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ECOLOGY AND ITS DOMAIN

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Передмова

Навчальний посібник призначений для студентів вищих навчальних закладів, що готують спеціалістів з екології, охорони навколишнього середовища та збалансованого природокористування.

Навчальний посібник спрямовано на подальший розвиток навичок усного мовлення на фахову тематику. Цій меті відповідає структура кожного уроку: прочитати та перекласти оригінальний фаховий текст, вивчити нові слова та словосполучення, підібрати англійські еквіваленти до слів, визначити правильність та неправильність твердження, відповісти на запитання, дати визначення термінам, вести бесіду на базі даного лексичного матеріалу.

Тексти розраховані не лише на розвиток англомовних навичок, а й містять нову і корисну інформацію.

Навчальний посібник складається з 4 частин. Перша — основний курс, складається з 14 уроків. Кожен урок базується на 3 текстах та післятекстових завданнях, а завершується творчими вправами. Друга частина складається з додаткових оригінальних текстів для читання. Третя частина містить граматичний довідник з вправами на закріплення матеріалу. Завершується Навчальний посібник тематичним словником.

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Unit 1

I. Read and translate the text:

Text A

The nature environments

Ecology deals with organisms and their environments, and it is important that we understand the relationship between them. Probably the most important statement that we can make about this relationship is that different kinds of organisms are not distributed at random amongst different kinds of environment: there is a correspondence between the two. This correspondence is part of our sense of the order of things.

Even a sand grain on the surface of the Moon has an environment. Amongst other things, this determines the radiation that it receives, its temperature, humidity, and whether there is a wind that moves it. The planet Earth has a characteristic physical environment that is determined by its geological history (its rocks, their formation, and their mineral composition) and in part by its climate. The Earth is exposed to solar radiation that varies across its surface depending on its distance from, movement around and changing inclination to the Sun. Therefore the surface of our planet, like that of any other, has a surface that varies from place to place in its topology, geology and climate.

The surface of the Earth is uneven and so liquid water drains under gravity from the highlands to the hollows.

The variations in the environment of the planet Earth are mainly defined by variations in the radiation received in its different parts and by the topology and nature of its geological formations.

II. Study the words:

random	вільний, випадковий
correspondence	співвідношення, аналогія
composition	склад
to expose	залишати незахищеним, піддавати (дії)
inclination	нахиленість
uneven	нерівний
hollow	впадина

III. Give the Ukrainian and learn the following word combinations:

to deal with	relationship between
to be exposed to	at random
to be determined by	on the surface

IV. Fill in the spaces with the appropriate words:

1. Ecology deals with organisms and their	at random
2. Different kinds of organisms are not distributed	climate
..... among different kinds of environment.	exposed
3. The Earth has also physical environment that is determined by its geological	inclination
and by	history
4. The Earth is to solar radiation that varies across its surface.	environment
5. Solar radiation on distance from, around and changing to the Sun.	movement
6. The variations in the environment are by variations in the radiation.	depends
	defined

V. Answer the questions:

1. What does ecology deal with?
2. How are different organisms distributed among different kinds of environment?
3. Is there any relationship between organisms and environment?
4. Is there any environment on the Moon?
5. What is physical environment of the Earth determined by?
6. What do the variations of solar radiation depend on?

VI. Express the key idea of the text in 2-3 sentences.

I. Read and translate the text:

Text B

Environmental conditions necessary for life

It is conceivable that biological activities on a planet such as Earth could be powered by energy obtained by inorganic transformations – such as the oxidation of methane, sulphur compounds, or ammonia. The mainstream of biological activity on our planet has depended on solar energy fixed in photosynthesis as its source of power. The result has been that, overwhelmingly, the biological activities on the planet are limited by the efficiency of the photosynthetic process, and thereby depend on incident radiation. But the intensity of radiation also determines the physical state of water. The distribution of solar radiation determines where and when photosynthesis can occur, but the distribution of solar radiation determines where water is available in liquid form. Hence, where radiation is abundant (e.g. in the tropics) liquid water may be scarce because it is volatilized, and where there is much less radiation, liquid water is scarce because it is solidified!

It is not too difficult to imagine a planet like Earth that is inhabited by just one sort of organism. It might be limited in its distribution to just a very tiny subset of the multiplicity of environments. It might range widely over many physical environments if it possesses broad temperature tolerance. Even one such ‘ideal’ organism would give the planet an ecology and biogeography. A visiting ecologist would find plenty to keep himself busy studying the relationships between the organism and its environment!

II. Study the words:

conceivable	ймовірний
mainstream	основний напрямок, гол. лінія
overwhelming	непоборний, переважаючий
incident (radiation)	притаманний, падаючий
abundant	багатий (в достатку)

scarce	недостатній
volatilization	випаровування
available	доступний, що є в розпорядженні
tiny	дуже дрібний, крихітний
subset	підрозділ
multiplicity	складність, різноманітність
to possess	володіти
tolerance	допустиме відхилення

III. Give the Ukrainian and learn the following word combinations:

powered by	incident radiation
to be obtained	limited distribution
to depend on	temperature tolerance
to keep busy studying	abundant radiation

IV. Fill in the spaces with the appropriate words:

1. Biological activities on a planet could be	available
by energy inorganic transformation.	solar
2. Biological activity depends on	powered
energy.	photosynthesis
3. Solar energy is fixed in	determines
4. Biological activity is	depended
by the efficiency of the photosynthesis process.	obtained by
5. Intensity of radiation also	limited
the physical state of water.	
6. Distribution of solar radiation determines where water is	
in liquid form.	

V. True or false statements:

1. Biological activity on our planet depends on solar energy
2. Biological activity is unlimited and independent.
3. Water is available in liquid form everywhere.
4. One organism can give the planet an ecology and biogeography.

VI. Make up a plan of the text.

I. Read and translate the text:

Text C

The match of organisms to varying environments

No environment is constant over time, but some are more constant than others. No form or behaviour of an organism can fit a changing environment unless it too changes. Three major categories of environmental change can be recognized.

Cyclic changes – rhythmically repetitive, like the cycles of the seasons, the movements of the tides and the light and dark periods within a day.

Directional changes – in which the direction of a change is maintained over a period that may be long in relation to the life span of the organisms that experience it. Examples are progressive erosion of a coastline, the progressive deposition of silt in an estuary and the cycles of glaciation.

Erratic change – this includes all those environmental changes that have no rhythm and no consistent direction: for example, the variation in the time of arrival of monsoon rains, the erratic course and timing of hurricanes and cyclones, flash storms, and fires caused by lightning.

The optimal fit of organisms to varying environments must involve some compromise between matching the variation and tolerating it. The repeated experience of cyclic change by successive generations of an organism has selected many patterns of behaviour that are in themselves cyclic: diapause in insects, the annual shedding of leaves from deciduous trees, the diurnal movements of leaves, the rhythm of tidal movement in crabs, the annual cycle of breeding systems and the seasonal cycle of fur colour and/or thickness in mammals and of plumage in birds.

II. Study the words:

fit

підходити, відповідати

tide

течія, потік

maintain

підтримувати, зберігати

span

проміжок

silt	осад, мул
estuary	дельта
glaciations	заморожування
erratic	дивний, нестійкий
flash	несподіваний, короткий

III. Check questions:

1. What are the major environment changes?
2. What phenomena and movements are characteristic for cyclic changes?
3. What do you know about directional changes?
4. What do erratic changes include?
5. What cyclic patterns of organisms behavior can you name?

Unit 2

I. Read and translate the text A: “Ecology and its branches”.

Bionomics is the science of the relationships between organisms and their environments.

The branch of sociology that is concerned with studying the relationships between human groups and their physical and social environments is called human ecology.

Physiological ecology focuses on the relationships between individual organisms and the physical and chemical features of their environment. Behavioral ecologists study the behaviours of individual organisms as they react to their environment. Population ecology is the study of processes that affect the distribution and abundance of animal and plant populations. Community ecology studies how communities of plant and animal populations function and are organized; it frequently concentrates on particular subsets of organisms such as plant communities or insect communities. Ecosystem ecology examines large-scale ecological issues, ones that often are framed in terms of measures such as biomass, energy flow, and nutrient cycling. Applied ecology applies ecological principles to the management of populations of crops and animals. Theoretical ecologists

provide simulations of particular practical problems and develop models of general ecological relevance systems ecology.

II. Give definitions to the following terms. Learn them.

human ecology
behavioral ecology
community ecology
ecosystem ecology
applied ecology
theoretical ecology
population ecology

III. Give English equivalents:

зв'язок між окремими організмами;
фізичні та хімічні риси;
поведінка окремих організмів;
впливати на розподіл та надмірну кількість популяцій;
досліджувати широкомасштабні питання;
застосовувати принципи.

IV. True-false statements:

1. Population ecology studies the behaviours of individual organisms.
2. Community ecology studies plant communities or insect communities.
3. Ecosystem ecology applies ecological principles to the management of populations of crops.
4. Applied ecology develops models of general ecological relevance.

V. Give derivatives to the following words:

Verb	noun	adj./adv
to behave		
	examination	
		applicable
	relationship	

Text B:
“Environmental Biology”.

I. Scan the words:

to be concerned (with)
abundance
to seek
range
to emphasize
unique
to draw
survival
constituent
habitat

II. Read and translate the text:

The subdiscipline of biology that concentrates on the relationships between organisms and their environments is also called environmental biology. Ecology is concerned with patterns of distribution (where organisms occur) and with patterns of abundance (how many organisms occur) in space and time. It seeks to explain the factors that determine the range of environments that organisms occupy and that determine how abundant organisms are within those ranges. It also emphasizes functional interactions between co-occurring organisms. In addition to being a unique component of the biological sciences, ecology is both a synthetic and an integrative science since it often draws upon information and concepts in other sciences, ranging from physiology to meteorology, to explain the complex organization of nature.

Environment is all of those factors external to an organism that affect its survival, growth, development, and reproduction. It can be subdivided into physical, or abiotic, factors, and biological, or biotic, factors. The physical components of the environment include all nonbiological constituents, such as temperature, wind, inorganic chemicals, and radiation. The

biological components of the environment include the organisms. A somewhat more general term is habitat, which refers in a general way to where an organisms occurs and the environmental factors present there.

III. Give English equivalents:

зв'язок між; поява організмів; прагнути пояснити; надмірна чисельність організмів; впливати на виживання; впливати на відтворення; природне середовище існування.

IV. Check questions:

1. What does biology concentrate on?
2. What is ecology concerned with?
3. Is ecology considered to be a unique component of biological sciences?
4. What does it seek to explain?
5. Is ecology a synthetic or integrative science?
6. How does environment affect the organism?
7. What physical components does environment include?

Text C

I. Read the text and make up a plan of it:

A recognition of the unitary coupling of an organism and its environment is fundamental to ecology; in fact, the definitions of organism and environment are not separate. Environment is organism-centered since the environmental properties of a habitat are determined by the requirements of the organisms that occupy that habitat. For example, the amount of inorganic nitrogen dissolved in lake water is of little immediate significance to zooplankton in the lake because they are incapable of utilizing inorganic nitrogen directly. However, because phytoplankton are capable of utilizing inorganic nitrogen directly, it is a component of their environment. Any effect of inorganic nitrogen upon the zooplankton, then, will occur indirectly through its effect on the abundance of the phytoplankton that the zooplankton feed upon.

Just as the environment affects the organism, so the organism affects its environment. Growth of phytoplankton may be nitrogen-limited if the number of individuals has become so great

that there is no more nitrogen available in the environment. Zooplankton, not limited by inorganic nitrogen themselves, can promote the growth of additional phytoplankton by consuming some individuals, digesting them, and returning part of the nitrogen to the environment.

II. Give the title to the text.

Unit 3

I. Read and translate the text A: “Subdivisions of Ecology”.

Ecology is concerned with the processes involved in the interactions between organisms and their environments, with the mechanisms responsible for those processes, and with the origin, through evolution, of those mechanisms. It is distinguished from such closely related biological subdisciplines as physiology and morphology because it is not intrinsically concerned with the operation of a physiological process or the function of a structure, but with how a process or structure interacts with the environment to influence survival, growth, development, and reproduction.

Major subdivisions of ecology by organism include plant ecology, animal ecology, and microbial ecology. Subdivisions by habitat include terrestrial ecology, the study of organisms on land; limnology, the study of species or a limited number of species, synecology is the study of fresh-water organisms and habitats; and oceanography, the study of marine organisms and habitat. Higher levels of organization include biomes and the biosphere. Biomes are collections of ecosystems with similar organisms and environments and, therefore, similar ecological properties. All of Earth's coniferous forests are elements in the coniferous forest biome. Although united by similar dynamic relationships and structural properties, the biome itself is more abstract than a specific ecosystem. The biosphere is the most inclusive category possible, including all regions of Earth inhabited by living things. It extends from the lower reaches of the atmosphere to the depths of the oceans.

II. What subdivisions of ecology did you come to know?

III. Give definitions to the following terms:

limnology
terrestrial ecology
synecology
oceanography

IV. Speak about biomes.

Text B

“Methodological approaches to Ecology”

I. Study the words:

to involve
to manipulate
to discover
to govern
equation
assumption
prediction
to avoid
pollution

II. Read and translate the text:

The principal methodological approaches to ecology are descriptive, experimental, and theoretical. Descriptive ecology concentrates on the variety of populations, communities, and habitats throughout Earth. Experimental ecology involves manipulating organisms or their environments to discover the underlying mechanisms governing distribution and abundance. Theoretical ecology uses mathematical equations based on assumptions about the properties of organisms and environments to make predictions about patterns of distribution and abundance.

One reason for this is certainly the environmental movement that began seriously in 1962 with Rachel Carson’s book *Silent Spring* and intensified in the 1970s. The popularity of environmental causes attracted people to ecology, sometimes in the mistaken belief that ecology is the science of avoiding

pollution. Biologists might date their own environmental movement from publication in 1967 of *The Theory of Island Biogeography* by Robert MacArthur and Edward O. Wilson, which explored stability and fragility of species in restricted habitats.

III. Check questions:

1. What are the principal methodological approaches?
2. What does descriptive ecology concentrate on?
3. What does experimental ecology involve?
4. What does theoretical ecology use?
5. What is the mistaken belief about ecology?

I. Read the text C

Another reason for gains in ecology in the 1960s and 1970s has been the postwar development of the computer. Ecology is very much concerned with numbers and mathematical models, since it treats a great many individuals interacting with each other and with their physical surroundings all at once. Prewar models of how populations behave were computed by hand or with mechanical calculators. By the mid-1970s, an ecologist could feed a formula into a computer and see how a population stabilized, became periodic, or exploded depending on the choice of a single parameter. With such a tool in a hand, much of the work in ecology during the 1960s and 1970s concentrated on finding how competition among species or individuals for niches – ways of living – affect populations. Energy distribution in populations also became easier to determine.

II. Give the main idea of the text.