

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ «ЧЕРНІГІВСЬКА ПОЛІТЕХНІКА»

## **FORESTRY**

**Методичні вказівки з англійської мови  
для студентів ОКР «Магістр»  
спеціальності 205 «Лісове господарство»**

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## ВСТУП

Методичні вказівки з англійської мови призначені для практичної та самостійної роботи студентів ОКР «Магістр» спеціальності 205 «Лісове господарство».

Методичні вказівки розроблено відповідно до програми підготовки магістрів спеціальності 205 «Лісове господарство». Запропоновані матеріали спрямовані на вивчення тем, що стосуються управління лісовими ресурсами, стратифікації лісу, деревостану та його відновлення, факторів пошкодження лісових насаджень, видів деревини, її характеристики та обробки, захисту лісового біорізноманіття тощо. Кожний урок передбачає опрацювання теми з фаху і містить текст, різноманітні вправи, спрямовані на закріплення лексичного матеріалу та розширення словникового запасу, завдання для розвитку мовленнєвих умінь та навичок. Запропоновані завдання множинного вибору, на визначення правильності/неправильності твердження, на заповнення пропусків, на зіставлення або встановлення відповідності, написання доповідей, анотацій на основі текстів та аудіовізуальних матеріалів можна виконувати як на практичному занятті, так і самостійно. Правильність виконання вправ та завдань та сформованість комунікативних умінь може оцінюватися викладачем на практичних заняттях, консультаціях або дистанційно із залученням університетської платформи Moodle.

Принцип добору та подачі завдань, від найпростіших до більш складних, дозволяє студентам вдосконалювати професійно-орієнтовану іншомовну комунікативну компетентність, залучати креативне мислення та різноманітні навчальні стратегії.

## Unit 1 Forest management

### Lead-in:

Can you explain the term “forest management”?

What forest management methods are used in Ukraine?

### 1. Read the text and answer the questions:

1. What does the term “forest management” refer to?
2. What is the recommended age of regeneration for conifer and broadleaf stands?
3. Why can trees be regenerated earlier?
4. Why are old conifers and decaying trees left standing on areas marked for regeneration?
5. Why is site preparation vital for successful forest regeneration?
6. What methods are used to adjust tree species ratios?
7. What is a role of drainage and fertilization when maintaining the health of the forest?

The concept of forest management has recently taken on a wider meaning. Today, it refers increasingly to management of the entire forest environment. The methods used in wood production take environmental factors into account at all stages of the wood growing process. Decisions taken at the forest regeneration stage have the most far reaching effects in terms of wood production and environmental management.

*Forest regeneration.* Forest regeneration is part of the sustainable use of forest resources. It is recommended that conifer stands be regenerated at the age of 60-120 years or at the age of 80-160 years, depending on growth site. For birch, the recommended age is 60-80 years. Stands can be regenerated earlier if the trees are sufficiently mature.

In most cases, the purpose of regeneration is to produce mixed forest in which the dominant species is either pine or spruce together with some birch. Extremely barren forest soils, on which broadleaved trees do not grow well, are an exception, and such areas are therefore exclusively coniferous forest. Aspen, sallow, and other deciduous trees, old conifers and decaying trees are left standing on areas marked for regeneration to provide habitats for threatened species and to enhance the landscape. Marshy areas, the banks of streams, rocky outcrops and other special features are left completely alone.

The choice of dominant tree species and regeneration method depends mainly on the type of soil and how fertile the area is. On barren growth sites, first consideration is given to natural regeneration, because this is the easiest and cheapest method – when it succeeds. If seedlings fail to spring up, restocking will be needed, including grass control and cleaning, operations that are both laborious and expensive.

In Ukraine, roughly 60 per cent of areas regenerated are dominated by pine, the remainder by spruce or birch. The proportion of spruce and birch has grown recently

at the expense of pine, and this trend is continuing. About a third of the area regenerated with pine is naturally regenerated. Spruce forest, on the other hand, is regenerated largely by planting, as natural regeneration has produced poor results. In northern Ukraine, conditions are more favourable than in the south, with the result that pine is more common in the north.

Planting density has been reduced in recent years, the idea being to cut regeneration costs by making more use of naturally regenerated and broadleaf and conifer seedlings. The recommended densities are 2,000 seedlings per hectare for pine, 1,400-1,800 for spruce and 1,200-1,600 for birch. Most of these are still planted manually.

Site preparation is vital for successful regeneration. On mineral soils, scraping away patches of surface vegetation improves seedling survival and promotes the growth of natural seedlings, particularly birch in mixed forest. Soil preparation methods have been made less aggressive to the terrain in recent years. Forest ploughing, for example, is being phased out. Today, some two-thirds of forest land is prepared by scarifying or scalping and the rest mounded by tractor digger or excavator. Interest in controlled burning is reawakening, but this method is little practised at present. In Ukraine, the areas regenerated are small: the average size is under two hectares and areas over 10 hectares are rare. Regeneration in small units is appropriate as modern timber harvesting and regeneration methods do not require large operating areas.

*Management of young stands.* Cleaning and thinning are used to adjust tree species ratios while stands are still young. Bushes, undergrowth and unwanted trees are cleared to allow the dominant species to grow properly.

The guidelines for tending young stands have been revised in recent years, particularly with a view to achieving mixed stands containing broadleaved trees and to delaying the final treatment of the young stand. The presence of broadleaved trees in a mixed young stand improves soil characteristics, reduces damage and increases the biodiversity of the stand. Broadleaved trees also help to improve the quality of conifers, notably pine, by suppressing the growth of branches. Young stands usually need tending once or twice during the 15 or so years of the juvenile stage. When tended for the final time, some trees are removed to give a density of 1,600-2,000 trees per hectare (depending on the species) in preparation for the first thinning cutting.

Young stands are cleared with a clearing saw, as herbicides are little used in forests today. Recovery of wood for fuel during the final tending of a young stand has started to arouse interest; this would also improve opportunities for mechanizing the process of managing stands.

*Thinning.* Thinning removes diseased and poor quality trees, thus providing more space for the best trees to grow. Depending on the site conditions and tree species, thinning is carried out 1-3 times during a rotation. Thinning is now performed less frequently than before in order to make the operation more economic and to reduce damage to standing trees.

The first thinning is carried out 30-35 years after regeneration, when the trees are 12-14 metres high. The stand density is reduced to around 1,000 stems per hectare. Considerably more first thinnings need to be carried out than at present. Neglecting to carry out first thinning significantly erodes the profitability of wood production. In later thinnings, the number of stems is reduced to 450-550.

*Drainage and fertilization.* The large scale drainage of peat land forests has now virtually stopped. However, the drains must be kept open to ensure that forests continue to grow on this peat land. Drain cleaning is needed every 20 years or so, and most of the areas drained are now in need of attention. Information obtained from drainage has led to a revision of forest drainage practice, and as a result some of the peat lands drained in the most barren areas are now being allowed to return to their natural state. The new guidelines for water pollution control drawn up by the environmental authorities, the forest industry and forestry organizations are being used in work to restore drains.

The amounts of fertilizer spread on forest land have fallen sharply in the last 10 years. Rather than being employed to increase wood yields, fertilizer is now being used increasingly to maintain a nutrient balance and to maintain the health of the forest.

## 2. Study the professional vocabulary:

forest regeneration	регенерація (відновлення) лісових насаджень
sustainable use of forest resources	стале використання лісових ресурсів
barren forest soils	безплідні лісові ґрунти
threatened species	види, що знаходяться під загрозою зникнення
marshy areas	заболочені території
to scrape away patches	вичистити ділянки лісу
planting density	щільність насаджень
thinning	проріджування насаджень
clearing saw	просічна пила
to suppress the growth of branches	пригнічувати ріст гілок
to erode the profitability of wood production	погіршувати рентабельність виробництва деревини
peat land forests	ліси, що ростуть на торфовищах
drainage	дренаж, осушення
to increase wood yields	збільшувати врожайність деревини
to maintain a nutrient balance	підтримувати баланс поживних речовин
to maintain the health of the forest	піклуватися про здоров'я лісу

## 3. Complete the sentences:

1. Forest management refers increasingly to management of ... .

2. Forest regeneration is part of the sustainable use of ... .
3. Extremely barren forest soils are areas where exclusively ... grow.
4. The choice of dominant tree species and regeneration method depends mainly on the type of ... and how ... the area is.
5. The easiest and cheapest method which is used for barren growth sites is ... .
6. Spruce forest is regenerated largely by ..., as natural regeneration has produced ... results.
7. On mineral soils, scraping away patches of surface vegetation improves ... and promotes the growth of natural seedlings in ... forest.
8. Bushes, undergrowth and unwanted trees are cleared to allow ... to grow properly.
9. The drainage of ... forests must be kept open to ensure that forests continue to grow.
10. Fertilizer is now being used not only to increase ..., but also to maintain ... and to maintain ... of the forest.

**4. Find in the text English equivalents for the following expressions. Make your sentences:**

управління лісовими ресурсами, навколишнє середовище, відновлення лісу, стаке використання лісових ресурсів, хвойні насадження, мішаний ліс, домінуючий вид, безплідні лісові ґрунти, широколисті дерева, покращити ландшафт, заболочені території, природна регенерація, прибирання трави, трудомісткі та дорогі операції, штучне насадження, щільність насадження дерев, саджанці, оранка лісу, метод скарифікації, сучасні способи заготівлі деревини, проріджування молодих насаджень, біорізноманіття насаджень, просічна пилка, видалення хворих та неякісних дерев, нехтування, погіршувати рентабельність виробництва деревини, осушення торфовищ, добрива, збільшення врожаю деревини, баланс поживних речовин.

**5. Read the text and fill in the gaps with following words. You have two extra words you do not need to use: *saw timber, increases, dominant, thinning, elimination, little, intermediate, stumps, stands, density, crown, codominant, overtopped, big.***

There are four basic methods of 1...:

- mechanical, which is typically applied in young 2... that are densely crowded or relatively uniform with little differentiation into crown classes, and becomes less suitable when variation in the size and quality of the trees 3...;
- low, which accelerates and simulates somewhat the natural 4... of the lower crown classes through competition;
- crown, which is recommended to develop and manage quality hardwood stands for the production of high value 5... and veneer logs;
- free, which is the removal of trees to control stand 6....

The four crown classes are used to help differentiate these methods and to guide tree selection during operations. Stand conditions and needs vary over time, often resulting in the application of more than one method over a stand's rotation.



7... trees have crowns extending above the general level of the 8... cover, and receive full light from above and partly from the side. They are larger than the average trees in the stand, and have well-developed crowns that may be somewhat crowded from the sides. 9... trees have crowns forming the general level of the crown cover, and receive full light from above but comparatively 10... from the sides. These trees usually have medium-sized crowns that are often crowded on the sides. 11... trees are shorter than others, but have crowns extending into the crown cover formed by bigger trees. They receive a little direct light from above, but none from the sides. They usually have small crowns that are considerably crowded on the sides. 12..., also called suppressed, are trees with crowns entirely below the general level of the crown cover and don't receive direct light either from above or from the sides.

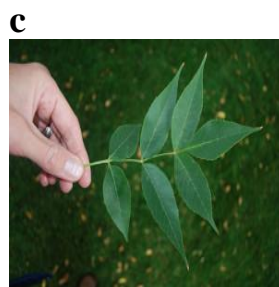
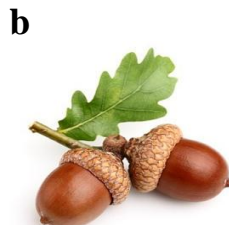
**6. Watch the video “Tree thinning: selecting trees to extract”.**  
[https://www.youtube.com/watch?v=Hj\\_S1A6rqXU](https://www.youtube.com/watch?v=Hj_S1A6rqXU)

With your partner discuss why trees need to be thinned. Explain how to select the trees to be cut down, mark them, and remove them using a standing sale. Make a list of tree species and instruments that are mentioned in the video.

**7. Read the text. Are these beliefs and superstitions different from Ukrainian ones? Match trees mentioned in the text with pictures below.**

**British myths, beliefs and superstitions about trees**

1. It is said that aspens tremble because the trees are ashamed of the fact that their wood was used to make the cross on which Christ was crucified.
2. It was believed that in order to stay young you should carry an acorn around with you.
3. Rowan wood was used to make babies' cradles because it was supposed to protect babies against magic spells and different forms of witchcraft.
4. Throwing pips of the crab apple into a fire can tell you whether you are truly loved. If they explode the answer is 'yes', if they don't, don't worry you will find true love some other time!
5. A woman who wants to meet her future husband soon should put an ash leaf in her left shoe.



**8. Speak on basic ways of forest management in Ukraine.**

## Unit 2 Forest stratification

### Lead-in

Can you explain the term 'forest stratification'?

How many layers are there usually in forests?

What are these layers composed of?

### 1. Read the text and answer the questions.

1. What does the term 'forest stratification' refer to?
2. What roles do lichens and fungi play in forests?
3. What layers do forests consist of?
4. What is each layer made up of?
5. What factors can modify the number of layers?

The term 'forest stratification' refers to various strata or layers of forests. The soil in forests is covered with organic matter, such as fallen leaves, twigs, branches, remnants of dead animals in different stages of decomposition. This layer, called litter, is also a home for bacteria, fungi, earthworms and other organisms which can quicken the decomposition process releasing nutrients and making them available for plants again.

The next layer is composed of lichens, fungi (including mushrooms) and short plants such as mosses, ferns, herbaceous plants (which can be annual, biennial or perennial) and seedlings of trees and bushes. Lichens are particularly useful for foresters because they indicate the level of pollution – when it is too high they are simply not present. Other interesting organisms occupying this layer are fungi. They play different roles in forests. On the one hand, fungi can be harmful and cause diseases, on the other, beneficial acting as decomposers or forming symbiotic relationships with some tree roots (mycorrhiza). Apart from lichens and fungi, this layer includes some well-known plants such as: wild strawberry (*Fragaria vesca*), bilberry (*Vaccinium myrtillus*), lily of the valley (*Convallaria majalis*) or asarabacca (*Asarum europaeum*).

Bushes form the next forest stratum. This layer is represented by such plants as:

blackthorn (*Prunus spinosa*), hawthorn (*Crataegus* sp.), alder buckthorn (*Frangula alnus*), juniper (*Juniperus communis*) and hazel (*Corylus avellana*), to mention but a few.

The last two layers comprise trees only: young ones known as saplings and higher ones which create the forest canopy.

The above-mentioned classification consisting of litter and three to four layers of vegetation is a very general one because the number of layers and the way they look may vary considerably. The differences may be caused by several factors such as stand age, soil type and climate conditions determining the growth of particular species. For instance, even a layman knows that coniferous forest floors, e.g. spruce ones, do not look like deciduous ones and beech ones can be recognised immediately

due to the fact that the leaves take a long time to decompose and hamper development in the ground layer.

**2. Look through the text and find the words that mean:**

- 1) the action of decaying;
- 2) a surface layer on the forest floor consisting of freshly fallen or slightly decomposed plant parts;
- 3) various types of organisms that get their food from decaying material or other lining things;
- 4) a plant-like organism that grows on trees, rocks, etc.;
- 5) a plant with long stems, leaves like feathers, and no flowers;
- 6) a young tree;
- 7) the uppermost branches of the trees in a forest, forming a more or less continuous layer of foliage.

**3. Match the following words with the pictures:**

*moss, bush, alder buckthorn, hawthorn, blackthorn, lichen, fern, fungi, sapling, bilberry, hazel, mycorrhiza*

1



2



3



4



5



6



7



8



9



10

11

12



#### 4. Give Ukrainian equivalents of the following words:

temperate forests, forest stratification, forest layer/stratum, organic matter, twigs, branches, decomposition, nutrients, moss, lichen, fungus, fern, herbaceous, annual, biennial, perennial, earthworm, seedlings, mycorrhiza, bilberry, wild strawberry, lily of the valley, asarabacca, blackthorn, hawthorn, alder buckthorn, juniper, hazel, sapling, canopy, stand, coniferous, deciduous, beech.

#### 5. Complete the sentences:

1. The soil in forests is covered with...
2. Forest litter is a home for...
3. Lichens are particularly useful for foresters because...
4. On the one hand, fungi can be harmful and cause diseases, on the other, beneficial acting as...
5. Coniferous forest floors can be recognised immediately due to the fact that...

#### 6. Match the sentence halves.

1. The forest floor is often blanketed with
  2. Fungi insects, bacteria, and earthworms are among the many organisms
  3. The herb layer of the forest is dominated by herbaceous (or soft-stemmed) plants such as
  4. The shrub layer is characterized by woody vegetation
  5. The understory of a forest consists of immature trees and small trees
  6. The canopy is the layer
  7. Emergents are trees
- a) that are shorter than the main canopy level of the tree.  
b) whose crowns emerge above the rest of the canopy.  
c) that grows relatively close to the ground.  
d) where the crowns of most of the forest's trees meet and form a thick layer.  
e) decaying leaves, twigs, fallen trees, animal scat, moss, and other detritus.  
f) that break down waste materials and ready them for reuse and recycling throughout the forest system.  
g) grasses, ferns, wildflowers, and other ground covers.

#### 7. Read the text and complete it with the words from the box.

ferns concentration shrubs branch-free decaying layers nutrients
--

annual canopy food tops relationships snakes decomposition sunlight thickness mosquitoes roof ground moss branches insects
---

Despite the variability of our planet's forests, there are some basic structural characteristics that many forests share. Mature forests often have several distinct vertical 1) ... . These include: emergent layer, 2) ..., understory, forest floor.

The emergent layer is made up of the tallest trees, spaced out, usually with straight 3) ... trunks with a crown on the tops. Trees here are in constant 4) ....

The canopy is made up of the 5) ... of trees. These tree tops form a 6) ... that blocks a good deal lot of light from entering the layers below it. The canopy is the layer with the highest 7) ... of plant and animal life. There are millions of 8) ... and animals in this layer as they have enough 9) ... to keep them there. Visibility is low because of the 10) ... of leaves and network of 11) ....

The understory has fewer trees, but lots of 12) ... and small trees. The area is made up of roots from taller trees, climbing plants, 13) ... and branches extending downwards. There is very little sunlight here with lots of fungi, 14) ..., mold and mildew on the leaves and trunks. This layer is home to a large number of insects, frogs, 15) ..., beetles, butterflies and termites. The wet, humid and dark nature of this layer makes it an ideal home for 16) ... and bugs.

The forest floor is the 17) ... level of the structure. It has soils with micro-organisms and life-forms feeding on 18) ... matter on the floor. The moist, dark conditions aid 19) ... of organic matter and 20) ... are quickly absorbed by the trees and other plants on them. There is very little light here.

**8. Choose the correct phrase from the list below to fill each gap in the text. There is one extra phrase which does not fit at all.**

The temperate forest layers are different levels of plants that live at different heights within the forest itself. There are five main layers of the temperate forest, including the canopy or 1) .... The forest is divided vertically into these different layers.

There are many different types of forest found throughout the world. The main forests are the temperate forests, boreal forests, and rainforests. All of these forests vary in terms of 2) .... But, they also vary in terms of how many layers they have. A rainforest has four main layers, but a temperate forest has five main layers.

**The Temperate Forest Layers**

**Tree Layer/Stratum Or Canopy** – This layer goes by various names, but they all mean the same thing. This is the highest level of the forest and consists of 3) ....

The trees are all reaching up towards the sun and competing with each other to 4) ... to live and grow. In a mature forest, the canopy can be very thick with leaves, 5) ... from the ground.

Each successive layer down in the forest receives less sunlight.

**Small Tree or Sapling Layer** – Slightly below the canopy are several smaller trees that 6) ..., but taller than the shrubs below. This layer also consists of new trees

that are growing and haven't yet reached the canopy because they are still young, really just saplings.

Shrub Layer – This layer is lower and closer to the ground and consists of 7) ... Herb Layer – This layer is made up of 8) ... . You can also find ground cover or other low lying plants in this layer.

Ground Layer – The final and bottom layer of the forest is the ground layer. There is still lots of life to be found in this level, 9) .... This layer is also made up of the fallen leaves, twigs, and fungi that is 10) ... .

- A are not quite as tall as the canopy
- B producing a thick layer of nutrient rich soil
- C decomposing the organic matter
- D what trees and vegetation make them up
- E those perennial wildflowers and ferns
- F tree layer and the shrub layer
- G the tallest trees
- H such as mosses, lichens, and clubmosses
- I get as much sunlight as possible
- J bushes and shrubs
- K making it hard to see the sky

**9. Watch the video “Layers of the forest” and make a list of professional vocabulary, then write a short summary.**

<https://www.youtube.com/watch?v=sau7Isd-Hh8>

**10. Speak on forest stratification.**

### **Unit 3 Basic characteristics of forest stands**

#### **Lead-in**

What is a forest stand?

What characteristics of a forest stand can you name?

#### **1. Read the text and answer the questions.**

1. What are basic characteristics of forest stands?
2. What is the difference between natural and artificial regeneration?
3. What does species composition refer to?
4. What role does an admixture play?
5. What is the difference between even-aged and uneven-aged stands?
6. What are the tree growth stages?
7. What are the typical age classes?
8. What does stand density reflect?
9. What does stand density depend on?

A forest stand is a part of a forest consisting of a relatively uniform group of trees growing close together and covering a particular area. Such a tree group can be described by several characteristics. The basic ones include: stand origin, species composition, age, stratification, stand and canopy density.

#### *Stand origin*

This characteristic tells us whether the stand was regenerated naturally or artificially. In the case of natural regeneration a forest regenerates itself by producing seeds which are later dispersed. The seeds germinate and new trees start to grow.

Artificial regeneration is achieved by sowing seeds, planting seedlings, stem cuttings or, very rarely, sprouts. The latter can be stump or root ones.

#### *Species composition*

Species composition is a criterion used not only in a stand description but also in forest type classification. As far as stands are concerned they can be divided into single-species or mixed ones usually containing one dominant species and some others as secondary components constituting no more than 50 per cent of species composition.

An admixture, which can be permanent or temporary, plays a very important role in forests because it contributes to litter production, increases soil moisture, protects the dominant species from unfavourable weather conditions (e.g. too much sun, drought), promotes biodiversity and provides shelter for beneficial insects and animals.

#### *Age*

There is no one universal characteristic identifying stand age because it can be described in different ways taking into account the tree age differences within a stand, growth stages of its trees or age classes.

Trees covering a particular area can be approximately the same age and such a stand is called even-aged. In an uneven-aged one much younger and older trees grow together.

In the case of even-aged stands the description concerning tree growth stages (a seedling, sapling, pole, mature tree) applies to the whole stand as well. In some classifications the pole stage or stand is further divided into a small pole stand and high pole one. Sometimes one additional class, known as a maturing stand, is also added.

In age classes trees are grouped according to their age. Twenty years is a usual period of time limiting one class, which means that the age differences between the youngest and the oldest trees cannot be more than the above-mentioned span. The typical age classes include trees 1–20 years old, 21–40, 41–60 and so on.

#### *Stratification*

This tells us how many tree layers or strata there are from the forest floor to the tree tops. Stands are divided into single-storey and multi-storey.

#### *Stand density*

Stand density reflects tree competition for space, light, nutrients and so on. It also describes how trees use the site, e.g. when the stand is too dense trees grow slower. However, for some foresters stand density and stocking means exactly the

same and is understood as an optimal number of trees per hectare that creates the best conditions for their growth and development and results in maximum timber production (measured by volume). Stand density depends not only on a number of trees per hectare but also their sizes (height and diameter) as well as crown cover known also as canopy closure. The latter parameter tells us how close the crowns of neighbouring trees are (whether the closure is full, moderate, broken or open) or defines whether the closure relates to one or more forest layers.

**2. Look through the text and find the words that mean:**

- 1) a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding;
- 2) a shoot of a plant;
- 3) a liquid such as water in the form of very small drops, either in the air, in a substance, or on a surface;
- 4) a place giving temporary protection from bad weather or danger;
- 5) the number of things in a place when compared with the size of the place;
- 6) a substance that provides nourishment essential for the maintenance of life and for growth;
- 7) the uppermost branches of the trees in a forest, forming a more or less continuous layer of foliage.

**3. Match the words with the definitions.**

- 1 sapling
- 2 dominant trees
- 3 codominant trees
- 4 intermediate trees
- 5 suppressed trees
- 6 seedling
- 7 snag

- A trees that occupy a subordinate position in the canopy. They are shorter than the dominant and codominant trees.
- B a very young tree that has grown from a seed
- C a young tree, especially one with a slender trunk
- D standing, dead or dying tree
- E trees that make up the general level of the canopy
- F trees that are below the general level of the canopy. They receive no direct light.
- G trees which extend above the general level of the canopy

**4. Give Ukrainian equivalents of the following words:**

forest stand, species composition, natural/artificial regeneration, disperse, sprout, stump/root sprouts, single-species/mixed-species stand, dominant species, admixture, litter, even-aged/uneven-aged stand, small/high pole stand, maturing/mature stand,



single-storey, multi-storey, stocking, crown cover/canopy closure, full/moderate/broken/open/horizontal/vertical crown closure.

### 5. Complete the sentences:

1. A forest stand is a part of a forest consisting of...
2. Stand origin tells us whether the stand was regenerated...
3. Artificial regeneration is achieved by
4. Stands can be divided into...
5. An admixture plays a very important role in forests because...
6. There is no one universal characteristic identifying stand age because...
7. The typical age classes include...
8. Stand density reflects tree competition for space...
9. Stand density depends not only on a number of trees per hectare but also...

### 6. Read and fill in the blanks with 1–2 words.

A forest stand is a part of a forest. It consists of a relatively uniform group of trees that grow close together and cover a particular area. There are several ways a stand can be described. The basic characteristics include: age, 1) ..., stratification, 2) ... and stand origin.

Stand age can be described in many ways. The most common is based on age classes. Twenty years is a usual period of time limiting one class so typical age classes include trees 1-20 years old, 21-40, 41-60 and so on. If trees in a stand belong to one age class such a stand is called 3) .... When they belong to more classes – 4) ....

Stand can be 5) ... or mixed. In mixed stands there are dominant tree species and 6) ..., which in Ukrainian forests usually constitutes 10-30 per cent.

7) ... refers to the numbers of tree layers from the 8) ... to tree tops. Stands can be divided into single-storey and multi-storey.

9) ... tells us how close the crowns of neighbouring trees are.

Stand origin tells us if the stand regenerated naturally or 10) ... (was planted or sown).

There are different types of trees that grow in forests. They differ in age, shape and the role they play in forests.

The youngest trees are called 11) ..., those older than them – 12) ... . Next, trees enter a 13) ... stage, which can be divided into small 13) ... and high 13) .... Finally, when the trees are able to produce 14) ... and are old enough to be cut down they are called 15) ... trees.

Trees can also play different roles in a stand. The tallest are known as 16) ..., a little shorter – 17) .... Others that reach the bottom of their crowns are called 18) ... . Finally, there are trees that do not have a chance to develop – 19) ... trees or the ones that are already dead – 20) ... .

## 7. Choose the correct phrase from the list below to fill each gap in the text.

Once the initial stage of forest regeneration is completed, seedlings are not left alone but constantly monitored by foresters 1) ... as a whole. Depending on key objectives set, improvement may include: promotion of biodiversity, watershed protection, prevention of soil erosion and floods, recreational and aesthetic values, improvement of sanitary conditions, species composition and 2) ... . The latter goal, in many cases, takes precedence over the others. All practices taking place between forest establishment and harvesting are known as forest stand improvement, tending the forest 3) ... .

Having finished the establishment stage young trees grown for timber are sometimes pruned in order to shape them in such a way 4) ... . Such pruning is called training or formative pruning and applies mainly to deciduous trees, such as oak, ash or beech.

Pruning changes the appearance of the plant by removing or reducing its parts. It usually includes: favouring a single leader, cutting dominant or undesirable branches, e.g. fork ones, over-crowded, criss-crossing and the like. It should be carried out when plants are dormant with the exception of dead branches which 5) ... . Although it is time-consuming and labour-intensive it is worth the effort because it results in production of high quality timber.

The next phase of forest stand improvement is called thinning and focuses on creating favourable conditions for the growth of desirable trees. Such a goal can be achieved by gradual reduction of stand density which, in turn, decreases competition 6) ... and results in the production of healthy, straight, tall, mature trees.

Trees which are removed from the stand belong to several categories. The first one encompasses trees damaged by biotic factors 7) ... or abiotic ones such as wind, snow or ice. The second involves plants of improper form, e.g. forked, 8) ... or representing undesirable species. The third, trees that hinder the growth of desirable ones. They are too tall or interfere with the development of desirable species.

Removal of damaged trees from a stand is called sanitation cutting. It prevents 9) ... . Undesirable species and trees with improper form are topped in cases when their removal would break the canopy closure. The same applies to overtopping ones or hindering the growth of desirable species, e.g. wolf trees.

- A pests and diseases
- B can be pruned all year long
- C spread of pests and diseases
- D or intermediate treatments
- E crooked
- F that their natural form is maintained
- G who try to improve the quality of the stand
- H for light, water and nutrients
- I profitable production of timber

**8. According to the text above are the following statements true or false?**

1. Intermediate treatments are different from tending the forest.
2. The shape of a young tree is sometimes corrected.
3. A double leader is a favourable tree quality.
4. Trees can be pruned all year long no matter what part is removed.
5. Thinning means the same as removing undesirable trees.
6. Trees that threaten the development of desirable ones are removed.

**9. Watch the video “Forest Stand Improvement” and answer the questions.**

<https://www.youtube.com/watch?v=O9LOn2lOIT4>

1. What are reasons for FSI?
2. How does a forest look like after FSI?
3. Why is FSI important for timber production?
4. What trees are removed during FSI?
5. What are weed trees?
6. What methods of thinning out undesirable trees are mentioned?
7. What clothes and equipment are used to ensure safety?

**10. Speak on methods of forest stand improvement.**

### **Unit 4 Forest nurseries**

**Lead-in:**

Can you explain the term “forest nurseries”?

What are the advantages and disadvantages of fertilisers?

Why must a site for nurseries be prepared in a specific way?

**1. Read the text and answer the questions:**

1. How can collected seeds be used in forest regeneration?
2. Why should a nursery site be chosen wisely?
3. What areas are not proper for establishing a forest nursery and which ones are preferred?
4. Why is it a good idea to establish a nursery on a recently logged site?
5. What other factors are crucial for site selection?
6. How is the area for a nursery prepared?
7. What are the advantages of organic fertilisers?
8. How are inorganic ones applied?

#### **Forest nurseries: site selection and preparation**

Collected seeds can be either directly sown in order to establish a forest or used to produce planting stock for forest regeneration. The latter method is much more common and takes place in forest nurseries which produce seedlings well adapted to local conditions because they are grown from seeds whose provenance is known.

Successful planting stock production is determined by many factors among which proper site selection is often the key.

Before establishing a nursery it is a good idea to take a closer look at the land form. Level grounds or slight slopes are the best. Areas along streams or rivers should be avoided because at night cold air slides down the slopes and fills the low-lying terrain, where young plants are often damaged by frost. Such a phenomenon is called a frost hollow or a cold pool (a larger area). Periodically flooded or swampy grounds should be excluded as well.

Nurseries are often established in forests on recently logged sites where surrounding trees protect seedlings from harsh weather conditions such as strong wind, frost or too high temperature. In such a favourable microclimate young plants grow better. However, it is worth remembering that trees in the vicinity should belong to a different species than the produced planting stock because of the danger of disease transmission or pest attack.

Topography and microclimate are not the only factors taken into account as far as proper site selection is concerned. Others include: precipitation, the length of the growing season and type of soil which should not be too heavy or too light but with adequate drainage and thickness. Last but not least, easy access to the nursery by road and proximity of water resources are also important.

As mentioned before, forest nurseries are usually located on recently logged areas. However, before the production of planting stock begins, the site should be carefully prepared. The preliminary preparation usually includes: tree uprooting or stump extraction as well as removal of logging debris, stones, weeds and any vegetation which can hamper seedling development. Next, typical agricultural equipment can be used, e.g. ploughs, harrows or cultivators. Tillage may also encompass organic or inorganic fertiliser application.

Organic fertilisers such as green manure, compost or peat are safer for the environment. They are also beneficial for soil structure because they provide organic matter important for microorganisms living in soil and improve soil water retention. Chemical fertilisers are applied after soil analysis is performed. They contain nutrients in a water-soluble, concentrated form. The most commonly used in forestry consist of major plant nutrients: nitrogen (N), phosphorus (P) and potassium (K). They can supplement nutrients directly to the soil for root uptake or by foliar application. They can come in two forms: liquid or solid. Once the site is prepared and seedbeds formed it is time to start nursery stock production.

## **2. Study the professional vocabulary:**

nursery	школка
site selection	вибір місця
planting stock	посадковий запас
frost hollow	долина між височинами, що піддається впливу низьких температур
disease transmission	передача хвороби
precipitation	опади

growing season	вегетаційний період
heavy/light soil	важкий / легкий ґрунт
drainage	дренаж
tree uprooting	викорінення дерева
stump extraction	видалення пня
weeds	бур'яни
plough	плуг
harrow	борона
cultivator	культиватор
tillage	обробка ґрунту
organic/inorganic fertilisers	органічні / неорганічні добрива
fertiliser application	внесення добрив
green manure	зелений гній
compost	компост
peat	торф
water retention	утримання води
nutrient	поживна речовина
water-soluble	водорозчинний
nitrogen	азот
phosphorus	фосфор
potassium	калій
seedbed	насінневе дно
nursery stock	розплідник

### 3. Find the words in the text that mean:

1. seedlings produced in nurseries used later in artificial regeneration
2. a place where young plants, e.g. shrubs or trees, are produced
3. an area at the foot of a hill or mountain where at night the temperature is lower than on the surrounding slopes; as a result, frost damage is a common phenomenon
4. extracting a whole tree with its roots from the ground
5. pulling the basal part of a tree trunk and its roots out of the ground
6. agricultural equipment that turns under the soil
7. soil preparation for planting or sowing
8. opposite of 'organic'
9. plants that are grown in order to enrich soil with nutrients and organic matter
10. dissolving in water
11. elements important for plant growth and development
12. taking fertilisers in by roots
13. spraying fertilisers on leaves
14. opposite of 'solid'

**4. Fill in the blanks with the following words. Change the form of the verb when necessary:** *shake like a leaf, go out on a limb, take a leaf out of smb's book, nip smth in the bud, twig, bark up the wrong tree.*

1. Well, if you want to borrow some money you .... I'm broken.
2. He hasn't ... how to load the dishwasher properly although I explained it in detail.
3. By deciding to wear a black wedding dress she definitely...
4. The quarrel ... by a hostess who smiled disarmingly and offered some snacks and drinks.
5. Before the job interview last week I ... .
6. My boss keeps telling Tom that he should ... Mary's ...because she hasn't been late for work for weeks!

**5. Some words have often more than one meaning. Match the words on the left with their meanings on the right.**

- |           |  |
|-----------|--|
| 1. bark   | A. empty inside  |
| 2. bud    | B. in American English, a boot of a car                                |
| 3. leaf   | C. the sound dogs make   |
| 4. limb   | D. a part of a company representing it elsewhere                       |
| 5. trunk  | E. a page of a book  |
| 6. branch | F. an arm or a leg   |
| 7. hollow | G. the form used in American English to address a man, an informal use |

**6. Put the trees into two categories: coniferous and deciduous.**

beech, fir, linden, elm, aspen, larch, ash, rowan, pine, spruce

coniferous: ...

deciduous: ...

**7. Read the definitions and guess which words they describe.**

- A . covers a tree trunk
- B . a coniferous tree that sheds its leaves in autumn
- C . cut down trees
- D . the most profitable forest product
- E . a small branch
- F . the main tree root
- G . opposite of 'coniferous'
- H . a small, green part of a tree that takes part in photosynthesis

**8. Read the text and choose whether the statements are true or false:**

In the south-west London, near the river Thames there is a fantastic park of Great Britain – the Kew Gardens. It is a botanical garden. All year round you can see lots of flowers there because Kew gets its plants – 100,000 different plants – from all countries of the world. The plants which like hot weather live in greenhouses, for example, palms grow in the palm house. The first palm was planted here 150 years ago. Now not only palm trees, but bananas and oranges grow here too.

Another house which people like to visit is the cactus house. Cactuses came here from deserts where month after month it doesn't rain. There are hundreds of different

trees in 120 ha of Kew. Some of the trees are 200 years old. The workers of the Garden planted them when Kew was quite young. In some countries trees become scarce. The workers of Kew go to these countries and come back with the seeds of these trees and plant them at Kew. Thus the trees which are few in the world live in this garden.

Kew is important for men who are fond of nature trees and flowers and for youngmen who are going to study botany and gardening. Every year sixty young men from all over the world come here for the three year course of gardening at Kew. After this course they work in big parks and gardens in many different countries.

1. The gardeners of Kew go to the countries where trees become scarce with the seeds of the trees and plant them.
2. All visitors of Kew can visit only green houses and the palm house.
3. The first tree in the park was planted here 150 years ago.
4. Once a young man comes to Kew for training, he can be successfully employed for any park and garden.
5. Succulent plants originate from deserts where they grow in arid conditions.

**9. Read and match tree species mentioned in the text with pictures below:**

1. In Celtic mythology hazel symbolised wisdom.
2. During their long sea voyages Vikings didn't suffer from scurvy because they used pine needles, rich in vitamin C, to brew beer.
3. A famous city in Italy, Venice, is built on black alder poles.
4. In Old English the word 'hornbeam' meant 'hard wood'.
5. In the past things such as water supply systems, gutters, rainwater pipes and boats were made of mountain elm (*Ulmus glabra*) because its wood does not rot in water.
6. In 500 B.C. a Greek doctor Hippocrates, treated his patients with white powder obtained from the bark of white willow (*Salix alba*). The medicine proved effective against fever and as a general painkiller. Nowadays, the same substance, salicin, can be found in mass-produced aspirin.
7. Romans believed that hawthorn protected people from illnesses so they tied its twigs to the cradles of newborn babies.
8. Gin production would not be possible without juniper berries which give this alcoholic drink its unique flavour. The word 'gin' itself comes from French 'ginevre' which means juniper.
9. According to Norse mythology the first human being was created from common ash (*Fraxinus excelsior*).
10. A trunk constitutes 60% of the total tree weight.

1



2



3



4





**10. Read the text and choose whether the statements are true or false:**

Average forest area is affected each year by destructive insects and diseases amounts to 2.0 – 3.5 million ha. In 1996 more than 194,000 ha of forests perished in consequence of these biologic impacts. Control of destructive insects and diseases is carried out annually on the area exceeding 500,000 ha, the biological methods (application of bacteria and virus preparations) being used, on the average, for 77% of this area. The area of 7 to 9 million ha is involved annually in the forests health monitoring representing a system of efficient control of forest condition, which ensures a timely detection of pathological changes in forests, assessment of situation and forecasts of its development. Forests pathology expeditions carry out an annual survey of the area of 6 to 10 million ha for obtaining more accurate data relating to spread of forest diseases and mass reproduction of pests, with the purpose of prescribing appropriate measures for protecting from damage forests.

1. Every year control of harmful insects and diseases is executed on the territory over 5000 km<sup>2</sup>.
2. Every year a great number of forests in the world are completely destroyed by pests.
3. Forest pathologists study the area in order to get information concerning the expansion of forest diseases and mass reproduction of pests without prescribing strict measures for protecting from damage.

**11. Tell about the ways of preparing a site for forest nursery.**

**Unit 5 Damage to trees**

**Lead-in**

What is the difference between biotic and abiotic factors?  
 What biotic and abiotic factors can cause damage to trees?



## **1. Read the text and answer the questions.**

1. What are three groups of factors that cause damage to trees?
2. Why are all damaging factors interconnected?
3. What kinds of abiotic factors are mentioned in the text?
4. In what way can low temperatures be dangerous for trees?
5. What injuries can be caused by frost?

Trees in forests are exposed to danger caused by severe or extreme weather conditions, human activity and also pests and diseases. Unfortunately for trees, the threats mentioned above are often interconnected and have a cumulative effect on forest health. For instance, adverse weather can damage trees which, as they become weaker, are more susceptible to pathogens and insect attack.

### *Abiotic damage*

Abiotic factors such as precipitation (rain, snow, hail), drought, strong wind, frost, temperature fluctuations or lightning can damage the whole tree or its parts such as buds, foliage, shoots, twigs, branches, stems, trunks, bark or even roots. Whole trees can be uprooted due to strong wind, avalanche or snow accumulation on a tree canopy whereas lightning can kill the whole tree or injure its top or bark.

Buds which are no longer dormant, young tree parts which have started to grow and whose tissues are still soft can be damaged by late spring frost. Early autumn frost can be dangerous as well because during this period of time plants are usually not properly prepared for winter (they have not yet gone through the process of hardening off). Frost is also the reason of dieback of different parts of a tree as well as seedling frost heaving. The latter damage happens in spring when frozen soil melts during the day and pushes seedlings upwards. When it freezes again their roots are broken and young plants topple.

Foliage can suffer from low temperatures as well. In addition, it can be affected by high temperature, e.g. leaf dieback or 'red belt'. Leaves are also damaged by heavy rain or hail.

Stems and trunks are affected by frost and too strong sunshine. Frost lesions, frost cracks, frost ribs, cankers and sunscald (visible bark injury on the south-west side of the trunk) are among the most common tree injuries caused by the abovementioned factors.

Limbs, branches, stems and seedlings are often damaged by snow, ice or hail. As a result, they are broken, bent or deformed.

Unfortunately for trees the danger list does not end here. Forests are also affected by drought, fire or climate change, to mention but a few.

## **2. Look through the text and find the words that mean:**

- 1) a destructive insect or other animal that attacks trees;
- 2) likely or liable to be influenced or harmed by a particular thing;
- 3) an irregular rising and falling in number or amount;
- 4) a mass or quantity of something that has gradually gathered or been acquired;

- 5) having normal physical functions suspended or slowed down for a period of time;
- 6) a group of connected cells in an animal or plant that are similar to each other;
- 7) a condition in which a tree or shrub begins to die from the tip of its leaves or roots backwards, owing to disease or an unfavourable environment;
- 8) the upward or outward movement of the ground surface caused by formation of ice in soil;
- 9) to lose balance and fall down;
- 10) a line on the surface of something along which it has split without breaking apart;
- 11) a destructive damage to the bark.

**3. Match the following words with the pictures:**

*lightning, drought, blizzard, avalanche, gale, flood*



**4. Put the following words into different categories.**

*blizzard, sleet, rime, drizzle, gale, avalanche, glaze*

ice	snow	rain	rain+snow	wind
-----	------	------	-----------	------

**5. Match the words with the definitions.**

- 1. windfallen tree
- 2. frost crack
- 3. abiotic damage
- 4. hail
- 5. sunscald
- 6. dieback of shoot tips
- 7. blowdown/windthrow
- 8. bark scorch/heat canker

9. 'red belt'
10. frost rib

- A** a tree injury caused by weather
- B** frost crack heals and is filled with callus forming a ridge
- C** needles turn red when temperature is high during the day, low at night and soil is frozen. Leaves lose water but they cannot replenish it from the soil
- D** the same as a windfallen tree
- E** a tree uprooted by wind
- F** sapwood shrinks across growth rings and a tree trunk cracks
- G** tips die due to temperature fluctuations in winter
- H** often happens after thinning when bark is suddenly exposed to direct sunlight
- I** the same as sunscald
- J** precipitation in the form of small ice balls

### 6. Complete the sentences:

1. Trees in forests are exposed to danger caused by...
2. Abiotic factors such as ... can damage the whole tree or its parts such as ...
3. Whole trees can be uprooted due to...
4. Early autumn frost can be dangerous because...
5. Foliage can suffer from...
6. Stems and trunks are affected by...
7. The most common tree injuries caused by frost and too strong sunshine are...
8. Limbs, branches, stems and seedlings are often damaged by...
9. Forests are also affected by...

### 7. Read the text and answer the questions.

1. Name the two main groups of factors damaging forests.
2. What is the difference between anthropogenic and biotic damage?
3. What can forest fire be caused by?
4. How does air pollution affect trees?
5. What is its impact on soil?
6. Name the most common air pollutants.
7. What are tree diseases caused by? Name some of them.
8. Why are insect pests so dangerous to forests?
9. Define the term 'secondary insect pest'.
10. What kind of damage can other animals cause? Give examples.

Apart from abiotic threats, forests can also suffer man-made damage as well as that caused by biotic factors, such as insects and fungi, which can be blamed for the majority of injuries and diseases affecting trees.

#### **Anthropogenic factors**

Human activities such as careless or irresponsible use of forests for recreation, artificial regeneration preferring single-species and even-aged plantation, harmful

harvesting practices, e.g. clear cutting, are only a few examples of threats posed by man to forests. Unfortunately, trees are also damaged by other factors such as fire or air pollution. What most people find hard to believe is the fact that only about 10 per cent of fires are natural whereas 90 per cent of them are man-made and due to negligence, e.g. unattended campfires, sparks from equipment or vehicles, discarded burning cigarettes, burning pastures and wastelands or arson.

Air pollution affects forests directly by damaging foliage causing, for instance, discoloration, necrosis, premature leaf shedding or indirectly by changing soil quality. The most common problem is soil acidification leading to depletion of nutrients which become unavailable for roots. What is more, when the soil pH decreases metals such as mercury, aluminum or lead are easily released and become toxic to plants. Some of the most harmful pollutants for trees include: sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), fluorine (F<sub>2</sub>) and its compound hydrogen fluoride (HF), ammonia (NH<sub>3</sub>) and oxidants, e.g. ozone (O<sub>3</sub>), to mention but a few.

### **Biotic damage**

Biotic damage in forests falls into the following general categories: diseases and injuries. The former are caused mainly by bacteria and fungi, the latter by pests (insects and other animals).

Bacterial diseases are not very numerous whereas fungal ones pose a serious threat to our forests. Needle cast, pine twisting rust, powdery mildew of oak and annosum root rot are only a few examples of the most common diseases caused by fungi.

Biotic damage is also caused by insects which can attack healthy trees as well as ones previously weakened by abiotic factors or other pests. Healthy trees are attacked mainly by foliophagous (known also as defoliating) insects such as: pine lappet moth (*Dendrolimus pini*), nun moth (*Lymantria monacha*), pine sawfly (*Diprion pini*), pine looper moth (*Bupalus piniaria*), pine beauty (*Panolis flammea*) and green oakroller moth (*Tortrix viridana*), to mention but a few. Secondary insect pests invade weakened or dying trees. The most popular include bark beetles and larger or lesser pineshoot beetles. Unfortunately for trees, insects can damage each part of a plant, such as buds, cones and seeds, as well as posing a threat to any developmental tree stage.

Animals such as beavers fell trees and build dams flooding the neighbouring area. Deer often trample seedlings, browse young and juicy parts of trees or rub antlers on trees damaging their bark. Red squirrels strip bark, destroy lateral and terminal shoots, buds and cones. Wild boars churn up the soil, causing agricultural damage, destroy forest plants by trampling them and contribute to soil erosion by digging along stream banks and ponds.

### **8. Give Ukrainian equivalents of the following words:**

abiotic damage/injury, pathogen, hail, lightning, bud, foliage, twig, limb, branch, trunk, bark, avalanche, uproot, dormant, hardening off, tissue, dieback, frost heaving, 'red belt', drought, anthropogenic, single-species, even-aged, clearcutting, discoloration, mercury, lead, sulphur dioxide, nitrogen dioxide, fluorine, ammonia,

needle cast, pine twisting rust, powdery mildew of oak, annosum root rot, pine lappet moth, nun moth, pine sawfly, pine looper moth, pine beauty, green oakroller moth, secondary insect, bark beetle, large/lesser pineshoot beetle, large/lesser weevil, browse, squirrel, churn up.

**9. Read the text and fill in the blanks with 1–2 words.**

Weather conditions such as rain, snow, 1) ..., 2) ..., flood, strong wind, frost, temperature 3) ... or 4) ... can damage the whole tree or its parts such as buds, leaves, twigs, branches, trunks, bark or even 5) .... Strong wind or 6) ... can uproot the whole tree or break it.

The most dangerous organisms for forests are bacteria and fungi because they cause numerous tree 7) ..., and insects which are the most common forest 8) ... .

Trees are often affected by frost and sunlight. Tree bark warmed by the sun in winter, can reach a temperature as much as 18 degrees warmer than the air temperature. When clouds shade the bark or temperatures drop quickly at nightfall, the bark and cambium layer beneath is damaged. This type of freeze damage is called 9) .... 10) ... occur when water in the cells of the tree trunk freezes and moves out of the cells, causing the wood to shrink. Tension between the frozen and unfrozen layers of wood is so great that the wood separates.

**10. Read a newspaper article about environmental damage to Europe's forests. Choose from the list (A-G) the sentence which best summarises each part (1-5) of the article. There is one extra sentence which you do not need to use. There is an example at the beginning (0).**

0 E

Forestry experts have called on the European Union to use its powers in order to protect the continent's woodlands. This follows the publication of a recent report showing that one quarter of Europe's trees showed signs of severe damage. The experts are asking for wide-ranging action as it now seems clear that Europe's forests are reaching crisis point.

1

The study examined trees across the whole of Europe and found that they were being damaged throughout the continent. Twenty-six per cent of Europe's trees had lost significant numbers of leaves, while more than ten per cent showed signs of discoloration.

2

The report also put forward factors such as air pollution and climate change as causes of this environmental problem. Responding to the report, however, a European spokesman said it was too early to be certain about what was causing the widespread damage. The European Commission has now begun a more detailed 20-year study which will hopefully produce clearer answers.

3

Francis O’Sullivan, senior forestry officer at the World Wildlife Fund for Nature (WWF), pointed out: “While Europe is quick to condemn tropical countries over their forestry policies, it has been ignoring the crisis in its own backyard. Europe now has fewer forests than any other continent except Antarctica, and has less protected woodland than any other region in the world.”

4

Less than one per cent of our ancient forests remain,” he added. “If this is allowed to continue, the damage to our forest systems will result in a reduction in water quality and will cause a crisis in the fishing, tourist and timber industries, as well as threatening the ecological balance in Europe”.

5

Nigel Dudley, a specialist forestry adviser, says that the forestry industry has made substantial progress in organising a programme of forest management, but in his opinion European governments have not been acting quickly enough. Dudley believes that there is a need for further European action on commitments made at the Rio Earth Summit in 1992. Next month the WWF will be reporting on how well governments around the world have kept their Rio summit promises.

- A More research is needed to find out the reasons for tree damage.
- B Europe should pay more attention to its own environmental problems.
- C Environmental damage is threatening certain European industries.
- D Planting more trees is only part of the solution.
- E Threatened trees need European protection.
- F Europe’s trees have been harmed in a variety of ways.
- G The forestry industry has acted more quickly than European governments.

### 11. Watch the video “Forest threats: insects”. Read the text paying attention to the words in bold.

<https://www.youtube.com/watch?v=MWI-3Gz0q6A>

Oregon is a great place for growing trees especially conifers but our forests are **vulnerable** to multiple **threats**. Insects are a big threat to Oregon forests. Bark beetles often kill trees that **are** already **suffering**. The results can be **devastating** especially in southern, central and eastern Oregon. These **tiny** pests can detect when a tree is stressed from drought, disease or fire. That’s when they attack. An insect population **explodes**. Bark beetles **burrow** through bark to lay their eggs. Their **larvae** then chew further through the tree **severing** the conductive **tissues** that deliver water and nutrients. Entire forests in Oregon **are being affected** by insects such as a mountain pine beetle. Mass **mortality** from insects creates thick stands of dead and dry trees. This is an **explosive fuel** source for a future wildfire. One way to **combat** the threat of insects is to thin an **overcrowded** forest. This provides more water and nutrients for the **remaining** trees. But trees should be thinned carefully so as not to damage the soil or the remaining trees, which could attract additional insects. For some tree species the timing of the thinning **matters** and **slash** needs to be

immediately **treated** to avoid creating **breeding grounds** for more insects. Active forest management practices such as thinning and **prescribed burning** can improve forest health and help protect our forests from deadly insect attacks.

vulnerable – ['vʌ ln(ə)rəb(ə)l] уразливий

threat [θret] – загроза

suffer – страждати

devastating ['devəsteɪ tɪ ŋ] – руйнівний; жахливий

tiny ['taɪni] – крихітний

explode [ɪk'spləʊ d] – раптово швидко збільшуватися

burrow ['berəʊ ] – рити нору, хід

larva [' lɑ : və]; (pl- larvae) – личинка; гусениця

sever ['sevə] – відокремлювати, відривати, роз'єднувати

tissue ['tɪʃu:] – тканина

mortality [mɔ : 'tælɪtɪ] – смертність

explosive fuel [ɪk'spləʊ sɪv fjʊ əl] – вибухове паливо

slash [slæʃ ] – вирубка

treat [tri:t] – обробляти

avoid [ə'vɔɪ d] – уникати

breeding ground – джерело

prescribed burning ['bɜ : nɪ ŋ] – встановлений (передбачений) випал

## 12. Complete the sentences with the appropriate words.

1. Conifers are especially vulnerable to multiple \_\_\_\_.
2. Bark beetles often kill trees that \_\_\_\_ already \_\_\_\_.
3. These tiny pests can detect when a tree is stressed from \_\_\_\_, \_\_\_\_ or \_\_\_\_.
4. Bark beetles burrow through bark to lay their \_\_\_\_.
5. Their larvae then chew further through the tree severing the conductive \_\_\_\_ that deliver water and nutrients.
6. Mass mortality from insects creates thick stands of \_\_\_\_ and \_\_\_\_ trees.
7. This is an explosive fuel source for a future \_\_\_\_.
8. One way to combat the threat of insects is to \_\_\_\_ an overcrowded forest.
9. But trees should be thinned carefully so as not to damage the \_\_\_\_ or the \_\_\_\_ trees.
10. Slash needs to be immediately treated to avoid creating \_\_\_\_ \_\_\_\_ for more insects.
11. Active forest management practices such as \_\_\_\_ and prescribed \_\_\_\_ can improve forest health.

## 13. Speak on biotic and abiotic factors that cause damage to trees.

## 14. Study the following information about wood decay and its prevention. Make a list of unknown words. Write a summary (about 250 words).

Wood decay leads to loss of tree vigor and vitality, resulting in decline, dieback, and structural failure. Wounds play an important part in this process since they are the primary point of entry for wood decay pathogens. While other factors

may also result in decline and dieback, the presence of wounds and/or outward signs of pathogens provide confirmation that wood decay is an underlying problem. Wounds and wood decay reduce the ability of trees to support themselves.

Bark which serves to protect tree tissues, is the first line of defense against wood decay organisms. Whenever bark is broken it can result in a wound. Wounds that penetrate bark expose underlying tissues to invading pathogens (e.g., fungi and bacteria) that cause rot or decay. Wounds may be as small as nail holes or much larger. They may be caused by any number of mechanical factors, human activities, insect pests, or animals. Some factors that cause wounds include:

- a) lawn equipment (e.g., mower and string trimmer damage to trunk and surface roots);
- b) pruning (especially stubs left from topping or other improper pruning cuts);
- c) construction equipment and activities (trenching, grade changes, etc.);
- d) vehicles, bikes, scooters, or other objects running into tree trunks;
- e) wire, twine, or other objects girdling or embedded in trunk or branch;
- f) herbicides (especially sub-lethal rates of glyphosate);
- g) animal damage (deer, mice, woodpeckers, squirrels, etc.);
- h) insect injury (especially wood boring insects);
- i) severe weather (e.g., lightning, wet snow, ice, high wind, sunscald);

Wounded trees do not technically “heal” since they are not capable of repair or replacement of damaged tissues. Instead, trees close over their damaged tissues with woundwood/callus tissue. Trees also wall-off (compartmentalize) injuries by producing chemical and physical barriers to pathogens. Organisms that are able to overcome these protective barriers can then colonize and invade wounded tissues. Among the most aggressive of these organisms are the wood decay fungi. Not all wounds lead to wood decay, as trees are frequently able to successfully compartmentalize wounded tissues. In many cases, formation of internal barriers within trees can prevent spread of infectious microbes. Rapid formation of woundwood/callus can also prevent the introduction of new pathogens. The ability of trees to compartmentalize decay differs between woody plants. Factors that affect this ability to compartmentalize decay include:

- a) plant species (genetic ability of the plant to compartmentalize);
- b) type of pathogen or disease;
- c) tree age;
- d) size and shape of wound;
- e) location of wound;
- f) vigor (how much the tree has grown);
- g) vitality (overall tree health);
- h) season (time of year).

Healthy trees normally respond injury more quickly than those that are stressed. Small wounds on young, healthy plants may close within a single growing season. Large wounds require several growing seasons to close, and some may never close. The rate of formation of woundwood/callus is often an indicator of relative tree



vigor, but it is not necessarily indicative of tree resistance to the internal spread of decay. Extensive internal decay may exist behind a completely closed wound.

Wood decay begins when microscopic fungal strands (mycelia) or spores are carried by wind, insects, pruning equipment, or other means to a wound. Depending on the host plant, fungal species, and point of entry, decay is classified as a root rot, butt rot (decay at tree base), or trunk and branch rot. As the decay pathogen overcomes host plant defenses and colonizes, tissues essential for tree function and structural support are destroyed. During rainy seasons and moderate temperatures, many wood decay fungi produce visible reproductive structures, such as shelflike fungal bodies or mushrooms. Rate of wood decay and appearance of structures can vary greatly, depending upon the type of tree, as well as its vigor and age. There are hundreds of species of wood decay fungi. Some disease organisms infect many species of plants, while others infect just a few. Examples of wood decay fungi include:

*Armillaria* (shoestring root rot fungus, honey mushrooms)



*Fomes*



*Ganoderma* (artist's conk)



*Polyporus*



*Trametes*



*Xylaria* (dead man's fingers)



The most conclusive indicators of decay include presence of mushroom structures in soil at or near tree base, bracket or shelf- like fungal structures on trunks or branches. Absence of these obvious indicators does not mean the tree is free of decay. Fruiting bodies of some decay fungi do not appear until decay is well advanced; others may go unnoticed because they are small, short-lived, hidden, or produced infrequently. Other potential indicators of decay include: old wounds or cracks that fail to close; loose bark; an open cavity; wood that is soft, white, spongy, and stringy; or brown and brittle; bleeding (oozing sap) from the trunk or branch; abnormal swellings or bulges; presence of compression rings evident on the trunk; dead branches within the crown; weakened wood that is highly susceptibility to wind or other storm damage; presence of ants, termites, fungus beetles, millipedes, pill bugs, and/or white grubs.

Closing a wound requires considerable energy from the tree, and it takes time. Long delays in closing wounds provide wood decay organisms the opportunity to infect and colonize. Once wood decay has begun, there are no controls or cures. Thus, wound prevention is critical. So it is important to protect trees and shrubs from injuries due to lawn equipment by managing grass and weed growth near trunks. We need to maintain a layer of organic mulch around tree bases, but not against trunks. Plastic tree guards, gravel, and rubber mulch are never recommended. Choose a planting site that provides adequate space for full growth to maturity. Avoid planting large trees under or adjacent to utility lines or too close to houses. This will eliminate the need for pruning to control plant size. Do not plant trees in areas where damage is likely (e.g., vehicle traffic). Prune damaged and diseased branches promptly. Do not cut into the branch collar or the branch bark ridge. Never leave pruning stubs (they will not close) and never top trees.

Proper care of a tree wound encourages development of woundwood/callus formation. It is crucial to make corrective pruning cuts. Wound sealants and paints do not prevent decay and are not recommended for treating wounds. Maintain tree vigor by mulching to moderate root zone temperatures, irrigating during dry seasons, and fertilizing according to soil test results.

## **Unit 6 Wood and its treatment**

### **Lead-in:**

Is wood production very important for the economy of Ukraine?

What types of wood are widespread in Ukraine?

How can we protect wood from decay and deterioration?

## 1. Read and translate the text.

### Wood and its treatment

Forests provide us with wood, and throughout the history, the unique characteristics of wood have made it a natural material for homes and other structures, furniture, tools, vehicles, decorative objects, etc. Today, for the same reason, wood is of great importance for our national economy. Unlike resources such as coal, oil, wood is renewable.

All wood is composed of cellulose, lignin, hemicellulose, and other materials contained in a cellular structure. Variations in the characteristics and volume of these components and differences in cellular structure make woods heavy or light, stiff or flexible, and hard or soft.

Wood species can be divided into hardwoods, or deciduous, and softwoods, or coniferous, and to use wood most effectively, specific characteristics or physical properties must be considered.

Historically, some species were more available and more popular than others. For example, because white oak is tough, strong, and durable, it was mainly used for shipbuilding, bridges, railroad ties, flooring, etc. Woods such as black walnut and cherry were used primarily for furniture and cabinets. Builders and craftsmen of the past understood that wood from trees grown in certain locations under certain conditions was stronger, more durable, more easily worked with tools, or finer grained than wood from trees in other locations. Modern research on wood has confirmed that location and growth conditions do affect wood properties.

Wood is a valuable engineering material, and in many cases, technological advances have made it even more useful.

Wood is one of the best raw materials because it is available in many species, sizes, shapes, and can meet almost every demand. Due to its strength, durability and performance, wood is an important structural material. Dry wood has good insulating properties against heat, sound, and electricity. The grain pattern and colors of wood make it an esthetically pleasing material, and its appearance may be easily enhanced by stains, varnishes, lacquers, and other finishes. It is easy to shape wood with tools, and fasten it with adhesives, nails, screws, bolts, and dowels. Damaged wood is easily repaired. In addition, wood resists oxidation, acid, saltwater, etc. It has good shock resistance, can be treated with preservatives, and can be combined with almost any other material for both functional and esthetic uses.

## 2. Study the professional vocabulary:

wood	деревина, лісоматеріал, дерево (зрубане), ліс
to provide with	забезпечувати
tools	інструменти
to be of great importance	набувати великого значення
to be composed of	складатись з
cellulose	целюлоза

hemicellulose	геміцелюлоза
lignin	лігнін
cellular structure	будова клітини
volume	кількість, об'єм
stiff	жорсткий, міцний
flexible	гнучкий
hardwood	деревина твердолистяних або листяних порід, листяні породи
softwood	шпилькова деревина, шпилькові породи
tough	твердий, міцний
durable	стійкий, довгочасний
to grain	надавати зернистості, подрібнювати, наносити текстурний малюнок
performance	експлуатаційні властивості
insulating properties against heat	теплоізоляційні властивості
insulating properties against sound	звукоізоляційні властивості
insulating properties against electricity	електроізоляційні властивості
structural (engineering) material	конструкційний (технічний) матеріал
grain pattern	візерунок текстури (деревини)
to enhance	покращувати, підсилювати
stain	барвник
varnish	лак
finishes	опоряджувальні матеріали
to fasten	скріплювати
screw	гвинт, шуруп
dowel	нагель, дюбель, штифт
to shape	надавати форму, моделювати, формувати
to resist	чинити опір, протидіяти
oxidation	окислення
acid	кислота
shock resistance	удароміцність

**3. Match the words and word combinations in column A with their English equivalents in column B.**

A	B
1. деревина	a) grain pattern
2. деревина твердолистяних порід	b) characteristics
3. целюлоза	c) shape
4. характерні ознаки	d) wood
5. шпилькова деревина	e) fasten
6. порода	f) preservative
7. експлуатаційні властивості	g) hardwood

8. меблі	h) enhance
9. довговічність	i) cellulose
10. покращувати, підсилювати	j) resist
11. теплоізоляційні властивості	k) furniture
12. надавати форму	l) durability
13. скріплювати	m) insulating properties
14. чинити опір	n) performance
15. антисептик	o) softwood
16. візерунок текстури	p) species
17. міцність	q) strength
18. місцезнаходження	r) growth conditions
19. умови зростання	s) location
20. конструкційний матеріал	t) structural material

**4. Fill in the blanks with appropriate words:** *lignin, insulating properties, wood, enhanced, location, renewable, preservatives, durability, importance, hardwoods.*

1. Forests provide us with ..., and the unique characteristics of wood have made it a natural material for homes, furniture, tools, vehicles, etc.
2. All wood is composed of cellulose, ..., hemicellulose, and other materials.
3. Wood species can be divided into ... and softwoods.
4. Due to its strength, ... and performance, wood is an important structural material.
5. Growth conditions and ... influence wood properties.
6. Dry wood has good ... against heat, sound, and electricity.
7. Wood may be easily ..., shaped or fastened.
8. Wood resists oxidation and can be treated with ....
9. Today wood is of great ... for our national economy.
10. Unlike such resources as coal and oil, wood is ....

**5. Complete the following sentences choosing the best answer:**

1. Wood is provided by ...
  - a) unique characteristics;
  - b) forests;
  - c) natural material;
  - d) national economy.
2. Wood consists of ...
  - a) cellular structure;
  - b) specific characteristics;
  - c) physical properties;
  - d) cellulose, lignin, hemicellulose, and other materials.
3. Black walnut and cherry were used primarily...
  - a) for shipbuilding and railroad ties;
  - b) for cabinets and furniture;
  - c) bridges and bar timbers;
  - d) flooring.

4. According to modern research...

- a) wood has become a useless material;
- b) location and growth conditions of wood don't affect wood properties;
- c) location and growth conditions do affect wood properties;
- d) white oak is non-durable.

5. It is easy to enhance wood ...

- a) with preservatives;
- b) with screws and dowels;
- c) by stains, varnishes, lacquers, and other finishes;
- d) with tools.

**6. Fill in the correct word(s) from the list below. Use the words only once:** *cellular, properties, grain, material, growth, insulating, advance, resistance, throughout, characteristics*

- |                    |                      |
|--------------------|----------------------|
| 1. ... pattern     | 6. engineering ...   |
| 2. ... the history | 7. physical ...      |
| 3. ... properties  | 8. technological ... |
| 4. ... conditions  | 9. shock ...         |
| 5. ... structure   | 10. specific ...     |

**7. Use the word combinations from ex. 6 in the following sentences.**

1. Forests provide us with wood, and ..., the unique characteristics of wood have made it a natural material for homes and other structures.
2. Variations in the characteristics and volume of these components and differences in ... make woods heavy or light, stiff or flexible, and hard or soft.
3. Wood species can be divided into hardwoods and softwoods and to use wood more effectively, specific characteristics or ... must be considered.
4. Modern research on wood has confirmed that location and ... do affect ....
5. Wood is a valuable ..., and in many cases ... have made it even more useful.
6. Dry wood has good ... against heat, sound, and electricity.
7. The ... and colors of wood make it an esthetically pleasing material.
8. It has good ..., can be treated with preservatives, and can be combined with almost any other material for both functional and esthetic uses.

**8. Give synonyms to the underlined words using the words from the list. Change the grammar forms where necessary:** *meet, valuable, effectively, mainly, consider, affect, specific characteristics, be composed of.*

1. To use wood more efficiently, particular properties must be taken into consideration.
2. Wood is a useful engineering material.
3. All wood is made up of cellulose, lignin, hemicellulose and other materials contained in a cellular structure.
4. Cherry was used mostly for furniture and cabinets.

5. Modern research on wood has confirmed that location and growth conditions influence wood properties.
6. Wood is available in many species, sizes, shapes, and can satisfy almost every demand.

**9. Find in the text opposites to the following words.**

1. non-effectively
2. unavailable
3. general
7. weak
3. light
8. short-lived
4. stiff
9. disadvantage
5. softwood
10. useless

**10. Fill in the correct preposition if necessary and translate the sentences into Ukrainian: *of, for (2), with (5), under, in, from, against*.**

1. All wood is composed ... cellulose, lignin, hemicellulose, and other materials.
2. Wood resists ... oxidation, acid, saltwater, etc.
3. Wood can be treated ... preservatives, and combined ... almost any other material ... both functional and esthetic uses.
4. Walnut was used primarily ... furniture and cabinets.
5. Craftsmen of the past understood that wood ... trees grown in certain locations ... certain conditions was stronger, more durable, more easily worked ... tools, or finer grained than wood from trees in other locations.
6. It is easy to shape wood ... tools, and fasten it ... adhesives, nails, etc.
7. Dry wood has good insulating properties ... heat, sound, and electricity.

**11. Match the words with their definitions.**

- |                  |  |
|------------------|--|
| 1. adhesive      | a) to improve smth or to make it more attractive or more valuable  |
| 2. cellulose     | b) the process of combining a substance with oxygen;   |
| 3. hemicellulose | c) material used to give color to wood;  |
| 4. lignin        | d) the carbohydrate that is the principal constituent of wood and forms the framework of the wood cell;                              |
| 5. enhance       | e) a substance which can hold materials together by surface attachment. It is a general term and includes cements, paste, glue, etc. |
| 6. stain         | f) the component of wood, located mainly between wood cells, which is the thin cementing layer between wood cells;                   |
| 7. varnish       | g) a cellulose like material (in wood) that is easily  |
| 8. fasten        |  |
| 9. oxidation     |  |

divided by acid, and transformed into several different simple sugars;

h) a clear sticky liquid used for covering wood or other surfaces. It forms a shiny clear surface that gives protection;

i) to fix one thing to another using smth such as nails, screws, dowels, adhesives, etc

**12. One word in each line is odd. Cross this word out, and say why you have done it.**

1. Glue, paste, stain, cement.
2. Adhesive, nail, varnish, dowel.
3. Cellulose, stain, lignin, hemicellulose.
4. Fire, oxidation, acid, saltwater.
5. Stain, varnish, lacquer, tool.

**13. Decide if the following statements are true or false. Correct the wrong sentences.**

1. Wood is of great importance for our economy due to its specific characteristics.
2. Cellulose is the secondary component of wood and forms the framework of the wood cell.
3. To use wood most effectively, physical properties should be considered.
4. Historically, some species were less available and less popular than others.
5. According to modern research wood properties aren't affected by location and growth conditions of wood.
6. Wood is easily fastened with tools, nails, lignin.
7. Wet wood has bad insulating properties against sound and electricity.
8. Varnish is a clear sticky liquid which is used for shaping wood which forms a shiny clear surface that gives protection.
9. Wood resists oxidation, fire, and preservatives.
10. Wood species can be divided into hardwoods, or deciduous, and softwoods, or coniferous.

**14. Translate the following sentences into English using the Passive Voice where it is possible.**

1. Деревина - один з найпопулярніших будівельних матеріалів та має велике значення для розвитку економічного потенціалу держави.
2. Цей будівельний матеріал має як численні переваги, так і недоліки.
3. Деревина складається з целюлози, лігніну, геміцелюлози та інших компонентів.
4. До позитивних властивостей деревини належать екологічність, низька теплопровідність, гарні естетичні якості, широкі архітектурні можливості.
5. У давні часи для виготовлення меблів використовували горіх та вишню.



6. Починаючи будівництво не зайвим буде дізнатися про властивості деревини, про переваги і недоліки тих чи інших порід.
7. Унікальність деревини полягає в ароматичних речовинах, що містяться в ній.
8. Схильність до грибкових уражень, можливість пошкодження і руйнування комахами і гризунами вимагає додаткової обробки деревини захисними розчинами і покриттями.
9. Деревина не окислюється, не піддається впливу кислот та морської води.
10. Деревину можна обробляти антисептиками, а також поєднувати практично з будь-якими матеріалами.

### **15. Discuss.**

1. Discuss with your partner the unique characteristics of wood.
2. Prepare a report on the importance of wood for national economy.

## **Unit 7 Biodiversity**

### **Lead-in:**

What do you know about biodiversity?

Why is biodiversity so important?

Is it possible to influence the biodiversity?

### **1. Read the text and answer the questions:**

1. What is biodiversity?
2. How many levels does biodiversity consist of? What are they?
3. What is genetic biodiversity?
4. What is species diversity?
5. What are the main reasons in conservation of species?
6. What are the main threats to biodiversity?
7. What pollution do people cause to threaten the biodiversity?
8. What can we do to protect biodiversity?

### **Biodiversity**

Biodiversity is the short form of biological diversity. It is a modern term which simply means “the variety of life on earth”. In article 2 of UN Convention on Biological Diversity, biodiversity is defined as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”.

Biodiversity is not distributed evenly on the Earth. It is consistently richer in the tropical regions and in other localized regions. Flora and fauna diversity depends on climate, altitude, soils and the presence of other species. In the year 2006 large numbers of the Earth's species are formally classified as rare or endangered or threatened species; moreover, most scientists estimate that there are millions more species actually endangered which have not yet been formally recognized. About 40

percent of the 40,177 species assessed using the IUCN Red List criteria, are now listed as threatened species with extinction - a total of 16,119 species.

Biodiversity is often used as a measure of the health of biological systems. There are three traditional levels at which biodiversity have been identified:

- **Genetic biodiversity** is a variation between individuals of the same species. It includes genetic variation between individuals in a single population, as well as variations between different populations of the same species.
- **Ecosystem biodiversity** is a diversity of a higher individual of the same species.
- **Species biodiversity** is the variety of species in a given region or area. It can either be determined by counting the number of different species present, or by determining taxonomic diversity level of organization of the ecosystem.

Scientifically, there are three main reasons in the preservation of species; genetic or medical resources, ecosystem stability, and ethics, and today the scientific community stress the importance of maintaining biodiversity because of a multitude of benefits of biodiversity. Biodiversity is a resistance to catastrophe. Biodiversity provides food for humans. A significant proportion of drugs are derived, directly or indirectly, from biological sources. A wide range of industrial materials are derived directly from biological resources. These include building materials, fibers, dyes, resins, gums, adhesives, rubber and oil.

The main threats to biodiversity include: habitat loss, fragmentation, degradation; and climate change. Other threats to biodiversity and to ecosystems include: the over-harvesting of plant and animal species, the introduction of non-native species, and pollution. Many types of human-caused pollution are a threat such as the release of excessive amounts of nitrates and phosphates from sewage and agricultural run-off, persistent organic pollutants that can concentrate in food webs (and in our own tissues) and adversely affect hormonal and reproductive function, pharmaceuticals used by people and in livestock production that are toxic to wildlife, herbicides and pesticides, plastics, and excessive ultraviolet radiation from depletion of the stratospheric ozone layer that can damage the DNA and proteins of land-based, freshwater, and marine organisms.

Protecting biodiversity is now very essential since biodiversity is crucial for reducing climate pollution and dealing as well as adapting to the effects of climate change. If we don't protect biodiversity, the effects could be as harmful as the effects of global warming itself. In other words, protecting biodiversity is essential for our wellbeing. Biodiversity helps to balance the nature. One of the best ways to conserve biodiversity is to establish protected forest areas. But these areas must be of a certain size, or consist of a well-designed network of forest areas, to allow the local forest ecosystems to continue operating effectively. The forest surrounding the protected area must then be carefully managed so that it serves as a buffer zone. These surrounding forests also allow local communities to earn a livelihood without infringing on the protected forest. There have been numerous efforts aimed at safeguarding the world's biodiversity by protecting species in areas outside their original habitats. For example, seeds of some of the most economically important trees are being conserved in seed centers and gene-banks as a way of protecting their

genetic diversity. But a large number of forest species have seed that do not survive storage, and many species of animals and plant-life are hard to protect once removed from their ecosystems. Reducing the use of pesticides and fertilizers in lawn can protect the habitat. Biodiversity is also protected by reducing the energy demand. If so, you will reduce the carbon dioxide release into the atmosphere, which contributes to global warming.

## 2. Study the professional vocabulary:

biodiversity	біорізноманіття
variability	видозмінність
terrestrial sources	наземні джерела
aquatic ecosystems	водні екосистеми
ecological complexes	екологічні комплекси
to distribute	розповсюджувати
endangered or threatened species	види, що вимирають або перебувають під загрозою зникнення
to assess	оцінювати
extinction	вимирання
to stress	наголошувати, загострювати
benefits of biodiversity	переваги біорізноманіття
to derive	брати початок, походити
resins	смоли
adhesives	клеї
over-harvesting of plant	надмірне збирання врожаю з рослини
to introduce non-native species	впроваджувати неендемичні види
sewage and agricultural run-off	каналізаційні та сільсько-господарські стоки
persistent organic pollutants	стійкі органічні забруднювачі
depletion of the stratospheric ozone layer	виснаження стратосферного озонівого шару
to infringe	порушувати, зменшувати

## 3. Say if the following sentences are true or false:

1. The health of the ecosystem is measured by the biodiversity.
2. Biodiversity is distributed equally everywhere on the Earth.
3. More species are found in tropical regions.
4. Climate, altitude, soils and the presence of other species determines the flora and fauna diversity.
5. Biodiversity causes catastrophes.
6. Biodiversity provides a wide range of industrial materials.
7. Many types of pollution are caused by human.
8. Scientists have recognized all rare or endangered or threatened species.
9. Biodiversity helps reduce climate pollution.

10. All types of seeds are being conserved in seed centers and gene-banks as a way of protecting the genetic diversity.

**4. Find the words or phrases in the text that have the same meaning:**

1. weather
2. to change
3. whole
4. to come from
5. disaster
6. many, a number of
7. variety
8. to preserve
9. to defend
10. to decrease

**5. Find the words or phrases in the text that correspond to the following definitions:**

1. the plants of a particular region or period, listed by species and considered as a whole;
2. species at risk of extinction because of human activity, changes in climate, changes in predator-prey ratios, etc;
3. a sudden and widespread disaster;
4. the natural environment of living organisms;
5. a chemical preparation for destroying plant, fungal, or animal pests;
6. causing or likely to cause harm;
7. a chemical or natural substance added to soil or land to increase its fertility;
8. a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants;
9. This phenomenon includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer;
10. Invisible rays that are part of the energy that comes from the sun.

**6. Study how new words are often formed.**

- By combining two words

Ex: tea + pot = teapot; hot + spot = hotspot; over + population = overpopulation; under + developed = under-developed;

- By shifting and combining

Ex: biology + diversity = biodiversity; biology + mass = biomass; ecology + system = ecosystem;

- By adding prefixes

**With noun: (multi-, bi-, sub-, mis-, inter-, non-, mono-):** multipurpose, multichoice, repaint, bilingual, subtropical,

**With verb: (dis-, re-):** dislike, disappear, rewrite...

**With adjective: (un-, im-, il-):** unsure, impolite, illegal...

**7. Use the correct form of the following words to complete sentences:**

1. ... is the natural or intentional restocking of existing forests and woodlands that have been depleted, usually through deforestation (forestation).
2. It is ... to know exactly the total number of extinct and threatened species (possible).
3. The foresters are going to ... new trees in the forest (grow).
4. A forest is an area, incorporating all living and ...components (living).
5. Some species of pines need fire to ...(generate).

**8. Complete the following paragraph using suggested words: *to, increase, can, from, is, same, that, by.***

People require products derived ..... nature such as food, water, wood, electrical power and soil to survive and to enjoy life. As populations....., more natural resources are sought. Cities expand to house the increasing population, agriculture intensifies ..... grow enough food, more power generation ..... required to produce adequate electricity and more roads are built to transport goods and people. Because people and nature exist together on the ..... land, each of these human endeavors has the potential to contribute in a large or small way to those things ..... threaten biodiversity. Road construction can fragment habitat and increase access to wilderness areas; urban expansion ..... result in paving of riparian areas, draining of wetlands and polluting of streams; and agricultural practices can displace native species and divert water from sources used ..... aquatic species.

**Task 9. Translate the above paragraph into Ukrainian**

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