UNIT 2. FROM SPECIES TO ECOSYSTEMS

Key words

community – спільнота
biotic – біотичний, живий
abiotic – абіотичний, неживий
interaction – взаємодія
nitrogen – азот
soil – грунт
photosynthesis – фотосинтез
to capture – захватити
biological control – біологічний контроль
pest – шкідник, паразит
parasite – паразит
predator – хижак
to provide – забезпечувати
movement – рух
organic – органічний
biomass – біомаса
matter – матерія
to prey – полювати, ловити

Ex.2.1. Read the text and answer the questions.

1. What is an ecosystem?
2. How do the components of an ecosystem interact?
3. Which factors are ecosystems controlled by?

Ecosystem

Ecosystem is a community made up of living organisms and nonliving components such as air, water, and mineral soil. Ecosystems can be studied in two different ways. They are considered as interdependent groups of plants and animals, or as hierarchical systems and communities controlled by general rules. The living (biotic) and non-living (abiotic) components interact through nutrient cycles and energy flows. Ecosystems include interactions between organisms, and between organisms and their environment. Ecosystems can be of any size but each ecosystem has a specific, limited space. Some scientists consider the entire planet as one ecosystem.

Energy, water, nitrogen and soil minerals are essential abiotic components of an ecosystem. Ecosystem consumes the sun's energy and captures carbon dioxide from the atmosphere and uses them via photosynthesis to support the life in it. Animals are also important in the movement of matter and energy through ecosystems. They influence the amount of plant and microbial biomass that lives in

the system. As organic matter dies, carbon is released back into the atmosphere. This process provides nutrient cycling by converting nutrients stored in dead biomass back to a form that can be used again by plants and other microbes.

Ecosystems are controlled by both external and internal factors. External factors such as climate, parent material that forms the soil, topography and time, affect the ecosystem. However, ecosystem can't influence these external factors. Ecosystems are dynamic: they always tend to keep balance and recover from any invasion from outside. Internal factors are different: they have two-way interactions with the ecosystem – they both control each other.

Humans operate within ecosystems and can influence both internal and external factors. Global warming is an example of accumulative effect of human activities. Ecosystems provide benefits, called 'ecosystem services', which people depend on for their livelihood.

Ex.2.2. Translate the words and word combinations from the text into Ukrainian.

Community, living organisms and nonliving components, interdependent groups of plants and animals, nutrient cycles, soil minerals, via photosynthesis, captures carbon dioxide, dead biomass, livelihood.

Ex.2.3. Match Ukrainian word combinations with their English equivalents.

1) community	a) вуглекислий газ
2) soil	b) потоки енергії
3) nutrient cycles	c) забезпечувати
4) energy flows	d) зовнішні та внутрішні фактори
5) photosynthesis	e) спільнота
6) carbon dioxide	f) користь
7) matter	g) фотосінтез
8) provide	h) грунт
9) benefit	i) поживні цикли
10) external and internal factors	j) матерія

Ex.2.4. Decide whether the statements are true or false.

1. Nonliving components of ecosystem include air, water, soil, and plants.
2. All the components of ecosystem influence each other.
3. Ecosystems need solar energy to stay alive.
4. Nutrition cycles are less important than energy flows in ecosystems.
5. External factors and ecosystems interact and affect each other.
6. Both external and internal factors help ecosystems keep balance.

Ex.2.5. Give examples of:

Ecosystems, living (biotic) and non-living (abiotic) components, external and internal factors, human influence on ecosystems.

Ex.2.6. Complete the sentences with the words from the box.

a) size	b) benefits	c) photosynthesis	d) community
e) time	f) nutrient cycles	g) animals	h) balance

1. Ecosystem is a … made up of living and nonliving components.
2. The components of ecosystem interact through … and energy flows.
3. Ecosystems differ in … .
4. … is an essential process in energy exchange within an ecosystem.
5. The amount of plant and microbial biomass is controlled by … .
6. Some external factors such as … and climate also affect ecosystems.
7. Naturally, any ecosystem is seeking … .
8. People need the … provided by ecosystems.

Ex.2.7. Read the text and complete it with phrases a–f below.

Parts of Ecosystem

Any ecosystem is made up of two parts: nonliving (the physical environment) and living (the biological community). The nonliving environment usually includes energy from the sun, temperature, water, gases in the air, wind, soils and the rocks beneath them,

and the topography, or shape of the land. These nonliving parts of ecosystem determine (1) … , and they also affect each other.

The world's deserts, for example, occur where the annual rainfall is ten inches or less. The lack of rain is sometimes caused by the topography. Along the west coast of North America winds carry (2) …. . The air is forced to rise as it hits the coastal mountain ranges. As it rises it cools and the water vapor in the air falls as rain or snow on the seaward side of the mountains. As a result, there is little rainfall on the other side. This is called (3) … .

Living parts of ecosystem often affect the nonliving parts. When rain falls on a forest, the tree branches and leaves help break (4) … . Layers of dead leaves on the forest floor soak up water and prevent the drops from washing soil away. Little water runs off the land. So living trees help maintain the soil on which they depend. In fact, the trees enrich the soil, since the leaves that fall to the forest floor (5) … part of the soil itself.

As ecologists study ecosystems, they often turn to the science of meteorology for information. Does the annual rainfall (6) … , or is it spread evenly over the year? How much does the temperature vary between day and night, and through a year? Finding answers to these questions is important because the climate of the area has a tremendous effect on its plant and animal life.

topography – топографія; поверхня; рельєф
desert – пустеля
annual rainfall – річна кількість опадів
water vapor – водяна пара
mountain ranges – гірські хребти
seaward side – схил гори, звернений до моря
rain shadow – дощова тінь

a) the force of the drops
b) come mostly in one season
c) the kinds of living organisms that can exist in it
d) eventually decay and become
e) water vapor inland from the Pacific Ocean
f) *the rain shadow effect*

Ex.2.8. Put the words and word combinations in correct order to make a sentence.

1) non-living one / Living part / determined / is / ecosystem /by / the / of.

2) rain on a forest, / and / the tree branches / help / When / break / the force / of / falls / the drops / leaves /.

3) runs / water / off / the / Little / land.

4) trees / Living / maintain / help / which / the / on / they / depend / soil.

5) much / the / between / day / temperature / How / vary does / and / night?

6) the / rainfall / mostly / season / in / annual / one / or / is / spread / it / evenly over / Does / come / the year?

Ex.2.9. Match the English word combinations with their Ukrainian equivalents.

1)	energy from the sun	a)	рельєф поверхні землі
2)	biological community	b)	лісовий настіл
3)	shape of the land	c)	узбережні скелі
4)	forest floor	d)	рослинне життя
5)	lack of rain	e)	величезний вплив
6)	coastal mountains	f)	пустелі світу
7)	tree branches	g)	сонячна енергія
8)	tremendous effect	h)	нестача дощу
9)	plant life	i)	гілки дерев
10)	the world's deserts	j)	біологічна спільнота

Ex.2.10. Translate into Ukrainian.

Usually, also, any, for example, sometimes, along, or, the other, often, so, in fact, mostly, between, through.

Ex.2.11. Find and correct a semantic mistake in the text below.

Any ecosystem is made up of two parts: nonliving and living. The nonliving environment usually includes energy from the sun, temperature, water, gases in the air, wind, soil etc. They are determined by the living organisms that exist in the ecosystem.

Ex.2.12. Read the text and answer the questions.

1. Which factors are involved into the pond ecosystem?
2. What are producers, consumers and decomposers?
3. Give examples of the producers, consumers and decomposers of any other ecosystem (e.g., deciduous forest).

Living Parts of Ecosystem

To learn more about living parts of ecosystem, you should visit a pond. The pond ecosystem usually contains all the nonliving components mentioned above. The sun provides energy for life. The climate determines how much rain falls in the area and whether the pond is covered with ice. These factors have a great effect on the life that the pond supports. The underlying rocks and soils affect the chemistry of the water which in turn helps determine what kinds of plants and animals dwell in the water. And the life of the pond affects the nonliving environment: when plants and animals die, their remains settle to the bottom and decay there, enriching the bottom with muck and making the pond shallower.

Living parts of a pond ecosystem (and of any ecosystem) can be divided into three groups: producers, consumers and decomposers.

PRODUCERS are green plants which capture radiant energy from the sun and convert it into food energy. They also take substances such as carbon dioxide, water, oxygen, nitrogen, and sulfur from the environment and convert them into plant material that is used as food by other organisms. In fact, green plants might better be called converters than producers. Regardless, all other life in the pond ecosystem depends on green plants. The same is true for forests, prairies, tundra, and oceans.

CONSUMERS are animals that depend on green plants as their food. Some of them eat directly plants while others consume animals that have eaten plants. The plantfeeders include tiny animals called zooplankton that eat phytoplankton, and larger organisms, such as pollywogs, insects, and snails that eat larger plants. The planteaters, or herbivores, get their energy directly from the green plants. Other consumers are either carnivores (that usually eat herbivores) or omnivores (that eat both plants and animals). The carnivores in the pond ecosystem include fish, herons, and insects such as giant water beetles. Raccoons and people are omnivores.

DECOMPOSERS are the third major group of organisms. They use dead plant and animal material as food. Decomposers break down the material getting the energy they need to live and releasing minerals and other nutrients back into the environment. Most decomposers are simple organisms such as bacteria and fungi. These microscopic organisms can be found everywhere in the pond, but are especially abundant at the bottom where dead particles of plants and animals settle. On land, decomposers are most abundant at or near the surface of the soil.

producers – продуценти (рослинні джерела живлення, що створюють з неорганічних речовин органічні)

consumers – консументи (споживачі)

decomposers – деструктори, редуценти (мікроорганізми, які розкладають органічні залишки)

plantfeeders – рослиноїдні (травоїдні) тварини, фітофаги

carnivores – м'ясоїдні (тварини) / комахоїдні рослини

herbivores – травоїдні (тварини)

omnivores – всеїдні тварини

abundant – рясний

Ex.2.13. Decide whether the statements are true or false according to the text.

1. The pond ecosystem takes energy from the sun.
2. The rocks and the soil from the bottom eventually determine what kinds of plants and animals dwell in the pond.
3. The main function of producers is producing carbon dioxide, water, oxygen, nitrogen, and sulfur.
4. All the living organisms in the pond ecosystem are consumers.
5. Decomposers consume dead organisms to support living ones.

Ex.2.14. Translate the words from Ukrainian into English.

Скелі, грунт, отримувати енергію, основні групи, сірка, дрібні тварини, двоокис вуглецю, всеїдні, азот.

Ex.2.15. Complete the sentences with suitable words.

1. ... break down plant and animal material, getting the energy they need to live.

2. ... take substances such as carbon dioxide, water, oxygen, nitrogen and sulfur from the environment and convert them into plant material.

3. Some ... consume directly plants while others eat animals that have eaten plants.

4. Animals called ... eat phytoplankton and larger organisms.

5. The other consumers are either ... that usually eat herbivores or ... that eat both plants and animals.

Ex.2.16. Fill in the table according to the example.

Adjective	**Noun**
shallow	shallowness
deep	
long	
wide	
high	
narrow	

Ex.2.17. Read the text and answer the questions.

1. Why do individual predators have to be controlled?
2. Why do biologists believe that most living organisms are parasites?
3. What is ‘biological control’?
4. What does the term ‘symbiosis’ mean?

Living things in ecosystem affect each other in many ways. Consumers that kill other animals for food are called predators. The word ‘predator’ usually brings to mind pictures of lions and wolves, but such creatures as robins, frogs, and humans are also predators. Some predators, carnivores such as lions, depend entirely on animals they kill, while many others, such as foxes and humans, eat plant food too.

Sometimes individual predators prey upon farm animals, and they have to be controlled. However, people often try to wipe out the entire populations of predators. They believe that it’s a good idea, though humans themselves are the greatest predators in the world.

Parasites live on or in other living things – their hosts, often spending the whole life with them. The parasite gets food and sometimes shelter, while the host gains nothing and may even suffer from the parasite.

Very few living things are free of parasites, which are usually smaller and more numerous than their hosts. Indeed, many parasites have parasites of their own.

Some biologists believe that most of the individual organisms are parasites, since there are so many parasitic fungi, bacteria, flatworms, insects, and mites. Parasites are an important part of all communities and, like predators, often affect the numbers of other organisms in the community. People try to bring parasites and predators deliberately into the area where they might control the number of the pests. This method of limiting the number of pests is called a biological control and it might eliminate the need for insect poisons used today.

The close association between parasite and host is an example of symbiosis, which means 'living together'. There are a lot of other examples of symbiosis in nature. In some relationships, one organism benefits and the other one is not affected at all which is called commensalism. Fish called remoras attach themselves to sharks. They get a free ride and eat fragments of the shark's food. There are many other commensal relationships in the sea. In some symbiotic relationships, both organisms benefit that is called mutualism.

predator – хижак

parasite – паразит

host – організм-носій, господар (паразита)

to prey – полювати, ловити

flatworm – гельмінт, плоский черв'як

mite – кліщ

pest – шкідник, паразит

biological control – біологічний контроль (боротьба)

symbiosis – симбіоз

commensalism – комменсализм (взаємини двох популяцій, корисні для однієї і байдужі для іншої)

mutualism – мутуалізм (*симбіоз на взаємовигідній основі*)

Ex.2.18. Translate the words and word combinations from English into Ukrainian.

Predators, control, wipe out, parasite, parasitism, numerous, biologist, fungi, bacteria, flatworm, eliminate, symbiosis, benefit, commensalism, fragment, mutualism.

Ex.2.19. Match the English words with their Ukrainian equivalents.

1) lion	a) гриб
2) wolf	b) плоский черв'як
3) fox	c) клещ
4) human	d) вовк
5) fungus	e) акула
6) flatworm	f) лев
7) shark	g) дрізд
8) mite	h) лисиця
9) robin	i) людина
10) frog	j) жаба

Ex.2.20. Complete the table according to the example.

Predators	**Parasites**
lions	fungi

Ex.2.21. Put the nouns into plural form.

Consumer, predator, wolf, lion, human, carnivore, fox, parasite, organism, fungus, bacterium, insect, relationship.

Ex.2.22. Choose the best answer to the questions.

1. What are the greatest predators in the world?

a) lions b) foxes c) humans

2. Why do biologists believe that most individual organisms are parasites?

a) because parasites depend on their hosts;

b) because parasites are an important part of all communities;

c) because there are so many parasitic fungi, bacteria, flatworms and insects.

3. What does the term ‘symbiosis’ mean?

a) killing each other b) living together c) preying together

4. What does the term ‘commensalism’ mean?

a) both organisms benefit in relationships;

b) one organism benefits, the other one is not affected;

c) none of the organisms benefits but both are affected.

5. What does the term ‘mutualism’ mean?

a) both organisms benefit in relationships;

b) one organism benefits, the other one is not affected;

c) none of the organisms benefits but both are affected.

Ex.2.23. Decide whether the statements are true or false according to the text above.

1. People have to control the predators preying upon farm animals.
2. Parasites affect the other organisms in the community.
3. Hosts are the organisms that live on or in other living things.
4. Predators are free of parasites.
5. Symbiosis is a good example of biological control.
6. Relationships beneficial for both organisms are called mutualism.

Ex.2.24. Ask as many questions to each sentence as you can.

1. Living things in ecosystem affect each other in many ways.
2. Parasites are an important part of a community.
3. Fish called remoras attach themselves to sharks.
4. There are many other commensal relationships in the sea.
5. Some predators depend entirely on the animals they kill.

Ex.2.25. Discuss these questions.

1. Do you agree that people should protect themselves and their property from wild animals?
2. What should people do to protect themselves?
3. *Do you think that poisoning animals is the best way to discourage them?*

Ex.2.26. Read the text and answer the questions below.

Predator and Pest Control

Some animal populations have been greatly reduced or even deliberately exterminated because they are considered dangerous. Extermination of wild animals began in approximately A.D. 80 with the killing of the European lion. Between 1937 and 1970, U.S. government predator control agents trapped, poisoned, or shot 23,800 bears, 7,255 mountain lions, 1,574 gray wolves, 50,283 red wolves, 477,104 bobcats, and 2,823,056 coyotes. Millions of wild animals were killed by poisoned baits, placed traps and individuals for entertainment or sport.

Predator control programs are results of misunderstanding of human-wildlife relationships and the role of dangerous animals in ecosystems. In 1990, predator-related livestock losses in the United States were claimed to be $27.4 million. According to the Office of Animal Damage Control, predator control that year cost $38 million, mainly to kill 86,500 coyotes.

Many poisons used in pest and predator control are wide-spectrum, long-lasting biocides. They contaminate soil and water, then get into the food chain, travel from one organism to another and affect many species. One of the most controversial of these poisons is compound 1080. First introduced in 1945, this powerful, persistent toxin is capable to kill not only the primary target animal but also a whole series of scavengers and decomposers that eat the poisoned carrion as it spreads through the food chain. Over 150,000 baits with compound 1080 had been distributed before its use was banned in 1972. Recently, ranchers have been asking for permission to use collars with 1080 on livestock. They believe that wolves and coyotes will grab their prey by the neck, puncturing the collar and getting a lethal dose of poison. Each collar, however, contains enough poison to kill 185 coyotes or six men. A much better solution would be to employ more herders and guard dogs to watch the sheep and cattle.

1. What animals are mentioned in the text?
2. Find the following numbers in the text: 1945; 38; 185; 7,255; 477,104; 1080; 27.4; 23,800. What do they refer to?

3. Why do people need pest and predator control?
4. What methods do people use to kill predators?
5. Who is mostly interested in killing predators?
6. Why do you think people should stop using the poisonous substances against animals?

Ex.2.27. Find synonyms to the following words from the text:
Solution, dose, puncture, loss, extinction, population, contaminate.

Ex.2.28. Choose one of the given words (*a or b*) *to complete the sentences.*

1. Theophrastus was the first to write about plants in terms of their places of living or ... such as the marsh.
   a) biomes b) habitats
2. Scientists realized that the plants and animals in a certain area make up a sort of ... .
   a) community b) nature
3. As ecologists study ecosystems, they often turn to the science of ... for information.
   a) meteorology b) ecology
4. ... are animals that depend on green plants for food.
   a) producers b) consumers
5. Plant-feeders include tiny animals called ... .
   a) phytoplankton b) zooplankton
6. Consumers that kill other animals for food are called ... .
   a) parasites b) predators

UNIT 3. BIOMES

Key words

biome – біома
distinguish – розрізняти
determine – визначати
characterize – характеризувати
variety – різноманіття
equator – екватор
prevail – переважати
desert – пустеля
zone – зона
tundra – тундра
taiga – тайга
coniferous forest – хвойний ліс
deciduous forest – листяний ліс
rainforest – тропічний ліс
steppe – степ

Ex.3.1. Read the text and do the exercises below.

Types of Biomes

A biome is a major land ecosystem, a large land area that has a distinct kind of plant life. It may include ecosystems of many kinds, but the whole area is distinguished by a particular kind of plant life such as grassland, rain forest, or whatever characterizes the biome.

The location of biomes over the earth is determined mostly by climate, especially by rainfall and temperature. And climate itself is determined by many factors including latitude (distance from the equator), ocean currents, topography, and the prevailing winds.

Biomes don't begin and end sharply. They blend together at their borders, sometimes over a span of many miles. The zone between two biomes or between two ecosystems is called an ecotone. There are a lot of ecotones around us – the shore of a pond, the bank of a stream, the edge between a forest and a meadow. Usually there is a great variety of life in ecotones because animals living there have the best of the two worlds, getting food, shelter, and other necessities from two different ecosystems.

Within a biome you can find areas with the plants which are different from the ones in the other parts of the biome. Often this is a topography effect. The climate at the top of a mountain ridge is cooler than the climate of the surrounding land, so plants usually found in northern biomes can grow on the ridge.

Though the word ‘biome’ is unfamiliar to a lot of people, there are many examples of biomes around us: steppes, deserts, prairies, deciduous forests, tundra, taiga, etc.

Ex.3.2. Translate the English words into Ukrainian.

Biome, characterize, location, climate, temperature, determine, factor, distance, equator, ocean, topography, mile, zone, variety, term, prairie, characteristic, prevail.

Ex.3.3. Match the English verbs with their Ukrainian equivalents.

1) to include	a) відрізняти
2) to distinguish	b) переважати
3) to determine	c) закінчувати(ся)
4) to find	d) змішувати
5) to prevail	e) думати
6) to begin	f) визначати
7) to end	g) рости
8) to blend	h) отримувати
9) to get	i) знаходити
10) to think	j) починати(ся)
11) to surround	k) включати (в себе)
12) to grow	l) оточувати

Ex.3.4. Match the English words and word combinations with their Ukrainian equivalents.

1) plant life	a) луг, степ
2) grassland	b) океанічна течія
3) rainforest	c) берег водойми (ставка)
4) latitude	d) рослинне життя
5) ocean current	e) межа
6) prevailing winds	f) вологий (тропічний) ліс
7) shore of a pond	g) укриття
8) bank of a stream	h) берег потоку (річки)
9) border	i) переважні вітри
10) shelter	j) широта

Ex.3.5. Choose the best option (*a, b or c*) *to complete the sentences.*

1. Biome is characterized by a particular kind of ... .
   a) human life b) animal life c) plant life
2. Location of biomes is determined by ... .
   a) people b) climate c) industry
3. The zones between two biomes or between two ecosystems are called ... .
   a) shelters b) ecogeopraphy c) ecotones
4. Topography can effect ... .
   a) distance from the equator
   b) types of plant life
   c) gravitational forces

Ex.3.6. Choose the best option (*a or b*) *to translate the noun+noun combinations.*

1) plant life
   a) рослини живуть b) рослинне життя
2) rain forest
   a) тропічний ліс b) лісний дощ
3) summer rains
   a) дощове літо b) літні дощі
4) surface water characteristics
   a) характеристики поверхневих вод
   b) характерні поверхневі води
5) marine climate
   a) клімат моря b) морський клімат

Ex.3.7. Read the following text. While reading, find answers to these questions.

1. What is called tundra?
2. What influences the growth of plants?
3. What is the difference between the arctic tundra and the alpine tundra?

Tundra

Climates in high mountain areas or at far northern or southern latitudes often are too harsh for trees. This treeless landscape called

tundra is characterized by a very short growing season and cold, harsh winters. Although water may be abundant on tundra, for much of the year it is locked up in ice or snow and therefore unavailable to plants. Due to the lack of plants tundra is considered a very cold desert.

Arctic tundra is a biome of low productivity, low diversity, and low resilience. Winters are long and dark. Only the top several centimeters of the soil thaw out in the summer and the lower soil is permanently frozen permafrost. This frozen layer prevents snowmelt water from being absorbed into the soil, so the surface soil is waterlogged during the summer. Try to imagine the difficulties encountered by plants in this kind of soil. Most of the year it is completely frozen, and even during the brief growing season the permafrost is a barrier to deep root growth.

Alpine tundra differs from Arctic tundra in several ways. Plants of Alpine tundra face different challenges than those of Arctic tundra. The thin mountain air lets intense solar radiation affect the inner cells and cause deep pigmentation. The summer sun also causes very hot daytime ground temperatures, even though the night temperatures can return to freezing. Alpine soil is open to winds and often rocky. The sloping areas cause moisture to drain quickly. Due to this combination of sun, soil, slope, and air currents, drought is a problem.

Although tundra can support life during the brief summer growing season, only a few species are able to survive the harsh winters or migrate to warmer climates. Dominant tundra plants are dwarf shrubs, grasses, mosses, and lichens. Its larger life-forms, such as arctic musk ox and caribou, or alpine mountain goats and mountain sheep, must be adapted to survive the harsh climate and sparse food supply. Many animals migrate or hibernate during winter.

Damage to tundra is slow to heal. At present, the greatest threat to this distinctive biome is oil and natural gas wells in the Arctic and mineral excavation in mountain regions. Because plants grow slowly during the brief summer at high altitudes or latitudes it is unlikely that truck ruts and bulldozer tracks on the tundra landscape will heal during our life-times. Furthermore, some of the most promising sites for oil exploration or mining are the sites where animals can find food in summer. Even slight inbreak into this fragile ecosystem can cause great damage.

thaw out – розтанути
waterlogged – заболочений
encountered – стикалися

Ex.3.8. Match the words from column A with those in column B.

A	B
treeless	water
long	lands
migratory	birds
harsh	winters
abundant	climate
cold	desert
snowmelt	landscape

Ex.3.9. Find sentences in the text 'Tundra' with phrases from exercise 3.8 and translate them into Ukrainian.

Ex.3.10. Decide whether the following statements are true or false. Correct the false ones.

1. Climates in high mountain areas are fine for trees.
2. Tundra is a rather warm desert.
3. Arctic tundra and Alpine tundra differ from each other.
4. The tundra plants and animals adapt to survive the harsh climate.
5. The greatest threat to tundra at present is fossil fuel extraction.

Ex.3.11. Match English word combinations with their Ukrainian equivalents.

1) vast land	a) верхній шар
2) evergreen forest	b) арктична пустеля
3) annual precipitation	c) велика територія
4) top layer	d) полярний заєць
5) arctic desert	e) річна кількість опадів
6) polar bear	f) трав'яний покрив
7) arctic hare	g) вічнозелений ліс
8) mat of grasses	h) розлив нафти
9) oil spill	i) полярний ведмідь
10) dwarf willow	j) карликова верба

Ex.3.12. Make as many word combinations as you can.

include	question
living	frozen
permanently	animals
raise	trees
affect	
arctic	

Ex.3.13. Translate the following phrases into Ukrainian.

Frozen water, growing population, animals living there, plants found there, covered with ice, little is known about.

Ex.3.14. Read the texts and do the exercises below.

Taiga, or northern coniferous forest, is made up almost completely of spruce and fir trees. It lies south of tundra and covers a broad zone across North America, Europe, and Asia. Taiga forests reach southward along mountain ranges such as the Rockies and the Appalachians. Since taiga lies closer to the equator than tundra, it receives more energy from the sun. Snowfall is greater and the snow insulates the soil, preventing permafrost in most areas. The needlelike leaves of the evergreen trees have a waxy coating that protects them from the cold and reduces the loss of water. Little sunlight slips through the evergreens to the forest floor, so few plants grow there.

Even though most of taiga is made up of evergreens, there are other trees, such as birches, willows, and aspens, which are favoured foods of moose and beavers. The evergreens are the main habitat of red squirrels and martens. Taiga winters are long and cold, but the insulating snow cover, and the food and shelter of trees make it possible for a greater variety of animals to survive there than in the tundra to the north.

The climate of taiga is unfavourable for people to live there. So far, people have used taiga mostly as a source of lumber and paper pulp. Explorers are searching for fuel and mineral treasures in the land of taiga. The demand for all of these resources will increase with population growth.

Temperate deciduous forest covers most of the eastern United States, Great Britain, eastern Asia, and almost all of central Europe. The growing season is warm and long, and there are forty inches or more of rainfall spread evenly through the year. A greater variety of plants and animals lives in this biome than in taiga and tundra. Most of the trees are deciduous, dropping their leaves in autumn. They include oak, maple, beech, elm, birch, and ash. Enough of the sun's energy gets through the upper leafy crowns of tall trees to support another layer of trees, the understory, and abundant shrubs, ferns, and wildflowers.

Man has influenced this biome significantly and the climate of the temperate deciduous forest has changed. Numerous forests have been cut down to provide vast areas for farming, industries, and building cities, highways, etc. Chicago, Boston, Philadelphia, and New York City stand in the areas where deciduous forests once grew.

Ex.3.15. Complete the sentences with the words from the box.

a) foods	b) marvelously	c) soil	d) equator
e) variety	f) trees	g) survive	h) fuel

1. Taiga is made up almost completely of spruce and fir … .
2. Since taiga lies closer to the … than tundra, it receives more energy from the sun.
3. Snowfall is greater and the snow insulates the … .
4. There are other trees such as birches, willows and aspens, which are favoured … of moose and beavers.
5. Taiga winter is long and cold but the food and shelter of trees make it possible for a greater variety of animals to … there.
6. The explorers are searching for … and mineral resources in taiga.
7. A greater … of plants and animals lives in this biome than in taiga and tundra.
8. Animal life of the forest is … varied.

Ex.3.16. There are six sentences in the text. Find where each sentence begins and ends.

Coniferous Forest

The coniferous forest, which is called the 'great north woods', has fewer types of trees than those in warmer regions not many kinds of trees (only firs, spruces, pines and other conifers) can stand the cold northern winters their needles, for instance, have a waxy covering that protects them from freezing because of the cold, fallen branches, needles, and dead animals do not decay as fast as in warmer regions since the decay of plant and animal remains is one of the main factors in producing fertile soil, the soil of the coniferous forest is not particularly rich poor soil is another reason why many kinds of trees are unable to grow there.

Ex.3.17. Read the text and answer the questions.

1. Where are the most productive biological communities in the world?
2. Why is it said that rainforests make their own rain?
3. How many layers can tropical forests have?
4. What does the forest understory consist of?
5. What animals can survive in the forest floor layer?
6. What kind of soil is in the tropical rainforests?
7. What is the role of decomposers in maintaining high productivity of rainforests?

Tropical Rainforests: Life in Layers

The richest and most productive biological communities in the world are in the tropical forests. These forests have been reduced to less than half of their former extent by human activities and now cover only about 7 percent of the earth's land area. However, about two-thirds of the vegetation mass and about half of all living species in the world live in this area!

The biggest biological diverse of the tropical moist forests is in the Amazon River basin of South America, the Congo River basin of central Africa, and the large islands of Southeast Asia. Whereas in the forests of mainland Southeast Asia, western Africa, and Central

America wet and dry seasons change during a year, the South American and central African forests are true rainforests. Rainfall is generally more than 400 cm per year and falls more or less evenly throughout the year. It is said that such rainforests 'make their own rain' because about half the rain that falls in the forests comes from condensation of water vapor released by transpiration from the trees themselves.

Habitats in tropical rainforests can be divided into three to five distinct layers from ground level to the tops of the tallest trees. Crowns of numerous trees of the top layer form a canopy about 40 m above the forest floor. Hundreds of birds, insects, reptiles, and small mammals live in the canopy, never getting down from the crowns of the trees.

The forest understory consists of small trees and shrubs growing between the trunks of the major trees, as well as lianas and ferns that attach themselves to the trees. Some of the bigger trees may support 50 to 100 different species of plant and animals.

By contrast, the forest floor is generally dark, humid, and rather open. Few herbaceous plants can survive in the deep shade created by the canopy of the trees. The most of fauna is represented by ants, termites and rodents. Rare predators such as leopards, jaguars, smaller cats, and large snakes hunt both on the ground and in the understory.

The next layer is the soil. Although the productivity of a tropical rainforest can be as high as 90 tons per hectare per year, the soil is acidic, nutrient poor and not fertile. It has been depleted by tropical rains and high temperatures.

The warm and moist soil of tropical rainforests is favourable for decomposers such as fungi, bacteria, etc. The interactions of decomposers and living plant roots in the soil maintain the rainforest ecosystem. Tropical rainforests are able to support high productivity only through rapid recycling of nutrients. Some of these decomposers have symbiotic relationships with the roots of specific trees. The trees have broad, not deep roots to gain nutrients from the soil. So nutrients are absorbed quickly and almost entirely and are reused immediately to make the plants grow and provide necessary base to the pyramid of this ecosystem.

Ex.3.18. Find the following words and word combinations in the text and check their meaning:

Biological diverse, vegetation mass, canopy, trunk, understory, shrub, fern, herbaceous plants, fertile, fungi, symbiotic relationships.

Ex.3.19. Use as many adjectives from the text as you can to describe:

– the top layer of the tropical forests;
– the forest understory;
– the forest floor;
– the soil level.

Ex.3.20. Match the words in column A with their definitions in column B.

A	B
1) decompose	a) the uppermost branches of the trees in a forest
2) nutrient	b) of land or soil that can produce good crops
3) fertile	c) steam, smoke or other substances spread about or hanging in the air
4) condensation	d) to become bad or rotten, or decay
5) canopy	e) a large continuous extent of land
6) trunk	f) a substance that helps a living thing grow
7) vapor	g) the thick main stem of a tree, from which the branches grow
8) mainland	h) drops of water that form on a cold surface when steam or water vapor touches it

Ex.3.21. Read the text below and check the meaning of unknown words.

Restoring a Dry Tropical Forest

A. When the Spanish conquistadores arrived in Central America in the sixteenth century, about 5.5 million hectares of dry tropical forest stretched along the Pacific coast from Colombia to Mexico. In contrast to the evergreen rainforests and cloud forests on the Atlantic side of the isthmus, dry forests have distinct seasons. During the wet summer months, the vegetation is dense and lush. In the winter, however, when rains are sparse, trees and bushes lose their leaves, and the whole forest becomes open and desert-like.

B. This dry forest was much easier to convert to farms and ranches than the moist forests. Its climate is healthier, and its soil was more fertile and conducive to agriculture. Today, only about 1 percent of Central America's dry forest remains in anything like its original condition, making it one of the most threatened ecosystems in the world. As the forest has disappeared, many of its unique plant and animal species have become rare and endangered. If much more forest is lost, hundreds or even thousands of species will become extinct.

C. An exciting project is currently underway in Costa Rica where scientists and local residents have joined together to restore about 700 square kilometers of dry tropical forest to approximately its original condition. A new national park called Guanacaste (named after the Costa Rican national tree that once grew in this forest) is being created from private lands, an existing park, and other public land holdings. Under the leadership of entomologist Dan Janzen, attempts are being made to understand the ecosystem and to reintroduce native plants and animals in an effort to restore – rather than just rehabilitate – the forest.

D. How is this possible after the land has been abused and degraded for centuries? Isn't it long past the point at which it can be rescued? Fortunately, according to Janzen, most of the original flora and fauna have not been completely eliminated, only reduced. Small areas containing most of the indigenous species remain scattered across the countryside. The challenge is to find these species and create habitats where they can thrive and re-create the forest.

E. Fire is one of the greatest threats to the forest. Every year during the dry season local people accidentally or deliberately start fires that sweep across the land, destroying native species and converting forest to grassland full of non-native invaders. Creating breaks to control the spread of fire and persuading residents to fight fires rather than set them is the first step toward restoring the forest.

F. Contrary to what you might expect, grazing animals are not excluded from Guanacaste National Park. In fact, they are encouraged because they are efficient seed dispersers. Because the forest probably coevolved with a fauna that included large,

hoofed grazing animals before humans arrived, many plant species actually depend on animals for regeneration. Horses, monkeys, goats, birds, and even turtles eat fruits and pass their seeds their digestive system days or weeks later. This not only distributes seeds to new locations, it also provides fertilizer for their initial growth. Furthermore, some seeds have tough outer coverings that are weakened by digestive acids and enzymes, facilitating germination. Being able to use the new national park for grazing during restoration makes the whole process much more attractive to its neighbours.

G. Involving local people in the project and making the park economically beneficial to them is another essential key to successful restoration. When they see how a park will help them, residents will be enthusiastic participants. Native people, with their knowledge of the forest and their skills as land stewards, can be an invaluable resource in the restoration process.

H. Once Guanacaste National Park is reconstituted, locals can work as guides and rangers or provide services to tourists who come to visit and view wildlife. Providing jobs in the area will help stem the tide of urbanization and also preserve local culture. Biodiversity and cultural heritage can be saved simultaneously. This exciting project may serve as an inspiration and guide to similar efforts in many areas of the world where bad land-use practices threaten both wildlife and indigenous people.

Ex.3.22. Look through the text again and match the following headings with the paragraphs A–H of the text.

1. The challenge to create the forest.
2. A restoration project.
3. A key to successful restoration.
4. Dry tropical forests. What are they?
5. Benefits of restoration.
6. The dying forest.
7. The greatest threats to the forest.
8. Encouraging the grazing animals.

Ex.3.23. Decide if the statements are true or false. Correct the false ones.

1. Dry forests have the soil which is less fertile and conductive to agriculture.
2. The vegetation is usually very good during the wet summer months.
3. Local residents and the government are ready to restore dry tropical forests in Costa Rica.
4. It is possible to restore forests because many original plants and animals have not completely disappeared.
5. One of the greatest threats of the forest is fire.
6. Grazing animals are considered to be efficient seed dispersers.
7. It is not a good idea to allow grazing animals to use national park territory.
8. It is worth involving local people in the project of restoration.
9. It is impossible to save biodiversity and cultural heritage at the same time.

Ex.3.24. Give synonyms to the following words:

To restore, to rescue, to eliminate, to scatter, to invade, to expect, to disperse, residents, to diversify.

Ex.3.25. Read the text below and answer the questions.

1. What are the main characteristics of deserts?
2. How are animals adopted to live in deserts?
3. In which way can deserts be attractive or even miraculous?

Deserts

Deserts are characterized by low moisture levels and precipitation that is infrequent and also unpredictable from year to year. With little moisture to absorb and store heat, daily and seasonal temperatures can fluctuate widely.

Deserts can be classified by the amount of precipitation that falls, by the temperature that prevails, by the causes of desertification or by their geographical location. Deserts with less than 2.5 cm (1 in.) of measurable precipitation aren't able to support vegetation. If annual precipitation is 2.5 to 5 cm (1 to 2 in.), sparse vegetation can be found there (less than

10 percent of the ground is covered), and plants in this harsh climate have some specific features to conserve water and protect tissues from predation. Water-storage tissues and thick epidermal layers help reduce water loss. Spines or serrated leaves edges scare away predators.

Warm and dry air creates wide desert areas in continental interiors of South and West America, North and South Africa, China, and Australia. Descending air currents help create desert zones along the west coast of South America and Africa that are among the driest regions in the world. Although deserts are considered hot and barren, with sand dunes, those at high latitudes are often cool or even cold. Sand dunes can be found more often in coastal areas.

Deserts with 5 to 10 cm (2 to 4 in.) of annual precipitation support a wider variety of plants where shrubs and small trees dominate.

Animals of desert have both structural and behavioral adaptations to meet their three most critical needs: food, water, and heat balance. Most desert animals escape daytime heat hiding in burrows and rocky shelters which they leave only at night. Pocket mice and kangaroo rats get water they need from the seeds and grains they eat.

Desert environment is easily damaged by human activities and is slow to recover due to the harsh climate. Tracks of tanks left during World War II in the California desert, for instance, are still visible. Many dry areas have been overgrazed, mainly by domestic livestock. Other areas are becoming agricultural though future availability of water to sustain crops is uncertain. The cultivation of semi-arid regions encourages erosion of soil and is one of the causes of increased desertification. Desert farming is possible with the aid of irrigation and the Imperial Valley in California provides an example of how previously barren land can become productive by the import of water from an outside source. Many trade routes have been forged across deserts, especially across the Sahara Desert, and traditionally were used by caravans of camels carrying salt, gold, ivory and other goods.

Ex.3.26. Find in the text the most characteristic adjectives that describe life in deserts. What nouns do they describe?

Ex.3.27. Decide if the statement is true or false. Correct the false one.

1. Deserts have sparse vegetation because of low precipitation level.
2. It is never cool or cold in deserts.
3. You can see lots of shrubs covering land in deserts.
4. Everyone can easily adapt to life in difficult conditions of deserts.
5. Desert environment can't be recovered easily and quickly.

Ex.3.28. Check the meaning of the words that are used in the text and given below:

Burrow, moisture, shelter, fluctuate, spine, serrated, gravelly, sustain, vulnerable, visible, semi-arid, desertification.

Ex.3.29.Which of the following definitions can be given to the words from the exercise 3.27?

– to rise and fall;
– a hole or tunnel made in the ground and used as a home by rabbits, foxes, etc.;
– the process by which fertile land changes into desert;
– which has little rain but is not completely dry;
– which can be seen;
– to keep alive or in existence.

Ex.3.30. Match English word combinations with their Ukrainian equivalents.

1) desert soils	a) листяний ліс
2) abundant crops	b) водопостачання
3) deciduous forest	c) клімат пустелі
4) water supply	d) пасовище, степ
5) desert climate	e) збереження води
6) grassland	f) безхмарні дні
7) water conservation	g) багаті врожаї
8) rainy season	h) грунту пустелі
9) cloudless days	i) сезон дощів

Ex.3.31. Choose the best option to complete the sentences.

1. Desert plants have small leaves or no leaves; it helps them (*evaporate; repel; conserve*) water.
2. Rain water (*condenses; evaporates; precipitates*) quickly because of high temperature and frequent strong winds.
3. Plant seeds have tough coats which (*cover; protect; grow*) them till the next rainfall.
4. Some desert mammals (*come; go; have*) into a deep sleep during the driest months of the year.
5. People are (*changing; turning; getting*) to deserts more and more for farmland and home sites.

Ex.3.32. Put the words and word combinations in correct order to make a sentence.

1. months of the / year / Some / into /go / a deep / during / the driest / desert mammals / sleep.
2. plants and animals / home / for / that are specially / for life / that environment / in / The desert / is / adapted.
3. store / swell up / Cactus plants / water / and / during / the rainy season.
4. all continents / Deserts / about / of / cover / on /the earth's land surface / 14 per cent / and occur.
5. frequent / temperatures / climate / by / characterized / high / is / strong / winds/ and / Desert.
6. been / by / Deserts / changed /not / much / man / have.

Ex.3.33. Choose the best option to complete the sentences.

The desert biome is an area (*who, where, that*) gets less than 25 centimeters of rainfall a year. Desert biomes are (*in, over, on*) western North America, western Asia, the centre (*at, of, as*) Australia and (*in, along, under*) the west coast of South America. A desert can be hot (*or, as, but*) cold. The Sahara is a hot desert, scorching (*in, by, at*) day time, chilly (*in, before, at*) night. In a cool desert such (*that, as, also*) the Gobi desert there is also a great difference (*among, between, across*) daytime and night time temperatures. (*Also, Or, But*) in a cool desert, winter temperatures may drop (*below, above, at*) freezing.

Ex.3.34. Use the word from column B to complete the line in column A.

A	B
As you walk the desert you notice that	through
the plants in the desert adapted to the lack of	are
rainfall. They have roots near the surface.	wide-spread
This enables to absorb water quickly before	them
the water evaporates. Plants such cactus, have	as
thick fleshy stalks that them store water.	help
You can few animals in Sahara.	see
In the day time, creatures such as lizards	and
rodents often escape the heat in burrows. Night	underground
brings to the surface searching for food.	them

Ex.3.35. Choose the best option to translate the underlined words and word combinations.

1. The desert is home for plants and animals that are specially adapted for life in that environment.
   a) адаптовані b) були адаптовані c) будуть адаптовані
2. Once the water is gone, the farms have to be abandoned.
   a) як тільки вода закінчується
   b) одного разу вода закінчилась
   c) вода закінчилась
3. Cactus plants store water, then they shrink as the dry months come and most of the water is used.
   a) вода використовувалась
   b) вода використовується
   c) використана вода
4. In a cool desert, winter temperatures may drop below freezing.
   a) замерзає b) точки замерзання c) така, що замерзає
5. The Sahara desert is the world's largest desert, covering over 9 million km^2 of North Africa.
   a) така, що покриває b) покриває c) покривала
6. The Sahara desert expanded by 7 % between 1980 and 1995.
   a) збільшується b) збільшилася c) збільшена

Ex.3.36. Complete the table below using the examples given.

Positive degree	**Comparative degree**	**Superlative degree**
colourful	more colourful	most colourful
hot	hotter	hottest
		driest
		best
	less	
	worse	
brief		
high		

Ex.3.37. Complete the table.

Biome	Geographical position	Climate	Common plants	Common animals
Tundra				
Taiga				
Tropical rainforest				
Forest				
Desert				

Ex.3.38. Choose the best option (*a*, *b or c*) *to complete the sentences.*

1. To classify landscapes, scientists have divided them by similar climates, plants and animals into groups called ... .

a) ecosystems b) biomes c) ecotones

2. The frozen soil is called ... .

a) rock b) thaw c) permafrost

3. The northernmost forest is the ... forest.

a) coniferous b) rain tropical c) deciduous

4. ... trees, such as oaks and maples, shed their leaves in autumn.

a) coniferous b) deciduous c) rain tropical

5. The ... biome is an area that receives less than 25 cm of rainfall a year.

a) tundra b) rain tropical c) desert

6. ..., or northern coniferous forest, is made up almost completely of spruce and fir trees.

a) desert b) taiga c) tundra

7. ... cover about 70 % of the Earth's surface.

a) ponds b) oceans c) estuaries

Ex.3.39. Fill in the gaps with the words from the box.

at least	describe	are	by	of	grassland	into

Biome divisions are merely a system to help scientists ... the natural world. As you might expect, not all scientists divide the world ... the same kinds and number ... biomes. However, as a rule, ... six land biomes are accepted ... most scientists. The six major land biomes ... tundra, coniferous forest, deciduous forest, tropical rain forest, ..., and desert.

Ex.3.40. Divide the text on sentences.

The system of classifying the world's ecological systems into biomes is used to categorize similar communities on a broad, regional scale classifying biomes is based on the outward appearance of the dominant vegetation types in the area biomes differ in their productivity and biodiversity equatorial regions have the highest productivity and biodiversity, which tend to decrease at higher latitudes.