

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

Державний біотехнологічний університет

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ДІЛОВА АНГЛІЙСЬКА МОВА

Навчальний посібник
для здобувачів другого (магістерського) рівня
спеціальності 205 "Лісове господарство"

Харків
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Навчальний посібник складається з 12 розділів, що містять тексти природничої тематики для аудиторної та самостійної роботи студентів і лексико-граматичні вправи, спрямовані на формування словникового запасу здобувачів, закріплення граматичних знань та розвиток фахової усної та письмової комунікації.

Призначено для здобувачів другого (магістерського) рівня вищої освіти спеціальності 205 «Лісове господарство», які вивчають англійську мову.

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ПЕРЕДМОВА

1. Чому це важливо. Професійна та загальнонаукова термінологія відіграє значну роль у фаховій діяльності кожного випускника технічного закладу вищої освіти. Саме тому метою навчального посібника є комплексне формування комунікативної компетенції у професійній сфері: вироблення навичок оптимальної мовної поведінки для спілкування з іноземними колегами та партнерами для виконання спільних проєктів з технічного та комерційного міжнародного співробітництва. Під час читання, перекладу та різних форм засвоєння спеціально підібраних текстів студенти навчатимуться сприймати важливу для них інформацію англійською мовою, а також обирати засоби для її відтворення.

2. Обґрунтування запропонованої структури. Посібник складається з 12 розділів, які гармонійно пов'язані між собою й утворюють об'єднані тематичні блоки, що містять тексти загальної та природничої тематики та лексико-граматичні вправи, спрямовані на формування лексичного запасу здобувачів, вивчення основ монологічного та діалогічного мовлення, закріплення граматичних знань та розвиток фахової усної та письмової комунікації. Потім подано тексти для компетентісно-орієнтованої самостійної роботи студентів.

3. Матриця академічної орієнтації. Матеріали посібника призначено для здобувачів спеціальності 205 «Лісове господарство», які вивчають англійську мову, починаючи від короткого циклу вищої освіти до другого (магістерського) рівня. Законом України «Про вищу освіту» ці рівні характеризуються наступним чином:

«Початковий рівень (короткий цикл) вищої освіти передбачає здобуття особою загальнокультурної та професійно орієнтованої підготовки, спеціальних умінь і знань, а також певного досвіду їх практичного застосування з метою виконання типових завдань, що передбачені для первинних посад у відповідній галузі професійної діяльності.

Перший (бакалаврський) рівень вищої освіти відповідає шостому кваліфікаційному рівню Національної рамки кваліфікацій і передбачає здобуття особою теоретичних знань та практичних умінь і навичок, достатніх для успішного виконання професійних обов'язків за обраною спеціальністю.

Другий (магістерський) рівень вищої освіти відповідає сьомому кваліфікаційному рівню Національної рамки кваліфікацій і передбачає здобуття особою поглиблених теоретичних та/або практичних знань, умінь, навичок за обраною спеціальністю (чи спеціалізацією), загальних засад методології наукової та/або професійної діяльності, інших компетентностей, достатніх для ефективного виконання завдань інноваційного характеру відповідного рівня професійної діяльності»¹.

4. Додаткові компоненти. Знайомство з природничими науками неможливе без знань їх понятійного апарату. Саме тому посібник доповнено словником спеціальної лексики, яка не лише сформує науковий світогляд, а й удосконалисть рівень професійної культури. А довідкові граматичні таблиці в доступній формі допоможуть студентам систематизувати, конкретизувати та поглибити отримані практичні знання.

¹ <https://zakon.rada.gov.ua/laws/show/1556-18#Text>

MODULE I
SILVICULTURE AND SILVICULTURAL SYSTEM

UNIT 1

I. Read and translate the text. Learn the active vocabulary of the lesson:

silviculture (n)	лісівництво
woodland (n)	ліс, лісовий масив
tending (ger)	догляд, піклування
manipulating (ger)	управління
clearcutting (n)	повна вирубка
timber (n)	лісоматеріал, деревина
habitat (n)	місце поширення, ареал
stand (n)	деревостан
treatment (n)	захід, обробка
rotation (n)	(ліс). оборот рубки
seedling (n)	сіянець; проросток; саджанець
disturbance (n)	порушення, пошкодження
establish (v)	прийнятися (про рослину)
feasible (adj)	підхожий
adjust (v)	налаштувати
diverse (adj)	різноманітний
constraint (n)	обмеження
contradictory (adj)	суперечливий
thinning (ger)	проріджування

Word- combinations

diverse needs	різноманітні потреби
sustainable basis	стійка основа
applied forest ecology	прикладна лісова екологія
economic returns	економічна віддача
artificial regeneration	штучна регенерація
key themes	ключові теми
sprout regrowth	відростання паростків
wildlife habitat	середовище існування дикої природи

SILVICULTURE

Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis. It is often described as the tending of a forest or the growing of trees. Essentially silviculture is a discipline

concerned with meeting human needs by manipulating a forest. Because forests typically require long time periods to grow, silviculture usually relies on management of ecosystems that closely mimic those found in nature. For this reason, silviculture is often described as applied forest ecology.

To understand silviculture, you must understand the complex interactions of three key themes:

Any management action must be ecologically feasible.

Any management action must be conducted within all economic constraints.

Any management action must consider the context of the governing society.

The practice of silviculture is divided into three areas: methods of regeneration, intermediate cuttings, and protection. In every forest the time comes when it is desirable to harvest a portion of the timber and to replace the trees removed for a new generation. The act of replacing old trees, either naturally or artificially, is called regeneration or reproduction, and these two terms also refer to the new growth that develops.

The period of regeneration begins when preparatory measures are initiated and does not end until young trees have become established in acceptable numbers and are fully adjusted to the new environment. The rotation is the period during which a single crop or generation is allowed to grow.

Intermediate cuttings are various types of cuttings made during the development of the forest i.e., from the reproduction stage to maturity. The cutting and thinning are made to improve the existing stand of trees, to regulate growth, and to provide early financial returns, without any effort directed at regeneration. Intermediate cuttings are aimed primarily at controlling growth through adjustments in stand density, the regulation of species composition, and selection of individuals that will make up the harvest trees.

Protection of the stand against fire, insects, fungi, animals, and atmospheric disturbances is as much a part of silviculture as is harvesting, regenerating, and tending the forest crop.

Silvicultural systems are divided into those employing natural regeneration, whereby tree crops are renewed by natural seeding or occasionally sprout regrowth, and those involving artificial regeneration, whereby trees are raised from seed or cuttings. Natural regeneration is easier but may be slow and irregular; it can only renew existing forests with the same sorts of tree that grew before. Artificial regeneration needs more effort, yet can prove quicker, more even, and in the long run more economical. It permits the introduction of new sorts of trees or better strains of the preexisting ones, and trees can be spaced to allow for heavy machinery.

It is always important to remember that forests are diverse and may be managed for many different goals:

- To maximize timber production and economic returns, as exemplified by loblolly pine plantations managed by corporations in the southern US.
- To create preferred wildlife habitat, as exemplified by the old-growth longleaf pine stands managed for red cockaded woodpecker on many military bases in the southern US.

- To protect water quality, as exemplified by northern hardwood stands managed in the Catskill Mountains of New York to provide clean drinking water for New York City.
- To restore ecosystem function, as exemplified by bottomland hardwood stands replanted on former agricultural lands in the Lower Mississippi Alluvial Valley.
- To preserve natural forest ecosystems and wilderness, as exemplified by the management of forests in National Parks.

Silvicultural systems may be applied to an individual stand to meet any one or several of these goals. While it is sometimes possible to meet more than one management objective on a single stand, it is not possible to optimize management for all possible objectives. Some objectives are inherently contradictory to one another (e.g., preservation and timber).

The objectives of the forest landowner should always guide the forester in choosing the appropriate treatments for a stand. While not every stand is managed to maximize financial profits, every stand must be managed under whatever economic constraints are dictated by the landowner.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

quality of forests and woodlands; to meet diverse needs; sustainable basis; needs and values of landowners; applied forest ecology; ecologically feasible; key themes; economic constraints; poor silvicultural decisions; necessary nutrients; sprout regrowth; to play a major role; making decisions; controversy; means of producing wood and fiber; relatively; different goals; timber production; wildlife habitat; to protect water quality; hardwood stands; wilderness; financial profits; relatively slowly; thinning; fertilizer application; genetically improved seedlings; sustainable basis; economic returns; manipulating a forest.

III. Give the English equivalents to the following words and word-combinations:

мистецтво і наука; людські потреби; керування лісом; потреби та цінності; складні взаємодії; економічні обмеження; економічно обґрунтоване рішення; вирішення суперечки; листяні породи; виробництво деревини; економічні прибутки; різні цілі; питна вода; збереження природних лісових екосистем; суперечити один одному; відповідна обробка; максимізувати фінансові прибутки; низька інтенсивність; лісгосподарські заходи; окремий деревостан; власник лісу; якість питної води; впровадження нових сортів дерев.

IV. Match the terms with their definitions:

1. ecosystem	a) the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands
2. timber	b) a biological community of interacting organisms and their physical environment.
3. thinning	c) a planned process whereby a stand is tended, harvested, and reestablished.
4. silviculture	d) wood prepared for use in building and carpentry.
5. seedling	e) the ability to be maintained at a certain rate or level.
6. understory	f) the natural home or environment of an animal, plant, or other organism.
7. sustainability	g) a method of regenerating an even aged stand in which a new age class develops in a fully exposed microclimate after removal of all trees in the previous stand.
8. habitat	h) a young plant, especially one raised from seed and not from a cutting.
9. clearcutting	i) making the wood-stand less dense to achieve more timber productivity.
10. silvicultural system	j) a layer of vegetation beneath the main canopy of a forest.

V. Insert an appropriate term from the list into the text below:

(*conifers, flora, pines, cypress, lumber, soils, domestic, hardwoods, plantations, eucalyptus*)

Australian forests

The Australian forest ... consists mainly of evergreen ... , mainly A limited area, about 3 per cent of the forest land, has favorable ... and rainfall and contains forests of the Indonesia type, and forest area of similar size is covered by ... , mainly The conifer forests are exhausted and do not meet the ... demand for ... , and large quantities have to be imported from New Zealand and North America. To some extent this deficit will be covered by large-scale ... of exotic

VI. Choose the word or phrase you think best completes the sentences.

1. Trees give off a lot of ... into the air.
 - a) nitrogen;
 - b) manganese;
 - c) hydrogen;
 - d) oxygen;

- e) calcium.
- 2. Many thousand years ago people built houses and made useful things from ... which he got from trees.
 - a) stones;
 - b) sand;
 - c) timber;
 - d) clay;
 - e) straw.
- 3. A forest single understory consists of ... which are coming to replace the falling stand of veterans above.
 - a) leaves;
 - b) cones;
 - c) flowers;
 - d) needles;
 - e) saplings.
- 4. Stands are classified according to ... classes of which they are composed.
 - a) age;
 - b) width;
 - c) roots;
 - d) branches;
 - e) height.
- 5. Scientists study the age of trees from their annual ...
 - a) boughs;
 - b) rings;
 - c) crowns;
 - d) radicals;
 - e) leaves.
- 6. Most trees of tropical rain forests formation are ...
 - a) coniferous;
 - s) small;
 - c) broadleaf;
 - d) poisonous;
 - e) sparse.
- 7. Silviculture is a discipline concerned with meeting human needs by ...a forest.
 - a) cutting;
 - b) stripping;
 - c) sawing;
 - d) manipulating
 - e) protecting.

VII. Complete the table to make word families. Use the dictionary to help you. In case there is no corresponding derivative, put a “No” sign.

Noun	Verb	Adjective	Adverb
		sustainable	
growth			
	manage		
ecology			
		removable	
operator			
			socially
		intensive	
	rely		
diversity			
		financial	
	regenerate		

Fill gaps in the sentences with one of the words from the table. You may change the tense and form of the word:

1. This type of soil is able ...vigorous growth of pine trees.
2. Many years ago a large thick forest ... here.
3. These forests ... by experienced foresters.
4. Pollution of nature is a very important ... problem.
5. This part of the forest ...next year.
6. The foresters should consider the social context in which they
7. There are a lot of ... forests in this region.
8. ... of forests in an integral part of successful silviculture treatment.

VIII. Complete the following sentences with the correct form of the words:

I. Forest (n) / forest (v)

- The banks of the river were ... half a century ago.
- These ... are mixed ones.

II. Need (n) / need (v)

- Trees ... water, nutrients, sunlight.
- Rational forests use meet human ... in timber.

III. Effect (n) / effect (v)

- The ... of light on plants is very significant.
- Weather ... the colour of annual rings in trees.

IV. Growth (n) / grow (v)

- Many different trees ... there.

- ... of these lime-trees slows down because of lack of sunlight.

V. *Plant (n) / plant (v)*

- Students ... fir trees at the University building this month.
- Trees are woody ...

IX. Match a word or a word-combination on the left with the appropriate ones on the right:

diverse, sustainable, long time, applied forest, ecologically feasible, economic, poor silvicultural, evergreen, forest, common management, necessary, hardwood, intensive site, ecosystem, financial	periods, action, decisions, ecology, trees, practice, nutrients, species, basis, constraints, preparation, function, profits, needs, floor.
---	---

X. Each sentence below contains a content mistake. Find and correct it.

1. Forest typically requires short time periods to grow.
2. Silviculture is often described as applied forest economy.
3. Any management action must be conducted beyond all economic constraints.
4. One of the forest management goals is to decrease timber production.
5. The creation of preferred wildlife habitat is undesirable in forest management.
6. Every stand is managed to maximize financial profits.
7. Depending on the management objectives, silvicultural inputs will be similar in their intensity.

XI. Take one clause from each of the two columns below to make a sentence. Make sure your sentences make sense.

1. The cutting and thinning are made ...	a) is as much a part of silviculture as harvesting.
2. Silviculture is often described ...	b) is often described as applied forest ecology.
3. Any management action must ...	c) to improve the existing stand of trees.
4. Protection of the stand against fire, insects, fungi and animals ...	d) may be slow and irregular.
5. Natural regeneration is easier but ...	e) as the tending of a forest or the growing of trees.
6. Artificial regeneration needs more effort ...	f) must be ecologically feasible.
7. The period of regeneration begins when ...	g) inherently contradictory to one another.
8. Silvicultural systems may be	h) yet can prove quicker, more

	even, and in the long run more economical.
9. Some objectives are ...	i) preparatory measures are initiated.
10. For this reason, silviculture ...	j) applied to an individual stand to meet any one or several goals.

DEVELOP YOUR COMMUNICATIVE SKILLS

XII. Make a summary to the text.

XIII. Discuss the text, using the oral speech phrases. Work in pairs.

- A. Silviculture deals with growing trees.
B. To be more exact, according to the text ...
- A. Essentially silviculture is a discipline concerned with meeting human needs in timber.
B. I would like to add ...
- A. To understand silviculture, we must understand the complex interactions of tree key themes.
B. As far as I know, ...
- A. Poor silvicultural decisions can be attributed to the failure of the foresters involved to fully consider at least one of these critical themes.
B. According to the text, ...
- A. The foresters involved were making decisions that were both ecologically and economically sound.
B. I quite agree that ...
- A. It is common knowledge that forests are diverse and may be managed for many different goals.
B. As for me, there is no doubt ...
- A. Judging from the text silvicultural systems may be applied to an individual stand to meet any one of several of these goals you have just mentioned.
B. Yes, I can assume the statement, ...
- A. The information about the variety of silvicultural inputs is presented in the text.
B. It goes without saying that ...

UNIT 2.

I. Read and translate the text. Learn the active vocabulary of the lesson:

compose (v)	складати
overcrowding (ger)	перенаселення
disease (n)	хвороба
nutrient (n)	поживна речовина
maintain (v)	підтримувати
objective (n)	ціль
access (n)	доступ
drawback (n)	недолік
lumber (n)	пиломатеріали
suitable (adj)	підходящий
competition (n)	конкуренція
vigorously (adv)	енергійно
understory (n)	підлісок
outweigh (v)	переважати
pulpwood (n)	балансова деревина
clear-cutting (ger)	суцільна вирубка
hurricane (n)	ураган
thrive (v)	процвітати
shelter (n)	притулок
edge (n)	край
logger (n)	лісоруб
harvesting (ger)	лісозаготівля

Word-combinations

entire rotation	повна заміна
intermediate treatments	проміжні заходи
establishment treatments	заходи по відновленню
prescribed burning	встановлене випалювання
harvesting	лісозаготівля
wildlife species	види дикої природи
recreational user	відпочиваючий
forest floor	лісова підстилка
natural disturbance	природне порушення
briar thickets	зарості шипшини

SILVICULTURAL SYSTEM. MANAGEMENT BASICS

PART I

A silvicultural system is a planned process whereby a stand is tended, harvested, and reestablished. It includes every management activity that occurs on that stand over an entire rotation.

Management activities, or treatments, that together compose a silvicultural system can be broken down into several categories. These are regeneration treatments, stand establishment treatments, and intermediate treatments.

When well-managed, forests provide clean air and water, homes for wildlife, beautiful scenery, places for recreation and more than 5,000 products we all use every day. When they are not well managed, forests are often unhealthy and unproductive because of overcrowding, disease, insects, and competition for light, water and nutrients.

To maintain or improve the health and productivity of a forest and to achieve the landowner's objectives for the property, foresters use a number of management techniques, including harvesting, prescribed burning and reforestation.

Harvesting Trees

In forest management, trees are harvested for a variety of reasons including improving the health of the forest; controlling the types of trees that grow on the site; attracting certain wildlife species; providing a source of income for the landowner; producing paper, lumber and numerous other forest products; and improving access to the area for hikers, hunters and other recreational users.

Just as there are many reasons for harvesting trees, there are many different harvesting methods. Each method has its benefits, drawbacks and conditions under which it is the most suitable way to harvest trees. No one harvesting method is ideal for all situations.

Thinning Trees

When trees are crowded together, they are in greater competition for sunlight, nutrients and water. As a result, they tend to be less healthy and to grow less vigorously. To improve the health and productivity of the forest, forest managers may remove a portion of the trees in the early stages (10-15 years) of a growing stand of trees so there is less competition for sunlight, water and nutrients. The forest is 'thinned' by taking out a certain percentage of the trees. The remaining trees will grow faster, stronger and larger. The thinning also improves the growth of the forest's understory such as wildflowers and native weeds by increasing the amount of sunlight that reaches the forest floor. This growth provides more food and cover for animals such as quail and rabbits.

This type of harvest is typically referred to as a "pre-commercial" harvest since the costs associated with the forest management (road maintenance, harvesting, etc.) often equal or outweigh the money earned on the harvested trees for the landowners. This type of harvest results in pulpwood size trees, which are smaller in diameter than trees that would be made into lumber.

Clear-cut

Clearcutting removes all the trees in a given area, much like a wildfire, hurricane or other natural disturbance would do. It is used most frequently in pine forests, which require full sunlight to grow, and in hardwood forests with yellow poplar, sweetgum, cherry, maple and other species that require full sunlight.

Clear-cuts are an efficient way to convert unhealthy stands to healthy, productive forests because they allow forest managers to control the tree species that grow on the site through natural or artificial regeneration.

While a clear-cut removes all canopy cover and is unattractive for a short period of time, it is an effective method for creating habitat for a variety of wildlife species. Animals that eat insects, such as turkeys and quails, and those that eat annual and perennial plants, such as bears and deer, thrive in recently clear-cut areas.

Many creatures also find shelter from weather and predators in the low growing grasses, bushes and briar thickets that follow this type of harvest. In addition, clearcutting is an important forest management tool because it can be used to create edges – areas where two habitat types or two ages of the same habitat meet. Because edges provide easy access to more than one habitat, they usually have more diverse wildlife communities than large blocks of a single habitat.

A clear-cut harvest will produce a mixture of pulpwood and sawtimber products for the forest products industry based on the size of the trees and whether the trees are softwood (pine) or hardwood (maple, oaks, etc.). Loggers sort the trees onto different trucks for their different locations. The smaller diameter trees, typically called pulpwood, will head to a paper mill or energy facility. The larger diameter trees, typically referred to as sawtimber, will be sent to a sawmill. Again, different tree species (whether softwood or hardwood) are sent to specific markets.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

to tender, harvest and reestablish; entire rotation; land ownership; landowner objectives; the same age; management activities; regeneration treatments; places for recreation; harvest techniques; primary objective; newly established forest; to vary; stand establishment treatments; direct seeding; overcrowding; regeneration treatments; stand growth; prescribed burning; property; thinning and pruning; entire rotation; to maintain or improve; variety of reasons; benefits and drawbacks; to grow less vigorously; water and nutrients; pulpwood size trees; hardwood forests.

III. Give the English equivalents to the following words and word-combinations:

перетворення нездорових насаджень; штучна регенерація; створення середовища існування; різноманітність видів; дика природа; навіс; індики і перепела; багаторічні рослини; ведмеді та олені; знайти притулок; інструмент управління; хижак; створення країв; простий доступ; спільноти дикої природи; вироби з пиломатеріалів; хвойні або листяні породи; паперова фабрика; пилорама; однорічні рослини; непривабливий; потребувати; жовта тополя, ясен, вишня і клен; дорівнювати або переважати.

IV. Match the terms with their definitions:

1. lumber	a) to appear from a seed under favorable conditions
2. clear-cut	b) make or become less dense, crowded, or numerous
3. forest floor	c) the material used in carpentry or making furniture
4. artificial	d) the total amount of fallen leaves, roots, dry branches and twigs covering the ground in the forest
5. to germinate	e) wood suitable for making into pulp for making paper
6. pruning	f) a person who walks for long distances, especially across country.
7. pulpwood	g) made or produced by human beings rather than occurring naturally
8. hiker	h) any management activities that take place between the time of stand establishment and the next regeneration treatment
9. hurricane	i) a shoot of a plant
10. intermediate treatment	j) a storm with a violent wind, in particular a tropical cyclone

V. Insert an appropriate term from the list into the text below:

(demand, timber, reserves, royal, well-covered, growing, regeneration, woodland, bulky, grazing)

From the History of British Forests

In prehistoric times, Britain was ... with trees. But as the population changed and grew, as agriculture developed and the need for ... increased, the forest areas gradually disappeared. The ... of cattle and sheep prevented much natural ... of trees. However, some ... areas enjoyed a ... protection because of the facilities they offered for game hunting. Similar control was exercised by landowners. Some of these woodland areas as New Forest, Forest of Dean and Epping Forest, still exist with many of the old customs and laws still surviving.

So much home-grown timber was used in the First World War, that it was quite obvious that the ... of trees should no longer be left to individuals. There had to be a national policy. Accordingly, the Forestry Commission was set up in 1919. The Second World War once again made great ... for timber ... because the effective blockade of the ports made the import of this ... item a great problem.

VI. Choose the word or phrase you think best complete the sentences.

1. A silvicultural system is a ... process whereby a stand is tended, harvested, and reestablished.
 - a) spontaneous;
 - b) chaotic;
 - c) well-considered;
 - d) uncontrolled;
 - e) unforeseen.
2. Age class structure describes how many ... can be found in a forest.
 - a) trees;
 - b) bushes;
 - c) lawns;
 - d) groups;
 - e) paths.
3. Cooperation between the breeders, entomologists and forest products scientists has led to the species more ... to insect diseases.
 - a) vulnerable;
 - b) opposing;
 - c) susceptible;
 - d) favorable
 - e) comfortable.
4. Forestry equipment must be designed to ... the forestry conditions.
 - a) suit;
 - b) build;
 - c) ruin;
 - d) predict;
 - e) indicate.
5. Regeneration treatments are harvest ... that end one rotation and allow a new rotation to begin.
 - a) directions;
 - b) plans;
 - c) statements;
 - d) machinery;
 - e) methods.
6. The research efforts concerning the ... of forest residues and low-quality wood for industrial purposes are most interesting.

- a) manufacture;
 - b) classification;
 - c) estimation;
 - d) use;
 - e) burning.
7. Stand establishment treatments are any management activities that follow regeneration treatments and ... the growth of new cohorts.
- a) slow down;
 - b) delay;
 - c) help;
 - d) stop;
 - e) make worse.

VII. Complete the table to make word families. Use the dictionary to help you. In case there is no corresponding derivative, put a No sign.

Noun	Verb	Adjective	Adverb
plan			
	reestablish		
	act		
rotation			
		useful	
	typify		
			practically
		own	
	depend		
		categorical	

VIII. Fill in the gaps with one of the words from the table. You may change the tense and form of the word:

1. The foresters of Kharkiv region ... their silvicultural system last year.
2. The birch must be ... on this fertile soil.
3. The students of the Forestry Department take an ... part in the forest management.
4. The part of the forest has been ... this month.
5. The furniture factories ... the timber next month.
6. A fir-tree is a ... woody plant for this area.
7. Growing of oak trees was ... here one hundred and fifty years ago.
8. These forests are ... of the British Queen.

IX. Complete the following sentences with the correct form of the words:

I. Plan (n) / plan (v)

- The Forestry Department is going ... growing of trees in our district.
- ... to beautify our city with trees has not been worked out yet.

II. Stand (n) / stand (v)

- An even aged ... is regenerated by clearcutting.
- Don't ... You may sit down.

III. Light (n) / light (v) / light (adj)

- At the end of September leaves turn ... yellow, brown and red.
- ... promotes the process of photosynthesis in leaves.
- The sun ... up the crowns of trees.

IV. Seed (n) / seed (v)

- The field has been ... this week.
- Birds eat ... of trees.

IV. Regeneration (n) / regenerate (v)

- ... method alone has been referenced.
- People should ... forests.

X. Each sentence below contains a content mistake. Find and correct it.

1. A silvicultural system includes every management activity that occurs on the stand over a short period of time.
2. Different harvesting methods have no drawbacks.
3. Rotations can't regenerate forests.
4. When well-managed, forests are often unhealthy and unproductive.
5. The more sunlight and space in the forest, the more competition among the young trees.
6. The thinning usually oppresses the growth of the forest's understory.
7. When trees are crowded together, they tend to be healthier and to grow more vigorously.

XI. Some words do not belong to the following groups of words. Cross them out.

- method, technique, way, leaf, manner, mode, order, crown, system, arrangement;
- to harvest, to note, to gather, to pick, to reap, to collect, to cry, to assemble, to pick up;
- land, age, earth, dust, three, continent, ground, soil, mud, slush, mire;
- to make, to form, to read, to build, to create, to work out, to write, to compose, to compile, to construct, to constitute;
- forest, tree, branch, pen, leaves, trunk, wood, grove, pine, forest, cup, maple, birch, poplar, twig, bough.

DEVELOP YOUR COMMUNICATIVE SKILLS

XII. Make a summary of the text.

XIII. Discuss the text “Silvicultural Systems” with your partner. Items for discussion:

- Definition of silvicultural systems.
- The categories that management treatments can be classified into.
- The benefits and drawbacks of any management treatment.

UNIT 3

I. Read and translate the text. Learn the active vocabulary of the lesson:

harvest (n)	вирубка, лісозаготівля
shelter (n)	притулок
regeneration (n)	регенерація
medium (adj)	середній
oak (n)	дуб
hickory (n)	гікорі, пекан (дерево)
seedling (n)	розсада
sprout (n)	паросток
benefit (n)	користь
shallow (adj)	неглибокий
remain (v)	залишитися
disadvantage (n)	недолік
require (v)	потребувати
damage (n)	пошкодження
ability (n)	можливість
resistance (n)	опір
seed (n)	насінина
eventually (adv)	зрештою
log (n)	колода
habitat (adj)	звичний
habitat (adj)	звичний
woodpecker (n)	дятел
hawk (n)	яструб
lightening (n)	блискавка

Word-combinations

shade-tolerant species	тіньовитривалі види
overstory trees	деревя вищого ярусу
partially-cut stand	деревостан з частковою вирубкою
prescribed burning	призначене спалювання
wind damage	пошкодження вітром
future marketability	майбутня товарність
growth rate	норма росту
scattered trees	розкидані дерева
soil disturbance to reap the benefits	порушення ґрунту скористатися перевагами

SILVICULTURAL SYSTEM. MANAGEMENT BASICS

PART II

Shelterwood Cut

In a shelterwood cut, mature trees are removed in two or three harvests over a period of 10 to 15 years. This method allows regeneration of medium to low shade-tolerant species because a “shelter” is left to protect them. Many hardwoods, such as oak, hickory and cherry, can produce and maintain seedlings or sprouts in light shade under a partially cut stand. However, the young trees will not grow and develop fully until the remaining overstory trees are removed.

One benefit to shelterwood harvests is that they provide cover and early successional food sources for wildlife. However, this method of harvest is not recommended for trees with shallow root systems because the remaining trees are more susceptible to wind damage after neighboring trees are removed. Another disadvantage to shelterwood cuts is that they require more roads to be built through the forest, and increase the risk of soil disturbance and damage to the remaining trees during harvesting.

Seed Tree Harvest

In a seed tree harvest, five or more scattered trees per acre are left in the harvested area to provide seeds for a new forest stand. These trees are selected based on their growth rate, form, seeding ability, wind resistance and future marketability.

Wildlife benefit from seed tree harvests in much the same way as they do from a clear-cut harvest, except that they also reap the benefits of the seed trees themselves. If left on site indefinitely, seed trees eventually may become snags or downed logs, which are important habitat components for woodpeckers and many other species. Seed trees are also excellent food sources and nesting sites for hawks and other birds.

One disadvantage to seed tree harvests is that the remaining trees are at increased risk of damage from wind, lightning, insect attack and logging of nearby trees. This type harvest may also require the landowner to make future investments in thinning and competition control because of uncontrolled reseedling.

Group Selection Harvest

Group selection is essentially a small-scale clear-cut where groups of trees in a given area are harvested over many years so that the entire stand has been cut within 40 to 50 years. This method is used primarily on bottomland hardwood stands to harvest high-quality, top dollar logs. The size of the group cut determines the tree species that are likely to return after the harvest. Openings that are less than one-fourth acre favor shade-tolerant species, and larger openings favor sun-loving species.

Group selection provides ideal pockets of young vegetation for grouse, deer and songbirds. But because it requires intensive management and frequent access to all areas of the property, it can be an expensive forest regeneration method.

Single-Tree Selection Harvest

Single-tree selection removes individual trees that are ready for harvest, of low value or in competition with other trees. With single-tree selection, the forest continuously produces timber and constantly has new seedlings emerging to take the place of harvested trees. Single-tree selection maintains a late succession forest that benefits many wildlife species such as squirrels and turkey.

Single-tree selection harvesting is best in small or confined areas for a variety of reasons. One is that this harvesting method requires more roads. In addition, surrounding trees can be damaged during harvests, and frequent use of logging equipment in a given area may compact the soil. Sun-loving trees, which are an important source of food for wildlife, do not regenerate well with single-tree selection, so forest managers must use mechanical or chemical controls to prevent shade-tolerant species from taking over the site.

Prescribed Burning

Prescribed burning is a forest management practice that benefits certain forests by reducing the amount of leaves, branches and dead trees accumulated on the forest floor that could fuel a wildfire. In addition to helping control the spread of wildfire, removal of this "litter layer" also promotes the growth of new forage and succulent plants, which are important sources of food for many wildlife species including rabbits and deer. And the increase in available insects and seeds following a prescribed fire is good for turkeys and a variety of nongame species.

While improving wildlife habitat, prescribed fire also promotes the health of the forest by controlling the spread of disease and insect infestations, and reducing plant competition for nutrients, water and sunlight.

This management technique is commonly used in Longleaf, Shortleaf and Loblolly pine forests because these trees are naturally resistant to fire. In fact, the Longleaf Pine requires fire for its seeds to germinate.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the Ukrainian equivalents to the following words and word-combinations:

mature trees; to remove; over a period; to allow; to maintain; to develop fully; wildlife; to increase; during harvesting; per acre; a new forest stand; except; indefinitely; nesting sites; landowners; small scale; high-quality; sun-loving species; single-tree selection; emerging; squirrel; frequent use; to prevent; a forest floor; seedlings or sprouts; hardwoods; partially cut stand; overstory trees; disadvantage and damage; growth rate; wind resistance; seeding ability; eventually; woodpecker; logging of nearby trees; thinning; hawk; shade-tolerant species; frequent access.

III. Give the English equivalents to the following words and word-combinations:

захищати; молоді дерева; частково вирубати; забезпечувати; лісозаготівля; відбір; важливий компонент; майбутні інвестиції; прорідження; скористатися перевагами; зменшити кількість опалого листя; сприяти; інтенсивний менеджмент; низька цінність; вибір окремого дерева; білка та індичка; приносити користь; багато видів диких тварин; лісозаготівельне обладнання; тіньовитривалий вид; призначене спалювання; підстилковий шар; розпалити пожежу; кролики та олені; поширення захворювання; поширення комах.

IV. Match the terms with their definitions:

1. mature	a) a shoot of a plant
2. hickory	b) an agile tree-dwelling rodent with a bushy tail, typically feeding on nuts and seeds.
3. habitat	c) the presence of an unusually large number of insects or animals in a place, typically so as to cause damage or disease.
4. sprout	d) fully developed physically, full-grown
5. infestation	e) a part of the trunk or a large branch of a tree has fallen or been cut off
6. group selection harvest	f) the natural home or environment of an animal, plant, or other organism.
7. squirrel	g) a temperate forest tree with pinnately compound leaves and large nuts
8. log	h) a log of high quality and value
9. single-tree selection	i) small-scale clear-cut where groups of trees in a given area are harvested over many years

10. top dollar log	j) a method of regeneration when individual trees that are ready for harvest are removed
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V. Insert an appropriate term from the list into the text below:

(removal, preparation, mature, regeneration, established, clumps, treatment, amount, aesthetic, height)

Seed Tree Harvests

A seed tree is a tree left standing on purpose during a final harvest as a source of seed for natural ... of a new, even-aged forest. Therefore, a seed tree harvest practice is the ... of all trees or all merchantable trees in a forest with the exception of a seed trees collection. Seed tree harvests are a form of final harvest practice that promotes regeneration by leaving mature, live trees either scattered throughout a site or in ... on the site. Trees that remain following a seed tree harvest also act as the gene source for the newly ... forest. Therefore, seed trees should be healthy, dominant, or trees that can provide a suitable ... of high viability seed.

Additional forms of site ... may be needed in these areas to prepare properly the ground for natural regeneration. For example, seeds needing bare mineral soil to become established may also require a prescribed fire to scarify the ground or herbicide ... before seed fall to facilitate their germination and survival. There are two stages generally used to implement the practice.

The first stage removes all standing live trees other than the seed trees. A few years later, the second stage involves entering the regenerated stand to remove the ... trees that served as seed trees for the regenerated stand.

The second entry takes place when the regenerated, desirable trees are of sufficient stocking and However, the second stage is not always implemented since some landowners prefer to leave the larger, older seed trees on the site for ... reasons.

VI. Choose the word or phrase you think best completes the sentences:

1. Forests of Ukraine consist of many tree

- a) groups
- b) areas
- c) species
- d) sorts
- e) sections

2. An unequal forest ... is caused by different geographic and climatic conditions.

- a) nature
- b) distribution
- c) territory
- d) quality

- e) thickness
3. Northern tree-seed crops ... greatly in size from year to year.
- a) vary
 - b) develop
 - c) increase
 - d) decrease
 - e) specify
4. Fruiting ... the natural rhythm of the trees themselves.
- a) describes
 - b) starts
 - c) reveals
 - d) means
 - e) depends on
5. Trees require more than one year ... the nutrient reserves.
- a) to form
 - b) to choose
 - c) to accumulate
 - d) to take
 - e) to give
6. For a ... crop, the weather must ideally be fine.
- a) quick
 - b) low
 - c) poor
 - d) bad
 - e) good
7. In autumn fruit ... form.
- a) flowers
 - b) buds
 - c) leaves
 - d) stems
 - e) roots

**VII. Complete the table to make word families. Use the dictionary to help you.
In case there is no corresponding derivatives, put a “No” sign.**

Noun	Verb	Adjective	Adverb
		silvicultural	
	cultivate		
	grow		

			partially
disturbance			
	invest		
			indefinitely
competition			
		productive	
	select		
intensification			
			constantly

Fill gaps with one of the words from the table. You may change the tense and form of the word:

1. ... deals with management of ecosystems.
2. Forests cover ... areas in the world.
3. Quality of seed ... is connected with climatic and soil conditions.
4. Timber production is ... in this region.
5. The best seeds were ... to grow new trees.
6. ... in forest industry should increase.
7. Wildlife must not be ... by people.
8. ... of these rare tree species is very important.

VIII. Complete the following sentences with the correct form of the words:

I. Harvest (v) / harvest (n)

- Last year three ... tree seeds were gathered.
- The farmers ... a rich yield of wheat a year ago.

II. Shade (n) / shade (v)

- These high trees ... bushes and grass.
- The ... of the oak crown is widely spread.

III. Sprout (n) / sprout (v)

- There are many young ... under the maple tree.
- Seeds ... quickly in the fertile soil.

IV. Cover (n) / cover (v)

- In this part of the forest the grass ... is very thick.
- The fallen leaves ... the ground.

V. Damage (n) / damage (v)

- Pests cause a great ... for trees.
- The branches of the trees were ... by a thunderstorm.

IX. Match a word or a word-combination on the left with the appropriate one on the right:

mature, shade-tolerant, light, cut, shelterwood, forest, successional, shallow, soil, harvested, small-scale, sun-loving, intensive, low, single-tree, frequent, logging, chemical.	shade, clear-cut, harvests, disturbance, trees, food sources, area, species, stand, root systems, use, equipment, species, value, selection management, management practice, controls,
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X. Each sentence below contains a content mistake. Find and correct it.

1. Many hardwoods cannot produce and maintain seedlings in light shade under a partially cut stand.
2. The young trees will grow and develop fully until the remaining overstory trees are removed.
3. One benefit to shelterwood harvests is that they provide cover and early successional food sources for wildlife.
4. In a seed tree harvest, five or more scattered trees per acre are left in the harvested area to provide roots for a new forest stand.
5. Seed trees are excellent food sources and nesting sites for birds.
6. One disadvantage to seed tree harvests is that the remaining trees are at increased risk of damage from wind, lightening, etc.
7. Single-tree selection removes individual trees that are not ready for harvest.
8. Sun-loving trees regenerate well with single-tree selection.

XI. Take one clause from each of the two columns below to make a sentence. Make sure your sentences make sense.

1. Mature trees are removed in ...	a) seedlings in light shade under a partially cut stand.
2. Many hardwoods can produce and maintain ...	b) two or three harvests during ten years.
3. The young trees will not grow and develop fully ...	c) roads to be built through the forest.
4. One benefit to shelterwood harvests is that ...	d) and nesting sites for birds.
5. The remaining trees are more susceptible to wind damage ...	e) in small or confined areas for a variety of reasons.
6. Shelterwood cuts require more ...	f) the tree species that are likely to return after the harvest.
7. It left on site indefinitely...	g) until the remaining overstory trees are removed.

8. Seed trees are also excellent food sources ...	h) seed trees may become snags or downed logs.
9. The size of the group cut determines ...	i) after neighboring trees are removed.
10. Single-tree selection harvesting is best ...	j) they provide cover and food sources for wildlife.

DEVELOP YOUR COMMUNICATIVE SKILLS

XII. Make your own plan to the text and retell it according to the plan.

TASKS FOR SELF-CONTROL

I. Choose the word or phrase you think best completes the sentences:

1. Silviculture is a ... concerned with meeting human needs by manipulating a forest.
a) theory b) discipline c) science
2. Silviculture is ...described as applied forest ecology.
a) usually b) seldom c) often
3. The objectives of the forest landowner should always guide the forester in choosing the appropriate treatments for a
a) stand b) tree c) forest
4. A silvicultural system is a planned process whereby a ... is tended, harvested, and reestablished.
a) stand b) forest c) grove
5. Forests provide clean air and water, ... for wildlife, beautiful scenery, places for recreation and more than 5,000 products we all use every day.
a) place b) house c) home
6. Trees are harvested for a variety of reasons including improving the health of the forest; controlling the types of ... that grow on the site; attracting certain wildlife species; providing a source of income for the landowner; producing paper, lumber and numerous other forest products; and improving access to the area for hikers, hunters and other recreational users.
a) trees b) bushes c) shrubs
7. To improve the health and productivity of the forest, forest managers may remove aof trees.
a) piece b) portion c) part
8. The thinning also the growth of the forest's understory such as wildflowers and native weeds by increasing the amount of sunlight that reaches the forest floor.
a) improve b) is improving c) improves
9. Clearcutting removes all the trees in a given ..., much like a wildfire, hurricane

or other natural disturbance would do.

- a) place b) locality c) area
10. Clear-cuts are an efficient... to convert unhealthy stands to healthy, productive forests because they allow forest managers to control the tree species that grow on the site through natural or artificial regeneration.
a) method b) means c) way
11. Animals that ... insects, such as turkeys and quails, and those that eat annual and perennial plants, such as bears and deer, thrive in recently clear-cut areas.
a) drink b) eat c) kill
12. A clear-cut harvest will produce a mixture of pulpwood and sawtimber products ... the forest products industry based on the size of the trees and whether the trees are softwood (pine) or hardwood (maple, oaks, etc.).
a) in b) at c) for
13. Many hardwoods, such as oak, hickory and cherry, can ... and maintain seedlings or sprouts in light shade under a partially cut stand.
a) receive b) give c) produce
14. One benefit to shelterwood harvests is that they ...cover and early successional food sources for wildlife.
a) supply b) provide c) give
15. In a seed tree harvest, ... or more scattered trees per acre are left in the harvested area to provide seeds for a new forest stand.
a) six b) four c) five
16. These trees are selected based on their growth ..., form, seeding ability, wind resistance and future marketability.
a) size b) length c) rate
17. Group selection is essentially a small-scale clear-cut ...groups of trees in a given area are harvested over many years so that the entire stand has been cut within 40 to 50 years.
a) that b) which c) where
18. Group selection provides ideal pockets of ... vegetation for grouse, deer and songbirds.
a) young b) old c) dead
19. Single-tree selection removes individual trees that are ready for harvest, of low value or in competition with other trees.
a) individuals b) bushes c) trees
20. Prescribed burning is a forest management practice that benefits certain forests by reducing the amount of leaves, branches and dead trees accumulated on the forest ...that could fuel a wildfire.
a) grass b) canopy c) floor

II. Match the terms with their definitions:

1. mature	a) fully developed physically, full-grown
2. hickory	b) an agile tree-dwelling rodent with a bushy tail,

	typically feeding on nuts and seeds.
3. habitat	c) the presence of an unusually large number of insects or animals in a place, typically so as to cause damage or disease.
4. sprout	d) a shoot of a plant
5. infestation	e) a part of the trunk or a large branch of a tree has fallen or been cut off
6. group selection harvest	f) the natural home or environment of an animal, plant, or other organism.
7. squirrel	g) a temperate forest tree with pinnately compound leaves and large nuts
8. log	h) small-scale clear-cut where groups of trees in a given area are harvested over many years
9. single-tree selection	i) a log of high quality and value
10. top dollar log	j) a method of regeneration when individual trees that are ready for harvest are removed

11. lumber	k) to appear from a seed under favorable conditions
12. clear-cut	l) make or become less dense, crowded, or numerous.
13. forest floor	m) the material used in carpentry or making furniture
14. artificial	n) the total amount of fallen leaves, roots, dry branches and twigs covering the ground in the forest
15. to germinate	o) wood suitable for making into pulp for making paper.
16. pruning	p) a person who walks for long distances, especially across country.
17. pulpwood	q) made or produced by human beings rather than occurring naturally,
18. hiker	r) any management activities that take place between the time of stand establishment and the next regeneration treatment.
19. hurricane	s) shoot of a plant
20. intermediate treatment	t) a storm with a violent wind, in particular a tropical cyclone

**MODULE 2
REFORESTATION**

**UNIT 4
NATURAL REGENERATION**

I. Read and translate the text. Learn the active vocabulary of the lesson:

mature (v)	дозріти
salvage (v)	рятувати
intimate (adj)	глибокий
vary (v)	мінятися, відрізнятись
timber (n)	лісоматеріал, будівельний ліс
origin (n)	походження
sucker (n)	<i>бот.</i> кореневий паросток
layering (n)	розмноження відсадками, відводками
dispersal (n)	розсіювання; розкидання
predation (n)	хижацтво, хижацьке винищення
abundant (adj)	рясний
viable (adj)	життєздатний
coincide (v)	збігатися
time (v)	вибирати час; розраховувати
aspen (n)	осика
cottonwood (n)	тополя тригранна
down (n)	<i>бот.</i> пушок
glide (v)	ковзати; рухатися плавно
acorn (n)	жолудь
shoreline (n)	берегова лінія
absorb (v)	усмоктувати; поглинати
moss (n)	<i>бот.</i> мох
dense (adj)	густиий; щільний
limb (n)	<i>бот.</i> гілка першого порядку; сук
residual (adj)	залишковий

Word-combinations

fast growing species	види рослини, що швидко зростають
a woodland stand	лісонасадження
natural disturbances	природні катаклізми
stages of growth	етапи зростання
wildlife habitat	середовище існування дикої природи
woody vegetation	деревна рослинність
shade-tolerant species	тіньовитривалі види

NATURAL REGENERATION

There are many reasons to harvest and regenerate a woodland stand:

- the trees are mature;
- there is low potential for future value growth;
- to improve wildlife habitat;
- to salvage and renew the stand after a severe windstorm, insect outbreak, fire, or other natural disturbance.

Choosing the right harvest and regeneration method, however, requires an intimate knowledge of the ecological processes underlying woodland stand development, as well as site conditions, stand size, timber value, current and desired tree species on the stand, landowner objectives, and other factors.

Most natural stands are composed of many tree species at various stages of growth. Woodlands constantly change as trees grow and die, moisture conditions vary, and natural disturbances occur, people plant and cut trees. Variations in stand age and origin, soil type, aspect, disturbance history, and species make every stand unique.

The various harvest and regeneration methods are not a discrete set of choices, but a spectrum of alternatives. At one end of the spectrum is the removal of all woody vegetation, leading to dramatic changes in soil temperature, moisture, and light conditions. These post-harvest conditions favor fast-growing species that need full sunlight. At the other end of the spectrum is removal of single trees at scattered locations throughout the stand. This kind of harvest creates small canopy gaps favoring regeneration of shade-tolerant species. Between the two ends of the spectrum lies an infinite variety of treatments that vary by the number of trees harvested and how they are distributed around the stand.

Woodlands can be regenerated by natural or artificial means.



Figure 4-1. Natural regeneration methods.

Trees reproduce naturally from seed, root suckers, stump sprouts, or layering.

Seed

All tree species can reproduce from seed, but only a very small percentage of seeds will become established seedlings. Success depends on:

- The supply of viable seed;
- Effective seed dispersal;
- Seedbed condition;

- Weather;
- Competition from other plants;
- Damage from insects and diseases;
- Predation by animals.

The amount of seed available depends on tree species, age, health, and weather. Tree species with very large seeds produce relatively few seeds, while species with small seeds produce abundant seed. Very young and very old trees produce few viable seeds. Healthy trees with large crowns produce more seeds than trees that are unhealthy, have small crowns, or are suppressed by taller trees. Seeds from some tree species remain viable for only a few days after dispersal while seeds from other species may survive for several years on the tree or on the forest floor. The frequency of good seed crops depends on the tree species, overall tree health, and weather during pollination and seed growth. If your regeneration strategy relies on tree seeds to regenerate the new stand, time your harvest and regeneration treatments to coincide with a good seed year.

Tree seeds are dispersed in a variety of ways. For example, aspen and cottonwood seeds are covered with cotton-like down and may be carried several miles by wind. Maple and pine seeds have wings allowing them to glide in the wind. Cherry seeds frequently are dispersed by birds that eat the cherries and drop the seeds far from parent trees. Walnuts, acorns, and pinecones are carried away and buried by squirrels. Seeds from willows and other shoreline species may be dispersed by water.

Each tree species requires certain seedbed conditions for seedling survival. For many species seed must be in contact with mineral soil so the seed can absorb enough moisture to germinate and grow. Seeds from other species may germinate on leaf litter, rotten logs, or moss, but if those materials dry out, the seedlings will die.

Root Suckers

Some hardwoods (such as aspen and black locust) can regenerate from root suckers, usually after the parent tree has been cut down. Root suckers grow from live roots, not from exposed stumps. Trees that grow from root suckers are genetically identical clones of the parent tree. A single parent tree may produce several hundred suckers, creating a dense new stand. The number of suckers may be reduced if there is too much shade on the forest floor from residual trees left after a harvest; the parent tree is particularly large, old, or in poor health.

Stump Sprouts

Oak, basswood, birch, maple, and some other hardwoods sprout from stumps. Like root suckers, stump sprouts are genetically identical to the parent tree. The difference is that stump sprouts grow from exposed stumps, not roots. The most vigorous sprouts arise from relatively young stumps cut close to the ground in late fall or winter when there are food reserves stored in the roots. Stumps often send up numerous sprouts, but these usually thin naturally to two or three main stems.

Layering

Layering occurs when a buried branch on a living tree takes root and develops into a new tree. The lower limbs of some trees sometimes touch the ground and

become covered with organic matter. Roots develop on those buried branches. Layering is not usually an important reproduction method in forests.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

severe windstorm; insect outbreak; woodland stand; natural disturbance; knowledge; site conditions; tree species; timber value; landowner objectives; various stages of growth; to occur; stand age and origin; soil type; regeneration methods; moisture; woody vegetation; light conditions; fast-growing species; removal of single trees; shade-tolerant species; infinite variety of treatments; artificial means; root suckers; layering; stump sprouts; damage from insects and; predation by animals; during pollination; cotton-like down.

III. Give the English equivalents to the following words and word-combinations:

виживати протягом кількох років; відносно мало насіння; вік, здоров'я та погода; нездоровий; під час запилення; залежати від; стратегія регенерації; осика і тополя тригранна; мало життєздатного насіння; після розсіювання; частота; кореневий відросток; батьківські дерева; паросток; відводок; конкуренція з боку інших рослин; насіння клена і сосни; ковзати по вітру; види дерев берегової лінії; певні умови посівного ложа; гнилі колоди; проростати і рости; листові підстилки; дуб, липа та береза; залишки дерев; оголені ґні.

IV. Match the terms with their definitions:

1. vegetation	a) a simple nonflowering plant bryophyte that has short stems with small leaves arranged in spirals and resembling scales and inhabits moist shady sites
2. root sucker	b) the natural conditions and environment in which a plant or animal lives, e.g., forest, desert, or wetlands
3. moss	c) a tree that produces several hundred suckers, creating a dense new stand.
4. stump sprout	d) the bottom part of a tree left projecting from the ground after most of the trunk has fallen or been cut down
5. layering	e) they are sprouts that grow from exposed stumps, not roots, and are genetically identical to the parent tree.
6. habitat	f) the fruit of the oak tree, a smooth oval nut in a rough cup-shaped base
7. stump	g) an organism or cell, or group of organisms or cells, produced asexually from one ancestor or stock, to which

	they are genetically identical
8. clone	h) sprouts that grow from live roots of the parent tree and are genetically identical clones of the parent tree
9. parent tree	i) sprouts that occur when a buried branch on a living tree takes root and develops into a new tree
10. acorn	j) plants in general or the mass of plants growing in a particular place

V. Insert an appropriate word from the list into the text below:

(limiting, adaptations, stand, development, light and space, nutrients, factors, survive, appropriate, moisture)

Trees and stands of trees are able to ... and grow under unique combinations of environmental conditions (e.g., nourishment, moisture, etc.). Different types of trees or stands require different combinations of these ... depending on their particular.... Healthy, productive stands are those in which these factors are found in ... quantities for optimum growth and development for the species mix in question.

When one or more factors are in short supply the growth and development of the tree or ... is affected. Where a serious soil ... shortage exists, for example, increasing the abundance of light, space or soil ... would not likely increase the growth rate of trees at that site. As soil moisture is increased, however, a corresponding increase in the growth and ... of the stand could be expected until some other factor becomes....

VI. Match the beginning of the sentence with its ending:

1. Seeds from some species may germinate on leaf litter, rotten logs, or moss, but ...	a) drop the seeds far from parent trees.
2. Cherry seeds frequently are dispersed by birds that eat the cherries and ...	b) if those materials dry out, the seedlings will die.
3. Seed must be in contact with mineral soil ...	c) cut close to the ground in late fall or winter.
4. The most vigorous sprouts arise from relatively young stumps	d) so, the seed can absorb enough moisture to germinate and grow.
5. The amount of seed available depends on ...	e) these usually thin naturally to two or three main stems.
6. Stumps often send up numerous sprouts, but ...	f) tree species, age, health, and weather.
7. Layering occurs when a buried branch on a living tree ...	g) to improve wildlife habitat.
8. One of the reasons to harvest and	h) takes root and develops into a new

regenerate a woodland stand is ...	tree.
9. Most natural stands are composed of ...	i) there is too much shade on the forest floor from residual trees left after a harvest.
10. The number of suckers may be reduced if ...	j) many tree species at various stages of growth.

VII. Choose the word or phrase you think best completes the sentences.

1. Very young and very old trees produce...
 - a) a lot of seeds.
 - b) few viable seeds.
 - c) only one seed.
 - d) no seeds.
2. Root suckers grow from live roots, not from...
 - a) cones.
 - b) seeds.
 - c) trees.
 - d) exposed stumps.
3. Seeds from willows and other shoreline species may be dispersed by
 - a) wind.
 - b) birds.
 - c) water.
 - d) animals.
4. ... can be regenerated by natural or artificial means.
 - a) forests
 - b) woodlands
 - c) fields
 - d) bushes
5. A single parent tree may produce ...
 - a) several hundred suckers
 - b) several suckers
 - c) several thousand suckers
 - d) only one sucker
6. Stump sprouts grow from exposed stumps, not...
 - a) seeds
 - b) flowers
 - c) trees
 - d) roots
7. Trees that grow from root suckers are ... of the parent tree.
 - a) non-identical clones
 - b) completely different clones
 - c) genetically identical clones
 - d) similar clones

VIII. All the sentences below contain content mistakes. Find and correct them.

1. Seeds from willows and other shoreline species may be dispersed by wind.
2. Seeds from some species may germinate on leaf litter, rotten logs, or moss, but if those materials dry out; the seedlings will still develop successfully.
3. Root suckers grow from exposed stumps.
4. A single parent tree may produce only a single root sucker.
5. The number of suckers may be reduced if there is too much light on the forest floor.
6. Tree species with very large seeds produce a large quantity of seeds.
7. A high percentage of seeds will become established seedlings.
8. Most natural stands are composed of many tree species at the same stage of growth.

DEVELOP YOUR COMMUNICATIVE SKILLS

IX. Describe the reasons of a woodland stand regeneration.

X. Explain the difference between 4 types of natural regeneration (from seeds, root suckers, stump sprouts and layering).

XI. Discuss the text with your partner. Items for discussion:

- various harvest regeneration methods;
- tree seeds dispersal;
- the amount of tree seeds available;
- different types of natural regeneration.
- tree species mentioned in the text.

UNIT 5

ARTIFICIAL REGENERATION

I. Read and translate the text. Learn the active vocabulary of the lesson:

artificial (adj)	штучний, неприродний
permit (v)	дозволяти; давати змогу
sow (v)	сіяти, висівати
bog (n)	болото, трясовина
spruce (n)	ялина
rodent (n)	гризун
conifer (n)	хвойне дерево
dig (v)	копати, рити

fir (n)	ялиця; смерека
harsh (adj)	твердий
designate (v)	визначати, встановлювати
grade (v)	сортувати
greenhouse (n)	теплиця
biodegradable (adj)	який розкладається мікроорганізмами
cutting (n)	черешок, відсадок
replica (n)	точна копія, репродукція
poplar (n)	тополя
protrude (v)	видаватися, стирчати
determine (v)	визначати, встановлювати
reach (v)	досягати
allocate (v)	встановлювати місце, локалізувати

Word-combinations

fibrous root system	мичкувата коренева система
nursery seedbed	розсадник
slow growing species	види рослини, що повільно зростають
site preparation	підготовка ділянки
tree spacing	відстань між деревами

ARTIFICIAL REGENERATION

Artificial regeneration refers to the planting of seeds, seedlings, or cuttings. Artificial regeneration usually is more expensive than natural regeneration, but permits better control over species selection, genetic characteristics, and tree spacing.

Direct Seeding



Direct seeding is the process of sowing or planting seeds. It often is used to establish jack pine and black spruce, as well as some hardwoods, including black walnut. Direct seeding of black spruce is preferred to planting seedlings on sites with poor access, such as spruce bogs. The appropriate site preparation, moisture, and temperature requirements vary by species and are similar

to those necessary for natural seeding. Often the seed is chemically treated to protect it from diseases, rodents, and birds.

Seedlings

Planting seedlings, either bare-root or container-grown stock, is the most reliable way to regenerate a stand, especially for conifers. Bare-root seedlings are dug from the nursery bed and shaken to remove most of the dirt around their roots. They

frequently are designated as 1-0, 2-0 or 2-1 stock, with the first number referring to how many years they were grown in the original nursery seedbed and the second to how many years they were grown after being transplanted to another nursery bed. Transplants generally have a more fibrous root system and larger stem diameter than seedlings that are not transplanted. Transplants are recommended for regenerating slow-growing conifer species such as spruce and fir, and for harsh planting sites where survival is likely to be a problem.

Seedling costs vary depending on tree age, grade, species, and quantity ordered. Transplants survive very well, but are expensive and, therefore, are not widely used. One- or two-year-old seedlings are less expensive than transplants and are recommended for most hardwood and conifer plantings. Tree seedlings sometimes are graded and sold by height class, stem diameter, or root condition.

Container-grown seedlings usually are grown in a greenhouse in 1- to 2-inch diameter containers. Some biodegradable containers may be planted in the ground with the seedling in them. Other seedlings must be removed from the container before they are planted. Container-grown stock can be very useful for dry planting sites or for late season planting.

Cuttings

Cuttings are exact genetic replicas of the parent tree. They commonly are used to regenerate poplars, but also can be used to regenerate willow and green ash. Cuttings are usually 8- to 12-inch lengths of tree stems about 1/4- to 3/4-inch in diameter (longer cuttings may be used on drier sites). They are cut during the late winter from the previous year's growth of vigorous seedlings or stump sprouts. Cuttings usually have no visible roots, but when buried vertically with just an inch of the stem protruding above ground, they will form roots. Rooted cuttings also may be available for purchase. Cuttings grow best where the soil remains moist throughout the growing season.

Tree Spacing

When designing a plantation, you need to determine an appropriate spacing between mature trees. Consider the typical crown width of a tree species when individual trees reach a useful size. For example, when growing trees for timber, you'll need to allocate enough space so the individual trees will be just beginning to crowd each other when they are large enough to support a commercial thinning. A forester can help you determine the correct spacing depending on the species and purpose for the plantation.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the Ukrainian equivalents to the following words and word-combinations:

direct seeding; better control; sites with poor access; temperature requirements; disease; container-grown stock; nursery seedbed; original; grade; to vary; quantity ordered; correct spacing; stem diameter; large enough; root condition;

biodegradable containers; to form roots; growing season; mature trees; chemically treated; to protect from diseases, rodents, and birds; frequently; to remove the dirt around the roots; nursery bed; slow-growing conifer species; spruce and fir; harsh planting sites; less expensive; cuttings; vigorous seedlings; timber.

III. Give the English equivalents to the following words and word-combinations:

типова ширина крони; вирощування дерев на деревину; саджанці з голим коренем; правильний інтервал; дорослі дерева; видиме коріння; саджанці, вирощені в контейнерах; виживання; сильні саджанці; посів або посадка насіння; кращий контроль за вибором видів; доступні для покупки; виділити достатньо місця; вкорінені живці; залишатися вологим; протягом вегетаційного періоду; розсадник; контейнери, що розкладаються; теплиця.

IV. Match the terms with their definitions:

1. bog	a) a special site for growing seedlings from a seed
2. rodent	b) an interval between the units of a forest
3. timber	c) a small animal of an order with large gnawing incisor teeth that continue growing throughout the animal's life
4. spacing	d) exact genetic replica of the parent tree
5. greenhouse	e) a tall, fast-growing tree of north temperate regions, widely grown in shelter belts and for timber and pulp
6. nursery	f) a glass or transparent plastic structure, often on a metal or wooden frame, in which plants that need heat, light, and protection from the weather are grown
7. selection	g) an area of wet marshy ground, largely consisting of accumulated decomposing plant material
8. poplar	h) a process in which environmental or genetic influences determine which types of organism thrive better than others, regarded as a factor in evolution
9. seedling	i) standing trees or their wood, especially when suitable for sawing into building materials
10. cutting	j) a young developing plant that has been grown from a seed

V. Insert an appropriate word or a word combination into the following text:

(the ability of seedlings, in short supply, expected, productivity, combinations, survive, affecting, appropriate quantities, abundance of light, limiting)

Trees and stands of trees are able to ... and grow under unique combinations of environmental conditions (e.g., nourishment, moisture, light and space). Different types of

trees or stands require different ... of these factors depending on their particular adaptations. Healthy, productive stands are those in which these factors are found in ... for optimum growth and development for the species. When one or more factors are ... the growth and development of the tree or stand is affected. Where a serious soil moisture shortage exists, for example, increasing the ..., space or soil nutrients would not likely increase the growth rate of trees at that site. As soil moisture is increased, however, a corresponding increase in the growth and development of the stand could be ... until some other factor becomes

The manner in which these factors interact at the scale of the seedling will determine ... to germinate, become established, survive, and grow. Among the factors ... growing conditions at any site, the one that, if increased, will result in the greatest corresponding increase in ... of the stand, is considered to be the “most limiting factor”.

VI. Match the beginning of the sentence with its ending:

1. The seed is chemically treated to protect it ...	a) for harsh planting sites where survival is likely to be a problem.
2. Transplants are recommended for regenerating slow-growing conifer species such as spruce and fir, and ...	b) from diseases, rodents, and birds.
3. A forester can help you determine the correct spacing depending ...	c) permits better control over species selection, genetic characteristics, and tree spacing.
4. Artificial regeneration usually is more expensive than natural regeneration, but ...	d) on the species and purpose for the plantation.
5. Cuttings grow best where ...	e) other seedlings must be removed from the container before they are planted.
6. Some biodegradable containers may be planted in the ground with the seedling in them while ...	f) the soil remains moist throughout the growing season.
7. When designing a plantation, you need to ...	g) species and are similar to those necessary for natural seeding.
8. The appropriate site preparation, moisture, and temperature requirements vary by ...	h) determine an appropriate spacing between mature trees.
9. Cuttings usually have no visible roots, but when ...	i) larger stem diameter than seedlings that are not transplanted.
10. Transplants generally have a more fibrous root system and ...	j) buried vertically with just an inch of the stem protruding above ground, they will form roots.

VII. Each sentence below has a content mistake. Find and correct it.

1. Transplants generally have a less fibrous root system.
2. Cuttings are rarely genetic replicas of the parent tree.
3. Container-grown seedlings usually are grown in a greenhouse in 5- to 7-inch diameter containers.
4. Transplants are less expensive than one- or two-year-old seedlings and are recommended for most hardwood and conifer plantings.
5. Planting seedlings, either bare-root or container-grown stock, is a less reliable way to regenerate a stand.
6. The seeds are rarely chemically treated before planting.
7. Artificial regeneration usually is more expensive than natural regeneration and it doesn't permit better control over species selection, genetic characteristics, and tree spacing.
8. Cuttings are usually cut during the late autumn from the previous year's growth of vigorous seedlings or stump sprouts.

VIII. Confirm or contradict the following statements, saying *True or False*.

1. Artificial regeneration is usually cheaper than natural regeneration.
2. Direct seeding is the process of sowing or planting seeds.
3. Direct seeding of black spruce is preferred to planting seedlings on hard soils.
4. Planting seedlings, either bare-root or container-grown stock, is the most reliable way to regenerate a stand, especially for hardwoods.
5. Seedling costs vary depending on tree age, grade, species, and quantity ordered.
6. Transplants survive very well and are not expensive, therefore, are widely used.
7. Container-grown seedlings are usually grown on a special growing site.
8. When designing a plantation, you need to determine an appropriate spacing between mature trees for them to develop successfully.

DEVELOP YOUR COMMUNICATIVE SKILLS

IX. Describe artificial regeneration.

X. Make the plan of the text and retell it.

XI. Explain the difference between different types of artificial regeneration (direct seeding, seedlings, cuttings, tree spacing).

UNIT 6

I. Read and translate the text. Learn the active vocabulary of the lesson:

overestimate (v)	переоцінювати
provide (v)	забезпечувати
maintain (v)	підтримувати
sustainable (adj)	стійкий, регулярний
deforestation (n)	вирубка лісу
rampant (adj)	буйний, нестримний
pollution (n)	забруднення
trap (v) (n)	зловити в пастку, пастка
survival (n)	виживання
particle (n)	частка, частинка
thrive (v)	процвітати
medium (n)	середовище
indigenous (adj)	місцевий
biodiversity (n)	біологічне різноманіття
watershed (n)	вододіл, басейн ріки
purify (v)	очищувати
livelihood (n)	засоби існування
flood (n)	затоплення, повінь
runoff (n)	стік
replenish (v)	поповнювати (-ся)
rubber (n)	гума
extract (v)	вилучати
disastrous (adj)	катастрофічний

Word-combinations

world's storehouses	світові сховища
water table	рівень ґрунтових вод
huge amount	величезна кількість
necessary habitat	необхідне середовище існування
critical source	важливе джерело
giant lungs	гігантські легені
hilly areas	горбисті регіони
barren conditions	безплідні умови
significant economic value	значна економічна цінність

IMPORTANCE OF FORESTS

The importance of forests can be hardly overestimated. The trees supply oxygen to the atmosphere. They affect the rainfall in a particular region. They also provide us with wood, medicines, food, perfumes, paper, clothes, etc. Trees are the world's largest storehouses of carbon which is important to maintain global temperatures. The rise in carbon levels is believed to be the main reason behind global warming. In spite of the advantages of forests, deforestation has become very rampant in the modern era causing several problems like pollution, soil erosion, and climate change.

Forests maintain the ecosystem by absorbing greenhouse gases like carbon dioxide that are believed to be the reason for climate change. Carbon is stored in the biomass within the forests. Tropical forests alone harbor a huge amount of carbon (around a quarter of a trillion tons) that can be disastrous if it is released into the atmosphere.

Forests provide a sustainable environment for the survival of millions of animals. It is home to several species including snakes, turtles, crocodiles, insects, birds, butterflies, monkeys, and other wild animals. It provides an ecosystem for the animals to thrive. The forest floor is also a rich medium for microorganisms, which are essential for the conversion of dead matter into nutrients. Forests are also home to indigenous people who depend on them for their livelihood. Globally, around 90% of the species including various plants and animals thrive in forests. The forest has been declared the home of 500 types of animals. They offer the necessary habitat and support biodiversity. They are home to the genes of biodiversity.

Forest-based water tables, rivers, streams, and lakes are critical sources of water. The green cover preserves the water reserves from sun radiation. The Amazon forest is home to the world's largest watershed and river system.

Photosynthesis is a critical function of plants to generate food and energy. Plants, shrubs, and trees absorb carbon dioxide from the atmosphere during the daytime and release oxygen. According to an estimate, an acre of mature trees can provide oxygen for 18 people. They act as giant lungs purifying the air in the atmosphere by removing carbon dioxide and maintaining balanced levels of oxygen that we breathe every day. Trees absorb odors and pollutant gases like ammonia and sulphur dioxide out of the air. These toxins are trapped in the leaves and barks.

Forests provide green cover which absorbs the Sun's radiation and keeps the temperature down. They regulate atmospheric temperature through evapotranspiration and breeze. Forests also promote rainfall that helps in maintaining the water table and a cool climate. Deforestation has the opposite effect causing the global temperature to rise dramatically.

Dead leaves and broken branches ultimately are converted to soil through the decomposition process and this conversion enriches the soil with nutrients. Microorganisms present in the soil convert the biodegradable material to simpler particles that can be utilized by the plants again. Trees have very strong roots that hold the soil intact in cases of floods or any other reasons that cause soil erosion.

They are very critical in hilly areas or stream slopes as they slow the runoff and keep the soil intact. Uncontrolled soil erosion can destroy the fertile soil leading to barren conditions.

Forest is an important component of the water cycle process. They regulate evaporation, condensation, and precipitation of the water. They also nourish the aquifers thereby replenishing groundwater supplies. Trees allow the rainwater to flow down the trunk into the soil thereby preventing the stormwater from carrying pollutants to the ocean. They act as giant sponges that filter water and recharge the water table.

Forests are rich in herbs, plants, and trees of medicinal value. The extracts, seeds, leaves, and bark from these plants and trees treat several diseases while being non-toxic to the human body.

Forests have a lot to offer to human beings. Every component of a tree including leaves, branches, stem, bark, fruits, seeds, and root are useful. Forests provide wood, timber, raw materials, vegetables, and fruits, which have significant economic value. The timber is used in construction and making furniture. Wood is also essential in the production of paper. The rubber extracted from trees is used to make several products. Even green waste has economic significance.

Finally, forest is a home for wildlife, beautiful scenery, place for recreation which provides humans with relaxation, inspiration and mental health.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

to overestimate; rainfall; according to an estimate; carbon level; advantage; soil erosion; climate change; importance; greenhouses gases; to harbor; huge amount; disastrous; to release; sustainable environment; survival; snakes, insects and butterflies; forest floor; conversion; to maintain nutrients; livelihood; to thrive; necessary; forest-based water tables; to slow the runoff; to preserve; to generate food; indigenous people; to maintain balanced levels of oxygen; evapotranspiration and breeze; ultimately; flood; making furniture; groundwater supplies.

III. Give the English equivalents to the following words and word-combinations:

важливість; постачання кисню; забезпечувати деревиною, ліками та одягом; підтримувати; збільшення рівня вуглецю; головна причина; викликати проблеми; теплиця; випускати в атмосферу; забезпечувати екосистему поживними речовинами; виробляти енергію; кущі; двоокис вуглецю; зрілі дерева; очищувати повітря; викликати глобальне потепління; стійке

середовище; мати економічне значення; корінне населення; підтримувати біорізноманіття; рівень ґрунтових вод; стік води; різко зростати; важливе джерело; схили та пагорби; опади; збалансований рівень.

IV. Match the terms with their definitions:

1. furniture	a) large movable equipment, such as tables and chairs, used to make a house, office, or other space suitable for living or working
2. slope	b) a slow-moving reptile, enclosed in a scaly or leathery domed shell into which it can retract its head and thick leg.
3. lungs	c) a tough elastic polymeric substance made from the latex of a tropical plant or synthetically
4. turtle	d) a surface of which one end or side is at a higher level than another; a rising or falling surface
5. pollution	e) rain, snow, sleet, or hail that falls to the ground
6. rubber	f) an area or ridge of land that separates waters flowing to different rivers, basins, or seas
7. precipitation	g) the pair of organs situated within the rib cage, consisting of branching passages into which air is drawn, so that oxygen can pass into the blood and carbon dioxide be removed
8. watershed	h) contamination, impurity, defilement
9. butterfly	i) the process of turning from liquid into vapor
10. evaporation	j) a winged insect resembling a moth after a pupa stage

V. Give the possible derivatives of the following verbs:

To provide, to pollute, to store, to sustain, to declare, to generate, to act, to regulate, to convert

VI. Match the antonyms:

1. rise	a) drought
2. rampant	b) exclude
3. modern	c) pollute
4. absorb	d) domesticated
5. huge	e) minor
6. include	f) decline
7. wild	g) tiny
8. essential	h) scarce
9. purify	i) release
10. rainfall	j) ancient

VI. Choose the correct answer to the following questions:

1. What do trees supply to the atmosphere?
 - a) nitrogen
 - b) oxygen
 - c) air
 - d) hydrogen
2. Why is carbon important?
 - a) to maintain global warming
 - b) to favor trees growth
 - c) to breathe in
 - d) to maintain global temperatures
3. What does deforestation cause?
 - a) pollution, soil structure, climate conditions
 - b) evolution of soil texture, climate influence
 - c) pollution, soil erosion, climate change
 - d) formation of soil process, climate forecast
4. How do forests maintain the ecosystem?
 - a) by absorbing greenhouse moisture
 - b) by absorbing greenhouse gases
 - c) by taking nutrients
 - d) improving air condition
5. Why are microorganisms essential?
 - a) to transform carbon dioxide
 - b) to convert nutrients into dead matter
 - c) to convert organic matter into inorganic one
 - d) to convert dead matter into nutrients
6. What does the green cover preserve the water reserves from?
 - a) sun radiation
 - b) sunlight
 - c) sun system
 - d) sunset
7. Why is photosynthesis important?
 - a) to generate carbon dioxide
 - b) to generate food and energy
 - c) to generate moisture and tissues
 - d) to use food and energy

VII. Arrange the words to make a sentence:

1. to be, the rise, behind, carbon, in, the main, global, reason, is, warming, believed, levels, behind.
2. the ecosystem, gases, forests, by, maintain, greenhouse, absorbing.

3. the forests, is, the biomass, within, is, carbon, stored, in.
4. a rich, the forest, for, floor, medium, also, microorganisms, is.
5. preserves, sun, from, the green, the water, radiation, cover, reserves.
6. a critical, plants, food, photosynthesis, function, is, to generate, of, and, energy.
7. odors, trees, and, absorb, gases, pollutant.
8. to flow, allow, the rainwater, trees, down, the soil, the trunk, into.

VIII. Confirm or contradict the following sentences saying *True* or *False*.

1. Oxygen is supplied to the atmosphere by oceans and seas.
2. Trees are a source of wood, medicines, food, perfumes, paper, clothes, etc.
3. Nowadays deforestation occurs only in underdeveloped countries.
4. Greenhouse gases are absorbed by forests to maintain climate conditions.
5. A huge amount of carbon is held by rocks.
6. Many animals can survive in a sustainable environment provided by forests.
7. The forest floor is a poor medium for microorganisms.
8. Forests purify the air by removing oxygen.
9. The sun radiation is absorbed by forests green cover.
10. The bark is used to make furniture.

IX. Translate into English using the active vocabulary of the lesson:

1. Зелена рослинність захищає водні ресурси від сонячного випромінювання.
2. Фотосинтез — це важлива функція рослин для виробництва їжі та енергії.
3. Трави, кущі та дерева поглинають вуглекислий газ з атмосфери протягом дня і виділяють кисень.
4. Деревина діють, як гігантські легені, очищуючи повітря в атмосфері виділенням вуглекислого газу та підтриманням збалансованого рівня кисню, яким ми дихаємо кожного дня.
5. Ліси забезпечують зелений покрив, який поглинає сонячне випромінювання та знижує температуру.
6. Ліси також сприяють опадам, які допомагають у підтриманні рівня ґрунтових вод та прохолодного клімату.
7. Вирубка лісів має протилежний ефект, призводячи до критичного підвищення температури.
8. Пале листя та поламани гілки, в решті решт, розкладаються в ґрунті, що збагачує його поживними речовинами.
9. Мікроорганізми, присутні в ґрунті, перетворюють біорозкладений матеріал на простіші частинки, які знову можуть бути використаними рослинами.
10. Ліс — це важливий компонент процесу водного циклу.

X. Some words do not belong to the following groups of words. Cross them out.

1. region, area, leaf, territory, effect, plot, site, place, district.
2. species, kind, cycle, sort, group, matter, variety, family, class, type.
3. turtle, squirrel, snake, air, wolf, fox, hare, support, monkey, bear, hedgehog.
4. river, sea, ocean, mountain, lake, pond, stream, water-fall, valley, spring.
5. climate, rainfall, temperature, erosion, sun, moisture, reason, snow, wind, precipitation, cloud.

DEVELOP YOUR COMMUNICATIVE SKILLS

XI. Make a summary to the text.

XII. Discuss the text “Importance of Forests” with your partner. Items for discussion:

1. Forests and atmosphere.
2. Animals in forests.
3. Forest soils.
4. Forests and water.
5. Forest products for human.

XIII. Would you like to live near a forest or not? Share your thoughts on this topic with your groupmates.

TASKS FOR SELF-CONTROL

I. Choose the word or phrase you think best completes the sentences.

1. Most natural stands of many tree species at various stages of growth.
a) are included b) are represented c) are composed
2. Woodlands constantly change ... trees grow and die.
a) during b) when c) as
3. Woodlands can be regenerated by natural or artificial
a) ways b) methods c) means
4. All tree species ... reproduce from seed, but only a very small percentage of seeds will become established seedlings.
a) may b) can c) should
5. Tree species with very large seeds ... relatively few seeds, while species with small seeds produce abundant seed.
a) get b) take c) produce
6. Very young and very old trees produce few viable seeds.
a) a lot of b) few c) many
7. Tree seeds are dispersed in a variety of ...

- a) methods b) means c) ways
8. Each tree species requires certain seedbed ... for seedling survival.
a) requirements b) circumstances c) conditions
9. Some hardwoods (such as aspen and black locust) can regenerate from root suckers, ... after the parent tree has been cut down.
a) often b) always c) usually
10. Root suckers ... from live roots, not from exposed stumps.
a) grow b) grew c) are growing
11. Trees that grow from root suckers are genetically identical clones of the parent
....
a) bud b) seedling c) tree
12. Oak, basswood, birch, maple, and some other hardwoods ...from stumps.
a) grow b) live c) sprout
13. ... root suckers, stump sprouts are genetically identical to the parent tree.
a) alike b) like c) similar
14. Layering ... when a buried branch on a living tree takes root and develops into a new tree.
a) is b) takes place c) occurs
15. Artificial regeneration usually is... ..than natural regeneration, but permits better control over species selection, genetic characteristics, and tree spacing.
a) expensive b) most expensive c) more expensive
16. Direct seeding is the process of ... or planting seeds.
a) distributing b) sowing c) placing
17. Direct seeding to establish jack pine and black spruce, as well as some hardwoods, including black walnut.
a) used b) is using c) is used
18. Planting seedlings, either bare-root or container-grown stock, is the most reliable way to regenerate a..., especially for conifers.
a) forest b) grove c) stand
19. Bare-root seedlings are dug from the nursery bed and shaken to remove most of the dirt around their... .
a) stumps b) sprouts c) roots
20. Seedling costs vary depending ... tree age, grade, species, and quantity ordered.
a) in b) from c) on

2. Match the terms with their definitions:

1. vegetation	a) a simple nonflowering plant bryophyte that has short stems with small leaves arranged in spirals and resembling scales and inhabits moist shady sites
2. root sucker	b) the natural conditions and environment in which a plant or animal lives, e.g., forest, desert, or wetlands
3. moss	c) a tree that produces several hundred suckers, creating a dense new stand

4. stump sprout	d) the bottom part of a tree left projecting from the ground after most of the trunk has fallen or been cut down
5. layering	e) they are sprouts that grow from exposed stumps, not roots, and are genetically identical to the parent tree
6. habitat	f) the fruit of the oak tree, a smooth oval nut in a rough cup-shaped base.
7. stump	g) an organism or cell, or group of organisms or cells, produced asexually from one ancestor or stock, to which they are genetically identical.
8. clone	h) sprouts that grow from live roots of the parent tree and are genetically identical clones of the parent tree
9. parent tree	i) sprouts that occur when a buried branch on a living tree takes root and develops into a new tree
10. acorn	j) plants in general or the mass of plants growing in a particular place
11. furniture	k) large movable equipment, such as tables and chairs, used to make a house, office, or other space suitable for living or working
12. slope	l) a slow-moving reptile, enclosed in a scaly or leathery domed shell into which it can retract its head and thick legs
13. lungs	m) a tough elastic polymeric substance made from the latex of a tropical plant or synthetically
14. turtle	n) a surface of which one end or side is at a higher level than another; a rising or falling surface
15. pollution	o) rain, snow, sleet, or hail that falls to the ground
16. rubber	p) an area or ridge of land that separates waters flowing to different rivers, basins, or seas
17. precipitation	q) the pair of organs situated within the rib cage, consisting of branching passages into which air is drawn, so that oxygen can pass into the blood and carbon dioxide be removed
18. watershed	r) the process of turning from liquid into vapor
19. butterfly	s) contamination, impurity, defilement
20. evaporation	t) a winged insect resembling a moth after a pupa stage

MODULE III
CONIFEROUS AND DECIDUOUS TREES

UNIT 7

I. Read and translate the text. Learn the active vocabulary of the lesson:

genus (n)	рід
timber (n)	деревина
bark (n)	кора
whorl (n)	пучок листя навколо стебла
bud (n)	брунька
needle (n)	голка
scale (n)	луска
cone (n)	шишка
pollen (n)	пиллок
male (adj)	чоловічий
female (adj)	жіночий
mature (v)	дозрівати
softwood (n)	м'яка деревина
hardwood (n)	тверда деревина
carpentry (n)	теслярські роботи
turpentine (n)	скипидар
bough (n)	гілка
edible (adj)	їстівний
resinous (adj)	смолистий
nodal (adj)	вузловий, центральний
uninodal (adj)	одновузловий
multinodal (adj)	багатовузловий
raw (adj)	сирий
baking (ger)	випічка
logging (ger)	лісозаготівля

Word-combination

to evaluate the soil fertility	оцінити родючість ґрунту
to generate a bud	утворювати бруньку
acid soil	кислий ґрунт
calcareous soil	вапнистий ґрунт
sandy soil	піщаний ґрунт
wilt disease	в'янення
decay resistant qualities	властивості, стійкі до гниття

PINE-TREE



The modern English name *pine* derives from Latin *pinus*. ***Pines*** are trees in the genus ***Pinus*** in the family Pinaceae. There are about 115 species of pine, although different authorities accept between 105 and 125 species.

Pines are native to most of the Northern Hemisphere, and have been introduced throughout most temperate and subtropical regions of the world, where they are grown as timber and cultivated as ornamental plants in parks and gardens. A number of introduced species have become invasive, threatening native ecosystems.

Pines are evergreen, coniferous resinous trees (or rarely shrubs) growing 3–80 m tall, with the majority of species reaching 15–45 m tall.

The bark of most pines is thick and scaly, but some species have thin, flaking bark.

The new spring shoots are sometimes called "candles"; they are covered in brown or whitish bud scales and point upward at first, then later turn green and spread outward. These "candles" offer foresters a means to evaluate fertility of the soil and vigour of the trees. Pines have four types of leaf:

- *Seed leaves* (cotyledons) on seedlings, borne in a whorl of 4–24 cm.
- *Juvenile leaves*, which follow immediately on seedlings and young plants, 2–6 cm long, single, green or often blue-green, and arranged spirally on the shoot.
- *Scale leaves*, similar to bud scales, small, brown and non-photosynthetic, and arranged spirally like the juvenile leaves.
- *Needles*, the adult leaves, which are green (photosynthetic), bundled in clusters commonly with 2–5 needles joined together. The needles persist for 1.5–40 years, depending on species.

Pines are mostly monoecious, having the male and female cones on the same tree. The male cones are small, typically 1–5 cm long, and only present for a short period, falling as soon as they have shed their pollen. The female cones take 1.5–3 years (depending on species) to mature after pollination. At maturity the female cones are 3–60 cm long.

Each cone has numerous spirally arranged scales, with two seeds on each fertile scale; the scales at the base and tip of the cone are small and sterile, without

seeds. The seeds are mostly small and winged, and are wind-dispersed but some are bird-dispersed. At maturity, the cones usually open to release the seeds, but in some of the bird-dispersed species, the seeds are only released by the bird breaking the cones open.

Pines grow well in acid soils, some also on calcareous soils; most require good soil drainage, preferring sandy soils, but a few will tolerate poorly drained wet soils. A few are able to sprout after forest fires.

Some species of pines (e.g., Bishop Pine) need fire to regenerate, and their populations slowly decline under fire suppression regimes. Several species are adapted to extreme conditions imposed by elevation and latitude (e.g., Siberian Dwarf Pine, Mountain Pine, etc.). The pinyon pines and a number of others, notably Turkish Pine and Gray Pine, are particularly well adapted to growth in hot, dry semi-desert climates.

The seeds are commonly eaten by birds and squirrels. Some birds are of importance in distributing pine seeds to new areas. Pine needles are sometimes eaten by some butterfly and moth species, the Pine sawfly, and goats.

Pines are among the most commercially important tree species, valued for their timber and wood pulp throughout the world. In temperate and tropical regions, they are fast-growing softwoods that will grow in relatively dense stands. Commercial pines are grown in plantations for timber that is denser, more resinous, and more durable than spruce. Pine wood is widely used in high-value carpentry items such as furniture, window frames, paneling, floors and roofing, and the resin of some species is an important source of turpentine.

Many pine species make attractive ornamental plantings for parks and larger gardens, with a variety of dwarf cultivars being suitable for smaller spaces. Pines are also commercially grown and harvested for Christmas trees. Pine cones, the largest and most durable of all conifer cones, are craft favorites. Pine boughs, appreciated especially in wintertime for their pleasant smell and greenery, are popularly cut for decorations. Pine needles are also used for making decorative articles like baskets, trays, pots, etc.

Because pines have no insect or decay resistant qualities after logging, they are generally recommended for construction purposes as indoor use only. This wood left outside can be expected to last no more than 12–18 months depending on the type of climate it is exposed to.

Some species have large seeds, called pine nuts, that are harvested and sold for cooking and baking.

The soft, moist, white inner bark (cambium) is edible and very high in vitamins A and C. It can be eaten raw in slices as a snack or dried and ground up into a powder for use as a thickener in stews, soups, and other foods.

A number of species are attacked by nematodes, causing pine wilt disease, which can kill the trees quickly.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the English equivalents to the following words and word-combinations:

декоративні рослини; загрожувати рідним екосистемам; північна півкуля; помірні та субтропічні регіони; дорогі столярні вироби; вічнозелені, хвойні дерева; більшість видів; тонка кора, що відшаровується; дуже туга спіраль; поширюватися назовні; оцінити родючість ґрунту; сила дерев; жіночі шишки; дозрівати після запилення; в залежності від виду; звільнити насіння; у дозріванні; вапняні ґрунти; проростати після лісових пожеж; екстремальні умови; сосна сибірська карликова; їстівний; смолиста деревина;

III. Give the Ukrainian equivalents to the following words and word-combinations:

commercially important tree species; fast-growing softwoods; more resinous; high-value carpentry items; birds and squirrels; poorly drained wet soils; to regenerate; sandy soils; acid soils; forest fires; several species; particularly; butterfly and moth species; monoecious; male and female cones; to shed their pollen; after pollination; small and winged seeds; wind-dispersed; juvenile leaves; arranged spirally on the shoot; joined together; immediately; thick and scaly; resinous trees; to threaten.

IV. Match the terms with their definitions:

1.timber	a) the more or less conical multiple fruit of the pine, fir etc.
2.pine	b) the external covering of the woody stems, branches, etc.
3.cone	c) a sticky flammable organic substance, exuded by some trees and other plants (notably fir and pine)
4.resin	d) any wood that is relatively soft and easily cut
5.carpentry	e) the hard, compact wood or timber of seed trees as oak, maple
6.turpentine	f) a fine powdery substance, typically yellow, consisting of microscopic grains discharged from the male part of a flower or from a male cone
7.softwood	g) a volatile pungent oil distilled from gum turpentine or pine wood
8.hardwood	h) the activity or occupation of making or repairing things in wood
9.pollen	i) a tree of the genus Pinus, comprising coniferous trees
10.bark	j) the wood of growing trees suitable for structural uses

V. Insert an appropriate word from the list into the text:

(*species, coniferous, conifer, leaves, trees, evergreen, needles, seeds, foliage, cones*)

Woodlands can be divided into two main types, ... and broadleaf. Within these two general categories there are many other different types. These are usually classified according to the dominant tree ... making up the woodland.

Coniferous woodland, as its name suggests, is made up predominantly of Conifers are ... often having needle-like ..., such as the familiar Christmas tree. They are usually ... In other words, rather than shedding their ... all at one time in the autumn, they lose a proportion throughout the year, with these being constantly replaced. As a result, they always have ... on them. All conifers also produce their ... inside ...

VI. Choose the word or phrase you think best completes the sentences.

1. Pine trees are long-lived reaching the ages of ...
 - a) 10 – 20 years
 - b) 1500 – 1800 years
 - c) 100 – 1000 years
 - d) 5 years
2. Pines are mostly monoecious, having the male and female ...
 - a) cones
 - b) flowers
 - c) bunds
 - d) leaves
3. Pine trees grow well on ...
 - a) acid soils
 - b) clay soils
 - c) black soils
 - d) peat soils
4. Pine trees are valued for their ...
 - a) timber and wood pulp
 - b) cones
 - c) needles
 - d) juice
5. Each pine cone has numerous spirally arranged scales with ...
 - a) 4 seeds
 - b) 2seeds
 - c) one seed
 - d) numerous seeds
6. Corn seeds are commonly eaten by ...
 - a) people

- b) snakes
 - c) birds and squirrels
 - d) fish
7. The modern English name “pine” derives from “pinus”, ...
- a) Latin word
 - b) Greek word
 - c) German word
 - d) Spanish word.

VII. Complete the table to make word families. Use the dictionary to help you. In case there is no corresponding derivative, put a No sign.

Noun	Verb	adjective	adverb
	introduce		
cultivation			
	produce		
		regular	
			actually
growth			
fertility			
			commercially
		important	
		numerous	
	mature		
			particularly

Fill the gaps with one of the words from the table. You may change the tense and form of the word:

1. The tree ... to many countries of temperate and subtropical regions.
2. Pine trees ... and ... as ornamental plants in parks and gardens.
3. The trees are grown on ... soils.
4. Pines are among the most ... of tree species in the USA.
5. This tree species is ... well adapted to growth in hot, dry semi desert climates.
6. plant produces numerous seeds.
7. These plants are often attacked by ... pests.
8. Pine needles are an ... source of vitamins A and C.

VIII. Look through the text for information and complete the following sentences.

1. The bark of most pines is ...
2. The branches are produced ...
3. Many pines are ...

4. The new spring shoots ... called ...
5. The “candles” offer ...
6. Pines have four types ...
7. The trees are mostly monoecious, having ...
8. The female cones take ...

IX. Translate into English using the Active Vocabulary of the lesson:

1. Кора більшості сосен товста і луската, але у деяких видів кора тонка, що лущиться.
2. Сосни є рідними для більшої частини Північної півкулі, і були завезені в більшість помірних і субтропічних регіонів.
3. Нові весняні пагони іноді називають «свічками»; вони покриті коричневим або білуватим кольором.
4. Сосни переважно однодомні, мають чоловічі та жіночі шишки на одному Дереві.
5. Кожна шишка має численні спіральні розташовані лусочки.
6. Сосни добре ростуть на кислих ґрунтах, деякі також на вапняних.
7. Деяким видам сосен потрібен вогонь для відновлення, і їх популяція повільно зменшується під час режимів пожежогасіння.
8. Деякі птахи відіграють важливу роль у поширенні насіння сосни на нові території.

DEVELOP YOUR COMMUNICATIVE SKILLS

X. Describe the morphology of a pine tree.

XI. Explain the difference between 4 types of leaves (seed, juvenile, scale leaves and needles).

XII. Discuss the text with your partner. Items for discussion:

- botanical characteristics of a pine tree;
- climatic and soil condition for growing pines;
- reproduction of pines;
- pine species mentioned in the text.

UNIT 8

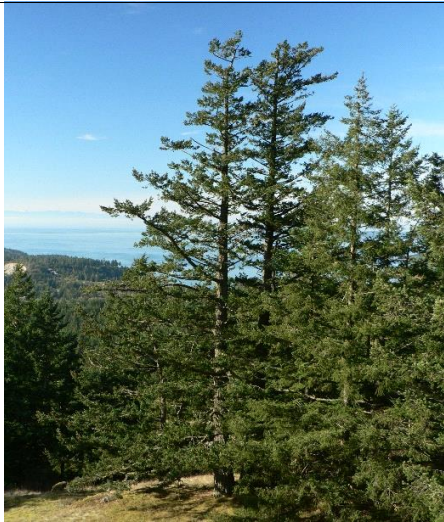
I. Read and translate the text. Learn the active vocabulary of the lesson:

fir (n)	ялиця
similarity (n)	similarity (n)
thrive (v)	процвітати
introduce (v)	представити, вводити
slope (n)	схил
exposure (n)	виставляння. відкритість
medium-size (adj)	середнього розміру
resemble (v)	нагадувати
encircle (v)	оточити
pendulous (adj)	звисаючий
persistent (adj)	стійкий
scales (n)	луска
hemlock (n)	тсуга
native (adj)	місцевий
cedar (n)	кедр
bract (n)	приквіток
knot (n)	вузол, сучок
fascicle (n)	пучок
protrude (v)	виступати
mast (n)	щогла
withstand (v)	протистояти, витримувати
resist (v)	протистояти
cause (v)	викликати
foliage (n)	листя
aircraft (n)	літак, авіація

Word-combinations

high loads	високе навантаження
construction industry	будівельна промисловість
well-aerated soil	добре аерований ґрунт
compacted soil	злитий ґрунт
unfavorable conditions	несприятливі умови
growth ring	кільце росту
mixed forest	змішаний ліс
host tree	дерево господар

DOUGLAS-FIR



Douglas-fir is one of the English common names for evergreen coniferous trees of the genus *Pseudotsuga* in the family Pinaceae. Other common names include Douglas tree, and Oregon pine.

The common name Douglas-fir honors David Douglas, the Scottish botanist who first introduced it into cultivation in 1827. Douglas is known for introducing many North American native conifers to Europe.

Douglas-firs reaches its best growth on well-aerated, deep soils with pH range from 5 to 6. It will not thrive on poorly drained or compacted soils.

The distribution of Douglas-firs is limited by factors such as unfavourable climate conditions like high seasonal winds and heavy wet snows. In the northern part of its range temperature is a major limiting factor, that is why Douglas-fir is mainly found on southern slopes in this region. In the southern part we find Douglas-firs growing on northern exposures.

Douglas-firs are medium-size to extremely large evergreen trees, 20–120 metres tall. The leaves are flat, soft, linear, 2–4 cm long, generally resembling those of the firs, occurring singly rather than in fascicles; they completely encircle the branches, which can be useful in recognizing the species. The female cones are pendulous, with persistent scales (unlike true firs), and are distinctive in having a long tridentine (three-pointed) bract.

According to some botanists, Rocky Mountain Douglas-fir extends south into Mexico to include all Mexican Douglas-fir populations.

All of the other species are of restricted range and little-known outside of their respective native environments, where they are often rare and of scattered occurrence in mixed forests.

Two needle-cast fungus diseases Rhabdocline and Swiss needle-cast have become serious problems in Douglas-firs plantations across the USA. These diseases cause premature needle loss resulting in trees with thin foliage. This condition adversely affects all Douglas-firs plantations, but is especially bad in Christmas tree plantations where thin foliated trees may not be saleable.

Both diseases seem to be more severe on the Rocky Mountains variety of Douglas-firs than on the Pacific coast variety. Douglas-firs beetle is the most destructive bark beetle attacking Douglas-firs. Outbreaks develop in host trees following stand disturbances such as wind throw, fire, drought or severe defoliation. Stands with extensive amounts of root disease may also predispose trees to beetle attack.

Douglas-fir wood is used for structural applications that are required to withstand high loads. It is used extensively in the construction industry. Other examples include its use for homebuilt aircraft.

Oregon pine is also used in boat building when it is available in long, fairly knot-free lengths. Most timber now comes from plantation forests in North America which are managed to produce faster growing timber with fewer knots. This timber is generally lighter but weaker. Traditionally, Oregon pine was used in mast building due to its ability to resist bending loads without fracturing. This was based on using older native forest wood with a high number of growth rings per inch. This sort of wood is seldom available new but can be sourced from merchants dealing in recycled timber. Native Oregon pine is heavy, about the same weight as Western red cedar, but with far better bending characteristics than cedar. Large-sized Oregon pine, as used in beams, is inclined to split as it dries, like oak, but this does not reduce its strength.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the English equivalents to the following words and word-combinations:

вічнозелене дерево; хвойне дерево; рід; вид; дерево середніх розмірів; ялина; ялиця; гілка; шишка; широко розповсюджений; поширюватися; змішаний ліс; деревина ялини; будівельна промисловість; грибкове захворювання хвої; плантації ялин; міцність деревини; кедр; різдвяне дерево; добре аерований ґрунт; несприятливі кліматичні умови; хвороби та шкідники ялиці; пошкоджувати плантації дерев; кора дерева; пожежа та посуха; коренева хвороба дерева; зібране насіння; кислотність ґрунту.

III. Give the Ukrainian equivalents to the following words and word-combinations:

mast building; recycled timber; better bending characteristics; faster growing timber; fewer knots; root disease; Douglas-firs beetle; the most destructive bark beetle; premature needle loss; sailable; Chinese species; taxonomic treatment; mixed forests; according to some botanists; widespread and abundant species; female cones; seasonal winds; major limiting factor; unfavourable climate conditions; fascicles; common name; evergreen coniferous trees; similarity; native conifers.

IV. Give all the possible derivatives of the following verbs:

Accept, vary, restrict, occur, apply, grow, produce, destruct

V. Match the terms with their definitions:

1. slope	a) any of a number of conifers that typically yield fragrant, durable timber
2. cedar	b) a leaf of some conifers
3. trident	c) a surface of which one end or side is at a higher level than another; a rising or falling surface
4. fascicle	d) plant leaves collectively
5. needle	e) a bundle of structures, such as nerve or muscle fibers or conducting vessels in plants
6. foliage	f) trees staying with green foliage all the year round
7. evergreen trees	g) a redwood tree, especially the California redwood
8. sequoia	h) the process of losing leaves
9. defoliation	i) an airplane, helicopter, or other machine capable of flight
10. aircraft	j) a three-pronged spear, especially as an attribute of Poseidon (Neptune)

VI. Insert an appropriate term from the text into the following sentences:

1. Douglas-fir is the English common name for ... coniferous trees.
2. The firs are medium-size to extremely large evergreen ..., 20 – 120 meters tall.
3. The leaves of the tree are ..., soft, linear, 2 – 4 centimetres long.
4. The ... cones of Douglas-fir are pendulous with persistent scales.
5. Douglas-fir ... is used for structural applications that are required to withstand high loads.
6. Most timber now comes from ... forests in North America.
7. Douglas-fir is one of the most commonly marketed ... tree species in the USA.
8. The firs are best adapted to well-aerated, ... soils with pH from 5 to 6.
9. Douglas-fir beetle is the most ... bark beetle attacking the tree.
10. The stands of firs with extensive amounts of ... disease predispose trees to beetle attack.

VII. Each sentence below has a content mistake. Find and correct it.

1. Douglas-fir wood is rarely used for structural applications as it is very flexible.
2. Both diseases seem to be more severe on the Pacific coast variety of Douglas-firs.
3. Douglas-firs beetle is not very aggressive pest attacking Douglas-firs.
4. Two needle-cast fungus diseases have become serious problems in Douglas-firs plantations across the UK.
5. Douglas-firs are usually short to medium-size evergreen trees.
6. The distribution of Douglas-firs is limited by factors such as unfavourable

climate conditions like droughts or tropical rains.

7. In the southern part we find Douglas-firs growing on southern exposures.
8. Douglas-firs reaches its best growth on poorly drained or compacted soils.

VIII. Translate into English using the Active Vocabulary of the lesson:

1. Зараз більшість деревини надходить із плантаційних лісів у Північній Америці, які виробляють швидше зростаючу деревину з меншою кількістю сучків.
2. Традиційно орегонська сосна використовувалася в будівництві щогл завдяки її здатності протистояти навантаженню без руйнування.
3. Деревина дугласової ялиці використовується для конструкцій, які повинні витримувати високі навантаження.
4. Поширення дугласії обмежене такими факторами, як несприятливі кліматичні умови.
5. Дугласія — вічнозелені дерева від середніх до надзвичайно великих розмірів, висотою 20–120 метрів.
6. Жіночі шишки звисають, зі стійкими лусочками і відрізняються довгим тризубним (трикутним) приквітком.

DEVELOP YOUR COMMUNICATIVE SKILLS

IX. Describe the botanical characteristics of the Douglas-fir.

X. Make a summary to the text.

XI. Discuss the diseases and pests of Douglas-fir using phrases for text discussion.

- A: Douglas-fir like other conifers is damaged by some diseases. What are they?
B: According to the text ...
- A: What do these diseases cause?
B: As far as I know,
- A: Rhabdocline and Swiss diseases are more severe on the Pacific coast variety of Douglas fir tree, than on the Rocky Mountain variety, aren't they?
B. Just the contrary ...
- A: What is the most destructive beetle damaging the Douglas fir tree?
B: According to the information given in the text ...
- A: What part of the tree is injured by this pest?
B. In my opinion ...

UNIT 9

I. Read and translate the text. Learn the active vocabulary of the lesson:

elm (n)	в'яз
trunk (n)	стовбур
semi-deciduous (adj)	напівлистяний
horticulturalist (n)	садівник
landscaping (n)	планування садів, парків
apex (n)	верхівка
bee (n)	бджола
tolerant (adj)	терпимий
propagate (v)	розмножуватися
devastate (v)	спустошувати
transmit (v)	переносити
strain (n)	рід, вид, штам
damage (n)	пошкодження
cultivar (n)	сорт
value (v)	цінувати, оцінювати
grain (n)	зернятко, зернистість
lawn (n)	газон, галявина
yew (n)	тис
pruning (n)	обрізання, підрізання (гілок)
moth (n)	міль
larva (n)	личинка, гусінь
renaissance (n)	відродження
susceptible (adj)	вразливий

Word-combination

Dutch elm disease	голландська хвороба в'яза
perfect flower	досконала квітка
fungal spore	грибкова спора
elm leaf beetle	листоїд в'язів
leaf litter	листяна підстилка
vascular system	судинна система
beetle-dispersed fungus	грибок, що поширюється жуками

ELM



Narrow-leaved Elm.

Elms are deciduous and semi-deciduous trees comprising the genus *Ulmus* in the plant family Ulmaceae. The dozens of species are found in temperate and tropical-montane regions of North America and Eurasia, ranging southward into Indonesia. Elms are components of many kinds of natural forests. During the 19th and early 20th centuries, many species and cultivars of elms were planted as ornamental street,

lawn, and park trees in Europe, North America, and Australia.

Some individual elms have reached great size and age. In recent decades, many elms of European or North American origin have died from the Dutch elm disease (DED), a beetle-dispersed fungus; in response, horticulturists have developed various kinds of disease-resistant elm trees, allowing the genus to be increasingly used again in horticulture and landscaping.

Elm leaves are alternate, with simple, single- or doubly-serrate margins, usually asymmetric at the base and acuminate at the apex. The genus has apetalous perfect flowers which are mostly wind-pollinated, although bees do visit them. All species are tolerant of a wide range of soils and pH levels but, with few exceptions, demand good drainage.

The genus *Ulmus* first appeared about 20 million years ago. Originating in what is now central Asia, these trees flourished and spread over most of the Northern Hemisphere, traversing the Equator in Indonesia. There are about 30 to 40 species of elm. The name *Ulmus* is the classical name for these trees, with the English name "elm" and many other European names derived from it.

From the 18th century to the early 20th century, elms were among the most widely planted ornamental trees in both Europe and North America. They were particularly popular as a street tree in avenue plantings in towns and cities. Their tolerance of air-pollution and the comparatively rapid decomposition of their leaf-litter in the fall were further advantages.

In North America, the species most commonly planted was the American elm, which had unique properties that made it ideal for such use: rapid growth, adaptation to a broad range of climates and soils, strong wood, resistance to wind damage, and vase-like growth habit requiring minimal pruning.

During the 18th and 19th centuries, elm cultivars enjoyed much popularity as ornamentals in Europe by virtue of their rapid growth and variety of foliage and forms. Since 1990, the elm has enjoyed a renaissance through the successful development in North America and Europe of cultivars highly resistant to the new

disease. The total number of cultivars, ancient and modern, now exceeds 300, although many of the older clones, possibly over 120, have been lost to cultivation.

DED is caused by a micro-fungus transmitted by two species of elm-bark beetle. The first, less aggressive strain of the disease fungus, arrived in Europe from the Far East in 1910, and was accidentally introduced to North America in 1928.

The second, far more virulent strain of the disease was identified in Europe in the late 1960s, and within a decade had killed over 20 million trees (approximately 75%) in the UK alone. Approximately three times more deadly, the origin of the new strain remains a mystery.

Most serious of the elm pests is the elm leaf beetle which can decimate foliage, although rarely with fatal results. The beetle was accidentally introduced to North America from Europe.

Another unwelcome immigrant to North America is the Japanese beetle. In both instances the beetles cause far more damage in North America owing to the absence of the predators present in their native lands.

In North America, careful selection has produced a number of trees resistant not only to disease, but also to the droughts and extremely cold winters afflicting the continent. Research in the USA has concentrated on the American Elm, resulting in the release of highly resistant clones, notably the cultivars 'Valley Forge' and 'Jefferson'. Much work has also been done in the selection of disease-resistant Asiatic species and cultivars.

Elm wood was valued for its interlocking grain, and consequent resistance to splitting, with significant uses in wagon wheel hubs, chair seats and coffins. The elm's wood bends well and distorts easily making it quite pliant. The often long, straight, trunks were favored as a source of timber in ship construction. Elm is also prized by bowyers; of the ancient bows found in Europe, a large portion of them are elm. During the Middle Ages elm was also used to make longbows if yew was unavailable.

CHECK YOUR PROFESSIONAL VOCABULARY

II. Give the English equivalents to the following words and word-combinations:

листяні дерева; широколистяні дерева; види, стійкі до хвороб; випуск високостійких клонів; особливо популярні; швидке зростання; місцеві сорти; успішний розвиток; мінімальна обрізка; завдавати більшої шкоди; японський жук; приблизно; походження нового штаму; вірулентний штам захворювання; розквітати і поширюватися; напівлистяні дерева; південна півкуля; грибок, що поширюється жуками; голландська хвороба в'яза; спустошувати; личинка, гусениця; вразливий; планування ландшафту; в'яз.

III. Give the Ukrainian equivalents to the following words and word-combinations:

elm leaf beetle; leaf litter; beetle-dispersed fungus; renaissance; moth; larva; yew; tolerant; tropical-montane regions; to reach great size and age; horticulturists; disease-resistant elm trees; horticulture and landscaping; pH levels; to demand good drainage; aggressive strain of the disease fungus; serious elm pest; fatal results; careful selection; highly resistant clones; tolerance of air-pollution; wind damage; vase-like growth; variety of foliage and forms; to evolve anti-fungal genes.

IV. Match the terms with their definitions:

1. disease	a) a plant variety that has been produced in cultivation by selective breeding
2. genus	b) the unit of inheritance which is situated on and transmitted by the chromosomes
3. fungus	c) that part of a vascular bundle which consists of tracheids and immediately associated cells forming the woody portion
4. predator	d) an animal or a plant that naturally preys on other living organisms
5. xylem	e) the art or practice of garden cultivation and management
6. horticulture	f) the usual major subdivision of a family or subfamily usually consisting of more than one species
7. drought	g) a prolonged period of abnormally low rainfall, leading to a shortage of water
8. moth	h) any of a group of spore-producing organisms feeding on organic matter, including molds, yeast and mildew
9. cultivar	i) any of a very large group of Lepidopterous insects distinguished from the butterflies not having antennal
10. gene	j) morbid condition of the body or some organ or a part of the body

V. Match the synonyms:

1. compose	a) patience
2. tolerance	b) fast
3. advantage	c) leaves
4. properties	d) superiority
5. rapid	e) aridity
6. possibility	f) make up
7. drought	g) traits
8. damage	h) transfer
9. foliage	i) opportunity
10. transmit	j) harm

VI. Fill in the gaps with an appropriate word from the list below:

(*variety, leaves, snowfall, seeds, climatic, autumn, evergreen, temperate, nutrients, dormant*)

Broadleaf trees

Broadleaf woodland is composed of trees with ... which are not needle-like. The leaves of different broadleaf trees are within a great ... of shapes and sizes, but tend to be flat, broad shapes, quite unlike the needles of conifers. Deciduous trees lose all their leaves in the ... , remaining bare through the cold winter months until spring, when they grow new foliage. Some broadleaf trees however, are ... , rather than deciduous. Holly is an example. The ... of broadleaf trees are produced within a great variety of different structures, from acorns to berries.

Broadleaf trees such as Oak and Beech are adapted to the cold, but somewhat milder winters of ... climates. The damage to branches in conditions of heavy ... is, thus, a real possibility. This makes them less well-adapted to really harsh ... conditions. The loss of the leaves and the cessation of photosynthesis means that water, minerals and ... no longer have to be transported to all parts of the tree. Thus, the sap no longer circulates and the trees essentially become ... over the winter period.

VII. Complete the table to make word families. Use the dictionary to help you.

In case there is no corresponding derivative, put a No sign.

Noun	Verb	Adjective	Adverb
		temperate	
construction			
	introduce		
			vegetatively
	devastate		
			possibly
		resistant	
tolerance			
	occur		

Fill gaps in the sentences with one of the words from the table. You may change the form of the word:

1. This plant is ... propagated.
2. The often long, straight trunks were used as a source for keels in ship ...
3. New hybrid cultivars of elm ... to Dutch elm disease have been received.
4. The dozens of elm species are found in ... and tropical regions.
5. All species of the tree are ... of a wide range of soils and pH levels.
6. Dutch elm disease ... elms in Europe and USA in the second half of the 20th

century.

7. Fungal spores ... into the wounds in the tree caused by the beetles, invade the xylem or vascular system.

VIII. Choose the correct answer to the following questions:

1. When did Dutch elm disease devastate the forests in the USA for the first time?
 - a) in the 16th century,
 - b) in the second half of the 20th century,
 - c) in 1928;
 - d) last 5 years.
2. What insect is DED transmitted by?
 - a) elm-bark beetle,
 - b) oak-bark beetle,
 - c) brown-tail moth,
 - d) elm-sawfly.
3. Why did the elm cultivars enjoy much popularity as ornamentals in Europe?
 - a) because of their rapid growth;
 - b) because of their nice leaves;
 - c) because of their resistance to diseases;
 - d) because of their fragrant flowers.
4. Which kind of Elm has the research in the USA concentrated on?
 - a) Indonesian Elm;
 - b) Asiatic species;
 - c) 'Jefferson';
 - d) American Elm;
5. When did the genus *Ulmus* first appear?
 - a) three thousand years ago;
 - b) twenty million years ago;
 - c) one million years ago;
 - d) two million years ago;
6. What is the most dangerous elm pest?
 - a) elm leaf beetle,
 - b) elm sawfly,
 - c) elm-bark beetle,
 - d) Japanese beetle.
7. Where were elm trees particularly popular from the 18th to the early 20th century?
 - a) in botanical gardens;
 - b) as element of hedging;
 - c) in city parks;
 - d) in avenue plantings;

DEVELOP YOUR COMMUNICATIVE SKILLS

IX. Make a summary to the text.

X. Describe climatic and soil conditions for growing elm trees.

XI. Discuss the text “Elm” using model phrases. Work in pairs:

- A: What family does the tree belong to?
B: As far as I know,
- A: In what regions are most elm species found?
B: According to the text
- A: What types of soils are the species of this tree tolerant to?
B: In my opinion
- A: What are the main characteristics of the elm tree leaves?
B: According to the text
- A: The flowers of the tree are apetalous perfect ones. What does it mean?
B: I think that ...
- A: Can bees pollinate the flowers?
B: Certainly, I think so ...

XII. What special terms from the text can you use if you have to speak about diseases and pests damaging the tree?

TASKS FOR SELF-CONTROL

1. Choose the word or phrase you think best completes the sentences.

1. Pines are native to most of the Northern Hemisphere, and have been introduced ...most temperate and subtropical regions of the world.
a) on b) in c) throughout
2. Pinesas timber and cultivated as ornamental plants in parks and gardens.
a) are grown b) are cultivated c) are spread
3. Pines are evergreen, coniferous resinous trees (or rarely shrubs) growing 3–80 m tall, with the majority of ...reaching 15–45 m tall.
a) types b) varieties c) species
4. Pines ...four types of leaf: seed leaves, juvenile leaves, scale leaves, needles.

- a) are having b) have c) has
5. Pines are mostly monoecious, having the male and female cones on the same ...
a) shrub b) plant c) tree
6. Pines grow well in acid soils, some also on calcareous soils; most ... good soil drainage, preferring sandy soils, but a few will tolerate poorly drained wet soils.
a) possess b) have c) require
7. The ... of pines are commonly eaten by birds and squirrels.
a) flowers b) seeds c) fruits
8. Pines are among the most commercially important tree species, ...for their timber and wood pulp throughout the world.
a) famous b) estimated c) valued
9. The distribution of Douglas-firsby factors such as unfavourable climate conditions like high seasonal winds and heavy wet snows.
a) is limited b) is determined c) is defined
10. Douglas-firs are medium-size to extremely ... evergreen trees, 20–120 metres tall.
a) largest b) larger) c) large
11. The leaves are flat, soft, linear, 2–4 cm long, ... resembling those of the firs.
a) particularly b) especially c) generally
12. Elms are deciduous and semi-deciduous trees ... the genus *Ulmus* in the plant family Ulmaceae.
a) including b) consisting c) comprising
13. Elms are ... of many kinds of natural forests.
a) components b) elements c) representatives
- 14.... the 19th and early 20th centuries, many species and cultivars of elms were planted as ornamental streetlawn, and park trees in Europe, North America, and Australia.
a) for b) in c) during
15. The name *Ulmus* is the classical ... for these trees, with the English name "elm" and many other European names derived from it.
a) title b) name c) word
16. All species are tolerant of a wide range of soils and pH levels but, with few exceptions, demand good drainage.
a) want b) require c) demand
17. Elm leaves are alternate, with simple, single- or doubly-serrate margins, usually asymmetric at the ...and acuminate at the apex.
a) ground b) corner c) base
18. The ...*Ulmus* first appeared about 20 million years ago.
a) genus b) order c) family
19. During the 18th and 19th centuries, elm cultivars enjoyed much popularity as ornamentals in Europe by virtue of their rapid growth and variety of ... and forms.
a) stems b) foliage c) leaves

20. The total number of cultivars, ancient and modern, now ... 300, although many of the older clones, possibly over 120, have been lost to cultivation.

a) is over

b) prevails

c) exceeds

2. Match the terms with their definitions:

1. slope	a) any of a number of conifers that typically yield fragrant, durable timber
2. cedar	b) plant leaves collectively
3. trident	c) a surface of which one end or side is at a higher level than another; a rising or falling surface.
4. fascicle	d) a leaf of some conifers
5. needle	e) a bundle of structures, such as nerve or muscle fibers or conducting vessels in plants.
6. foliage	f) trees staying with green foliage all the year round
7. evergreen trees	g) a redwood tree, especially the California redwood.
8. sequoia	h) the process of losing leaves
9. defoliation	i) an airplane, helicopter, or other machine capable of flight.
10. aircraft	j) a three-pronged spear, especially as an attribute of Poseidon (Neptune)
11. disease	k) a plant variety that has been produced in cultivation by selective breeding
12. genus	l) the unit of inheritance which is situated on and transmitted by the chromosomes
13. fungus	m) that part of a vascular bundle which consists of tracheids and immediately associated cells forming the woody portion
14. predator	n) an animal or a plant that naturally preys on other living organisms
15. xylem	o) the art or practice of garden cultivation and management
16. horticulture	p) the usual major subdivision of a family or subfamily usually consisting of more than one species
17. drought	q) a prolonged period of abnormally low rainfall, leading to a shortage of water
18. moth	r) any of a group of spore-producing organisms feeding on organic matter, including molds, yeast and mildew
19. cultivar	s) any of a very large group of Lepidopterous insects distinguished from the butterflies not having antennal
20. gene	t) morbid condition of the body or some organ or a part of the body

MODULE 4

FOREST ECOLOGY

UNIT 10

I. Read and translate the text. Learn the active vocabulary of the lesson:

essential (adj)	істотний, необхідний
breathe (v)	дихати
behave (v)	поводити себе
survive (v)	виживати
attempt (v)	намагатися
purpose (n)	мета
fuel (n)	паливо
complexity (n)	складність
connote (v)	мати додаткове значення
disturbance (n)	тривога, порушення
focal (adj)	центральний
diverse (adj)	різний
approach (n)	підхід
beetle (n)	жук
retention (n)	утримання, зберігання
intricate (adj)	заплутаний, важкий
heterogeneous (adj)	різномірний
able (v)	давати змогу
fern (n)	папороть
enhance (v)	збільшувати, посилювати
abundance (n)	велика кількість
timber (n)	лісоматеріали
turkey (n)	індик
diminish (v)	зменшувати (ся)
mimic (v)	імітувати

Word - combinations:

forest management	керування лісом
thriving process	процес буйного росту
inhabited area	населена територія
infinite number	нескінченна кількість
spatial arrangements	просторові заходи

relative humidity	ВІДНОСНА ВОЛОГІСТЬ
terrestrial plant communities	групи наземних рослин

FOREST ECOLOGY

Part I

Forest ecology is the scientific study of the interrelated patterns, processes, flora, fauna and ecosystems in forests. The management of forests is known as forestry, silviculture or forest management. A forest ecosystem is a natural woodland unit consisting of all plants, animals and micro-organisms (biotic components) in that area functioning together with all of the non-living physical (abiotic) factors of the environment.

Forests have an enormously important role to play in human life. They are essential for people to breathe. They also serve as homes for millions of people, and billions depend on forests in some way. Likewise, a large proportion of the world's animal species live in forests. That's why we absolutely must protect them.

Forest ecology helps understand life in the forest. It shows how living organisms behave, live and survive. Furthermore, forest ecology attempts to provide an understanding of the thriving process of forests. Similarly, many forests are also used for economic purposes such as fuel and wood products. Therefore, understanding how forests are managed is also a goal of forest ecology.

Forest ecology is one branch of a biotically-oriented classification of ecological study types. Thus, forests are studied at a number of organizational levels, from the individual organism to the ecosystem. However, as the term forest connotes an area inhabited by more than one organism, forest ecology often concentrates on the level of the population, community or ecosystem.

Logically, trees are an important component of forest research, but the wide variety of other life forms and abiotic components in most forests means that other elements, such as wildlife or soil nutrients, are often the focal point. Thus, forest ecology is a highly diverse and important branch of ecological study.

Forest ecology studies share characteristics and methodological approaches with other areas of terrestrial plant ecology. However, the presence of trees makes forest ecosystems and their study unique in numerous ways.

Since trees can grow larger than other plant life-forms, there is the potential for a wide variety of forest structures. The infinite number of possible spatial arrangements of trees of varying size and species makes for a highly intricate and diverse micro-environment in which environmental variables such as solar radiation, temperature, relative humidity, and wind speed can vary considerably over large and small distances.

In addition, an important proportion of a forest ecosystem biomass is often underground, where soil structure, water quality and quantity, and levels of various

soil nutrients can vary greatly. Thus, forests are often highly heterogeneous environments compared to other terrestrial plant communities.

This heterogeneity in turn can enable great biodiversity of species of both plants and animals. Some structures, such as tree ferns may be keystone species for a diverse range of other species. A number of factors within the forest affect biodiversity: primary factors enhancing wildlife abundance and biodiversity; the presence of diverse tree species within the forest and the absence of even aged timber management.

For example, the wild turkey thrives when uneven heights and canopy variations exist and its numbers are diminished by even aged timber management. Forest management techniques that mimic natural disturbance event can allow community diversity to recover rapidly for a variety of groups including beetles.

INCREASE YOUR VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

in addition; to vary considerably; spatial arrangement; wide variety of forest structures; solar radiation; relative humidity; thriving process of forests; area inhabited by many organisms; a goal of forest ecology; world's animal species; non-living physical (abiotic) factors; enormously important role; likewise; furthermore; to behave, live and survive; similarly; terrestrial plant communities; economic purposes; fuel and wood products; wildlife and soil nutrients; important branch of ecological study; infinite number; wind speed; water quality and quantity.

III. Give the English equivalents to the following words and word-combinations:

екологія лісу; неоднорідність; ключові види; імітувати природні порушення; функціонувати разом; оточуюче середовище; важлива роль; розмаїття дикої природи; дихати; види тварин; виживати; забезпечувати; економічні цілі; галузь промисловості; поживні речовини ґрунту; різні наукові підходи; деревовидні папороті; дослідження; достаток дикої природи; багаточисельні шляхи; першорядний; маленька відстань; підземні води; порівнювати; населена територія; чисельність і біорізноманіття.

IV. Find the terms in the text which describe the following:

- science and art of managing forests;
- branch of biology dealing with living organisms: habits, modes of life, and relations to their surroundings;
- large tract covered with trees;
- serving as or providing nourishment;
- wood prepared for building, carpentry;
- air in more or less rapid natural motion;

V. Match the words having the opposite meaning:

1. severe	a) susceptibility
2. unique	b) constantly
3. resistance	c) health
4. renaissance	d) slow
5. accidentally	e) alien
6. disease	f) common
7. rapid	g) exactly
8. native	h) mild
9. approximately	i) decline

VI. What do the underlined words in the following sentences mean?

1. A forest ecosystem is a natural woodland unit which consists of plants, animals and microorganisms.

- a) describes
- b) draws
- c) includes

2. The forest ecosystem is very important.

- a) interesting
- b) significant
- c) big

3. Forests serve as homes for millions of animals.

- a) houses
- b) dwellings
- c) apartments

4. We must protect forests.

- a) help
- b) enclose
- c) save

5. Many forests are used for economic purposes.

- a) aims
- b) roles
- c) ideas

6. Forest ecology often concentrates on the level of the population, community or ecosystem.

- a) focuses
- b) shows
- c) stands

VII. Confirm or contradict the following statements, saying *True or False*.

1. Forestry ecology studies flora, fauna and ecosystems in forests.
2. Silviculture is the art and science of forest management.
3. A forest ecosystem isn't influenced by human activities.
4. Forests play an important role only in the life of people.
5. Forests are essential for humans to breathe and construct their houses.
6. A small proportion of the world's animal species live in forests.
7. People must protect their houses and gardens but not forests.
8. Forest ecology enables to understand how timber should be used in construction industry.
9. Forests are not used for economic purposes.
10. There are a lot of factors within the forest that influence biodiversity.

VIII. Translate into English using the Active Vocabulary of the lesson:

1. Екологія лісу вивчає світ рослин, тварин та мікроорганізмів, які функціонують разом з усіма неживими фізичними факторами.
2. Розуміння того, як ведеться лісове господарство, також є метою лісової екології.
3. Екологія лісу дуже різноманітна і важлива галузь екологічних досліджень.
4. Екологія лісу показує, як живі організми поведуться, живуть і виживають в умовах певної системи.
5. Ліси необхідні як для дихання людини, так і для задоволення багатьох її щоденних потреб.
6. Значна частина видів тварин живе в лісах.
7. Люди повинні захищати ліси та сприяти їх розумному утриманню та відновленню.
8. Багато лісів використовують в економічних цілях.

DEVELOP YOUR COMMUNICATIVE SKILLS

IX. Make a summary to the text.

X. Make your own plan to the text and describe Forest ecology as a science.

X. Ask ten questions to the text.

UNIT 11

I. Read and translate the text. Learn the active vocabulary of the lesson:

flux (n)	потік
store (n)	запас, резерв
contain (v)	містити в собі
treefall (n)	падіння дерев
alter (v)	змінювати(ся)
biota (n)	флора і фауна певного регіону
induce (v)	викликати, стимулювати
rate (n)	норма, пропорція, ступінь
instantaneous (adj)	миттєвий
debris (n)	уламки
decay (n)	гнила частина, розпад
due (adj)	обумовлений
arid (adj)	сухий, посушливий
remain (v)	залишатися
eerie (adj)	моторошний, жахливий
maturity (n)	зрілість
competition (n)	змагання, конкуренція
thinning (ger)	прорідження
stage (n)	стадія, фаза
transition (n)	перехід, переміщення
evaporation (n)	випаровування
increase (n)	збільшення
duff (n)	<i>амер.</i> гумус
repository (n)	сховище, умістище
flooding (ger)	затоплення
deprivation (n)	утрата, позбавлення

Word - combinations:

human overuse	надмірне використання людиною
forest floor	лісова підстилка
steady state phase	фаза стійкого стану
to be designated	бути призначеним
to be closely aligned	бути приєднаним
leaf litter	настил з листя
through grazing	через випас худоби

FOREST ECOLOGY

Part II

Forests accumulate large amounts of standing biomass, and many are capable of accumulating it at high rates, i.e., they are highly productive. Such high levels of biomass and tall vertical structures represent large stores of potential energy that can be converted to kinetic energy under the right circumstances.

The world's forests contain about 606 gigatons of living biomass (above- and below-ground) and 59 gigatons of dead wood.

Two such conversions of great importance are fires and treefalls, both of which radically alter the biota and the physical environment where they occur. Also, in forests of high productivity, the rapid growth of the trees induces biotic and environmental changes, although at a slower rate and lower intensity than relatively instantaneous disturbances such as fires.

Woody material, often referred to as coarse woody debris, decays relatively slowly in many forests in comparison to most other organic materials, due to a combination of environmental factors and wood chemistry. Trees growing in arid or cold environments do so especially slowly. Thus, tree trunks and branches can remain on the forest floor for long periods, affecting such things as wildlife habitat, fire behavior, and tree regeneration processes.

Some trees leave behind eerie skeletons after death. In reality these deaths are actually very few compared to the amount of tree deaths that go unnoticed. Thousands of seedlings can be produced from a single tree but only a few can actually grow to maturity. Most of those deaths are caused from competition for light, water, or soil nutrients, this is called natural thinning. Singular deaths caused by natural thinning go unnoticed, but many deaths can help form forest ecosystems.

There are four stages to forest regrowth after a disturbance, the establishment phase which is rapid increase in seedlings, the thinning phase which happens after a canopy is formed and the seedlings covered by it die, the transition phase which occurs when one tree from the canopy dies and creates a pocket of light giving new seedlings opportunity to grow, and lastly the steady-state phase which happens when the forest has different sizes and ages of trees.

Lastly, forest trees store large amounts of water because of their large size and physiological characteristics. They are therefore important regulators of hydrological processes, especially those involving groundwater hydrology, local evaporation, rainfall and snowfall patterns.

An estimated 399 million ha of forest is designated primarily for the protection of soil and water; an increase of 119 million ha has been since 1990.

Thus, forest ecological studies are sometimes closely aligned with meteorological and hydrological studies in regional ecosystem or resource planning studies. Perhaps more importantly the duff or leaf litter can form a major repository of water storage. When this litter is removed or compacted through grazing

or human overuse, erosion and flooding are exacerbated as well as deprivation of dry season water for forest organisms.

INCREASE YOUR VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

forest ecologists; effects of large disturbances; amounts of standing biomass; to be capable; high rates; tall vertical structures; potential energy; under the right circumstances; dead wood; physical environment; high productivity; rapid growth; lower intensity; tree regeneration processes; to leave behind; unnoticed; a single tree; natural thinning; establishment phase; seedlings; a pocket of light; regulators of hydrological processes; rainfall; meteorological studies; water storage; to be removed or compacted.

III. Give the English equivalents to the following words and word-combinations:

велика кількість; високопродуктивний; високі вертикальні конструкції; правильні обставини; пожежі та падіння дерев; фізичне середовище; траплятися; швидке зростання; викликати зміни в оточенні; деревний матеріал; грубі деревні залишки; у порівнянні; стовбури та гілки дерев; посушливі або холодні умови; процеси регенерації дерев; моторошні скелети померлих дерев; вирости до зрілості; конкуренція за світло, воду та поживні речовини; природне проріджування; лісовий навіс; випаровування.

IV. Match the terms with their definitions

1. biomass	a) the interruption of a settled and peaceful condition
2. erosion	b) the process of turning from liquid into vapor
3. disturbance	c) the total mass of organisms in a given area or volum
4. biotic	d) scattered pieces of waste or remains
5. debris	e) (of organic matter) rot or decompose through the action of bacteria and fungi
6. grazing	f) wild animals collectively; the native fauna (and sometimes flora) of a region
7. evaporation	g) the natural home or environment of an animal, plant, or other organism
8. decay	h) relating to or resulting from living things, especially in their ecological relations
9. wildlife	i) grassland suitable for pasturage
10. habitat	j) he process of eroding or being eroded by wind, water, or other natural agents

V. Match the words having the opposite meaning:

1. to accumulate	a) moist
2. rapid	b) tamed
3. coarse	c) to thrive
4. arid	d) slow
5. to remain	e) dark
6. wild	f) to scatter
7. to decay	g) to leave
8. light	h) loose
9. to create	i) smooth
10. compacted	j) to destroy

VI. Match the beginning of the sentence with its ending:

1. Forests accumulate ...	a) induces biotic and environmental changes.
2. Large stores of potential energy ...	b) remain on the forest floor for long periods.
3. Two conversions of great importance ...	c) large amounts of standing biomass.
4. The rapid growth of the trees ...	d) caused from competition for light, water, or soil nutrients.
5. Woody material often referred to as coarse woody debris ...	e) are fires and treefalls.
6. Tree trunks and branches can ...	f) be produced from a single tree.
7. Some trees leave ...	g) can be converted to kinetic one under the right circumstances.
8. Thousands of seedlings can ...	h) behind eerie skeletons after death.
9. Most of those deaths are ...	i) to forest regrowth after a disturbance.
10. There are four stages ...	j) decays relatively slowly in many forests.

VII. Arrange the words to make a sentence:

- capable, standing, forests, accumulating, are, of, biomass, rates, standing, high, at
- energy, be, to, energy, potential, can, under, converted, circumstances, kinetic, the right.
- are, conversions, two, and, fires, two, important, very, treefalls.
- many, woody, decays, material, slowly, forests, in, relatively.
- actually, to, can, only, seedlings, grow, a, maturity, few.
- with, deals, the establishment, seedlings, in increase, rapid, phase.

VIII. Each sentence below has a content mistake. Find and correct it.

1. The world's forests contain about 500 gigatons of living biomass (above- and below-ground) and 50 gigatons of dead wood.
2. Forests of high productivity with the rapid growth of the trees prevent biotic and environmental changes.
3. Forests oppress hydrological processes especially those involving groundwater hydrology because they use great amount of water.
4. When the leaf litter is removed or compacted it gives much space for grazing animals.
5. Dry tree trunks and branches can remain on the forest floor for long periods affecting positively tree regeneration processes.
6. There are two stages to forest regrowth after a disturbance.
7. Thousands of seedlings can be produced from a single tree and most of them can actually grow to maturity.
8. Natural thinning is mainly caused by human activities.

DEVELOP YOUR COMMUNICATIVE SKILLS

IX. Make a summary to the text

X. Make a dialogue with your partner speaking of the importance of Forest Ecology. Use the following model phrases:

- As far as I know ...
- According to the text ...
- In my opinion ...
- I think that ...
- Certainly, I agree with you ...
- I don't agree with you ...
- On the contrary! ...
- I am afraid, you are mistaken ...
- You are absolutely right
- No doubt that ...

UNIT 12

I. Read and translate the text. Learn the active vocabulary of the lesson:

deforestation (n)	вирубка лісів
swath (n)	просіка
vanish (v)	зникати
logging (v)	лісозаготівля
countless (adj)	незліченний
illegally (adv)	незаконно
intentional (adj)	навмисне
prevent (v)	запобігти
subsequent (adj)	наступний
perpetuate (v)	увіковічувати
barren (adj)	безплідний
desert (n)	пустеля
deprive (v)	позбавляти
solution (n)	рішення
disruption (n)	крах, зрив
eliminating (ger)	усунення
unsustainable (adj)	нежиттєздатний
estimate (v)	оцінювати
decrease (v)	зменшувати
image (n)	зображення
rebound (v)	відкинути назад
inevitably (adj)	неминуче
extinction (n)	вимирання
pristine (adj)	незайманий
pattern (n)	зразок. схема
logger (n)	лісоруб
exhaust (v)	виснажувати

Word- combinations:

grazing livestock	випасання худоби
current rate	поточний курс
“slash and burn” agriculture	«підсічно-вогневе» сільське господарство
remote forests	віддалені ліси
urban sprawl	розростання міст
dramatic impact	драматичний вплив
sun's rays	сонячні промені
tiny fraction	дрібна частка
low crop yield	низька врожайність культур

DEFORESTATION

Deforestation is clearing Earth's forests on a massive scale, often resulting in damage to the quality of the land. Forests still cover about 30 percent of the world's land area, but swaths the size of Panama are lost every year.

Forests are cut down for many reasons, but most of them are related to money or to people's need to provide for their families. The world's rain forests could completely vanish in a hundred years at the current rate of deforestation.

The biggest driver of deforestation is agriculture. Farmers cut forests to provide more room for planting crops or grazing livestock. Often many small farmers will each clear a few acres to feed their families by cutting down trees and burning them in a process known as "slash and burn" agriculture.

Logging operations, which provide the world's wood and paper products, also cut countless trees each year. Loggers, some of them acting illegally, also build roads to access more and more remote forests which leads to further deforestation. Forests are also cut as a result of growing urban sprawl.

Not all deforestation is intentional. Some is caused by a combination of human and natural factors like wildfires and subsequent overgrazing, which may prevent the growth of young trees.

Deforestation has many negative effects on the environment. The most dramatic impact is a loss of habitat for millions of species. Seventy percent of Earth's land animals and plants live in forests, and many cannot survive the deforestation that destroys their homes.

Deforestation also drives climate change. Forest soils are moist, but without protection from sun-blocking tree cover they quickly dry out. Trees also help perpetuate the water cycle by returning water vapor back into the atmosphere. Without trees to fill these roles, many former forest lands can quickly become barren deserts.

Removing trees deprives the forest of portions of its canopy, which blocks the sun's rays during the day and holds in heat at night. This disruption leads to more extreme temperatures swings that can be harmful to plants and animals.

Trees also play a critical role in absorbing the greenhouse gases that cause global warming. Fewer forests mean larger amounts of greenhouse gases entering the atmosphere—and increased speed and severity of global warming.

The quickest solution to deforestation would be to simply stop cutting down trees. Though deforestation rates have slowed a bit in recent years, financial realities make this unlikely to occur.

A more workable solution is to carefully manage forest resources by eliminating clear-cutting to make sure that forest environments remain intact. The cutting that does occur should be balanced by the planting of enough young trees to replace the older ones felled in any given forest. The number of new tree plantations is growing each year, but their total still equals a tiny fraction of the Earth's forested land.

Despite their uniqueness and extraordinary value, tropical rain forests are being destroyed and badly degraded at an unsustainable rate. Some scientists estimate that in the early 1990s tropical forests were being destroyed at a rate of about 14 million hectares each year. This figure marked a decrease since the 1980s, largely due to a reported decline of deforestation in the Amazon River basin in the early 1990s. Over the past three decades alone, about 5 million sq km or 20 percent of the world's tropical forests have been cleared. During this time, deforestation in tropical Asia reached almost 30 percent.

High rates of deforestation are inevitably followed by alarming rates of plant and animal extinction because many rain forest species cannot survive outside their pristine rain forest habitat. Some scientists estimate that dozens of rain forest species are becoming extinct every day.

Causes of deforestation vary from location to location, but certain patterns tend to be consistent across all forests. Logging companies in search of valuable rain forest hardwoods, or, less often, oil companies in search of petroleum, are often the first to enter a remote area of rain forest. Some logged forests, if left alone, can regenerate in a few decades. But typically, logged forests are not left alone the roads built by logging companies often provide access for landless farmers to enter a new area, as well as a means to transport agricultural crops to market.

Once the loggers abandon the land, a typical cycle of destruction ensues. When the landless farmers arrive, they clear the land for planting. Poor rain forest soils produce a low crop yield, especially after a couple of years. At that point, the farmers often sell their lands to cattle ranchers or large plantation owners. After nutrients have been exhausted and soils compacted by cattle, lands are then abandoned and often laid to waste. Rain forest does not readily regenerate on these lands without human intervention. Meanwhile, the colonist farmers and cattle ranchers move to a new piece of land made accessible by logging roads, where the cycle of deforestation begins again.

INCREASE YOUR VOCABULARY

II. Give the Ukrainian equivalents to the following words and word combinations:

forest ecologists; effects of large disturbances; amounts of standing biomass; to be capable; high rates; tall vertical structures; potential energy; under the right circumstances; dead wood; physical environment; high productivity; rapid growth; lower intensity; tree regeneration processes; to leave behind; unnoticed; a single tree; natural thinning; establishment phase; seedlings; a pocket of light; regulators of hydrological processes; rainfall; meteorological studies; water storage; to be removed or compacted.

III. Give the English equivalents to the following words and word-combinations:

велика кількість; високопродуктивний; високі вертикальні конструкції; правильні обставини; пожежі та падіння дерев; фізичне середовище; траплятися; швидке зростання; викликати зміни в оточенні; деревний матеріал; грубі деревні залишки; у порівнянні; стовбури та гілки дерев; посушливі або холодні умови; процеси регенерації дерев; моторошні скелети померлих дерев; вирости до зрілості; конкуренція за світло, воду та поживні речовини; природне проріджування; лісовий навіс; випаровування.

IV. Match the terms with their definitions:

1. deforestation	a) a dry, barren area of land, especially one covered with sand, that is characteristically desolate, waterless, and without vegetation
2. rain forests	b) the action of clearing a wide area of trees
3. logging	c) material such as coal, gas, or oil that is burned to produce heat or power
4. desert	d) a cut-through in the forest for clearing up the territory
5. fuel	e) a broader forest category called tropical moist forests, of which there are many different types
6. global warming	f) the fact or process of a species, family, or other group of animals or plants becoming extinct
7. extinction	g) a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect
8. exhausted	h) the activity or business of felling trees and cutting and preparing the timber
9. swath	i) as for resources or reserves to become completely used up
10. grazing	j) natural feeding the livestock on the pastures or grasslands

V. Match the words having similar meaning:

1. deforestation	a) cattle
2. agriculture	b) disappear
3. livestock	c) space
4. vanish	d) cutting down

5. room	e) following
6. subsequent	f) reason
7. cause	g) farming
8. environment	h) infertile
9. barren	i) seriousness
10. severity	j) habitat

VI. Match the beginning of the sentence with its ending:

1. Some logged forests, if left alone, ...	a) without human intervention.
2. Poor rain forest soils produce a low crop yield ...	b) to simply stop cutting down trees.
3. Rain forests do not readily regenerate on these lands ... without human intervention.	c) that can be harmful to plants and animals.
4. The quickest solution to deforestation would be ...	d) of portions of its canopy.
5. This disruption leads to more extreme temperatures swings ...	e) can regenerate in a few decades.
6. Removing trees deprives the forest ...	f) certain patterns tend to be consistent across all forests.
7. When the landless farmers arrive, ... they clear the land for planting.	g) reached almost 30 percent.
8. Causes of deforestation vary from location to location, but ...	h) at the current rate of deforestation.
9. During this time, deforestation in tropical Asia ...	i) they clear the land for planting.
10. The world's rain forests could completely vanish in a hundred years ...	j) especially after a couple of years.

VII. Fill the gaps with the suitable word from the box:

species, maturity, biomass, selectively, animal, damaging, bark, lumber

Planted trees may be grown according to a precise plan and clear-cut (the entire forest is felled) when they reach A drastic approach like that makes sense if the trees are a fast-growing ... planted specifically for use as ... fuel, for example. Individual trees can also be ... felled from mixed forests and either dragged away by machine or ... or even (if it makes economic and environmental sense) hauled upward by helicopter, which avoids ... other nearby trees. Sometimes trees have their ... and small branches removed in the forest before being hauled away to a ... yard for further processing,

VIII. Confirm or contradict the following statements saying *True or False*.

1. Trees do not play any role in absorbing the greenhouse gases that fuel global warming.
2. A more workable solution of this problem is to simply stop cutting down trees.
3. The number of new tree plantations is growing each year and their total now equals nearly half of the Earth's forested land.
4. Removing trees leads to more extreme temperatures swings that can be harmful to plants and animals.
5. Deforestation has both positive and negative effects on the environment.
6. Logging operations are very useful because they provide the world's wood and paper products.
7. The most dramatic impact of deforestation is a loss of habitat for millions of species.
8. Plant and animal extinction is quite a natural process and anyway does not depend on deforestation.
9. When the landless farmers arrive, they cut down the trees to make the space for planting.
10. After the soils have been exhausted and compacted by cattle, lands are then abandoned and often laid to waste.

IX. Translate into English using the Active Vocabulary of the lesson:

1. Деякі вирубані ліси, якщо їх залишити в спокої, можуть відновитися за кілька десятиліть.
2. Високі темпи знищення лісів неминуче супроводжуються тривожними темпами вимирання рослин і тварин.
3. Тропічні ліси знищуються та сильно деградують нестійкими темпами.
4. Кількість нових насаджень дерев зростає з кожним роком, але їх загальна площа все ще дорівнює мізерній частці всіх лісів на Землі.
5. Дерев також відіграють важливу роль у поглинанні парникових газів, які викликають глобальне потепління.
6. Видалення лісів призводить до екстремальних коливань температур, які можуть бути шкідливими для рослин і тварин.
7. Лише за останні три десятиліття було вирубано близько 5 мільйонів квадратних кілометрів, або 20 відсотків світових тропічних лісів.
8. Причини вирубки лісів різняться від місця до місця, але певні закономірності, як правило, однакові для всіх лісів.

DEVELOP YOUR COMMUNICATIVE SKILLS

X. Speak about the main reasons of deforestation.

XI. Make a plan to the text and retell it according to your plan.

TASKS FOR SELF-CONTROL

1. A forest ecosystem is a natural unit consisting of all plants, animals and micro-organisms (biotic components) in that area functioning together with all of the non-living physical (abiotic) factors of the environment.
a) territory b) grassland c) woodland
2. Forests have an enormously important role to play in human.....
a) life b) activity c) support
3. Forest ecology ... understand life in the forest: it shows how living organisms behave, live and survive.
a) has helped b) is helping c) helps
4. Understanding ... forests are managed is a goal of forest ecology.
a) which b) what c) how
5. Forest ecology is one branch of a biotically-oriented ...of ecological study types .
a) determination b) division c) classification
6. Forests are studied at a number of organization....., from the individual organism to the ecosystem.
a) levels b) degrees c) types
7. Trees are an important component of forest research, but the wide variety of other life forms and abiotic components in most forests means that other elements, such as wildlife or soil ..., are often the focal point.
a) nutrients b) microorganisms c) bacteria
8. Forest ecology studies ... characteristics and methodological approaches with other areas of terrestrial plant ecology.
a) have b) divide c) share
9. Forests accumulate large of standing biomass, and many are capable of accumulating it at high rates, i.e., they are highly productive.
a) amounts b) quantities c) storages
10. The world's forests contain about 606 gigatons of living biomass (above- and below-ground) and 59 gigatons of dead
a) plants b) material c) wood
11. Woody material, often to as coarse woody debris, decays relatively slowly in many forests in comparison to most other organic materials, due to a combination of environmental factors and wood chemistry.
a) called b) named c) referred
12. Deforestation is Earth's forests on a massive scale, often resulting in damage to the quality of the land.
a) thinning b) clearing c) cleaning
13. Forests for many reasons, but most of them are related to money or to people's need to provide for their families.
a) are cutting down b) cut down c) are cut down
14. The biggest driver of deforestation is agriculture: farmers cut forests to provide more room for planting crops or grazing

- a) livestock b) animals c) microorganisms
15. High rates of deforestation are inevitably followed by...alarming rates of plant and animal extinction because many rain forest species cannot survive outside their pristine rain forest habitat.
- a) with b) by c) in
16. Some scientists estimate that dozens of rain forest species are becoming extinct every
- a) year b) month c) day
17. Causes of deforestation vary from location to location, but certain patterns tend to be consistent across all
- a) lowlands b) pastures c) forests
18. Once the loggers abandon the land, a ... cycle of destruction ensues.
- a) important b) evident c) typical
19. Poor rain forest produce a low crop yield, especially after a couple of years.
- a) lands b) soils c) crops
20. After nutrients and soils compacted by cattle, lands are then abandoned and often laid to waste.
- a) have been exhausted b) exhausted c) are exhausted

2. Match the terms with their definitions:

1. deforestation	a) a dry, barren area of land, especially one covered with sand, that is characteristically desolate, waterless, and without vegetation
2. rain forests	b) a cut-through in the forest for clearing up the territory
3. logging	c) material such as coal, gas, or oil that is burned to produce heat or power
4. desert	d) the action of clearing a wide area of trees
5. fuel	e) a broader forest category called tropical moist forests, of which there are many different types
6. global warming	f) the fact or process of a species, family, or other group of animals or plants becoming extinct
7. extinction	g) a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect
8. exhausted	h) the activity or business of felling trees and cutting and preparing the timber
9. swath	i) as for resources or reserves to become completely used up
10. grazing	j) natural feeding the livestock on the

	pastures or grasslands
11. biomass	k) the interruption of a settled and peaceful condition
12. erosion	l) the process of turning from liquid into vapor
13. disturbance	m) the total mass of organisms in a given area or volume
14. biotic	n) grassland suitable for pasturage
15. debris	o) (of organic matter) rot or decompose through the action of bacteria and fungi
16. grazing	p) wild animals collectively; the native fauna (and sometimes flora) of a region
17. evaporation	q) the natural home or environment of an animal, plant, or other organism
18. decay	r) relating to or resulting from living things, especially in their ecological relations
19. wildlife	s) scattered pieces of waste or remains
20. habitat	t) the process of eroding or being eroded by wind, water, or other natural agents

TASKS FOR SPEAKING ACTIVITIES

Read and render the following topics about forests.

TOPIC № 1

FORESTRY IN UKRAINE

Forest distribution is unequal in Ukraine. Forests are concentrated in Polissya and the Carpathians. Forest ratio is various in different natural zones and it does not reach the optimum level, when forests have an optimal positive impact on the climate, soil, water resources, mitigate consequences of erosion and can improve forest productivity.

Age structure of forests was historically formed under the influence of reforestation of large clear-cut areas in the period after the Second World War and created new forests on large areas in 50—70th years of the last century. As a result, the largest share in age structure belongs to the middle aged stands – 45%. The average age of forests is more than 55 years.

Ukrainian forests consist of over 30 tree species. The prevailing species are: pine, oak, spruce, birch, alder, ash, hornbeam, and fir. Coniferous forests occupy 42% of the total territory including 33% of pine. 43% is covered by hardwood forests, 32% of which constitute oak and beech forests. Coniferous forests are prevailing in the northern part of the country and in the Carpathian region, broad-leaved in the central and the southern part of the country.

Main features of Ukrainian forests and forestry are the following:

- Relatively low average forest cover of the country. Forest ratio according to the whole area of a country is not big 15,7%. But taking into consideration the area of forest and its growing stock Ukraine takes the 8th place in a list of the biggest forest countries in Europe.

- Very different climatic and geographic conditions within a country caused very unequal forest distribution. Forests growth in various natural zones (Polissya, Forest Steppe, Steppe, the Carpathians and Crimea) which have significant differences in growing conditions requires different forest management approaches.

- Mainly ecological importance of forests and high proportion (50%) of forests with restriction on forest use.

- 15,7% of forest lands are reserved with a strong tendency to increase reserved areas. It leads to a very low intensity of forest resources use.

- Historically formed situation of giving state forests for permanent use to enterprises, institutions and organizations under subordination of several dozen ministries and agencies.

- Half of Ukrainian forests is artificially created and requires intensive care.

- Significant part of Ukrainian forests is affected by Chernobyl catastrophe.

Total area of forests and other categories of land designated to forestry purpose is 10,8 million hectares of which forested area – 9,7 million ha. During the last 50 years forest ratio increased at 1,5 times and growing stock at 2,5 times.

TOPIC № 2

CONSERVATION AND PROTECTION OF FORESTS

Forests are of great value because of their effect upon the climate, making it more equable. They tend to cause abundant and needed rainfall and to preserve the moisture when fallen, releasing it to the rivers gradually, and thus preventing abnormal freshets and extreme droughts. By absorbing and parting with heat slowly they cause the changes of temperature to be less sudden than in the open country. They temper the heat, and they serve as a protection, or a “windbreak”, to adjacent land. Trees, with other vegetation, are essential to the purification of the air. All this is in addition to the obvious uses of supplying fuel and wood for an almost endless variety of purposes, not to speak of the value of trees for shade and as features of the landscape.

The work on forests protection against pest and diseases is provided by the specialized service under subordination of the State Forest Resources Agency. The tasks of this service include supervision, inventory of forest pests and diseases, prescription and providing forest protection measures.

The primary goal of this specialized service is development and implementation of harmful insect biological control. In general, forest area which is affected by insects and diseases is more than 400 hectares, almost half of them needs some control measures. The most dangerous pests of forest stands are a regular and red pine sawyer, pine and gypsy moth, green oak and other tortrix.

The problem of forest protection against fires is of great importance nowadays. In forests which are under subordination of the State Forest Resources Agency about 3 000 forest fires occur annually at area over 3,5 ha. The most dangerous regions for fire development are the southern and the southern-eastern regions of Ukraine, which account 50% cases and 70% of forest fires areas.

A significant percentage of protected forests in Ukraine shows that the strict criteria on the principles of management were created in the forests and they fully meet all European strategy for the conservation of biological and landscape diversity.

In the forests which are under subordination of the State Forest Resources Agency more than 3,1 thousand territories of different kind of reserved objects with a total area of 1,2 million hectares have been created.

In subordination of the State Forest Resources Agency there are 12 environmental institutions, including: 6 nature reserves, 5 national parks and 1 household park as well as 1324 small oriented reserves, 34 regional landscape parks, 15 dendrological park, 43 parks as monuments of landscape architecture.

TOPIC 3

FORESTRY IN THE UNITED KINGDOM

The total area of woodland in the United Kingdom is 3.17 million hectares. It represents 13% of the total land area. The woodlands can be divided into three distinct categories, plantations, semi-natural woodlands, and mixed woodlands.

The UK's plantation forests are predominantly made up of non-native coniferous species, often planted on economically marginal agricultural land and in some cases, on previously cleared ancient semi-natural woodlands.

The commercial base of the UK forest industry relies heavily on Sitka spruce from North America. Scotch pine is the only native conifer of economic significance. There are about a dozen conifer species in common forestry use.

The UK's semi-natural woodlands are made up of broadleaved trees with areas of Scots pine, yew and juniper. Native woodlands are of particular value to Britain biodiversity, representing a range of UK habitats supporting many important species. The creation of native woodlands has been the focus of woodland expansion schemes in recent years.

Timber production and recreation are important uses of semi-natural woodland, but careful management is required to avoid conflict with wildlife interests. Ancient semi-natural woodlands are especially valuable as some are remnants of the original post-glacial forest.

Small mixed woodlands comprised of both native and non-native tree species are found on many farms and private estates across the United Kingdom. These woodlands have been created to offer shelter for livestock or to enhance the landscape. They represent an important but often unused timber resource.

Wood pasture and urban trees also represent a valuable contribution to the United Kingdom's forest resource.

Extensive programs of woodland diversification are under way to improve landscape impacts, continuity of habitats, biodiversity provision, continuity of timber supply and opportunities for recreation. Restoration of semi-natural woodlands and creation of new native woodland habitats are also policy priorities, along with the creation of new woodlands on urban areas. Valuable habitats, such as ancient woodland remnants, are protected as part of plantation management.

73% of the UK's woodland resource is privately owned – by individuals, family trusts, charitable trusts or companies. It is estimated that there are about 40,000 private woodland owners who own areas greater than five hectares.

Typically, woodlands owned by private and family interests are a part of mixed estates or are on farms. There are many thousands of small farm woodlands, but very few owners with more than 1,000 hectares of woodland. Management of woodlands for game is an important objective on many estates with woodland and on some farms. Typically, timber production is considered important in the larger family estates and company owned forests. An increasing number of woods are managed

specifically for recreational and conservation purposes by charitable trusts and private owners.

The remaining 27% of woodlands is owned publicly, the bulk of it managed by the Forestry Commission and its devolved bodies. Some woodlands are owned and managed by other public agencies, including local authorities.

TOPIC 4

FORESTS IN THE USA

Forests are found in almost every part of the world. Only the North and South poles, the tops of some mountains, the deserts, and some prairies are bare of forests. Forests can be grouped by location, climate, or the types of trees common to them. Forests can also be described in terms of their uses. Commercial forests, for example, are lands used for growing successive crops of trees for products. Wilderness preserves, on the other hand, are areas where no harvesting is allowed.

Trees in the forest are of two basic kinds. Hardwoods have broad leaves and bear their seeds in dry clusters or in fruits (examples are oak, maple, hickory, and apple). Most of the North American hardwoods are deciduous, which means they lose their leaves each fall. Softwoods have needle-shaped leaves and bear their seeds in cones, for which reason they are often called conifers (examples are pine, spruce, fir, and larch). Most softwoods are evergreen, which means they lose only some of their needles each year, and so remain green year-round.

One major type of hardwood forest is the steamy, tropical rainforest that grows in the tropics and subtropics. These forests are typically composed of big, old evergreen hardwood trees that grow in several layers, or groups according to height. The tallest layer may reach heights of 45 meters or more. Other layers, composed of shade-tolerant trees, reach to about 30 meters. Smaller trees and vines cover the ground in the shade in a dense tropical rainforest. These forests are often called jungles, though true jungles are dense thickets of brush and vines that may not have any tall trees.

One of the largest and most important tropical rainforests is in South America. It extends from the mouth of the Amazon River, in Brazil, to the mouth of the Orinoco River, in Venezuela, and covers millions of acres. In the United States, only the southern tip of Florida and a bit of the coast of Texas have tropical forests.

Beautiful woods such as rosewood, mahogany, ebony, and teak are commercially important products of these forests. They are prized for fine furniture and artistic uses.

Hardwood forests other than tropical ones cover much of the United States, most of northern Europe, areas of northern Russia, eastern China, and the east coast of Australia. These forests include broad-leaved trees adapted to higher elevations with more moderate climates.

The largest forest area in the United States is the Central Hardwood Forest. It covers about 130 million acres, from the edge of the central plains, across the lower edge of the Great Lakes states, to the coasts of New Jersey and New York. It straddles the Appalachian Mountains as far south as northern Georgia and spreads westward and covers large parts of eastern Texas. Because this area has rich soil and a moderate climate, it has been cleared in many places for farming.

Much of the wood for America's furniture industry comes from this forest. Hardwoods such as black walnut, red oak, white oak, yellow poplar (also called tulip

tree), sweet gum, and sycamore are among the most valuable trees. A few softwoods are also found, including the shortleaf and white pines.

The Northern Forest covers much of the Great Lakes states and the New England states in the United States. It also extends along the ridges of the Appalachian Mountains as far south as northern Georgia. This forest also covers much of Canada and the interior of Alaska and stretches across northern Asia, Russia, and the Scandinavian countries.

The Northern Forest is composed of softwood trees such as white pine, hemlock, and red spruce. Several hardwood trees, such as oak, maple, birch, and basswood, are also present. Trees in this forest tend to be smaller and more slow-growing than those in warmer areas with longer growing seasons.

The softwood forests of the southeastern United States are sources of lumber, plywood, and paper pulp. The more important southern, or yellow, pines are the loblolly, longleaf, shortleaf, and slash. The bald cypress grows in southern swamps.

Hardwoods such as the red oak, white oak, gum, ash, pecan, and live oak are found along southern rivers. They are a significant part of the forest economy in the South.

Another important forest region in the United States is the softwood forest of the Rocky Mountains. There are almost 90 million acres (36.4 million hectares) of lumber-producing commercial forests. Ponderosa pine, Idaho white pine, Douglas fir, larch, lodge pole pine, and western red cedar are among the important softwoods.

The rainy climate of the Pacific Northwest contributes to the growth of one of the United States' most productive softwood forest areas. It extends in a narrow band from the southern part of Alaska to central California. Inland, on the western slopes of the Coast Ranges, it extends somewhat farther south. These forests contain Douglas fir, California redwood, western hemlock, western red cedar, sugar pine, lodge pole pine, and white fir. Most of America's old-growth forests, stands which have not been harvested by humans or nature for hundreds of years, are in this region.

TOPIC 5

GLOBAL WARMING: CAUSES, EFFECTS AND PREVENTION

The greenhouse effect is a natural phenomenon. However, the increase in greenhouse gases is linked to human activities. Thus, no surprise that human activities are the main cause of global warming.

Here are some of the main reasons of global warming.

The massive use of fossil fuels is obviously the first source of global warming, as burning coal, oil and gas produces carbon dioxide - the most important greenhouse gas in the atmosphere.

The exploitation of forests has a major role in climate change. Trees help regulate the climate by absorbing CO₂ from the atmosphere. When they are cut

down, this positive effect is lost. So, deforestation is one more reason of global warming.

Another cause is intensive farming, not only with the ever-increasing livestock, but also with plant protection products and fertilizers.

Modern life is highly dependent on the mining and metallurgical industry. Metals and minerals are the raw materials used in the construction, transportation and manufacturing of goods. From extraction to delivery, this market accounts for 5% of all greenhouse gas emissions.

Now let's consider some harmful global warming effects.

The increase of temperature and the climate upheavals disturb the ecosystems, modify the conditions and cycles of plant reproduction. We have already witnessed the disappearance of many species both in flora and fauna and this process will still continue if we don't take some drastic measures to stop it.

Because of global warming, permafrost and ice are melting massively at the poles, increasing the sea level at a rate never known before. In a century, the increase reached 18 cm (including 6 cm in the last 20 years).

Human beings are not spared by these upheavals. Climate change is affecting the global economy. It is already shaking up social, health and geopolitical balances in many parts of the world. The scarcity of resources like food and energy gives rise to new conflicts.

The impact of global warming on the weather is huge: more droughts and heatwaves, more precipitations, more natural disasters like floods, hurricanes, storms and wildfires, frost-free season, etc.

So, how can the mankind prevent further global warming? What solutions to consider? Good news - there are some ways to reduce it.

The first way to prevent climate change is to move away from fossil fuels. What are the alternatives? Renewable energies like solar, wind, biomass and geothermal.

Producing clean energy is essential, but reducing our consumption of energy and water by using more efficient devices is less costly and equally important.

Promoting public transportation, carpooling, and both electric and hydrogen mobility can definitely help reduce CO₂ emissions and thus fight global warming.

Sustainable agriculture and forest management are sure to change the situation for the better. Encouraging better use of natural resources, stopping massive deforestation as well as making agriculture greener and more efficient should also be a priority.

TEXTS FOR READING

TEXT № 1

Read the text and retell it according to your own plan.

FORESTRY

Forestry is a management of forestlands for maximum sustained yield of forest resources and benefits. Although forestry originally concerned mainly timber production, it now also involves the management of grazing areas for domestic livestock, the preservation of wildlife habitats, watershed protection, and the development of recreational opportunities. The management of forestlands therefore helps to ensure that wooded areas are used for maximum benefit according to their nature.

Attempts to regulate and manage forestlands occurred well before the 19th century in Rome, the Middle East, China, and Western Europe. Wars and political instability invariably interfered with these efforts; so destructive use of forests was common in the more densely populated countries. Early settlers in the U.S., for example, regarded forests as impediments to cultivation and sought to remove them as quickly as possible. This attitude fostered a “cut and get out” philosophy among timber operators, and exploitative logging persisted well into the 20th century.

Scientific forestry was initiated in the U.S. at the end of the 19th century largely through the influence of the federal government, with measures including the establishment of the Division of Forestry in 1885 and authorization of forest reserves in 1897. The latter became known as the National Forests in 1905, when the jurisdiction of reserves was transferred from the Department of the Interior to the Department of Agriculture, and the Division of Forestry became the Forest Service. Since that time, forest management has been practiced on state and private lands as well as on federal holdings.

Forestry comprises such specialties as dendrology, silviculture, forest protection, mensuration, engineering, utilization, and management. Dendrology concerns tree identification, distribution, age determination, and species characteristics. Silviculture studies the relationship of a forest to its environment and involves the development, care, and reproduction of stands of timber.

Forest protection examines sources of injury, including disease, erosion, insect and animal destruction, and fire. The science of measuring forest stands, including rate of growth and potential yield of standing timber, is called mensuration. Forest engineering concerns the mechanics of cutting and transportation involved in modern timber growing and harvesting. Forest utilization considers the properties of wood and its conversion into lumber and wood products. Forest management applies business methods and the principles of technical forestry to the overall operation of forestlands.

The practice of technical forestry includes many operations, from tree planting to harvesting. Central to the operation is the cycle of cutting and replenishment. Four major

methods have been developed for this purpose: clear-cutting, selection, seed tree, and shelterwood. In clear-cutting all trees in a given area are cut, and reproduction is obtained by artificial planting or by natural seeding from trees bordering the cleared areas.

This method, adapted to light-demanding species, produces even-aged stands, allows control of stand composition, and is conducive to mechanized harvesting and disposal of slash, or logging debris. Selection cutting maintains a forest of mixed ages from which the largest and most mature trees are harvested periodically.

Although this method is expensive and may cause injury to younger trees during logging, it provides continuous cover and an attractive forest and involves sounder ecological practices. In the seed tree method, about 10 percent of the trees in the cutting area are left in an evenly spaced pattern as a natural seed source. The shelterwood method, which involves the removal of the mature trees in cuttings over a 10- to 15-year period, promotes natural reproduction and produces relatively even-aged stands.

Other practices contribute to the development of commercial forestry. These include artificial planting by direct seeding or transplants, especially in conjunction with clear-cutting; treatment with fertilizers to increase production; and the selection and breeding of timber trees, producing strains that excel in growth, disease resistance, or other desirable characteristics. These measures fit into the pattern of an intensive forestry in which greater production is obtained through technical knowledge and increased mechanization.

TEXT № 2

Read the text and give the title to each paragraph.

TEMPERATE DECIDUOUS FORESTS

Temperate deciduous forests or temperate broad-leaf forests are dominated by trees that lose their leaves each year. They are found in areas where warm moist summers alternate with mild winters. The three major areas of this forest type occur in the northern hemisphere: eastern North America, eastern Asia, and Europe. Smaller areas occur in Australasia and southern South America. Examples of typical trees include oak, maple, beech, and elm. The diversity of tree species is higher in regions where the winter is milder, and also in mountainous regions that provide an array of soil types and microclimates. One of the world's great protected examples of this forest type is found in Great Smoky Mountains National Park.

The principal factor operating in these forests is the seasonal appearance and disappearance of the canopy. Shade from the canopy limits the growth of many kinds of plants; many species that are typical of these forests time their growth and flowering to the short period just before the canopy opens. Hence, they are known as spring ephemerals. Examples include trilliums and bloodroot. Most are insect-pollinated. The

seeds themselves are often transported by ants, a mode of dispersal known as myrmecochory.

There are a smaller number of species able to grow under the canopy, and even that a few grow during the period when leaves are being lost. Many of the plants have leaf adaptations to cope with low light levels, and the need to exploit moving light flecks on the forest floor. A few understory plants, such as Indian pipe and *Corallorhiza* orchids, have adapted to the shade by parasitism.

The trees similarly are controlled by shade. Most tree seedlings require small gaps produced by falling trees in order to regenerate. A few require larger gaps such as those produced by windstorms. Gradients of soil moisture, soil depth, elevation and aspect control the distribution of many trees, shrubs and herbaceous species. Some require unusual conditions such as steep slopes, infertile soil, and drought to escape competition from the more common tree species.

Many migratory birds time their arrival to coincide with the opening of the canopy, which provides the insects that are their principal food sources for raising young. The spring warblers of North America are a typical example; see, for example, the black-throated blue warbler. Owing to the availability of wood from standing and fallen trees, woodpeckers are frequently found. The pileated woodpecker is a typical large species. Fallen wood, known as coarse woody debris, provides shelter for many kinds of amphibians, particularly salamanders. Many well-known animals live in this kind of forest; a few examples include squirrels, which are an important canopy species, and bears, which harvest nuts and berries produced in the canopy. The top predators in deciduous forest were once wolves and cougars, along with species of weasel like the fisher.

Humans have often colonized areas in the temperate deciduous forest. They have harvested wood for timber and charcoal. During the settlement of North America, potash made from tree ashes was exported back to Europe as fertilizer. As a result, less than one quarter of original forests remain. Many forests are now small fragments dissected by fields and roads; these islands of green often differ substantially from the original forests, particularly along the edges.

The introduction of exotic diseases continues to be a threat to forest trees, and hence the forest; examples include the loss of chestnut and elm. At the same time, species like deer, which are clearing rather than true forest animals, have expanded their range and proliferated in these altered landscapes. Large deer populations have deleterious effects on tree regeneration overall, but particularly for edible species including yew, yellow birch and hemlock.

Deer grazing also has significant negative effects on the number and kind of herbaceous flowering plants. The continuing pressure to increase deer populations, and the continued killing of top carnivores, suggests that overgrazing by deer will continue to be a significant forest conservation problem. Objective criteria for the restoration of deciduous forest include large trees, coarse woody debris, spring ephemerals, and top predators.

TEXT № 3

Read and translate the text, make a summary to it.

RAIN FORESTS

Rain forest is woodland characterized by lush vegetation and comparatively high temperature and rainfall throughout the year. Rain forests are the world's most biologically diverse ecosystems. Although they account for less than 7 percent of the land surface on the Earth, they contain more than 50 percent some scientists estimate as high as 90 percent of its plant and animal species. One hectare of tropical rain forest may contain more than 600 species of trees. By comparison, the forests of the United States and Canada combined contain only around 700 tree species. Even more impressive are the number and diversity of animal species that call rain forests their home. One study found more species of ants living on a single rain forest stump than exist in all of the British Isles.

Rain forests also play a critical role in global climate regulation by absorbing carbon dioxide, a gas believed to be partially responsible for global warming. Plants naturally absorb carbon dioxide and give off oxygen gas in the process of photosynthesis, and tropical rain forests absorb more carbon dioxide than any other terrestrial ecosystem on earth. Global emissions of carbon dioxide have increased nearly 30 percent in the last century. There is general agreement among the scientific community that by absorbing some of the gas, rain forests play a vital role in lessening its impacts.

To be classified as a rain forest, a forest must have a *closed canopy*, in which the treetops, or crowns, touch each other, creating a shaded forest interior. In addition, temperature and rainfall must be high and relatively even throughout the year. Forests that meet these criteria are found flanking the equator in South and Central America, Asia, Africa, and Australia. In South America, a vast, forested area of the Amazon River basin in Brazil and neighboring countries is by far the largest rain forest in the world. It encompasses more than 3.5 million sq km—about half of the total global rain forest cover.

The larger of two large rain forests in Asia is centered along the Malay Archipelago, including the islands of Borneo and Sumatra, the Malay Peninsula, and the Republic of the Philippines. The other main rain forest in Asia is found primarily on the island of New Guinea and in northern Australia. In Africa, most of the rain forest is concentrated along the Atlantic coast and the Congo River Basin.

In regions of the northern and southern hemispheres, small areas of temperate rain forest are found along the coasts where rainfall and humidity are high and winters are mild. Such temperate rain forests are found in the Pacific Northwest of the United States and southwestern Canada, for example. They are dominated by only a few tree species, however, making them differ dramatically from highly diverse tropical rain forests.

TEXT № 4

Read the text and make a plan to it. Try to mark the main characteristics of the rain forests.

RAIN FOREST CHARACTERISTICS

Tropical rain forests belong to a broader forest category called tropical moist forests, of which there are many different types. Forest scientists distinguish rain forests from other types by considering factors such as temperature, rainfall, length of dry season, and altitude.

Rain forests are typically hot and steamy the average annual temperature is 25° C (77° F). Temperature near the equator varies little over the course of a year, so rain forest temperatures are about the same all year round, the average minimum monthly temperature in a rain forest is 18° C (64° F). Rain forests are not found where the temperature drops close to 0° C (32° F) because their resident plants and animals are not well adapted to withstand frost. Temperature in a rain forest depends not only on distance from the equator but also on altitude. As elevation increases, nighttime temperatures go down significantly. This daily temperature variation affects forest ecology, and true rain forests typically are not found above 1,000 m (3,280 ft).

Rain forests can average as little as 1.8 m, or as much as 9.0 m, of rainfall a year. What distinguishes a true rain forest is the distribution of precipitation throughout the year there are no dry seasons. Every month, typically more than 100 mm of rain falls. If a rain forest does have dry periods, they are usually short and unpredictable.

In many climates, rainfall evaporation is carried away to fall as rain in distant places, but in the rain forests, nearly 50 percent of the precipitation comes from local evaporation. The warm, humid air surrounding a rain forest forms a microenvironment that permits little water to escape. Much of the rain that falls on the rain forest is intercepted by the trees in the canopy. Some of it rolls off the leaves and down the trunks to the forest below, but a high percentage evaporates and hangs as tiny droplets of water in the humid atmosphere. Gentle and continuous winds lift the tiny droplets higher in the atmosphere, where they cool and form clouds. When enough of these drops enter the atmosphere and cool, they condense and fall as rain, beginning the cycle again.

Despite their incredible lushness and high diversity, one of the peculiarities of rain forests is that the soil is poor in nutrients that can be absorbed by plant roots. The nutritious minerals have been washed out of the soils by heavy rainfall and high temperatures over thousands of years. To compensate for the nutrient-poor rain forest soils, most tropical trees absorb the nutrients they can find and hold them in their living tissue. In contrast, the rich soils of temperate forests are better able to retain nutrients, enabling a temperate forest tree to absorb small amounts of minerals as the tree needs them. When tropical trees die, nutrients are released into the soils by

decomposition. Rather than remaining in the soil reservoir as they would in a temperate forest, in the rain forest, the nutrients are rapidly absorbed again by other living organisms.

Rain forest structure is distinct from most other forest types because of its many layers of vegetation, referred to as *strata*. The lowest stratum is the understory, composed of palms, herbaceous plants (such as wild ginger), and tree seedlings and saplings. Just 2 percent of the sunlight penetrates the layers of leaves and branches above, so understory plant species have developed special traits to cope with low light levels. Many have deep red coloring on the underside of their leaves to capture some of the scarce light that does manage to reach the forest understory. This red coloring enables understory plants to absorb light of different wavelengths than the lush, green-foliaged canopy plants do. Above the forest floor but below the canopy there is one or more midstory strata, made up of woody plants, such as large shrubs and mid-sized trees.

The overstory is the canopy, in which the tree crowns form a continuous layer that captures the bulk of the rainwater and sunlight hitting the forest. The height of the canopy varies from region to region and forest to forest, ranging from 20 to 50 m. The lush, green canopy is teeming with life, and forest researchers have developed ingenious methods for accessing this mysterious ecosystem. Researchers use hot air balloons, cables, catwalks, towers, sophisticated tree-climbing gear, and even robots to study the millions of plants and animals that make their home high up in the forest canopy. Canopy researchers also use huge cranes that are dropped into the heart of the forest by helicopters. Suspended from the crane's long, movable arm is a large gondola that functions as a mobile treetop laboratory. Moving from tree to tree, forest researchers collect specimens, conduct experiments, and observe life in the canopy frontier.

The highest stratum of the rain forest is made up of the emergent trees, those individuals that stick up above the forest canopy. Emergents, which do not form a continuous layer, are usually the giants of the forest, reaching heights of 35 to 70 m or more, and trunk girths of over 2 m in diameter. Less than one percent of the trees in the forest reside in the canopy and emergent layers. However, these trees tend to be so large that they collectively account for the vast majority of the woody mass, or biomass, of the forest.

The nicely ordered strata of the rain forest, including the continuous layer of the canopy, are regularly disturbed by naturally occurring events, such as falling trees. Trees in a rain forest canopy are often interconnected by vines, and a falling tree may pull as well as push other trees down with it, producing a domino effect of falling trees. The resulting opening in the forest canopy enables light to pour onto the forest floor. New plants and animals then move into the area and begin to grow.

Other natural disturbances create even larger openings in the forest canopies. For example, along the hurricane belt in the Caribbean and the typhoon belt along the western Pacific, some forests are substantially altered when high winds and storms blow down hundreds of trees every few decades. On a smaller scale, large mammals, such as elephants, regularly raze rain forest vegetation in the Congo River Basin in

Africa. Scientists have found that these natural disturbances and the subsequent forest regeneration are a vital process that leads to healthy and diverse forests.

Rain forest ecosystems contain more plant and animal species than virtually any other habitat in the world. Although their range has contracted and expanded with climate changes over the last several million years, in general, rain forests are some of the oldest ecosystems on Earth. As a result of this continuity, rain forests boast millions of different species, many of which are *endemic*, or unique, to rain forest habitats.

Although they contain numerous species, rain forests are remarkably uniform in their general appearance. Most trees have tall, slender trunks that do not branch until near the crown. Many, such as kapok trees, are supported by thick buttresses that can stretch out 10 m or more. These buttresses provide needed support for rain forest trees, top heavy because nutrient-poor rain forest soils lead to fragile, shallow root systems. Rain forest tree bark tends to be thin and smooth. Notable exceptions are palms, which are common in some rain forests and virtually absent in other types of forests.

Rain forest plants have many unique physical characteristics that exploit the particular habitat, or niche, that a species occupies. Understory and midstory plants, such as relatives of the banana tree, tend to have particularly large leaves to capture as much light as possible what little light that is not intercepted by the canopy above. These large leaves do not dry out as they would high in the canopy, where the intense sunlight creates a drier environment. These traits can change, however, when a plant's environment changes. Canopy trees may change their shape over the course of their life, depending on the environment around them. Leaves often get smaller as trees grow larger. In some cases, leaves of juvenile plants may be almost 10 times larger than adults of the same canopy tree species.

TEXT № 5

Read the text and retell it according to your plan. Think about the major causes of forest fires. Make a summary to the text.

FOREST FIRES

Forest fires are natural or human-caused fires that burn forest vegetation. Foresters usually distinguish three types of forest fires: ground fires, which burn the humus layer of the forest floor but do not burn appreciably above the surface; surface fires, which burn forest undergrowth and surface litter; and crown fires, which advance through the tops of trees or shrubs. It is not uncommon for two or three types of fires to occur simultaneously. Fire management programs are extensive in the United States and other countries. Programs include fire prevention, fire fighting, and the use of fire in land management.

Most forest fires result from human carelessness or deliberate arson. Fewer fires are started by lightning. Weather conditions influence the susceptibility of an

area to fire; such factors as temperature, humidity, and rainfall determine the rate and extent to which flammable material dries and, therefore, the combustibility of the forest. Wind movement tends to accelerate drying and to increase the severity of fires by speeding up combustion.

By correlating the various climatic elements with the flammability of branch and leaf litter, the degree of fire hazard may be predicted for any particular day in any locality. Under conditions of extreme hazard, forests are closed to public use.

Although organizations involved with fire control have traditionally fought all fires, certain fires are a natural part of the ecosystem. Complete fire exclusion may bring about undesirable changes in vegetational patterns and may also allow accumulation of fuel, with increased potential for feeding catastrophic fires. In some parks and wilderness areas, where the goal is to maintain natural conditions, lightning-caused fires may be allowed to burn under close surveillance.

One of the most important aspects of forest-fire control is a system of locating fires before they are able to spread. Land-based forest patrols and lookouts have been largely replaced by surveillance aircraft, which detect fires, map their locations, and monitor their growth.

Ground fires, once established, are difficult to extinguish. When the humus layer is not very deep, a ground fire may be extinguished with water or sand. Most ground fires, however, are controlled by digging trenches around the burning area and allowing the fire to burn itself out. Surface fires are limited by clearing the surrounding area of low vegetation and litter, or digging emergency furrows to confine the area. Crown fires are difficult to extinguish. They may be allowed to burn themselves out, they may be halted by streams, or they may be limited by backfired areas. Backfiring consists of carefully controlled burning of a strip of forest on the leeward side of the blaze, so that when the fire reaches the burned area it can go no farther.

Foresters may purposely ignite prescribed fires under carefully controlled conditions to remove unwanted debris following logging, to favor tree seedlings, or to keep fuels from accumulating. Since most grasses and shrubs grow well after fires, and animals are attracted to the tender and nutritious new growth, prescribed fires often benefit both wildlife and livestock. The mosaic of vegetation of different ages that results from frequent small fires favors a rich diversity of plant and animal life.

Forest fires are often set deliberately to clear forested areas for grazing or agricultural purposes. In *slash-and-burn cultivation*, subsistence farmers burn small plots of forest for space to grow crops. After two or three years, when the nutrients in the soil have been depleted, the plots are abandoned and other plots are cleared by fire. Large-scale agricultural operations use similar methods to clear forested areas. These practices, along with logging operations, destroyed much of the world's tropical rain forests during the 1980s and 1990s. Thousands of deliberately set forest fires raged out of control in Indonesia, Brazil, and Mexico, burning millions of hectares of rain forest. Thick clouds of smoke blanketed vast areas in Southeast Asia, South America, and Central America, sending tens of thousands of people to hospitals with respiratory illnesses related to the air pollution.

GRAMMAR APPENDIX

CONDITIONALS

Conditionals (умовні конструкції або умовні речення) – особливий вид складнопідрядних речень, коли в підрядній частині виражається певна умова, а в головному – наслідки такої умови.

Тип речень	Умова	Наслідок	Коли вживаємо
Zero Conditional	If +Present Simple	Present Simple	Умовне речення, що передає загальні істини, природні або наукові факти, правила або ж часто повторювані події, що стали правилом
	Ice cream <u>melts</u> if we <u>heat</u> it. If you <u>don't water</u> plants, they <u>die</u> . The ground <u>gets</u> wet when it <u>rains</u> .		
First Conditional	If +Present Simple	Future Simple/ can, must, may + bare infinitive	Умовне речення, що виражає реальну або дуже ймовірну ситуацію в <i>теперішньому</i> або <i>майбутньому</i> часі
First Conditional	If +Present Simple	Future Simple/ can, must, may + bare infinitive	Умовне речення, що виражає реальну або дуже ймовірну ситуацію в <i>теперішньому</i> або <i>майбутньому</i> часі
	If I <u>like</u> this dress, I' <u>ll</u> definitely <u>buy</u> it. Your feet <u>will hurt</u> if you <u>wear</u> these uncomfortable shoes. If Jack <u>decides</u> to move to Florida, we <u>will</u> never <u>see</u> him again.		

Second Conditional	If + Past Simple	would, could, might + bare infinitive	Умовне речення, що передає <u>нереальну</u> ситуацію <u>в теперішньому часі</u> . Така ситуація <u>неможлива</u> або <u>маловірогідна</u> в <i>теперішньому</i> або <i>майбутньому</i> часі
	<p>If I <u>were</u> him, I <u>would</u> never <u>do</u> that. Jack <u>could be</u> happy if he <u>married</u> Janice. The children <u>might play</u> outside if the weather <u>were</u> nice.</p>		
Second Conditional	If + Past Simple	would, could, might + bare infinitive	Умовне речення, що передає <u>нереальну</u> ситуацію <u>в теперішньому часі</u> . Така ситуація <u>неможлива</u> або <u>маловірогідна</u> в <i>теперішньому</i> або <i>майбутньому</i> часі
	<p>If I <u>were</u> him, I <u>would</u> never <u>do</u> that. Jack <u>could be</u> happy if he <u>married</u> Janice. The children <u>might play</u> outside if the weather <u>were</u> nice.</p>		
Third Conditional	If + Past Perfect	would, could, might + Perfect Infinitive	Умовне речення, що виражає <u>нереальну</u> ситуацію в <i>минулому</i> та її <u>нереальні наслідки</u> , тобто ця <u>уявна ситуація</u> так і не відбулася. Умовні конструкції 3-го типу передають відтінок докори, критики, прикrostі через щось, що не було виконано у минулому
	<p>You <u>could have passed</u> your exam if you <u>had studied</u> harder. If they <u>had asked</u> me for help, I <u>would have helped</u> them. What <u>would</u> you <u>have done</u> if I <u>hadn't helped</u> you at that time?</p>		

Mixed Conditionals	If + Past Perfect	would, could, might + bare infinitive	Умова в підрядній if -частині стосується <i>минулого</i> часу, а результат в головному реченні – <i>теперішнього</i> часу.
	<p>If I <u>had got</u> that job, I <u>could be</u> rich now. If we <u>had taken</u> a map, we <u>wouldn't be</u> lost now. They <u>might be</u> still together if they <u>hadn't moved</u> to different countries.</p>		
	If + Past Simple	would, could, might + Perfect Infinitive	Умова в підрядній if -частині не стосується конкретного часу, а є <u>загальною постійною характеристикою</u> чогось. Однак результат або наслідки такої умови відбулися в <i>минулому</i> .
<p>I <u>wouldn't have helped</u> you if we <u>weren't</u> friends. If I <u>weren't</u> afraid of cats, I <u>might have adopted</u> one long time ago. Kate <u>wouldn't have let</u> you stay overnight at her place if she <u>weren't</u> a kind person.</p>			

В умовних реченнях, якщо підрядне **if**-речення стоїть після головної частини, кому між ними **не ставлять**.

PASSIVE VOICE

(Пасивний стан)

to be + Participle II (asked, written)

Time	Tense		
	SIMPLE	CONTINUOUS	PERFECT
PRESENT	<i>I am</i> <i>She</i> <i>He is</i> asked	<i>I am</i> <i>She</i> <i>He is</i> being asked	<i>She</i> <i>He has</i> <i>I</i> <i>You</i> been

	<i>You</i> <i>We are</i> <i>They</i> <i>Мене</i> <i>Її</i> <i>Його</i> <i>Вас, тебе</i> <i>запитують</i> <i>Нас</i> <i>Їх</i>	<i>You</i> <i>We are</i> <i>They</i> <i>Мене</i> <i>Її</i> <i>Його</i> <i>Вас, тебе</i> <i>запитують</i> <i>Нас</i> <i>Їх</i>	<i>We have</i> <i>asked</i> <i>They</i> <i>Її</i> <i>Його</i> <i>Мене</i> <i>Вас, тебе</i> <i>запитали</i> <i>Нас</i> <i>Їх</i>
PAST	<i>I</i> <i>She was</i> <i>He</i> <i>asked</i> <i>You</i> <i>We were</i> <i>They</i> <i>Мене</i> <i>Її</i> <i>Його</i> <i>Вас, тебе</i> <i>запитали</i> <i>Нас</i> <i>Їх</i>	<i>I</i> <i>She was</i> <i>He</i> <i>asked</i> <i>You</i> <i>We were</i> <i>They</i> <i>Мене</i> <i>Її</i> <i>Його</i> <i>Вас, тебе</i> <i>запитували</i> <i>Нас</i> <i>Їх</i>	<i>I</i> <i>She</i> <i>He</i> <i>being</i> <i>had been</i> <i>asked</i> <i>You</i> <i>We</i> <i>They</i> <i>Мене</i> <i>Її</i> <i>Його</i> <i>Вас, тебе</i> <i>запитали</i> <i>Нас</i> <i>Їх</i>
FUTURE	<i>I</i> <i>We</i> <i>will</i> <i>She</i> <i>asked</i> <i>He</i> <i>will</i> <i>be</i> <i>You</i> <i>They</i> <i>Мене</i>	<hr/>	<i>I</i> <i>We</i> <i>will</i> <i>She</i> <i>He</i> <i>will</i> <i>have</i> <i>been</i> <i>asked</i> <i>You</i> <i>They</i> <i>Мене</i>

	<i>Нас</i> <i>Її</i> <i>Його</i> запитають <i>Вас, тебе</i> <i>Їх</i>		<i>Нас</i> <i>Її</i> <i>Його</i> запитають <i>Вас, тебе</i> <i>Їх</i>
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MODAL VERBS
(модальні дієслова)

Present	Past	Future
<p style="text-align: center;">CAN</p> <p>1) «можливість» They can come to us soon. Вони можуть прийти до нас скоро.</p> <p>2) «вміння» I can speak English well. Я вмію добре розмовляти англійською.</p> <p>I cannot read Spanish. Я не вмію читати іспанськи.</p> <p>Еквівалент: to be able to I am able to come. Я можу прийти.</p>	<p style="text-align: center;">COULD «міг, міг би»</p> <p>We couldn't do it last week. Ми не могли зробити це минулого тижня.</p> <p>Could you help me do this task? Ви не могли б допомогти мені зробити це завдання?</p> <p>was / were able to I was able to come yesterday. Я зміг прийти вчора.</p>	<p style="text-align: center;">will be able to</p> <p>I will be able to come tomorrow. Я зможу прийти завтра</p> <p>will be able to I will be able to come tomorrow Я зможу прийти завтра</p>
<p style="text-align: center;">MAY</p> <p>1) «ймовірність події або дії» It may rain. Можливо буде дощ.</p> <p>2) «прохання» May I come in? Можна мені увійти?</p>	<p style="text-align: center;">MIGHT</p> <p>«ймовірність події або дії» It might be John. Це, можливо, Джон</p>	<p style="text-align: center;">will be allowed to</p> <p>I will be allowed to use the dictionary while translating the text tomorrow. Завтра мені дозволять користуватися словником при перекладі тексту</p>
MUST	HAD TO DO	

<p>1) «необхідність дії» He must do it in time. Він повинен зробити це вчасно.</p> <p>Еквіваленти: 1) to have to «змушений» He has to get up early. Він змушений рано вставати.</p> <p>2) to be to – «змушений зробити згідно з планом або домовленістю» I am to be at home at 5. Я повинна бути вдома о 5-й годині</p> <p>SHOULD «слід зробити, варто зробити» (тепер) You should do it right now Вам слід зробити це пряма зараз.</p>	<p>He had to do it yesterday. Він змушений був зробити це вчора.</p> <p>was / were to He was to speak at the meeting yesterday. Він повинен був виступити на зборах вчора.</p> <p>SHOULD HAVE DONE «слід було зробити» (раніше) You should have done it before. Вам слід було зробити це раніше.</p>	<p>He will have to do it next week. Він мусить зробити це наступного тижня</p>
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INDIRECT SPEECH (Непряма мова)

Пряма мова (Direct Speech) передається лапками та вважається окремим реченням. Після слів, що вводять пряму мову, зазвичай ставиться кома, а перше слово прямої мови пишеться з великої літери. Наприкінці прямої мови крапка або інший знак пунктуації ставиться всередині лапок:

She said: "I'm hungry." – Вона сказала: "Я голодна".

He said: "I'm going to play football." – Він сказав: "Я збираюся грати у футбол".

Непряма мова (Indirect Speech) не вимагає використання лапок та коми, оскільки вона передає зміст прямої мови. Перед використанням прямої мови може використовуватися сполучник *that*, але це не є обов'язковим:

She said that she was hungry. – Вона сказала, що вона голодна.

He said he was going to play football. – Він сказав, що збирається грати у футбол.

Під час передачі непрямої мови час підрядного речення змінюється. Це називається узгодженням часів.

ТАБЛИЦЯ ЗМІНИ ЧАСІВ У НЕПРЯМІЙ МОВІ

Час у прямій мові	Змінюється на час у непрякій мові
Present Simple	Past Simple
She said, "I am hungry."	She said (that) she was hungry.
Past Simple	Past Perfect
He said, "The party finished late".	He said (that) the party had finished late.
Future Simple	Future Simple in the Past
Mary said, "I will come tomorrow"	Mary said (that) she would come <i>next day</i> .
Present Continuous	Past Continuous
Mother said, "I am cooking the dinner now".	Mom said she was cooking dinner.
Past Continuous	Past Perfect Continuous
Nick said "They were playing in the gym."	Nick said they had been playing in the gym.
Future Continuous	Future Continuous in the Past
John said "I will be working at 5 <i>tomorrow</i> "	John said he would be working at 5 <i>the next day</i> .
Present Perfect	Past Perfect
Children said, "We have just finished our homework".	Children said they had finished their homework
Future Perfect	Future Perfect in the Past
Children said, "We will have finished our work by sunset"	Children said they would have finished their homework by sunset.
Present Perfect Continuous	Past Perfect Continuous
John said, "I have been waiting hours!"	John said he had been waiting <i>here</i> for 2 hours!
Future Perfect Continuous	Future Perfect Continuous in the Past
My wife said, "Next month we will have been living together years."	My wife said the next month we would have been living together for 25 for 25 years.

ЗМІНИ ЗАЙМЕННИКІВ, ПРИСЛІВНИКІВ ЧАСУ ТА МІСЦЯ У НЕПРЯМІЙ МОВІ

Пряма мова	Непряма мова
this	that
these	those
now	then
today	that day
tomorrow	next day
the day after tomorrow	2 days later
yesterday	the day before
the day before yesterday	2 days before
ago	before
here	there
this week	that week
last week	the week before
two days ago	two days before
next week	the next week

БЕЗОСОБОВІ ФОРМИ ДІЄСЛОВА

Voice Tenses	Infinitive (з часткою <i>to</i>)		Gerund (<i>-ing</i>)		Participle I (<i>-ing</i>)		Participle II (ст. д. – <i>ed</i> , нест. д. – 3 форма дієслова)
	Active	Passive	Active	Passive	Active	Passive	
Simple	to ask to write	to be asked to be written	asking writing	being asked being written	asking writing	being asked being written	asked written
Continuous	to be asking to be writing	-	-	-	-	-	-----
Perfect	to have asked	to have been asked	having asked	having been asked	having asked	having been asked	-----
	to have written	to have been written	having written	having been written	having written	having been written	

The use of non-finite forms of the verb

Члени речення	Infinitive (to)	Gerund (-ing)	Participle I (-ing)	Participle II (ст. д. – ed, нест. д. – 3-тя форма дієслова)
1. Підмет	<u>To walk</u> is useful	<u>Walking</u> is useful	----	----
	<u>Гуляти</u> – корисно			
2. Частина присудка	Our aim is <u>to master</u> English. Наша мета – <u>оволодіти</u> англійською мовою	Our aim is <u>mastering</u> English. Наша мета – <u>оволодіння</u> англійською мовою	He is <u>writing</u> a letter. Він <u>пише</u> листа	He has <u>written</u> a letter. Він <u>написав</u> листа
3. Додаток	She likes <u>to sing</u>	She likes <u>singing</u>	----	----
	Вона любить <u>співати</u>			
4. Означення	The method <u>to be used</u> is not new. Метод, <u>який</u> треба <u>використати</u> , не новий	—	Look at the trees <u>growing</u> in our garden. Подивись на дерева, <u>які</u> <u>ростуть</u> у нашому садку	The method <u>used</u> is not new. <u>Використаний</u> метод не новий
5. Обставина	He went there <u>to study</u> . Він пішов туди <u>навчатися</u>	He went there for <u>studying</u> . Він пішов туди <u>навчатися</u>	(While) <u>reading</u> he made notes. <u>Читаючи</u> , він робив записи	<u>When done</u> this work will give good results. Коли робота <u>буде</u> <u>зроблена</u> , вона дасть гарні результати

ІНФІНІТИВНІ КОНСТРУКЦІЇ
Complex Subject
(Складний підмет)

Підмет	Присудок	Інфінітив	Другорядні члени речення	Переклад
He	is said	to come	to us	Говорять, що він прийде до нас
This farm	is known	to have	rich soil	Відомо, що це господарство має багаті ґрунти
They	are expected	to work	on the farm	Сподіваються, що вони будуть працювати в господарстві
This crop	is likely	to give	high yields	Ймовірно, що ця культура дасть високі врожаї

Дієслова, що вживаються як присудки:

В Passive Voice:

to report, to say, to know, to suppose, to state, to expect, to believe та ін.

в Active Voice:

to seem, to appear, to be likely, to be unlikely, to be sure.

COMPLEX OBJECT

(Складний додаток)

Підмет	Присудок	Додаток, виражений іменником або займенником в об'єктному відмінку	Інфінітив	Другорядні члени речення	Переклад
We	expect	them	to do	it in time.	Ми сподіваємось, що вони зроблять це вчасно.
I	want	you	to work	better.	Я хочу, щоб ви працювали краще.
They	consider	us	to translate	this text.	Вони сподіваються, що ми перекладемо цей текст.
We	saw	him	enter	the house.	Я бачив, як він входив в будинок.
I	heard	her	sing		Я чув, як вона співала.

Конструкція вживається після дієслів (в активному стані):
to know, to want, to expect, to consider, to think, to suppose, to find, to believe та ін.

СЛОВОТВОРЕННЯ

I. Афіксація		
Частини мови	Префіксація	Суфіксація
1) іменник	counter: counteraction anti: antifascist over: overproduction non: nonconductor in: inability та ін.	-er / -or (додається до дієслів): doer -ee (від дієслів) – payee -age (від дієслів) – marriage -ance / -ence (від прикметників) – resistance -dom (від іменників та прикметників) – freedom -hood (від іменників) – brotherhood -ion (-ation, -tion, -sion, -ssion) (від дієслів) – collection -ment (від дієслів) – development -ness (від прикметників) – coldness -ship (від прикметників) – friendship -ure (від дієслів) – departure та ін.
2) прикметник	un: unequal in (il): incomplete, illegal dis: dishonest non: nonessential post: post- revolutionary inter: interdependent sub: subconscious ultra: ultra-short та ін.	-able /-ble (від дієслів) eatable -al (від іменників) central -ant / -ent (від дієслів) different -ful (від іменників) beautiful -ish: (від іменників та прикметників) Danish, reddish -ive: (від дієслів та прикметників) active -less: (від іменників) hopeless -ous: (від іменників) glorious -y (від іменників) windy та ін.
Частини мови	Префіксація	Суфіксація
дієслово	un: to undress dis: to disapprove re: to re-elect mis: to mislead to over: to over- estimate under: underpay counter: to counteract	-en (від прикметників / іменників) to sharpen -fy (від прикметників) to simplify -ize (від іменників) to characterize

	en: to enslave		
II. Конверсія			
а) іменник answer work		дієслово to answer to work	
б) прикметник clean empty		дієслово to clean to empty	
III. Чергування звуків (букв)			
іменник use [ju:s] life [laif]		дієслово to use [ju:z] to live [li:v]	
IV. Зміна наголосу			
éxport		to expórt	
ímport		to impórt	
V. Словоскладення			
<p>а) утворення іменника bed + room = bedroom school + boy = schoolboy father + in + law = father-in-law</p> <p>б) утворення прикметника dark + blue =dark-blue first + class = first-class</p> <p>в) утворення дієслова white + wash = to whitewash broad + cast = to broadcast</p>			

IRREGULAR VERBS

(Список неправильних дієслів)

be	was, were	been	бути
become	became	become	стати, зробитися
begin	began	begun	починати(ся)
blow	blew	blown	дути
break	broke	broken	ламати(ся)
bring	brought	brought	приносити
build	built	built	будувати
burn	burnt	burnt	горіти, палити
buy	bought	bought	купувати
catch	caught	caught	ловити, схоплювати
choose	chose	chosen	вибирати, добирати
come	came	come	приходити
cost	cost	cost	коштувати
cut	cut	cut	різати
do	did	done	робити
draw	drew	drawn	тягти; малювати
drink	drank	drunk	пити
eat	ate	eaten	їсти
fall	fell	fallen	падати
feed	fed	fed	годувати
feel	felt	felt	почувати (<i>себе</i>)
fight	fought	fought	боротися, битися
find	found	found	знаходити
fly	flew	flown	літати
forget	forgot	forgotten	забувати
freeze	froze	frozen	заморожувати
get	got	got	одержувати; ставити
give	gave	given	давати
go	went	gone	іти, ходити
grow	grew	grown	рости, ставати
have	had	had	мати
hear	heard	heard	чути
hold	held	held	тримати
keep	kept	kept	тримати, зберігати
know	knew	known	знати
lead	led	led	вести
learn	learnt	learnt	вчити(ся)
leave	left	left	залишати

let	let	let	дозволяти
lose	lost	lost	губити, втрачати
make	made	made	робити
meet	met	met	зустрічатися
pay	paid	paid	платити
put	put	put	класти
read	read	read	читати
ride	rode	ridden	їздити верхи
rise	rose	risen	вставати, сходити
run	ran	run	бігти
say	said	said	сказати
see	saw	seen	бачити
sell	sold	sold	продавати
send	sent	sent	посилати
shake	shook	shaken	трясти
shine	shone	shone	сяяти, блищати
show	showed	shown	показувати
sing	sang	sung	співати
sleep	slept	slept	спати
smell	smelt	smelt	нюхати, пахнути
speak	spoke	spoken	говорити, розмовляти
spend	spent	spent	витрачати
stand	stood	stood	стояти
swim	swam	swum	плавати
take	took	taken	брати
teach	taught	taught	вчити
tell	told	told	розповідати, говорити
think	thought	thought	думати
throw	threw	thrown	кидати
understand	understood	understood	розуміти
wake (up)	woke (up)	woken (up)	прокидатися
wear	wore	worn	носити
win	won	won	перемагати
write	wrote	written	писати

GLOSSARY OF TERMS

A

aerial release spraying - an aerial application of herbicide to reduce hardwood competition in young pine stands or to eliminate exotic species. This will generally be done on natural stands that have had a pre-commercial thinning.

all-aged stand - All, or almost all, age classes of trees represented.

allegany hardwood forest type - a portion of Maryland's northern hardwood forest in which black cherry, white ash, and red oak are dominant species.

annual rings - see growth rings.

aspect - the compass direction toward which a slope faces.

association - a collection of plants with ecologically similar requirements, including one or more dominant species from which the group derives a definite character.

B

basal area (of a tree) - the cross-sectional area of the trunk 4 1/2 feet above the ground; (**per acre**) the sum of the basal areas of the trees on an acre; used as a measure of forest density.

Biltmore stick - a tool calibrated to measure the diameter of a tree at breast height. Biltmore sticks are calibrated with different scales depending on the users' arm length.

biological diversity or biodiversity - the variety of life in all its forms and all its levels of organization. Biodiversity refers to diversity of genetics, species, ecosystems, and landscapes.

blaze - to mark a tree, usually by painting or cutting the bark. Forest properties often are delineated by blazing trees along the boundary lines.

blowdown - see windthrow.

board foot - a unit for measuring wood volume in a tree, log, or board. A board foot is commonly 1 foot by 1 foot by 1 inch, but any shape containing 144 cubic inches of wood equals one board foot.

bole - the trunk of a tree.

boots - Firefighters wear all leather boots to protect their feet on the fire-line and rugged terrain.

breast height - 4 1/2 feet above ground level. See diameter at breast height.

browse - parts of woody plants, including twigs, shoots, and leaves, eaten by forest animals.

buck - to cut trees into shorter lengths, such as logs or cordwood.

butt log - a log cut from the bole immediately above the stump.

C

caliper - a tool to measure the diameter of a tree.

canopy - the continuous cover formed by tree crowns in a forest.

carrying capacity - the maximum number of individuals of a wildlife species that an area can support during the most unfavorable time of the year.

Clear-cut - the harvest of all the trees in an area. Clearcutting is used to aid species whose seedlings require full sunlight to grow well.

clinometer - an instrument used to determine the height of a tree.

codominant tree - a tree that extends its crown into the canopy and receives direct sunlight from above but limited sunlight from the sides. One or more sides of a codominant tree are crowded by the crowns of dominant trees.

commercial clear-cut - a harvest cut that removes all merchantable timber from the area.

commercial forestland - any area capable of producing 20 cubic feet of timber per acre per year that has not been protected from such use by law or statute.

commercial treatments - timber stand improvements, such as thinning, that generate income from the sale of the trees removed.

community - A collection of living organisms thriving in an organized system through which water, energy, and nutrients cycle.

conifer - any tree that produces seeds in cones. See softwood.

consulting forester - an independent professional who manages forests and markets forest products for private woodland owners. Consulting foresters do not have direct connections with firms that buy wood products, but are retained by woodland owners as their agents.

Cooperative Extension Service (CES) - the educational arm of the USDA that links university research to people who can benefit from it.

cord - a unit of wood cut for fuel that is equal to a stack 4 x 4 by 8 feet or 128 cubic feet. A cord is the legal measure of fuelwood volume in Maryland.

cordwood - small diameter or low-quality wood suitable for firewood, pulp, or chips. Cordwood is not suitable for sawlogs.

critical area -land in Maryland that lies within 1,000 feet of the Chesapeake Bay and its tributaries and is subject to forestry and other land use regulations.

crook - a tree defect characterized by a sharp bend in the main stem.

crop tree - a young tree of a desirable species with certain characteristics desired for timber value, water quality enhancement, or wildlife or aesthetic uses.

crown - the uppermost branches and foliage of a tree.

crown classes - see codominant, dominant, intermediate, overtopped, and suppressed.

crown cover or crown closure - the percentage of a given area covered by tree crowns.

crown ratio or live-crown ratio - the ratio of the leaved portion of a tree's height to its total height.

cruise - a forest survey used to obtain inventory information and develop a management plan.

cull - a sawtimber sized tree that has no timber value as a result of poor shape

deciduous - shedding or losing leaves annually; the opposite of evergreen. Trees such as maple, ash, cherry, and larch are deciduous.

defects - characteristics of an individual tree that reduce its quality and utility.

deferment harvest - the residual stand resembles a seed tree cut when the regenerated stand becomes established. Instead, the residual trees remain until the regenerated stand is at the end of a rotation. Similar to a seed tree harvest, but the residual trees are left indefinitely for seed production.

den tree - a tree with cavities suitable for birds or mammals to nest in.

diameter at breast height - standard measurement of a tree's diameter, usually taken at 4 1/2 feet above the ground.

diameter-limit scale - a timber sale in which all trees over a specified dbh may be cut. Diameter-limit sales often result in high grading.

dimension lumber - hardwood dimension lumber is processed to be used whole in the manufacture of furniture or other products. Softwood dimension lumber consists of boards more than 2 inches thick but less than 5 inches thick. This wood is used in construction and is sold as 2 by 4s, 4 by 8s, or 2 by 10s.

dominant trees - trees that extend above surrounding individuals and capture sunlight from above and around the crown.

drip torch - Firefighters use these torches, that drip a flaming liquid mixture of diesel fuel and gasoline, to ignite fires in burnout operations.

E

ecology - the study of interactions between organisms and their environment.

ecosystem - organisms and the physical factors that make up their environment.

ecotone - a transition area between two distinct, but adjoining, communities.

edge - the boundary between two ecological communities, for example, field and woodland. Edges provide wildlife habitat. Consideration of an edge can reduce the impact of a timber harvest.

endangered species - any species or subspecies in immediate danger of becoming extinct throughout all or a significant portion of its range.

epicormic branching - branches that grow out of the main stem of a tree from buds produced under the bark. Severe epicormic branching increases knottiness and reduces lumber quality.

even-aged stand - a stand in which the age difference between the oldest and youngest trees is minimal, usually no greater than 10 to 20 years. Even-aged stands are perpetuated by cutting all the trees within a relatively short period of time.

evergreens - plants that retain foliage the year round.

extension forester - a Cooperative Extension Service professional who educates woodland owners on how they can effectively manage their forests.

F

Farm Services Agency (FSA) - The branch of the U.S. Department of Agriculture (USDA) that administers cost-sharing programs for such forestry practices as tree planting and timber stand improvement.

felling - the cutting of standing trees.

fertilization - the addition of nutrient elements to increase growth rate or overcome a nutrient deficiency in the soil.

final harvest - the removal of the remaining crop trees in an even-aged stand.

first commercial thinning – this will occur on plantations at age 12-20 years old to facilitate forest health and promote development of larger trees over a shorter amount of time. This is accomplished in plantations by removing every 5th row of trees and selectively thinning between rows. In naturally regenerated stands, thinning corridors will be established every 50 feet and the stand will be selectively thinned along both sides of the corridor. Approximately 30-35% of the total stand volume will be removed in this process.

fire Pack - Firefighters use these to carry tools, equipment, and supplies on their backs.

fire Resistant Clothing - These yellow shirts and green pants are the trademarks of wildland firefighters. **fire shelter** - Firefighters use this personal protection as a last resort if a wildfire traps them and they cannot escape. Firefighters can get into the tent-like shelter, made of heat reflective material, in about 25 seconds.

fire Shovel - These shovels, specifically designed for constructing a fireline, feature a tapered blade with both edges sharpened for scraping, digging, grubbing, cutting, and throwing dirt.

forest - a biological community dominated by trees and other woody plants.

forest fragmentation - the subdivision of large natural landscapes into smaller, more isolated fragments. Fragmentation affects the viability of wildlife populations and ecosystems.

forest types - associations of tree species that have similar ecological requirements. Maryland forest types include Allegheny hardwood, loblolly-shortleaf, northern hardwood, oak-gum-cypress, oak hickory, and oak-pine.

forested wetland - an area characterized by woody vegetation taller than 20 feet where soil is at least periodically saturated or covered by water.

forester - a degreed professional trained in forestry and forest management. In Maryland, all foresters must be registered with the state.

forestry - the science of tending woodlands.

Forestry Incentives Program (F.I.P.) - a Federal cost-sharing program that reimburse part of the costs landowners incur in completing certain forestry practices. The F.I.P. is administered by the NRCS.

fork - a tree defect characterized by the division of a bole or main stem into two or more stems.

frilling - the method of killing trees by inflicting a series of cuts around the bole and applying an herbicide to the wounds. Frilling or girdling can be used to reduce the density of a stand or to kill individual undesirable trees.

fusee - Firefighters also use these colored flares to ignite fires in burnout operations.

G

girdling - a method of killing trees by cutting through the stem, thus interrupting the flow of water and nutrients.

ground spraying - a ground application of herbicides to discourage unwanted hardwood competition. It is almost always associated with fertilization. This combined treatment is typically done a year or two after a successful thinning to achieve larger trees faster.

group selection - a process of harvesting patches of trees to open the forest canopy and encourage the reproduction of uneven-aged stands.

growth rings - the layers of wood a tree adds each season; also called annual rings. These rings frequently are visible when a tree is cut and can be used to estimate its age and growth rate.

H

habitat - the ecosystem in which a plant or animal lives and obtains food and water.

hardwoods - a general term encompassing broadleaf, deciduous trees.

harvest - the cutting, felling, and gathering of forest timber.

headlamp - Firefighters who work on the fire-line at night wear these flashlights on the front of their helmets.

herbaceous vegetation - low-growing, non-woody plants, including wildflowers and ferns, in a forest understory.

high grading - to remove all mature, good quality trees from a stand and leave inferior species and individuals. High grading should be distinguished from even-aged management in which mature and immature trees are removed to aid regeneration.

hypometer - any of several tools or instruments designed to measure the height of trees. The clinometer is such a tool.

I

improvement cut - a weeding done in stands of pole-size or larger trees.

industrial forester - a professional employed by a wood-using industry, usually a sawmill, who purchases timber from private woodland owners. Many industrial foresters offer free forest management or marketing services to the landowners who sell timber to the forester's employer.

increment borer - an auger-like tool with a hollow bit designed to extract cores from tree stems for the determination of age and growth rate.

intermediate crown class - trees with crowns that extend into the canopy with dominant and codominate trees. These trees receive little direct sunlight from above and none from the sides. Crowns generally are small and crowded on all sides.

intermediate tolerance - a characteristic of certain tree species that allows them to survive, though not necessarily thrive, in relatively low light conditions.

intolerance - a characteristic of certain tree species that does not permit them to survive in the shade of other trees.

introduced species - a nonnative species that was intentionally or unintentionally brought into an area by humans.

J

K

L

landing - a cleared area within a timber harvest where harvested logs are processed, piled, and loaded for transport to a sawmill or other facility.

loblolly-shortleaf forest type - an association of tree species common to the southeastern United States that includes loblolly and shortleaf pines and oaks.

logger - an individual who harvests timber for a living.

log rule - a method for calculating wood volume in a tree or log by using its diameter and length. The international 1/4-inch rule is the legal rule in Maryland.

lopping - cutting tree tops to a maximum specified height above the ground after a tree is felled.

lump-sum sale - a timber sale in which an agreed-on price for marked standing trees is set before the wood is removed (as opposed to a unit sale).

M

marking timber - indicating by paint or other means which trees are to be cut or otherwise treated. It is advisable to mark trees to be harvested twice-once at eye level and once on the stump.

mast - nuts and seeds, such as acorns, beechnuts, and chestnuts, of trees that serve as food for wildlife.

mcleod - Firefighters also use this combination hoe, rake and scraping tool and rake to remove plants and shrubs when building a fire line.

merchantable height - the point on a tree stem to which the stem is salable. Limits are: the point at which a sawlog tree is less than 8 inches in diameter, measured inside the bark (dib); the point at which a pulpwood tree is less than 4 inches dib; or the point on any tree where a defect is found that cannot be processed out.

N

Natural Resources Conservation Service (NRCS) - the branch of the USDA that coordinates and implements soil conservation practices on private lands. The NRCS can provide woodland owners with detailed information on his or her soil.

niche - the physical and functional "address" of an organism within an ecosystem; or, where a living thing is found and what it does there.

nongame wildlife - wildlife species that are protected by state wildlife laws and can not be hunted. Examples include songbirds, eagles, etc.

nonindustrial private forestland (NIPF) - forestland owned by a private individual, group, or corporation not involved in wood processing. Eighty-five percent of Maryland's forests are in this category.

nontidal wetlands - wetlands not affected by ocean tides. Nontidal wetlands are subject to special regulations.

northern hardwood forest type - an association of tree species common to the Northeastern United States that includes sugar maple, red maple, yellow birch, hemlock, and American beech.

O

oak-gum-cypress forest type - an association of tree species common to the bottom lands of the Southeastern United States.

oak-hickory forest type - an association of tree species common to the Northeastern United States that includes oak, hickory, yellow poplar, and red maple.

oak-pine forest type - an association of tree species common to the Southeastern United States that includes loblolly pine, Virginia pine, northern red oak, and white ash.

old-growth forest - a wooded area, usually greater than 200 years of age, that has never been altered or harvested by humans. An old-growth forest often has large individual trees, a multi-layered crown canopy, and a significant accumulation of coarse woody debris including snags and fallen logs.

overmature - a quality exhibited by trees that have declined in growth rate because of old age and loss of vigor.

overstocked - the situation in which trees are so closely spaced that they compete for resources and do not reach full growth potential.

overstory - the level of forest canopy that includes the crowns of dominant, codominant, and intermediate trees.

overstory removal - a silvicultural technique where the trees to be removed are all in the dominant or codominant crown class or position. This basically is performed to harvest mature trees and to remove competition from preferred understory trees.

overtopped - the situation in which a tree cannot sufficiently extend its crown into the overstory and receive direct sunlight. Overtopped trees that lack shade tolerance lose vigor and die.

P

patch cut - a clear-cut on a small area.

pole stand - a stand of trees, whose average d.b.h. is between 4 and 10 inches.

pole timber - trees 4 to 10 inches d.b.h.

precommercial operations - cutting in forest stands to remove wood too small to be marketed. Precommercial operations improve species composition and increase the quality, growth, and vigor of remaining trees.

precommercial thinning - a harvest made purely as investments in the future growth of stands so young so young that none of the felled trees are extracted and utilized. This treatment is usually completed by hand on trees 5-10 years of age.

precommercial treatments - forestry operations that require landowner investment, such as cleaning or weeding stands to remove trees that have little or no cash value. See commercial treatments.

prescribed fire - fires set deliberately, under proper supervision and certain conditions, to achieve a specific management goal such as enhancing wildlife habitat, encouraging fire-dependant plant species, reducing fuel loads that feed wildfires, and preparing sites for planting. Sometimes referred to prescribed burning.

prospectus - a document that describes the location of a property, indicates trees marked for cutting, and states that the timber will be sold in accordance with a

suitable contact. A prospectus includes the number of trees marked, their diameter classes, and a volume estimate for each species.

pruning - the act of sawing or cutting branches from a living tree. In forest management, pruning is done to promote the growth of clear, valuable wood on the tree bole.

pulaski - Firefighters use this tool, which combines a single-bitted axe blade for chopping with a narrow blade for trenching, to clear vegetation when constructing a fire line.

pulpwood - wood suitable for use in paper manufacturing.

pulpwood harvest - a harvest where the trees are to utilized for paper pulp. This type of harvest usually is preformed as a commercial thinning where the trees are all pole sized (4" to 11" d.b.h.), but definitely less than sawtimber sized (11" d.b.h. or greater).

Q

R

reforestation – the reestablishment of forest cover either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting).

regeneration - the process by which a forest is reseeded and renewed. Advanced regeneration refers to regeneration that is established before the existing forest stand is removed.

regeneration cut - a timber harvest designed to promote natural establishment of trees.

release - to remove overtopping trees that compete with understory or suppressed trees.

release harvest - the act of freeing a young stand of desirable trees, not past the sapling stage, from the competition of undesirable trees that threaten to suppress them.

residual stand - the trees remaining intact following any cutting operation.

riparian buffer zone - vegetated areas adjacent to or influenced by a perennial or intermittent bodies of water. These buffers are established and managed to protect aquatic, wetland, shoreline, and/or terrestrial environments.

rot - a tree defect characterized by woody decay in a standing tree or log.

rotation - the number of years required to grow a stand to a desired size or maturity.

S

salvage cut - the removal of dead, damaged, or diseased trees to recover maximum value prior to deterioration.

sapling - a tree at least 4 1/2 feet tall and up to 4 inches in diameter.

sapling stand - a stand of trees, whose average d.b.h. is between 1 and 4 inches.

sawlog - a log large enough to be sawed economically on a sawmill. Sawlogs are usually at least 8 inches in diameter at the small end.

sawlog tree - a tree at least 11 inches dbh and suitable for conversion to lumber. Sometimes, trees 11 to 14 inches dbh are called small sawlog trees, and trees larger than 18 inches dbh are called large sawlog trees.

sawtimber - trees from which sawlogs can be made.

sawtimber stand - a stand of trees, whose average dbh is greater than 11 inches.

scale stick - a calibrated stick used to estimate wood volume in a log.

sealed-bid sale - a timber sale, usually offered through a consulting forester, in which buyers submit secret bids.

second commercial thinning - usually performed on stands 20-28 years old, the objective is to lengthen the rotation age of the stand and produce larger trees faster. In some cases, this technique is used to improve habitat for the Delmarva Fox Squirrel (DFS). Approximately 30-35% of the total stand volume is be removed in this process.

seed tree - a mature tree left uncut to provide seed for regeneration of a harvested stand.

seed-tree harvest - the felling of all the trees in an area except for a few desirable individuals that provide seed for the next forest.

selection harvest - the harvest of all individual trees or small groups at regular intervals to maintain an uneven-aged forest. Selection harvests are used to manage species that do not need sunlight to survive.

service forester - a professional forester employed by the Maryland Department of Natural Resources Forest Service. Service foresters help private woodland owners develop and implement forest management plans. There is at least one service forester in each Maryland county.

shelterwood harvest - the harvest of all mature trees in an area in a series of two or more cuts, leaving enough trees of other sizes to provide shade and protection for forest seedlings.

silviculture - the art and science of growing forest trees.

site - the combination of biotic, climatic, topographic, and soil conditions of an area.

site index - a measure of the quality of a site based on the height of dominate trees at a specified age (usually 25 or 50 years), depending on the species.

site preparation - treatment of an area prior to reestablishment of a forest stand. Site preparation can include mechanical clearing, burning, or chemical (herbicide) vegetation control.

skidder - a rubber-tired machine with a cable winch or grapple used to drag logs out of the forest.

skidding - the act of moving trees from the site of felling to a landing area or landing. Tractors, horses, or specialized logging equipment can be used for skidding. Skidding methods vary in their impact on soils and the remaining stands.

slash - branches and other woody material left on a site after logging.

snag - a dead tree that is still standing. Snags provide important food and cover for a wide variety of wildlife species.

softwood - any tree in the gymnosperm group, including pines, hemlocks, larches, spruces, firs, and junipers. Softwoods often are called conifers although some, such as junipers and yews do not produce cones.

sprout - a tree growing from a cut stump or previously established root system.

stand - a group of forest trees of sufficiently uniform species composition, age, and condition to be considered a homogeneous unit for management purposes.

stand density - the quantity of trees per unit area, usually evaluated in terms of basal area, crown cover and stocking.

stocking - the number and density of trees in a forest stand. Stands are often classified as understocked, well-stocked or overstocked.

stratification - division of a forest, or any ecosystem, into separate layers of vegetation that provide distinct niches for wildlife. See canopy, understory, and herbaceous vegetation.

stumpage - the value of standing trees in a forest.

stumpage price - the price paid for standing forest trees.

stump height - the distance from the ground to the top of the stump. Good logging practice dictates that stumps be as low as possible (preferably as low as 12 inches) to reduce waste, to minimize visual impact on the logging site, and to promote resprouting of trees.

succession - the natural replacement of one plant (or animal) community by another over time in the absence of disturbance.

suppressed - a tree condition characterized by low growth rate and low vigor as a result of competition with overtopping trees. See overtopped.

sustained yield - an ideal forest management objective in which the volume of wood removed equals growth within the total forest.

sweep - a tree defect characterized by a gradual curve in the main stem.

T

thinning - a partial cut in an immature, overstocked stand of trees used to increase the stand's value growth by concentrating on individuals with the best potential.

threatened species - a species or subspecies whose population is so small or is declining so rapidly that it may become endangered in all or a significant portion of its range.

timber cruise - see cruise.

timber stand improvement (t.s.i.) - any practice that increases the value or rate of value growth in a stand of potential sawtimber trees. Pruning and thinning are considered t.s.i.

tolerance - a tree species' capacity to grow in shade

tree farm - a privately owned forest managed on a multiple use basis with timber production as an important management goal.

trim allowance - the extra 2 or 3 inches, left on a bucked log to allow logs with end checks, pulls, or slanting buck cuts to be trimmed to standard lumber lengths.

U

understocked - a stand of trees so widely spaced, that even with full growth potential realized, crown closure will not occur.

understory - the level of forest vegetation beneath the canopy.

uneven-aged stand - Three or more age classes of trees represented.

unit sale - a timber sale in which the buyer makes regular (weekly, monthly) payments based on mill receipts. Unit sales are useful when the amount of timber sold is so large that a preharvest, lump-sum payment would be prohibitive.

V

variable retention harvest system - an approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand for integration into the new stand to achieve various ecological objectives.

vegetation - low-growing, non-woody plants, including wildflowers and ferns, in a forest understory.

vener log - a high-quality log of a desirable species suitable for conversion to veneer. Veneer logs must be large, straight, of minimum taper, and free from defects.

virgin forest - an area of old-growth trees that never has been harvested by humans.

W

watershed - a region defined by patterns of stream drainage. A watershed includes all the land that contributes water to a particular stream or river.

well-stocked - the situation in which a forest stand contains trees spaced widely enough to prevent competition yet closely enough to utilize the entire site.

wildlife habitat - the native environment of an animal. Habitats ideally provide all the elements needed for life and growth: food, water, cover and space.

windthrow - a tree felled by wind. Windthrows, also known as blowdowns, are common among shallow-rooted species and in areas where cutting has reduced stand density.

wolf tree - a large older tree with a spreading crown and little or no timber value, but often great value for wildlife.

woodland - see forest.

REFERENCES

1. Герман Л.В., Шульга І.В. Англійська мова: практикум для здобувачів II (магістерського) рівня ф-ту лісового господарства /Л.В. Герман, І.В. Шульга. – Харків: ХНАУ, 2019. – 119 с.
2. Герман Л.В., Коврига Ю.В. Англійська мова за професійним спрямуванням: навч. посіб. для здобувачів першого (бакалаврського) рівня вищої освіти спец. 205 «Лісове господарство» / Л.В. Герман, Ю.В. Коврига. – Харків. нац. аграр. ун-т ім. В.В. Докучаєва. – Харків: ХНАУ, 2020. – 106 с.
3. Логінова О. В. Англійська мова: методичні вказівки до самостійної роботи для здобувачів першого (бакалаврського) рівня вищої освіти спеціальності 101 “Екологія ” /О. В. Логінова; Харківський національний аграрний університет ім. В.В. Докучаєва. – Харків: ХНАУ, 2020. – 32 с.
4. Герман Л. В., Логінова О. В. Методичні рекомендації до самостійної роботи з дисципліни «Англійська мова» для здобувачів першого (бакалаврського) рівня вищої освіти спеціальності 206 «Садово-паркове господарство» // Харків: ХНАУ, 2021. - 60 с.
5. Шульга І.В. Англійська мова: навч. посіб. для здобувачів першого (бакалаврського) рівня вищої освіти за спеціальністю 206 «Садово-паркове господарство» / І.В. Шульга. – Харків : ДБТУ, 2022. –160 с.
6. National Forestry Handbook. – USA: United States Department of Agriculture, 2004.- 216 p
7. Hammond H. Seeing the forest among the trees. – Vancouver: Polestar Press Ltd, 1992. – 311p.
8. Harlow W. Textbook of dendrology. – New York: Mr. Graw-Hill. Inc, 1991 – 501p.
9. <https://dnr.maryland.gov/forests/pages/gloss.aspx> Glossary of forestry terms
10. http://www.countrysideinfo.co.uk/woodland_manage/conifer.htm
11. <http://en.wikipedia.org/wiki/Spruce>
12. <http://forestry.sfasu.edu/faculty/jstovall/silviculture/index.php/silviculture-textbook>

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АНГЛІЙСЬКА МОВА

Навчальний посібник

для здобувачів другого (магістерського) рівня
спеціальності 205 "Лісове господарство"