students need to explain to the other members of their group what decision they came to regarding the facts, i.e. whether the facts support the topic or rebut it.

Remind the whole class what they have learned so far about the themed pack, repeat the key terms and their definitions and help the students link the information from their cards to the information they have obtained from the other members of their group. If needed use the "worksheet for the public" in the end of student's thematic packages where other students who listen to the debate can evaluate which speech convinced them the most.

[Watch the scientist's video lecture](#) (or other videos among the teaching materials that seemed the most interesting to the students) during the lesson.

By this point, the class should be quite familiar with the topic. Use the question cards to repeat what they have already learned from the information and story cards. Ask the students questions and let them take a standpoint in regard to them. If the classroom space allows, you can even do this physically – for example, dividing the room in two using tape on the floor, with one side being 'Yes' and the other side being 'No', and having the students choose one or the other depending on their standpoint. Give all of the students on the same side of the line 30 seconds to decide what their main argument is and why they think so.

Also take a couple of minutes to discuss whether the topic seems straightforward or complicated to them, giving them the chance to air their views and argue over them. Allow them the opportunity to say what the most interesting thing they have learned during the lesson is.





At the end of the lesson, inform the students what the topic of debate for the next lesson will be (i.e. the one you previously held back as a spare). Point out that the students can use the cards they looked at in the lesson, as well as their own notes, during the debate. Ask the students to start working on worksheet 1 and worksheet 2, so they can try to create the arguments, rebuttals and answers. At this point they can try it out for themselves and you can support them as they find out what is most difficult for them.

As a home task, get the students to search for extra information. Links can again be added as part of the additional information for the topic in the e-school for them to investigate. The students should finalize the worksheets as groups as a home task (away from other groups that could otherwise hear their arguments).

### Lesson aims:

By the end of the lesson, the students know:

- the key terms associated with the topic and their definitions; and
- the nature of and background to the problems.

By the end of the lesson, the students understand:

- the structure and use of the materials in the themed pack.

By the end of the lesson, the students are capable of:

- navigating their way through the materials in the themed pack.

### Lesson preparation:

- Select the themed pack to investigate.
- Print out the relevant information, story and question cards and cut them to size as indicated.
- Put together three-member groups.
- Distribute the topics of debate among the groups. Note: Keep one topic as a spare.
- Distribute the cards within the groups.
- Add links for the given topic to the e-school for the students to investigate at home.

## Lesson Plan 3: debate on „Mowing too often should be prohibited in cities. “

The third lesson sees the students start debating. Randomly divide the students up into ‘Yes’ and ‘No’ camps. You can use the information, story and question cards and the students’ own





notes on the student worksheet as supporting material. The duration of the Odyssey debate class format is 45 minutes, but factor in the time it will take to give feedback (giving it in the following lesson if possible). You can get the rest of the class involved in assessing the performance of individual debaters by getting the students to listen to them carefully and make notes during the debate. Worksheet 1 and Worksheet 2 are for the help for the teacher.

### **Lesson aims:**

By the end of the lesson, the students understand:

- how a debate is structured; and
- their role in the debate.

By the end of the lesson, the students are capable of:

- applying topic-appropriate knowledge in a debate format;
- expressing themselves clearly and comprehensibly (including in terms of their diction);
- predicting counter-arguments; and
- supporting their own arguments and rebutting others.

### **Lesson preparation:**

- Set up the classroom for the debate, rearranging the desks and chairs as necessary.
- Prepare the required information, story and question cards (using ones that have not already been used if possible, or printing out new ones).
- Prepare the student worksheets (using ones that have not already been used if possible, or printing out new ones).





## WORKSHEET NO 1 – answers

PRO	GREY AREA	CON
<p><b>Could there be more flower meadows in the cities? What plants could grow there?</b></p> <p>Many urban green areas could be mowed only once or twice a year. If the right techniques and plants are used to create such a meadow, the result will be beautiful and biologically diverse. The variety of the grown plants in a flower meadow depends on the soil - in drier areas, for example, yarrow, mayweed and bells, in wetter areas, daisies, buttercups, white clover. Different grasses would also belong to such biological communities.</p>	<p><b>Can the lawn be mowed every week in the backyard? Under what conditions could this be done?</b></p> <p>So, and so.</p> <p>Unfortunately, a home garden designed only as an even lawn is not rich in life. At the same time, there is a need for areas in the home garden where you can walk more, play ball or barbeque. Areas assigned for these activities cannot be very natural. Thus, there may be different areas in a home garden – some, where the lawn is constantly mowed, and others, more natural areas that can include shady shrubs, mixed vegetable and flower beds, or a flower meadow, rich in different types of grasses and flowering plants.</p>	<p><b>Are the ticks in tall grass a danger to people? Why?</b></p> <p>Many people are afraid of walking in tall grass because of the risk of undesired encounters with various insects. This is not an unfounded fear, really, as ticks lurk in the grass. Ticks spread dangerous illnesses such as encephalitis and borreliosis, which can lead to problems with the nervous system. While the incidence of encephalitis has decreased due to the availability of a vaccine, the incidence of borreliosis remains high.</p>





## WORKSHEET NO 2 – examples of argument

ARGUMENT	FORESEEN REBUTTALS OF THE OTHER GROUP	ANSWERS TO REBUTTALS
<p>Mowing too often in urban areas must be banned, as it reduces biodiversity. Although evenly mowed lawns look aesthetically pleasing to many, doing so impoverishes the vegetation and causes habitat loss for birds, insects, and small mammals. Biodiversity has also been shown to be an important indicator of people's quality of life, providing an opportunity for relaxation and peace of mind, as well as important ecosystem services such as improving air quality, reducing noise, and cooling the city. Consequently, the existence of biologically diverse areas within cities must be ensured and this can be supported by reducing the frequency of mowing.</p>	<p>Unmowed lawns and tall grasses in the urban areas are a favourable habitat for various insects, including ticks. Ticks can transmit diseases that are dangerous to humans, such as encephalitis or borreliosis. Reducing mowing in the urban environment increases the risk of tick bites and the spread of dangerous diseases.</p>	<p>The risk of ticks can be reduced by regular checking after walking in tall grass, using a tick repellent, or vaccinating against encephalitis.</p> <p>Insects make up almost 2/3 of all terrestrial species. They are the food base for many vertebrate species and main pollinators, covering 75% of the edible plants. Therefore, the unmown areas are of importance for both insects and humans. We need to be more careful about insects and ticks.</p>
	<p>The mowing to maintain the aesthetic appearance of the urban environments must be continued and reduce the growth of various flowering plants that cause allergies to many people.</p>	<p>It is almost impossible to avoid pollen allergies as something is blooming most of the time. Therefore, allergies cannot be the reason to continue frequent mowing and thus reduce urban biodiversity.</p>