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Англійська мова для студентів спеціальності «Екологія»

Міністерство освіти і науки, молоді та спорту України
Державний заклад
«Луганський національний університет
імені Тараса Шевченка»

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Англійська мова для студентів спеціальності «Екологія»

Навчальний посібник
для вивчення курсу
«Англійська мова за професійним спрямуванням»
для студентів спеціальності «Екологія»
вищих навчальних закладів

Луганськ
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Б-20 Англійська мова для студентів спеціальності «Екологія» : навч. посіб. для вивчення курсу «Англійська мова за професійним спрямуванням» для студ. спец. «Екологія» вищ. навч. закл. / З. Ю. Балакіна, В. Є. Сергєєва ; Держ. закл. «Луган. нац. ун-т імені Тараса Шевченка». – Луганськ : Вид-во ДЗ «ЛНУ імені Тараса Шевченка», 2011. – 166 с.

Навчальний посібник містить тексти зі спеціальної тематики, лексико-граматичні вправи, вправи творчого характеру для розвитку усного та письмового мовлення й підсумкові тексти.

Посібник призначено для студентів І-ІІ курсів спеціальності «Екологія».

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ПЕРЕДМОВА

Навчальний посібник призначено для студентів І-ІІ курсів спеціальності «Екологія», які вивчають англійську мову як першу іноземну. Мета посібника полягає в організації навчальної діяльності студентів із курсу «Англійська мова за професійним спрямуванням» як на аудиторних заняттях, так і під час самостійної роботи. Особлива увага приділяється розвитку навичок розуміння й аналізу автентичних текстів з основних проблем екології, збільшенню словникового запасу, удосконаленню навичок розмовної мови, умінню вести бесіду англійською мовою.

Посібник враховує особливості кредитно-модульної системи. Весь матеріал, який розміщено у посібнику, розподіляється на три модулі, що містять тринадцять юнітів, кожен з яких включає тексти зі спеціальної тематики, до текстів пропонуються дотекстові лексичні вправи та завдання на відпрацьовування мовленнєвих навичок і вмінь використання лексичного матеріалу, лексико-граматичні вправи, вправи творчого характеру, перекладні вправи, вправи для розвитку усного та письмового мовлення та аудіювання, завдання для індивідуальної роботи й підсумкові тексти. У кінці кожного розділу пропонуються практичні завдання та вправи, спрямовані на закріплення вивченого матеріалу.

Добірка вправ дозволяє здійснювати тематичний тренінг, розвивати навички читання і розуміння текстів, усного і письмового мовлення за фахом, вирішення проблемних ситуацій професійної сфери, розвивати творче мислення.

MODULE A

UNIT 1. ECOLOGY

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

ecology, ecosystems, adaptation, maximum, physical, respiration, carbohydrate, form, chemical, economics, material, biosphere, photosynthesis, formation, series, bacteria, modern, evolution, geographer, to classify, ecologist, type, community, energy, process, radiation, originally.

Task 2. Name different items belonging to:

1. physical environment
2. inputs into the ecosystem
3. terrestrial biomes
4. outputs from the ecosystem
5. parts of an ecosystem
6. feeding levels

Task 3. Answer the questions:

1. What is ecology?
2. What does the biological environment include?
3. Who introduced the term «ecology»? What does it mean?
4. What are the most important contributions to ecology?
5. What is the biosphere?
6. What is the difference between the two terms «plant formations» and «biomes»?
7. What are the major parts of an ecosystem?
8. What is the major driving force?
9. What are trophic or feeding levels?

Task 4. Read and translate the text.

ECOLOGY

Ecology is the study of the relationship of plants and animals with their physical and biological environment. The physical environment includes light and heat or solar radiation, moisture, wind, oxygen, carbon dioxide, nutrients in soil, water, and atmosphere. The biological environment includes organisms of the same kind as well as other plants and animals.

The term «ecology» was introduced by the German biologist Ernst Heinrich Haeckel in 1866; it is derived from the Greek «oikos» («household»), sharing the same root word as «economics». Thus, the term implies the study of the economy of nature. Modern ecology, in part, began with Charles Darwin. In developing his theory of evolution, Darwin stressed the adaptation of organisms to their environment through natural selection. Alexander von Humboldt, who was deeply interested in the «how» and «why» of vegetation distribution around the world, made important contributions to the study of nature.

The thin mantle of life that covers the earth is called the biosphere. Several approaches are used to classify its regions. The broad units of vegetation are called the «plant formations» by European ecologists and the «biomes» by North American ecologists. The major difference between the two terms is that «biomes» include animal life. Major biomes, however, go by the name of the dominant forms of plant life. Terrestrial biomes include

various types of forest, grassland, and desert. These biomes also include their freshwater communities: streams, lakes, ponds, and wetlands. A more useful way of looking at the terrestrial and aquatic landscapes is to view them as ecosystems. The major parts of an ecosystem are the producers (green plants), the consumers (herbivores and carnivores), the decomposers (fungi and bacteria), and the nonliving or abiotic components consisting of dead organic matter and nutrients in the soil and water. Inputs into the ecosystem are solar energy, water, oxygen, carbon dioxide, nitrogen, and other elements and compounds. Outputs from the ecosystem include water, oxygen, carbon dioxide, and nutrient losses.

The major driving force is solar energy. Ecosystems function with the energy flowing in one direction from the sun, and through nutrients, which are continuously recycled. Light energy is used by plants, which by the process of photosynthesis convert it to chemical energy in the form of carbohydrates and other carbon compounds. This energy is then transferred through the ecosystem by a series of steps that involve eating and being eaten, or what is called a food web.

Each step in the transfer of energy involves several trophic, or feeding, levels: plants, herbivores (plant eaters), two or three levels of carnivores (meat eaters), and decomposers. Bacteria, fungi, and animals that feed on dead material become the energy source for higher trophic levels. In this way, nature makes maximum use of the energy originally fixed by plants.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

relationship - відношення
heat - тепло
environment - довкілля
solar - сонячний
moisture - вологість, вогкість, волога
nutrient - *екол.* нутрієнт, поживне середовище
to imply - мати на увазі, припускати, означати
approach - підхід

plant formation - рослинний покрив
biome [ˈbaɪəʊm] - біом (сукупність видів рослин і тварин, що становлять живе населення однієї природної зони)
terrestrial - земний, континентальний
grassland - пасовище, луг
desert [ˈdezət] - пустеля
wetland - заболочене місце
producer - *тут* продуцент (організм, що утворює органічну речовину в процесі фотосинтезу)
consumer - *екол.* консумент (споживач)
herbivore [ˈhɜːbɪvɔː] - травоїдний
carnivore [ˈkɑːnɪvɔː] - м'ясоїдний
decomposer - *екол.* бактерія гниття
fungi - грибкові утворення, пліснява
input - *тут* що поступає
compound - хим. з'єднання
output - *тут* що виводиться
loss - збиток, втрата
continuously - постійно
food web - харчовий ланцюг

Vocabulary exercises

Task 6. Suggest the English for:

крок, заболочене місце, харчовий ланцюг, рослинний покрив, м'ясоїдний, постійно, втрата, підхід, рослина, сонячна енергія, термін, тварина, травоїдний, земля, бактерія гниття, світло, біосфера, вітер, включати, елемент, континентальний, вода, луг, вивчення, екосистема, відношення, волога, означати, пустеля, тепло, корисний, пліснява, з'єднання, еколог, життя, відмінність, енергія, використання, ландшафт, поживне середовище, розвиток, природний відбір, адаптація.

Task 7. Give Ukrainian equivalents to the following:

study, to convert, carbon dioxide, stream, plant life, useful, nutrient loss, relationship, pond, biome, eating, plant, solar energy, animal, environment, lake, to include, light, biosphere, wetland, carbon compounds, heat, moisture, use of energy, wind, nutrient, soil, water, photosynthesis, contribution, atmosphere, continuously, food web, several, kind, grassland, ecology, vegetation, biologist, producer, root word, force, nature, theory of evolution, compound, natural selection, world, decomposer, earth, approach, animal life, major, terrestrial, desert, ecosystem, consumer, dead organic matter, process, step, maximum, originally, solar radiation.

Task 8. Give the corresponding nouns:

to introduce, to develop, to select, to classify, to produce, to distribute, to contribute, to convert, to involve.

Task 9. Match the following words with their definitions:

a) vegetation b) carnivore c) wetland d) ecology e) radiation
f) adaptation g) herbivore

1. an area of land whose soil is saturated with moisture either permanently or seasonally;
2. a process in which energetic particles or waves travel through a medium or space;
3. the evolutionary process whereby population becomes better suited to its habitat;
4. a general term for the plant life of a region; it refers to the ground cover provided by plants;
5. meat eater;
6. animals that are adapted to eat plants;
7. the scientific study of the distributions, abundance and relations of organisms and their interactions with the environment.

Task 10. Express the following in one word:

1. areas where the vegetation is dominated by grasses and other non-woody plants;
2. a layer of gases that may surround a material body of sufficient mass and that is held in place by the gravity of the body;
3. the third planet from the Sun and the fifth-largest of the eight planets in the Solar System;
4. a landscape or region that receives an extremely low amount of precipitation, less than enough to support growth of most plants;
5. climatically and geographically defined as similar climatic conditions on the Earth, such as communities of plants, animals, and soil organisms;
6. combinations of two or more elements in Chemistry;
7. electromagnetic radiation of a wavelength that is visible to the human eye;
8. a process that converts carbon dioxide into organic compounds, especially sugars, using the energy from sunlight.

Task 11. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. wetland	a) земний
2. grassland	b) травоїдний
3. food web	c) підхід
4. decomposer	d) харчовий ланцюг
5. desert	e) сонячний
6. heat	f) вологість, вогкість, волога
7. continuously	g) мати на увазі
8. environment	h) заболочене місце
9. approach	i) луг
10. to imply	j) пустеля
11. terrestrial	k) довкілля
12. solar	l) поживне середовище
13. moisture	m) бактерія гниття
14. nutrient	n) постійно
15. herbivore	o) тепло

Comprehension check

Task 12. Work in pairs. Read the statements and agree or disagree with them. Agreement or disagreement should be followed by some appropriate comment where possible. Use clichés expressing agreement or disagreement:

Agreement	**Disagreement**
Yes, I agree entirely here.	Perhaps. But don't you think…
That's exactly what I think.	I couldn't agree more.

1. The physical environment includes light and heat or solar radiation, moisture, wind, oxygen, carbon dioxide, nutrients in soil, water, and atmosphere.
2. The term «ecology» was introduced by Charles Darwin in 1899.
3. The term «ecology» implies the study of the economy of nature.
4. Alexander von Humboldt developed the theory of evolution.
5. One approach is used to classify the regions of biosphere.
6. Inputs into the ecosystem are solar energy, water, oxygen, carbon dioxide, nitrogen, and other elements and compounds.
7. Outputs from the ecosystem include water, oxygen, carbon dioxide, and nutrient losses.
8. The major driving force is solar radiation.
9. Ecosystems function with energy flowing in one direction from the sun, and through nutrients, which are never recycled.
10. Light energy is used by plants, which, by the process of photosynthesis, convert it to physical energy in the form of carbohydrates and other carbon compounds.

11. Chemical energy is transferred through the ecosystem by a series of steps that involve eating and being eaten, or what is called a food net.
12. Bacteria, fungi, and animals that feed on dead material become the energy source for higher trophic levels.

Task 13. Fill in the missing words:

1. Terrestrial _____ include various types of forest, grassland, and desert.
2. The major driving _____ is solar energy.
3. Ecology is the study of the relationship of _____ and _____ with their physical and biological environment.
4. The biological _____ includes organisms of the same kind as well as other plants and animals.
5. Nature makes _____ use of energy originally fixed by plants.
6. The broad units of vegetation are called _____ by European ecologists and _____by North American ecologists.
7. Light energy is used by plants, which, by the process of _____, convert it to chemical energy in the form of carbohydrates and other carbon compounds.
8. The thin mantle of life that covers the _____ is called the biosphere.
9. The major parts of an ecosystem are the _____ (green plants), the _____ (herbivores and carnivores), _____ (fungi and bacteria), and the _____ or abiotic components consisting of dead organic matter and nutrients in the soil and water.
10. Modern _____ began with Charles Darwin.

Task 14. Make the word search. Find 9 words that are taken from the text:

E	**M**	**O**	**I**	**S**	**T**	**U**	**R**	**T**
C	**A**	**F**	**U**	**N**	**G**	**I**	**E**	**N**
O	**P**	**P**	**R**	**O**	**A**	**C**	**H**	**E**
L	**E**	**N**	**V**	**I**	**R**	**O**	**N**	**M**
O	**B**	**G**	**R**	**A**	**S**	**S**	**L**	**A**
G	**I**	**H**	**E**	**A**	**D**	**E**	**S**	**N**
Y	**O**	**M**	**E**	**T**	**T**	**R**	**E**	**D**

(See answer key)

Reading activities

Task 15. Read the text and try to summarize its content in several sentences.

HISTORICAL ROOTS OF ECOLOGY

Ernst Haeckel (left) and Eugenius Warming (right),
two early founders of ecology.

Ecology as a scientific discipline is relatively young, reaching prominence mostly in the second half of the 20th century. However, systematic ecological studies can trace roots to the ancient times, with Aristotle and Theophrastus, for example, making early observations on animal migrations and plant biogeography respectively. Several notable 19th century scientists such as Alexander Humboldt (1769–1859), Charles Darwin (1809–1882), Alfred Russel Wallace (1823–1913) and Karl Möbius (1825–1908) made many important contributions, from laying down the foundation of biogeography to identifying the interacting groups of the organisms as a functionally connected community (biocoenosis).

The term «ecology» itself (German: *Oekologie*) was first coined by the German biologist Ernst Haeckel in 1866, who defined it as «the comprehensive science of the relationship of the organism to the environment». The first significant textbook on the subject (together with the first university course) was written by the Danish botanist, Eugenius Warming. For this early work, Warming is sometimes identified as the founder of ecology.

Vocabulary exercises

Task 16. Read and translate given international words. Name part of speech.

ecology, scientific, discipline, systematic, ecological, migration, biogeography, group, organism, functionally, biocoenosis, biologist, botanist.

Task 17. Give Ukrainian equivalents to the following:

root, ancient times, observation, contribution, relationship, significant, founder.

Writing activities

Task 18. Complete the following sentences:

1. The, subject, first, significant, Danish, textbook, on, was, by, the, written, the, botanist.
2. Ecology, notable, made, contributions, many, scientists, important, to.
3. Relatively, ecology, young, is.
4. Studies, systematic, trace, ecological, can, roots, ancient, to, the, times.

Task 19. Write 5 questions to the text (general, special, alternative).

UNIT 2. ECOLOGY AND EVOLUTION

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

socially, conceptual, fundamental, publication, characters, technology, paradigm, ecology, dichotomous, evolution, disciplines, academic, morphological, genetic, evolutionary, principals, information, organism, monogamous, adaptation, genes, individual, separate, communities, testing, sexual, secret, biosphere, title, journal, focus, philosophies, nature, partner, unique, processes, organization, theory, evolutionary, role, development, molecular, analytical, techniques.

Task 2. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. cell	a) спорідненість
2. research	b) ластівка
3. in this respect	c) ховрах
4. science	d) спадковість
5. intractable	e) населення
6. sampling	f) закликати
7. kinship	g) межа, рубіж
8. inheritance	h) поведінковий
9. gopher	i) дослідження
10. to invoke	j) клітина
11. boundary	k) нерозв'язний
12. swallow	l) зразок, проба
13. behavioural	m) наука
14. population	n) у зв'язку з цим

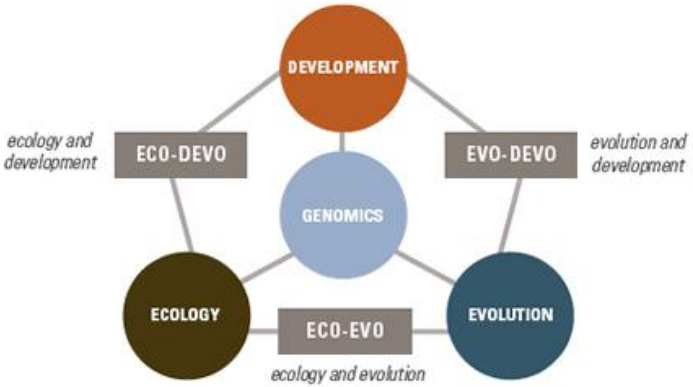
Task 3. Answer the questions:

1. What are the academic branches of the life sciences?
2. What traits can be mapped onto evolutionary trees to study principals of inheritance?
3. What disciplines are scientifically connected?
4. What is concerned with evolution?
5. What does ecology study?
6. What plays prominent conceptual roles in ecological as well as evolutionary theory?
7. When did connections between ecology and genetics become more prominent?
8. What does molecular ecology use to study genes in and among organisms?
9. What provides a sampling of organisms?

Reading activities

Task 4. Read and translate the text.

ECOLOGY AND EVOLUTION



Ecology and evolution are considered sister disciplines. Ecology and evolution are the academic branches of the life sciences. Morphological, behavioral and genetic traits can be

mapped onto evolutionary trees to study principals of inheritance. This information relates back to the ecology of adaptations. In this respect, ecology and evolution are scientifically connected because they both study hierarchies, networks, relations, and kinship among genes, cells, individuals, communities, species and the biosphere.

The two disciplines often appear together such as in the title of the journal *Trends in Ecology and Evolution*. There is no sharp dichotomous boundary that separates the two disciplines and they differ more in their areas of the applied focus than in their shared scientific philosophies on observing and understanding the principals of nature. Both disciplines discover and explain the emergent and unique properties and processes operating across different spatial or temporal scales of the organization.

Ecological theory is not necessarily invoked in evolutionary research regarding the role it played in many of the major transitions in the history of life. Evolution is concerned primarily with the nature of change through the guiding principles of natural selection, inheritance and survival. While the boundary between ecology and evolution is not always clear, it is understood that ecology studies the abiotic and biotic factors that influence the evolutionary process.

Natural selection, life history, development, adaptation, populations, and inheritance all play the prominent conceptual roles in the ecological as well as evolutionary theory. The fundamental scale of study for both disciplines is the gene. The connections between ecology and genetics became more prominent after the publication *Molecular Ecology* starting in 1992. Molecular ecology uses various analytical techniques to study the genes in and among organisms. However, there has long been an understanding of the relationship between ecology and the inheritance of the acquired characters through the genetic inheritance.

New technologies associated with the molecular ecology have engendered a new and collaborative research paradigm that investigates and probes questions about life that were otherwise intractable. Genetics and ecology have become partners in testing and solving the ecological problems and theory. Genes provide a sampling of organisms. Through genetics ecologists study

previously obscured sexual behaviour in animals such as secret mate preferences of female pocket gophers or multiple male partners in the socially monogamous tree swallows.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

behavioural [bɪˈheɪvɪərəl] - поведінковий
inheritance [ɪnˈherɪt(ə)ns] - спадковість
to relate - встановлювати зв'язок або відношення (to, with), мати відношення
in this respect - у зв'язку з цим, із цього приводу, в зв'язку з цим, при цьому
kinship - спорідненість, схожість, подібність
cell - клітина
emergent - терміновий, непередбачений
spatial - просторовий, існуючий в просторі
to invoke - закликати, волати, звертатися до
survival - виживання, виживаність
boundary - межа, рубіж
gene [dʒiːn] - ген
to engender - виникати, породити, зародити, зародитися
collaborative - спільний
to probe - досліджувати, випробувати
intractable - нерозв'язний, непереборний
sampling - зразок, проба
previously - заздалегідь, раніше
to obscure - затемняти, темнити, завуалювати
gopher - ховрах
swallow - ластівка

Task 6. Suggest the English for:

наука, відношення, клітина, ієрархія, спорідненість, тварина, адаптація, поведінковий, генетика, дослідження, ген, молекулярний, природа, вид, ластівка, ховрах, нерозв'язний, спільний, встановлювати зв'язок, просторовий, закликати, подібність, непередбачений, виживання, випробувати, розслідувати, завуалювати, зразок, назва, впливати.

Task 7. Give Ukrainian equivalents to the following:

inheritance, major transitions in the history of life, previously, temporal scales of organization, unique properties, to influence, prominent conceptual role, evolutionary theory, principals of nature, intractable, analytical techniques, cell, sharp boundary, more prominent, evolutionary process, natural selection, development, secret mate preferences, collaborative research paradigm, behavior, in this respect.

Task 8. Give the corresponding nouns:

to appear, to relate, to explain, to connect, to associate, to investigate, to solve.

Task 9. Match the following words with their definitions:

1. evolution	all the organisms that both belong to the same species and live in the same geographical area;
2. kinship	the functional basic unit of life;
3. gene	the struggle to remain alive and living;
4. molecule	the change over time in one or more inherited traits found in populations of organisms;
5. cell	a unit of heredity in a living organism;
6. survival	an electrically neutral group of at least two atoms held together by covalent chemical bonds;

7. population — the search for knowledge, or as any systematic investigation, with an open mind, to establish novel facts, usually using a scientific method;
8. research — a relationship between any entities that share a genealogical origin, through either biological, cultural or historical descent.

Task 10. Express the following in one word:

1. a group of interacting organisms sharing a populated environment;
2. an obstacle, impediment, difficulty or challenge, or any situation that invites resolution;
3. an enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the world;
4. a group of passerine birds in the family *Hirundinidae* which are characterised by their adaptation to aerial feeding;
5. the response of the system or organism to various stimuli or inputs, whether internal or external, conscious or subconscious, overt or covert, and voluntary or involuntary;
6. a newspaper or other periodical, in the literal sense of one published each day;
7. any contiguous living system such as animal, plant, fungus.

Comprehension check

Task 11. Do you agree with the following statements? Prove your point of view. Use clichés expressing agreement or disagreement:

Agreement	**Disagreement**
It goes without saying.	I disagree with you.
I quite agree with you.	Nothing of the kind.

1. Ecology and evolution are considered sister disciplines.

2. There is a sharp dichotomous boundary that separates the disciplines.
3. Evolution is concerned primarily with the nature of change through the guiding principles of natural selection, inheritance and differential survival.
4. Through evolution ecologists study previously obscured sexual behaviour in animals such as secret mate preferences of female pocket gophers or multiple male partners in the socially monogamous tree swallows.
5. Genetics and ecology have become partners in testing and solving ecological problems and theory.
6. Molecular ecology uses various analytical techniques to study the genes in and among objects.
7. Ecology studies the abiotic and biotic factors that do not influence the evolutionary process.

Task12. Fill in the missing words:

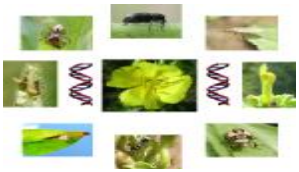
1. This information relates back to the _____.
2. Morphological, _____ and genetic traits can be mapped onto _____trees to study principals of inheritance.
3. New technologies associated with molecular ecology has engendered a new and _____research paradigm that investigates and probes questions about life that were otherwise_____.
4. Natural selection, life history, _____, adaptation, populations, and inheritance all play the _____conceptual roles in the ecological as well as evolutionary theory.
5. Ecological theory is not necessarily invoked in _____ research regarding the role it played in many of the major _____in the history of life.
6. Both disciplines discover and explain the emergent and unique _____and processes operating across different _____or temporal scales of the organization.

7. In this respect, ecology and evolution are _____connected because they both study_____, networks, relations and _____among genes, _____, individuals, communities, species and the biosphere.
8. Genes provide a _____ of organisms.
9. Connections between ecology and genetics became more _____after the publication *Molecular Ecology* starting in 1992.

Reading activities

Task 13. Read, make the plan to the text.

ORIGIN OF LIFE AND ECOLOGY



The environment is external yet interlinked directly with ecology. Chemistry, temperature, pressure, gravity, energy, and sunlight describe the main components of the Earth's environment that are importantly relevant to ecological processes. It is easier to learn about the environmental and ecological relations into conceptually manageable parts. However, once the effective environmental components are learned they conceptually come together as a holocoenotic system. The chemistry of the planet Earth has three important, independent and autocatalytic processes that work in unison when in living beings. The three chemical reactions include multiplication, variation, and heredity. The only ingredients necessary for creating these kinds of reactions independently are the abiotic materials coupled with free energy.

These are the environmental components that make the ingredients for the «primordial soup» theory that proposes that life originated from the abiotic autocatalytic chemical reactions in the Earth's primitive anoxic atmosphere. In a series of experiments in

the 1950s scientists recreated early conditions of the Earth's environment in a test tube. Using molecules suspected to be present in the primite atmosphere (H_2, CH_4, and NH_3) they recreated a kind of a primitive ecosystem containing self-generated amino acids which are organic in nature.

These experiments provided useful conceptual information about life processes which demonstrate that the molecular parts and processes of life can be recreated in a lab simulating chemistry, temperature, pressure, and energetics of the Earth's young environment. Henceforth, descendants of the early kinds of the autocatalytic molecules replicated the process of life and maintain a metabolic equilibrium between matter and energy. The complex process is now governed by the evolved replicatory molecular machinery of these chemical antecedents which include enzymes, RNA and DNA.

Writing activities

Task 14. Write Ukrainian equivalents to the following:

chemical reactions , ecological process, manageable part, variation, conceptual information, descendant, relation, pressure, sunlight, abiotic material.

Task 15. Make up sentences with the following words:

environment atmosphere temperature energy ecosystem molecule chemistry

Task 16. Write 5 questions to the text (general, special, alternative).

UNIT 3. ENVIRONMENT

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

factor, organism, biotic, temperature, ocean, form, ecosystem, minute, human, tropical, farm, climate, action, activity, natural ecology, chemist, principle, minimum, combination, limit resource, optimal, aeronautics, policy, global international, system, collect, information, atmosphere, administration.

Task 2. Match the following words with their definitions:

1. food	typically described as a principle or rule to guide decisions and achieve rational outcome;
2. size	the flow of gases on a large scale;
3. to lessen	to change, modify;
4. to evaluate	measurement;
5. policy	a natural body consisting of layers of mineral constituents of variable thicknesses, which differ from the parent materials in their morphological, physical, chemical and mineralogical characteristics;
6. wind	to reduce;
7. to alter	to appraise, estimate, value;
8. soil	any substance that is consumed to provide nutritional support for the body, possibly to the point of excess.

Task 3. Give Ukrainian equivalents to the following:

external factors, living organisms, animal species, rainfall, climate patterns, environment, term consequences, basic principle, breeding sites, amount of nutrients, optimal level, to better understand,

environmental policy, lawmaker, natural and human disruptions, artificial satellites, global change, human activity, natural world, health of the environment, ocean currents, particular plant, to lessen the impact of human activity, atmosphere, to collect information.

Reading activities

Task 4. Read and translate the text.

ENVIRONMENT

Environment includes all of the external factors affecting an organism. These factors may be other living organisms (biotic factors) or nonliving variables (abiotic factors) such as temperature, rainfall, day length, wind, and ocean currents. The interactions of organisms with the biotic and abiotic factors form an ecosystem. Even minute chages in any one factor in an ecosystem can influence whether or not a particular plant or animal species will be successful in its environment. Organisms and their environment constantly interact, and both are changed by this interaction. Like all other living creatures, humans have clearly changed their environment, but they have done so generally on a grander scale than have all other species. Some of these human-induced changes – such as the destruction of the world's tropical rain forests to create farms – have led to altered climate patterns. In turn, the altered climate patterns have changed the way animals and plants are distributed in different ecosystems.

Scientists study the long-term consequences of human actions on the environment, while environmentalists – professionals in various fields as well as concerned citizens – advocate ways to lessen the impact of human activity on the natural world. The science of ecology attempts to explain why plants and animals live

where they do and why their populations are the sizes they are. Understanding the distribution and population size of organisms helps scientists evaluate the health of the environment. In 1840 the German chemist, Justus von Liebig, first proposed that populations could not grow indefinitely, a basic principle now known as the Law of the Minimum. The biotic and abiotic factors, singly or in combination, ultimately limit the size that any population may attain. This size limit occurs when needed resources such as food, breeding sites, and water are in short supply. For example, the amount of nutrients in soil influences the amount of wheat that grows on a farm. If just one soil nutrient, such as nitrogen, is missing or below optimal levels, fewer healthy wheat plants will grow. Either population size or distribution may also be affected, directly or indirectly, by the way species in an ecosystem interact with one another.

To better understand the impact of natural and human disruptions on the Earth, in 1991 the National Aeronautics and Space Administration (NASA) began to use artificial satellites to study the global change, to collect the information about the interactions occurring in the atmosphere, on land, and in the oceans, and these data help scientists and lawmakers make sound environmental policy decisions.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

variable - змінна величина, змінний чинник
rainfall - кількість атмосферних опадів
interaction - взаємодія
grander - важливий, серйозний, головний
destruction - руйнування
to alter - змінювати
consequence - наслідок
to lessen - зменшувати
to evaluate - оцінювати
to attain - досягати, домагатися, добиратися
breeding site - розмноження

wheat - пшениця
artificial satellite - штучний супутник

Vocabulary exercises

Task 6. Suggest the English for:

руйнування, штучний супутник, пшениця, екологія, кількість атмосферних опадів, взаємодія, важливий, учений, руйнування, їжа, вода, змінювати, наслідок, оцінювати, зменшувати, змінна величина, довкілля.

Task 7. Arrange the following in pairs of antonyms:

external, to begin, width, artificial, abiotic, internal, length, to lessen, health, to increase, to finish, day, natural, night, disease, biotic.

Task 8. Express the following in one word:

1. liquid precipitation as opposed to non-liquid kinds of precipitation such as snow, hail, and sleet;
2. a chemical that an organism needs to live and grow or a substance used in an organism's metabolism which must be taken in from its environment;
3. the statistics of temperature, humidity, atmospheric pressure, wind, rainfall, atmospheric particle count, and other meteorological elements in a given region over a long period of time;
4. a major group of multicellular, eukaryotic organisms of the kingdom Animalia or Metazoa;
5. the general condition of a person in all aspects. It is also a level of functional and/or metabolic efficiency of an organism, often implicitly human;
6. a major body of saline water, and a principal component of the hydrosphere;

7. a person who writes and passes laws, especially someone who is a member of a legislature.

Task 9. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. variable	a) розмноження
2. wheat	b) штучний супутник
3. grander	c) змінювати
4. breeding site.	d) взаємодія
5. consequence	e) пшениця
6. destruction	f) змінний чинник
7. to evaluate	g) кількість атмосферних опадів
8. artificial satellite	h) довкілля
9. interaction	i) наслідок
10.to alter	j) руйнування
11.to lessen	k) зменшувати
12.environment	l) важливий, серйозний, головний
13.rainfall	m) оцінювати

Comprehension check

Task 10. Answer the questions:

1. What does environment include?
2. What are the external factors affecting an organism?
3. Who has changed the environment?
4. What does science of ecology attempt to explain?
5. What do environmentalists-professionals study?
6. Who proposed that populations could not grow indefinitely?
7. When does size limit occur?
8. When did NASA begin to use artificial satellites to study global change?
9. What helps scientists and lawmakers make sound environmental policy decisions?

Task 11. Decide whether the following statements are true or false:

1. Environment comprises all of the internal factors affecting an organism.
2. The interactions of organisms with biotic and abiotic factors form an environment.
3. Even minute changes in any one factor in an ecosystem cannot influence whether or not a particular plant or animal species will be successful in its environment.Like all other living creatures, humans have clearly changed their environment.
4. In turn, altered climate patterns have changed the way humans are distributed in different ecosystems.
5. The science of ecology attempts to explain why plants and animals live where they do and why their populations are the sizes they are.
6. In 1940 German chemist, Justus von Liebig first proposed that populations could not grow indefinitely, a basic principle now known as the Law of the Maximum.
7. The amount of nutrients in soil influences the amount of wheat that grows on a farm.
8. To better understand the impact of natural and human disruptions on the Earth, in 1991, Earth Science Enterprise began to use artificial satellites to study global change.

Task 12. Fill in the missing words:

1. External factors may be other living organisms or nonliving variables, such as temperature, _____, day length, wind, and_____.
2. Organisms and their _____constantly interact, and both are changed by this_____.
3. Some of the human-induced changes – such as the _____of the world's tropical rain forests to create farms – have led to altered_____.
4. Scientists study the long-term _____of human actions on the environment, while environmentalists – professionals

in various fields as well as concerned citizens – advocate ways _____the impact of human activity on the natural world.

5. The science of ecology attempts to explain why plants and animals live where they do and why their _____are the sizes they are.
6. Understanding the _____and population size of organisms helps scientists evaluate the health of the environment.
7. This size limit occurs when needed_____, such as food, _____, and water are in short supply.
8. Either population size or distribution may also be affected, directly or indirectly, by the way species in an _____interact with one another.

Task 13. Make the word search. Find 5 words that are taken from the text:

E	**O**	**R**	**G**	**A**	**N**	**I**	**W**
C	**A**	**T**	**M**	**O**	**S**	**S**	**H**
O	**P**	**H**	**E**	**R**	**E**	**M**	**E**
S	**R**	**A**	**I**	**N**	**F**	**T**	**A**
Y	**S**	**T**	**E**	**M**	**A**	**L**	**L**

(See answer key)

Reading activities

Task 14. Read, make the plan of the text.

HOW ECOSYSTEMS WORK

Ecosystem includes the organisms living in a particular environment such as a forest or a coral reef, and the physical parts of the environment that affect them. The term ecosystem was coined in 1935 by the British ecologist Sir Arthur George Tansley who described natural systems in «constant interchange» among their living and nonliving parts. The ecosystem concept fits into an ordered view of nature that was developed by the scientists to simplify the study of the relationships between organisms and their physical environment, a field known as ecology. At the top of the hierarchy is the planet's entire living environment known as the biosphere.

Within this biosphere there are several large categories of living communities known as biomes that are usually characterized by their dominant vegetation such as grasslands, tropical forests or deserts. The biomes are in turn made up of ecosystems. The living, or biotic, parts of an ecosystem such as the plants, animals, and bacteria found in soil are known as a community. The physical surroundings, or abiotic components, such as the minerals found in the soil, are known as the environment or habitat. Any given place may have several different ecosystems that vary in size and complexity. A tropical island, for example, may have a rain forest ecosystem that covers hundreds of square miles, a mangrove swamp ecosystem along the coast and an underwater coral reef ecosystem. No matter how the size or complexity of an ecosystem is characterized, all ecosystems exhibit a constant exchange of matter and energy between the biotic and abiotic community. Ecosystem components are so interconnected that a change in any one component of an ecosystem will cause the subsequent changes throughout the system.

Vocabulary exercises

Task 15. Read and translate given international words. Name part of speech.

ecosystem , organism, physical, ecologist, system, ecology, planet, biosphere, category, tropical, bacteria, mineral, component.

Task 16. Suggest the English for:

тварина, екосистема, грунт, рослина, довкілля, екологія, характеризувати, бути взаємозв'язаним, зміна.

Task 17. Give Ukrainian equivalents to the following:

particular, coral reef, to simplify, tropical forest, desert, mangrove, vegetation, habitat, concept, to affect, field, surrounding, subsequent changes, island, biosphere, complexity.

Writing activities

Task 18. Define statements true or false.

1. Ecosystem includes the objects living in a particular environment such as a forest or a coral reef, and the physical parts of the environment that affect them.
2. Ecosystem components are so interconnected that a change in any one component of an ecosystem will cause the subsequent changes throughout the system.
3. Within this biosphere there are several large categories of living communities known as biomes that are usually characterized by their dominant vegetation such as grasslands, tropical forests or deserts.
4. The ecosystem concept fits into an ordered view of nature that was developed by the scientists to simplify the study of the relationships between organisms and their physical environment, a field known as chemistry.
5. The physical surroundings such as the minerals found in the soil, are known as the environment or habitat.
6. A tropical island, for example, may have a rain forest ecosystem that covers hundreds of square miles, a mangrove swamp ecosystem along the coast and an underwater coral reef ecosystem.

Task 19. Write 5 questions to the text (general, special, alternative).

UNIT 4. CONNECTION BETWEEN ECOLOGY AND RENEWABLE ENERGY

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

ecological problem, natural gas, climate, energy, population, tradition, industry, ecology, progress, sector, condition, planet, ideal, phase, adequate, global, dominant, position, transition, cataclysmic, scenario.

Task 2. Match the following words with their meanings:

a) pollution b) benefit c) to satisfy
d) fossil e) emission
f) a planet g) to develop h) coal

1. to give satisfaction, to afford gratification;
2. any of the nine large celestial bodies in the solar system that revolve around the sun and shine by reflected light;
3. undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities;
4. a combustible black or brownish-black sedimentary rock normally occurring in rock strata in layers or veins;
5. the act of sending or throwing out;
6. the remains (or an impression) of a plant or animal that existed in the past geological age and that has been excavated from the soil;
7. evolve, make, create, expand, improve;
8. advantage, profit.

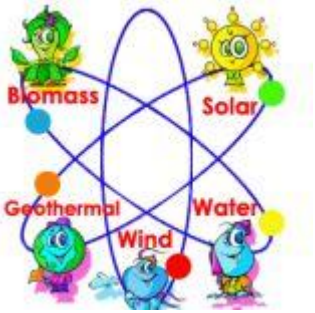
Task 3. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. renewable	a) зупинка, збій
2. fuel	b) зберігати
3. disaster	c) забруднення
4. solution	d) турбуватися
5. benefit	e) викид, вихлоп
6. halting	f) умова
7. to worry about	g) паливо
8. to maintain	h) перевага
9. emission	i) рішення
10.multidimensional	j) задовольняти
11. condition	k) поновлюваний
12. pollution	l) багатоплановий
13. to satisfy	m) катастрофа

Reading activities

Task 4. Read and translate the text.

CONNECTION BETWEEN ECOLOGY AND RENEWABLE ENERGY



Many ecological problems have originated from the excessive fossil fuels (coal, oil, natural gas) use, most notably climate change and pollution. Since the world needs more and more energy as the world population keeps growing we need more fossil fuels to satisfy

our hunger for energy. This is because a renewable energy has only started developing while fossil fuels have very long tradition and powerful industries to support them. The connection between ecology and renewable energy in its simplest meaning would be «the more renewable energy we use the better for ecology». The better for ecology means in this case less ecological problems to worry about. But, as said before, renewable energy has only started developing and despite more than obvious progress in certain renewable energy sectors (wind and solar energy) this is still far from what is required to replace fossil fuels and improve environmental condition of our planet.

Our planet is struggling against so many different ecological problems, and renewable energy would be the ideal solution for many of these problems: climate change, pollution, even endangered animals problems since all ecological problems are today interconnected and require multidimensional solution. More renewable energy would mean less air pollution, less greenhouse gas emissions to worry about, less endangered animals because of the climate change but still we are so far away from entering the «clean energy future». Why?

On the one hand, as said before, renewable energy sector is still in its infant phase, and it will require lot more funding and research to develop into adequate ecological solution to save our planet from the global environmental disaster. And on the other hand, fossil fuels lobbies are still extremely powerful and dominant, ready to do anything to maintain their dominant positions, including halting the progress of renewable energy sources as much as possible. Some environmentalists say that the future definitely belongs to renewable energy sources but something also has to be taken into account here, namely will our planet leave us enough time to see this future, or will the ever-growing magnitude of the ecological problems lead us to the point of no return, where our future would look like the cataclysmic scenario from some horror movie? The world has started noticing the benefits of renewable energy sources, but the current ecological problems are demanding much faster transition to renewable energy, and this is sadly the pace the world is not ready to follow at this point of time.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

excessive - надмірний, підвищений
fossil - скам'янілий, викопний
fuel - паливо
renewable - поновлюваний
solution - рішення
pollution - забруднення
multidimensional - багатоплановий, комплексний
emission - викид, вихлоп
disaster - катастрофа, лихо
halting - зупинка, збій
to maintain - зберігати
benefit - перевага

Vocabulary exercises

Task 6. Suggest the English for:

поновлювана енергія, умова, забруднення, перевага, паливо, дослідження, викид, належати, планета, багатоплановий, фільм жахів, задовольняти, промисловість, катастрофа, зберігати, повітря, надмірне, викопне, майбутнє, належати, брати до уваги, сонячна енергія, вугілля, покращувати, екологічна проблема, зміни клімату, швидкий перехід.

Task 7. Match the words:

1. renewable	a) pollution
2. multidimensional	b) fuel
3. to maintain	c) gas
4. environmental	d) condition
5. air	e) positions
6. world	f) solution
7. greenhouse	g) population
8. fossil	h) energy

Task 8. Give Ukrainian equivalents to the following:

ecological problems, excessive fossil fuels, climate change, hunger for energy, obvious progress, ideal solution, pollution, endangered animals problems, multidimensional solution, greenhouse gas emissions, infant phase, the benefits of renewable energy sources, adequate ecological solution, global environmental disaster, extremely powerful, to maintain their dominant positions, cataclysmic scenario, horror movie, require lot more funding and research, to support, air.

Task 9. Express the following in one word:

1. a natural or man-made hazard that has come to fruition, resulting in an event of substantial extent causing significant physical damage or destruction, loss of life or drastic change to the environment;
2. a method for solving a problem;
3. a substance that can be consumed to produce energy;
4. any one of a great variety of unctuous combustible substances, not miscible with water; they are of animal, vegetable or mineral origin;
5. the branch of biology concerned with the relations between organisms and their environment;
6. a mixture of gases (especially oxygen) required for breathing; the stuff that the wind consists of.

Comprehension check

Task 10. Answer the questions:

1. What is the origin of ecological problems?
2. What do we need to satisfy our hunger for energy?
3. What is the simplest meaning of the connection between ecology and renewable energy?
4. What problems is our planet struggling against?
5. What is a renewable energy?
6. Are fuels lobbies still extremely powerful or not?

7. What do some environmentalists say about renewable energy sources?
8. What are the current ecological problems demanding?

Task 11. Confirm or object the following statements:

1. Many ecological problems have originated from excessive fossil fuels (coal, oil, natural gas) use, most notably climate change and pollution.
2. Renewable energy has not only started developing while fossil fuels have very long tradition and powerful industries to support them.
3. The better for ecology means in this case more ecological problems to worry about.
4. Some environmentalists say that the future definitely belongs to fossil fuels .
5. On the one hand, renewable energy sector is still in its infant phase, and it will require lot more funding and research to develop into adequate ecological solution to save our planet from the global environmental disaster.
6. Our planet is struggling with so many different ecological problems, and renewable energy wouldn't be ideal solution for many of these problems.
7. All ecological problems are not interconnected.

Task 12. Fill in the missing words:

1. Since the world needs more and more energy as the world _____ keeps growing we need more _____ _____to satisfy our hunger for energy.
2. The connection between ecology and _____ _____in its most simplest meaning would be "the more renewable energy we use the better for ecology".
3. Despite more than obvious progress in certain renewable energy sectors (wind and solar energy) this is still far from what is required _____fossil fuels, and improve environmental _____of our planet.

4. More renewable energy would mean less air_____, less _____gas emissions to worry about, less endangered animals because of the climate change but still we are so far away from entering the "clean energy future".
5. Fuels lobbies are still extremely powerful and dominant, ready to do anything _____their dominant positions, including _____the progress of renewable energy sources as much as possible.
6. World has started noticing _____ of renewable energy sources.
7. Ecological problems are demanding much faster _____to renewable energy, and this is sadly the pace the world is not ready to follow at this point of time.

Task 13. Translate into Ukrainian.

1. Jupiter was the origin of the radiation.
2. Solar and wind power are renewable, but coal is not.
3. There are many forms of energy such as heat, mechanical, electrical, radiant, chemical and nuclear energies.
4. The term «fossil» is now usually appropriated to those inorganic substances which have become penetrated by earthy or metallic particles.
5. An important task of ecology is to investigate the conditions under which population sizes are in equilibrium.
6. The inclusion of human beings and the generalization of the notion of species to include species of man-made objects has made ecology the study of complex interactions in the terrestrial environment of man.
7. Nobody visits the river any more because of all the pollution.
8. A change in the physical, chemical or biological characteristics of the air, water or soil that can affect the health, survival or activities of humans in an unwanted way.
9. Humans and other organisms produce bodily wastes which enter rivers, lakes, oceans, and other surface waters; in high concentrations these wastes result in bacterial contamination and excessive nutrient loading.

Task 14. Read the text and try to summarize its content in several sentences.

RADIATION: LIGHT, HEAT AND TEMPERATURE

Almost all aspects of functional ecology is effected indirectly or directly by radiant energy from the sun. There are different wavelengths of electromagnetic energy emanating from the sun that provides inputs into the ecological energy budget of the planet. Radiant energy from the sun generates heat, provides photons of light measured as active energy in the chemical reactions of life, and also acts as a catalyst for genetic mutation.

The biology of life operates within a certain range of temperatures. Heat is a form of energy that regulates temperature. Heat affects the growth rates, activity, behaviour, and primary production. Temperature is largely dependent on the incidence of solar radiation. The latitudinal and longitudinal spatial variation of temperature greatly affects climates and consequently the distribution of biodiversity and levels of primary production in different ecosystems or biomes across the planet.

Heat and temperature also relate importantly and differently affect two metabolic divisions in animals, poikilotherms, having a body temperature that is largely regulated and dependent on the temperature of the external environment, and homeotherms, having a body temperature that is internally regulated and maintained by expending metabolic energy.

Light is the primary source of energy on the planet. Plants, algae, and some bacteria absorb light and assimilate the energy through photosynthesis. Organisms capable of assimilating energy

by photosynthesis or through inorganic fixation of H_2S are autotrophs. Autotrophs are responsible for primary production and the assimilation of light energy that becomes metabolically stored as potentional energy in biochemical enthalpic bonds. Heterotrophs feed on autotrophs for their supply of energy and nutrients. Hence, there is a relationship between light, production, and supplies of energy that affects the distribution, composition, and structure of ecosystem dynamics across the planet.

Vocabulary exercises

Task 15. Write Ukrainian equivalents to the following:

distribution, consequently, to measure, wavelength, certain range, input, inorganic fixation, algae, primary source of energy, to provide, incidence of solar radiation, variation, division, light energy, heat.

Task 16. What do these words taken from the text mean?

1. ecology
2. radiant energy
3. heat
4. light
5. heterotrophs
6. autotrophs

Writing activities

Task 17. Complete the following sentences:

1. Energy, is, of, that, regulates, heat, temperature, a, form.
2. The, planet, of, energy, light, primary, is, source, on, the.
3. There, a, between, relationship, is, light, and, supplies, of, production, energy.
4. Almost, indirectly, aspects, is, functional, effected, or, directly, by, energy, of, ecology, from, radiant, all, the, sun.

5. Within, a, the, certain, biology, of, of, temperatures, life, operates, range.

Task 18. Choose the right answer:

1. Most of the energy we use originally came from

   a) the sun
   b) the air
   c) the soil
   d) the oceans

2. Electrical energy can be produced from

   a) mechanical energy
   b) chemical energy
   c) radiant energy
   d) all of the above

3. The Ukrainians consume lots of energy. Which fuel provides the most energy?

   a) petroleum
   b) coal
   c) natural gas
   d) solar

4. Coal, petroleum, natural gas, and propane are fossil fuels. They are called fossil fuels because:

   a) they are burned to release energy and they cause air pollution
   b) they were formed from the buried remains of plants and tiny animals that lived hundred of millions of years ago
   c) they are nonrenewable and will run out
   d) they are mixed with fossils to provide energy

5. Gasoline is produced by refining which fossil fuel?

    a) natural gas
    b) coal
    c) petroleum
    d) propane

6. Propane is used instead of natural gas on many farms and in rural areas. Why is propane often used instead of natural gas?

    a) it’s safer
    b) it’s portable
    c) it’s cleaner
    d) it's cheaper

7. Global warming focuses on an increase in the level of which gas in the atmosphere?

    a) ozone
    b) sulfur dioxide
    c) carbon dioxide
    d) nitrous oxide

8. Solar, biomass, geothermal, wind, and hydropower energy are all renewable sources of energy. They are called renewable because they

    a) are clean and free to use
    b) can be converted directly into heat and electricity
    c) can be replenished by nature in a short period of time
    d) do not produce air pollution

(See answer key)

Task 19. Write 7 questions to the text (general, special, alternative).

MODULE B
UNIT 5. THE POPULATIONS OF ORGANISMS

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

functional, ecosystem, organism, energy, group, community, biotic, portion, attribute, dominance, result, control, individual, physical nature, form, vertical, temperature, oxygen, dioxide, carbon.

Task 2. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. to evidence	a) вміщувати
2. canopy	b) ялина
3. salinity	c) схрещувати
4. mussel	d) наділяти
5. to encompass	e) сукупність однорідних ділянок лісу
6. niche	f) двостулковий молюск
7. scarlet tanager	g) збирати
8. spruce	h) свідчити, служити доказом
9. to apportion	i) червоногруда танагра
10. strata	j) листова запона
11. to interbreed	k) *ліс.* мікромісцезнаходження
12. to glean	l) мінералізація (вод)

Task 3. Answer the questions:

1. What are the functional units of an ecosystem?
2. What is a population?
3. What is a definition of the term «community»?
4. What are the attributes of the community?
5. What can influence diversity of species in a community?
6. What is stratification?
7. How many layers does a forest have?

8. What is a niche?

Reading activities

Task 4. Read and translate the text

THE POPULATIONS OF ORGANISMS

The functional units of an ecosystem are the populations of organisms through which energy and nutrients move. A population is a group of interbreeding organisms of the same kind living in the same place at the same time. Groups of populations within an ecosystem interact in various ways. These interdependent populations of plants and animals make up the community, which encompasses the biotic portion of the ecosystem. The community has certain attributes, among them dominance and species diversity. Dominance results when one or several species control the environmental conditions that influence associated species. In a forest, for example, the dominant species may be one or more species of trees such as oak or spruce; in a marine community the dominant organisms frequently are animals such as mussels or oysters.

Dominance can influence diversity of species in a community because diversity involves not only the number of species in a community, but also how numbers of individual species are apportioned. The physical nature of a community is evidenced by layering or stratification. In terrestrial communities stratification is influenced by the growth form of the plants. Simple communities such as grasslands with little vertical stratification usually consist of two layers, the ground layer and the herbaceous layer. A forest has up to six layers: ground, herbaceous, low shrub, low tree and high shrub, lower canopy and upper canopy. These strata influence the physical environment and diversity of habitats for wildlife. Vertical

stratification of life in aquatic communities, by contrast, is influenced mostly by physical conditions: depth, light, temperature, pressure, salinity, oxygen, and carbon dioxide.

The community provides the habitat – the place where particular plants or animals live. Within the habitat organisms occupy different niches. A niche is the functional role of a species in a community – that is, its occupation, or how it earns its living. For example, the scarlet tanager lives in a deciduous forest habitat. Its niche, in part, is gleaning insects from the canopy foliage. The more a community is stratified, the more finely the habitat is divided into additional niches.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

to interbreed - схрещувати (про різні породи), схрещуватися
to encompass - вміщувати
diversity - різноманітність, різноманіття
oak - дуб
spruce [spru:s] - ялина
mussel - двостулковий молюск
oyster - устриця
to apportion - наділяти, розподіляти (пропорційно), розділяти
to evidence - свідчити, служити доказом, доводити
stratification - ієрархічне представлення, стратифікація
terrestrial - земний
foliage - листя, зелена рослинність, рослинний світ
shrub - кущі
canopy - листова запона, деревна запона
strata - сукупність однорідних ділянок лісу
aquatic - водний, водяний
depth - глибина
salinity - мінералізація(вод)
habitat - місце життя, місце існування
niche [niʃ] - ліс. мікромісцезнаходження, ніша, належне місце
scarlet tanager - червоногруда танагра

deciduous [dɪˈsɪdjʊəs] - листяний
to glean - збирати
herbaceous [həˈbeɪʃəs] - трав'яний, трав'янистий

Vocabulary exercises

Task 6. Suggest the English for:

схрещувати, збирати, трав'яний, червоногруда танагра, водний, глибина, листя, різноманітність, земний, дуб, наділяти, свідчити, двостулковий молюск, устриця, стратифікація, кущі, листова запона, сукупність однорідних ділянок лісу, ялина, мінералізація, ніша, листя.

Task 7. Give Ukrainian equivalents to the following:

interbreeding organisms, plant, deciduous forest, diversity of habitats, grassland, oxygen, spruce, interdependent populations, mussel, pressure, dominance, species diversity, salinity, ground layer, environmental conditions, animal, oak, canopy foliage, terrestrial communities, additional niches, lower canopy, aquatic communities, carbon dioxide, occupation, vertical stratification.

Task 8. Give the four forms of the verbs:

to interact, to make, to have, to involve, to consist.

Task 9. Arrange the following in pairs of synonyms:

stratification, to gather, variety, certain, to glean, diversity, ground, to move, soil, definite, layering, to go.

Task 10. Match the following words with their definitions:

1. to evidence	any of numerous monoecious deciduous or evergreen trees or shrubs of the genus Quercus, bearing acorns as fruit;

2. terrestrial	the extent, measurement or dimension downward, backward or inward;
3. aquatic	to give proof;
4. oyster	relating to the earth or its inhabitants;
5. spruce	variety, multiplicity;
6. oak	any of several edible bivalve mollusks of the family Ostreidae that live chiefly in shallow marine waters and have a rough, irregularly shaped shell;
7. diversity	any of various coniferous evergreen trees, having needlelike foliage, drooping cones and soft wood often used for paper pulp;
8. depth	living or growing in, on or near the water.

Task 11. Express the following in one word:

1. a medium-sized American songbird;
2. plant leaves, especially tree leaves, considered as a group;any of several marine bivalve mollusks, especially the edible members of the family Mytilidae, a blue-black species raised commercially in Europe. They are often found attached to rocky surfaces or the sides of the ships;
3. a woody plant of relatively low height, having several stems arising from the base and lacking a single trunk; a bush;
4. the degree of hotness or coldness of a body or environment;
5. the area or environment where an organism or ecological community normally lives or occurs;
6. formation or deposition of layers, as of rock or sediments.

Comprehension check

Task 12. Work in pairs. Read the statements and agree or disagree with them. Use clichés expressing agreement or disagreement:

Agreement **Disagreement**

Yes, it's true.	I see what you mean, but...
What you say is perfectly true.	You may be right, but...

1. A population is a group of different organisms living in the same place at the same time.
2. Groups of populations within an ecosystem interact in various ways.
3. Dominance results when one or several species do not control the environmental conditions that influence associated species.
4. Dominance can influence diversity of species in a community because diversity involves not only the number of species in a community, but also how numbers of individual species are apportioned.
5. Simple communities such as grasslands, with little vertical stratification, usually consist of one layer.
6. Vertical stratification of life in aquatic communities, by contrast, is influenced mostly by chemical conditions.
7. The scarlet tanager lives in a deciduous forest habitat.
8. The more a community is stratified, the more finely the habitat is divided into additional niches.

Task 13. Fill in the missing words:

1. The functional units of an _____are the populations of organisms through which energy and _____move.
2. These interdependent populations of plants and animals make up the_____, which _____the biotic portion of the ecosystem.
3. The community has certain attributes, among them _____and species diversity.
4. These _____influence the physical environment and diversity of _____for wildlife.
5. The physical nature of a community is evidenced by layering or_____.
6. In _____communities, stratification is influenced by the growth form of the_____.

7. The community provides the habitat – the place where particular plants or _____live.
8. Within the habitat organisms occupy different_____.
9. A niche is the functional role of _____in a community – that is, its occupation or how it earns its living.
10. For example, the _____lives in a deciduous forest habitat.
11. In a forest, for example, the dominant species may be one or more species of trees such as _____or _____; in a marine community, the dominant organisms frequently are animals such as _____or_____.

Task 14. Make the word search. Find 7 words that are taken from the text:

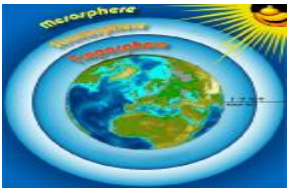
P	**F**	**O**	**L**	**I**	**A**	**G**	**E**
L	**D**	**E**	**C**	**I**	**D**	**U**	**O**
A	**S**	**S**	**T**	**R**	**A**	**T**	**U**
N	**P**	**R**	**U**	**C**	**E**	**A**	**S**
T	**O**	**Y**	**S**	**T**	**E**	**R**	**Y**
D	**E**	**V**	**E**	**R**	**S**	**I**	**T**

(See answer key)

Reading activities

Task 15. Read, make the plan to the text.

METABOLISM AND THE EARLY ATMOSPHERE



The Earth's environment has not always remained at a constant temperature and the atmosphere has changed significantly

as a result of the gross metabolic activity of life on the Earth. There is an evolving feedback loop between the ecological processes of life, geochemistry, and the Earth's atmosphere. Proceeding through the early stages of life, major ecological transitions modified the Earth's geochemical cycles.

The Earth formed approximately 4.5 billion years ago and the environmental conditions were too extreme for life to form for the first 500 million years. During this early Hadean period, the Earth started to cool allowing time for a crust and oceans to form. Environmental conditions were unsuitable for the origins of life until approximately 1 billion years after the Earth formed. The Earth's atmosphere transformed from hydrogen dominant, to one composed mostly of methane, and ammonia. Over the next billion years the metabolic activity of life transformed the atmosphere to higher concentrations of carbon dioxide, nitrogen, and water vapor. These gases changed the way that the light from the sun hit the Earth's surface and greenhouse effects trapped in heat. There were untapped sources of free energy within the mixture of reducing and oxidizing gases that set the stages for primitive ecosystems to evolve and, in turn, the atmosphere also evolved. The leaf is the primary site of photosynthesis in plants.

One of the earliest organisms was likely an anaerobic methanogen microbe. Early forms of fermentation would have also been a component of the primitive ecology producing higher levels of atmospheric methane.

Vocabulary exercises

Task 16. Read and translate given international words. Name part of speech.

temperature, atmosphere, metabolic, ecological, process, geochemistry, million, period, concentration, gas, effect, primitive, ecosystem, photosynthesis, methane, microbe, fermentation, organism.

Task 17. Give Ukrainian equivalents to the following:

feedback, crust, ocean, approximately, surface, source, leaf, constant temperature , significantly, loop, ecological transition, geochemical cycles, water vapor, extreme, concentration, environmental condition.

Writing activities

Task 19. Fill in the missing words:

1. The Earth's _____transformed from hydrogen dominant, to one composed mostly of methane, and ammonia.
2. One of the earliest organisms was likely an anaerobic methanogen_____.
3. Proceeding through the early stages of life, major ecological _____modified the Earth's geochemical cycles.
4. The Earth's environment has not always remained at a constant temperature and the atmosphere has changed _____as a result of the gross metabolic activity of life on the Earth.
5. The leaf is the primary site of _____in plants.
6. During this early Hadean period, the Earth started to cool allowing time for a _____and _____to form.

Task 20. Write 6 questions to the text (general, special, alternative).

UNIT 6. ECOLOGICAL PROBLEMS (Part 1)

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

problem, global, atmosphere, critical, decade, virtually, million, resource, stabilize, billion, fact, nation, person, strategy, factor, democracy, social, economic status, control, information, reproductive, radiation, energy, process, carbon dioxide, methane, temperature, planet, comfortable, concentration, dramatically, percent, region, hurricane, report, metal, organic, toxic, industrial, chemical, pelican, bison, international.

Task 2. Give Ukrainian equivalents to the following:

decision, consequence, to lessen, economic status, organic compounds, threat, depletion, to assume, contamination, habitat, agriculture, gases, devastating, fossil fuels, property, human population, greenhouse, meanwhile, supply, global warming, scientist, mammal droughts, foreseeable, social justice, consumption, inundate, consequence, emission, retard, glass panes, predict, elimination, desman, extinction, developing world.

Task 3. Answer the questions:

1. What are the problems facing the environment?
2. What do the experts predict?
3. Why have the population growth rates fallen in developing areas?
4. What is the greenhouse effect?
5. Why has the amount of carbon dioxide in the atmosphere increased dramatically within the last century?
6. What are Ukraine's environmental problems?
7. What does Ukraine release into the Black Sea?

Task 4. Read and translate the text.

ECOLOGICAL PROBLEMS
(Part 1)

The problems facing the environment are vast and diverse. The global warming, the depletion of the ozonelayer in the atmosphere and destruction of the world's rain forests are just some of the problems that many scientists believe will reach critical proportions in the coming decades. All of these problems will be directly affected by the size of the human population.

The human population growth is at the root of virtually all of the world's environmental problems. Although the growth rate of the world's population has slowed slightly since the 1990s, the world's population increases by about 77 million human beings each year. As the number of people increases, crowding generates pollution, destroys more habitats and uses up additional natural resources. The Population Division of the United Nations (UN) predicts that the world's population will increase from 6.23 billion people in 2000 to 9.3 billion people in 2050. The UN estimates that the population will stabilize at more than 11 billion in 2200. Other experts predict that numbers will continue to rise into the foreseeable future, to as many as 19 billion people by the year 2200.

Although rates of population increase are now much slower in the developed world than in the developing world, it would be a mistake to assume that the population growth is primarily a problem of developing countries. In fact, because larger amounts of resources per person are used in developed nations, each individual from the developed world has a much greater environmental impact than does a person from a developing country. Conservation strategies that

would not significantly alter lifestyles but that would greatly lessen environmental impact are essential in the developed world. In the developing world, meanwhile, the most important factors necessary to lower the population growth rates are democracy and social justice. Studies show that the population growth rates have fallen in the developing areas where several social conditions exist. In these areas, literacy rates have increased and women receive economic status equal to that of men, enabling women to hold jobs and own property. In addition, the birth control information in these areas is more widely available, and women are free to make their own reproductive decisions.

Like the glass panes in a greenhouse, certain gases in the Earth's atmosphere permit the Sun's radiation to heat the Earth. At the same time, these gases retard the escape into the space of the infrared energy radiated back out by the Earth. This process is referred to as the greenhouse effect. These gases, primarily carbon dioxide, methane, nitrous oxide, and water vapor, insulate the Earth's surface helping to maintain warm temperatures. Without these gases, the Earth would be a frozen planet with an average temperature of about 18°C instead of a comfortable 15°C. If the concentration of these gases rises, they trap more heat within the atmosphere causing worldwide temperatures to rise. Within the last century the amount of carbon dioxide in the atmosphere has increased dramatically, largely because people burn vast amounts of fossil fuels – coal and petroleum and its derivatives. The average global temperature also has increased by about 0.6 Celsius degrees within the past century. Atmospheric scientists have found that at least half of that temperature increase can be attributed to human activity. They predict that unless dramatic action is taken, the global temperature will continue to rise by 1.4 to 5.8 Celsius degrees over the next century.

Although such an increase may not seem like a great difference, during the last ice age the global temperature was only 2.2 Celsius degrees cooler than it is presently. The consequences of such a modest increase in temperature may be devastating. Already scientists have detected a 40 percent reduction in the average thickness of the Arctic ice. Other problems that may develop include

a rise in the sea levels that will completely inundate a number of low-lying island nations and flood many coastal cities such as New York and Miami. Many plant and animal species will probably be driven into extinction; agriculture will be severely disrupted in many regions, and the frequency of severe hurricanes and droughts will likely increase.

Ukraine's environmental problems include the nuclear contamination which resulted from the 1986 Chernobyl accident. One-tenth of Ukraine's land area was affected by the radiation. According to the UN reports approximately one million people were exposed to unsafe levels of radiation through the consumption of food. Approximately 3.5 million ha (8.6 million ac) of agricultural land and 1.5 million ha (3.7 million ac) of forest were also contaminated.

Pollution from other sources also poses a threat to the environment. Ukraine releases polluted water, heavy metal, organic compounds, and oil-related pollutants into the Black Sea. The water supply in some areas of the country contains toxic industrial chemicals up to 10 times the concentration considered to be within safety limits.

Air pollution is also a significant environmental problem in Ukraine. In 1992 Ukraine had the world's seventh-highest level of industrial carbon dioxide emissions which totaled 611.3 million metric tons, a per capita level of 11.72. In 1996 the total had dropped significantly to 397 million metric tons. The pollution of the nation's water has resulted in a large-scale elimination of the fish population, particularly in the Sea of Azov.

As of 2001 only 1.6% of Ukraine's total land area is protected, including 22 wetlands of international importance. Fifteen species, ten bird species, and twenty plant species are threatened, including the European bison, the Russian desman and the Dalmatian pelican.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

depletion [dɪˈpliːʃ(ə)n] - виснаження, вичерпання, спустошення

to predict - передбачати, прогнозувати
foreseeable - передбачуваний
to assume - припускати
to lessen - зменшувати, збавляти
meanwhile - тим часом
property - власність, майно
decision - рішення
greenhouse - парниковий
glass pane - шибка
infrared energy - інфрачервоне випромінювання
to retard - уповільнювати, затримувати
consequence - наслідок, результат
devastating - спустошливий, руйнівний
to inundate - затопляти, наводняти
extinction - вимирання (роду)
drought - посуха
consumption - споживання
threat - загроза
supply - запас, припаси
emission - викид, вихлоп (автомобіля і тому подібне)
elimination - виключення, знищення
desman - вихухоль
mammal - ссавець

Vocabulary exercises

Task 6. Suggest the English for:

передбачуваний, затопляти, вимирання, запас, посуха, парниковий, інфрачервоне випромінювання, вихухоль, ссавець, тим часом, наслідок, припускати, рішення, зменшувати, споживання, загроза, викид, шибка, тим часом, власність, рішення, уповільнювати.

Task 7. Match the following words and expressions with their definitions:

1. desman	an expression of an intention to inflict pain, injury, evil, or punishment;
2. to assume	to make less, reduce;
3. threat	to cause to move or proceed slowly, delay or impede;
4. world	to cover with water, especially floodwaters;
5. to lessen	either of two aquatic, insectivorous, molelike mammals, *Desmana moschata* of eastern Europe and western Asia or *Galemys pyrenaicus* of southwest Europe, having dense brownish fur, a long snout, and a flattened scaly tail;
6. to retard	to take for granted, suppose;
7. to inundate	the earth.

Task 8. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. depletion	a) викид, вихлоп
2. consumption	b) рішення
3. property	c) тим часом
4. infrared energy	d) посуха
5. meanwhile	e) власність, майно
6. emission	f) парниковий
7. greenhouse	g) передбачати, прогнозувати
8. glass pane	h) спустошливий, руйнівний
9. to predict	i) шибка
10. devastating	j) виключення, знищення
11. drought	k) споживання
12. decision	l) інфрачервоне випромінюванн

Comprehension check

Task 9. Work in pairs. Read the statements and agree or disagree with them. Agreement or disagreement should be followed by some appropriate comment where possible. Use clichés expressing agreement or disagreement:

Agreement	**Disagreement**
Yes, I agree entirely here.	Perhaps. But don't you think.
That's exactly what I think.	I couldn't agree more.

1. Global warming, the depletion of the ozonelayer in the atmosphere and destruction of the world's rain forests are just some of the problems that many scientists believe will reach critical proportions in the coming decades.
2. Human population growth is at the root of virtually all of the world's environmental problems.
3. Although the growth rate of the world's population has slowed slightly since the 1980s, the world's population increases by about 77 million human beings each year.
4. The Population Division of the United Nations predicts that the world's population will increase from 6.23 billion people in 2000 to 9.9 billion people in 2050.
5. Other experts predict that numbers will continue to rise into the foreseeable future, to as many as 19 billion people by the year 2200.
6. Conservation strategies that would significantly alter lifestyles but that would greatly lessen environmental impact are essential in the developed world.
7. In the developing world, meanwhile, the most important factors necessary to lower the population growth rates are democracy and social justice.
8. Like the glass panes in a greenhouse, certain gases in the Earth's atmosphere permit the Sun's radiation to heat the Earth.

9. The Earth would be a frozen planet with an average temperature of about 18°C instead of a comfortable 25°C.
10. The average global temperature also has increased by about 0.9 Celsius degrees within the past century.
11. Ukraine's environmental problems include the nuclear contamination which resulted from the 1986 Chernobyl accident.
12. Already scientists have detected a 40 percent reduction in the average thickness of the Arctic ice.

Task 10. Make up sentences:

1. The problems facing the environment are
2. Ukraine's environmental problems include
3. Air pollution is also
4. The UN predicts
5. Certain gases in the Earth's atmosphere permit
6. One-tenth of Ukraine's land area was
7. Many plant and animal species will
8. These gases

a) the Sun's radiation to heat the Earth.
b) that the world's population will increase.
c) affected by the radiation.
d) insulate the Earth's surface.
e) probably be driven into extinction.
f) a significant environmental problem in Ukraine.
g) the nuclear contamination.
h) vast and diverse.

Task 11. Fill in the missing words:

1. All of the problems will be directly affected by the size of the human_____.
2. Human population growth is at the root of virtually all of the world's _____problems.
3. Although rates of population increase are now much slower in the developed world than in the developing world, it would be

a mistake to assume that population growth is _____a problem of developing countries.

4. Conservation strategies that would not significantly alter lifestyles but that would greatly _____environmental impact are essential in the developed world.
5. Studies show that population growth rates have fallen in the developing areas where several social _____exist.
6. Within the last century the amount of carbon dioxide in the atmosphere has increased dramatically, largely because people burn vast amounts of_____ _____– coal and petroleum, and its derivatives.
7. Although such an increase may not seem like a great difference, during the last ice age the _____temperature was only 2,2 Celsius degrees (4 Fahrenheit degrees) cooler than it is presently.
8. Other problems that may develop include a rise in the sea levels that will completely _____a number of low-lying island nations and flood many coastal cities such as New York and Miami.
9. Many plant and animal species will probably be driven into_____, agriculture will be severely disrupted in many regions, and the frequency of severe _____and _____will likely increase.
10. One-tenth of Ukraine's land area was affected by the_____.
11. _____from other sources also poses a threat to the environment.
12. The water _____in some areas of the country contains toxic industrial chemicals up to 10 times the concentration considered to be within safety limits.
13. The pollution of the nation's water has resulted in a large-scale _____ of the fish population, particularly in the Sea of Azov.

Task 12. Tease your brain with these riddles.

1. Why did the foolish gardener plant a light bulb?

2. How do energy-conscious people feel about wind power?

3. How did Benjamin Franklin feel when he discovered electricity?

4. What does the nuclear scientist do in his spare time?

5. How is energy conservation like a baseball team?

6. What is burned by cars driven late at night?

7. How are renewable power plants like people who enjoy going to the beach?

8. In which part of the jail are energy criminals kept?

9. What is a renewable energy source that is used every day at your university?

10. What did the solar cells say to their cloudy boss?

11. How many energy students does it take to change a light bulb?

(See answer key)

Task 13. Find the following numbers in the text. What do they refer to? Make a sentence about each number.

18; 0; 1.6; 1990; 2050; 15; 2.5; 2200; 1; 4; 1986; 1.4; 1992; 19; 22; 5.8; 10; 2001; 10.4; 2000; 3.7; 2.2; 9.3; 0.6; 1.5; 6.23; 77; 40; 3.5; 1996; 11.72; 8.6; 20.

Reading activities

Task 14. Read, make the plan to the text. Write 7 questions to the text (general, special, alternative).

THE IMPACT ON WILDLIFE

The key impact of the global warming on wildlife is a habitat displacement, whereby ecosystems that animals have spent millions of years adapting to shift quickly. Ice giving way to water in a polar bear habitat is just one example of this. Another is the possibility that the warmer spring temperatures could dry up critical breeding

habitat for waterfowl in the prairie pothole region, a stretch of the land between northern Iowa and central Alberta. The affected wildlife populations can sometimes move into new spaces and continue to thrive. But the concurrent human population growth means that many land areas that might be suitable for such «refugee wildlife» are already taken and cluttered with residential and industrial development.

A recent report by the Pew Center for Global Climate Change suggests creating «transitional habitats» or «corridors» that help migrating species by linking natural areas that are otherwise separated by a human settlement. And as wildlife species go their separate ways, humans can also feel the impact. A World Wildlife Fund study found that a northern exodus from the United States to Canada by some types of warblers led to a spread of mountain pine beetles that destroy economically productive balsam fir trees. Similarly, a northward migration of caterpillars in the Netherlands has eroded some forests there.

Beyond habitat displacement, many scientists agree that the global warming is causing a shift in the timing of various natural cyclical events in the lives of animals. Many birds have altered the timing of long-held migratory and reproductive routines to better sync up with a warming climate. And some hibernating animals are ending their slumbers earlier each year, perhaps due to the warmer spring temperatures.

Vocabulary exercises

Task 15. Give Ukrainian equivalents of the following:

habitat displacement, animal, slumber, decisive steps, extinction, key impact, global warming, residential, mountain, industrial development, human settlement.

Writing activities

Task 16. Make up sentences with the following words:

population
extinction
climate
wildlife
fir tree
bird
migration

Task 17. Answer the questions:

1. What is the key impact of the global warming on wildlife? Give an example.
2. What does a recent report by the Pew Center for Global Climate Change suggest?
3. Can humans feel the impact of the global warming?
4. What did A World Wildlife Fund study find?
5. Do scientists agree that the global warming is causing a shift in the timing of various natural cyclical events in the lives of animals or not?

UNIT 7. ECOLOGICAL PROBLEMS (Part 2)

Pre-reading activities

Task 1. Match the following words with their definitions:

1. extended	forbiddance, inhibition;
2. unprecedented	to protect, hide, or conceal (something) from danger or harm;
3. stringent	to lessen, to cut, to decrease, to shorten;
4. depletion	to think, to believe, to consider, to rate;
5. to shield	the use or consumption of a resource, especially a natural resource, faster than it is replenished;
6. prohibition	having no previous example;
7. to estimate	imposing rigorous standards of performance;
8. to reduce	stretched or pulled out.

Task 2. Read and translate given international words. Name part of speech.

ozone, stratosphere, atmosphere, ultraviolet, chemical, aerosol, spray, chlorine, molecule, period, dramatic, ultraviolet, radiation, infection, oceanic, plankton, photosynthetic, organism, carbon dioxide, global, international, pact, protocol, specific, nation, ecosystem, tropical, coral, reef, portion, industry, transportation, carbon, sulfur, nitrogen, urban, automobile, ketone, serious, problem, transform, technology, regulate, pesticide, percent, planet, bacteria.

Task 3. Read and translate the text.

ECOLOGICAL PROBLEMS (Part 2)

The ozone layer, a thin band in the stratosphere (layer of the upper atmosphere), serves to shield the Earth from the Sun's harmful ultraviolet rays. In the 1970s scientists discovered that chlorofluorocarbons (CFCs) – chemicals used in refrigeration, air-conditioning systems, cleaning solvents, and aerosol sprays – destroy the ozone layer. CFCs release chlorine into the atmosphere; chlorine, in turn, breaks down ozone molecules. Because chlorine is not affected by its interaction with ozone, each chlorine molecule has the ability to destroy a large amount of ozone for an extended period of time.

The consequences of continued depletion of the ozone layer would be dramatic. Increased ultraviolet radiation would lead to a growing number of skin cancers and cataracts and also reduce the ability of the immune systems to respond to infection. Additionally, the growth of the world's oceanic plankton, the base of most marine food chains, would decline. Plankton contains the photosynthetic organisms that break down carbon dioxide. If plankton populations decline, it may lead to increased carbon dioxide levels in the atmosphere and thus to the global warming.

Recent studies suggest that the global warming, in turn, may increase the amount of the ozone destroyed. Even if the manufacture of CFCs is immediately banned, the chlorine already released into the atmosphere will continue to destroy the ozone layer for many decades. In 1987 an international pact called the Montreal Protocol

on Substances that Deplete the Ozone Layer set specific targets for all nations to achieve in order to reduce the emissions of the chemicals responsible for the destruction of the ozone layer. Many people had hoped that this treaty would cause the ozone loss to peak and begin to decline by the year 2000. In fact, in the fall of 2000 the hole in the ozone layer over Antarctica was the largest ever recorded.

The hole the following year was slightly smaller, leading some to believe that the depletion of the ozone had stabilized. Even if the most stringent prohibitions against CFCs are implemented, however, scientists expect that it will take at least 50 more years for the hole over Antarctica to close completely. Plant and animal species are dying out at an unprecedented rate. Estimates range that from 4,000 to as many as 50,000 species per year become extinct.

The leading cause of the extinction is a habitat destruction, particularly of the world's richest ecosystems – tropical rain forests and coral reefs. If the world's rain forests continue to be cut down at the current rate, they may completely disappear by the year 2030. In addition, if the world's population continues to grow at its present rate and puts even more pressure on these habitats, they might well be destroyed sooner.

A significant portion of industry and transportation burns fossil fuels such as gasoline. When these fuels burn, chemicals and particulate matter are released into the atmosphere. Although a vast number of substances contribute to air pollution, the most common air pollutants contain carbon, sulfur, and nitrogen. These chemicals interact with one another and with ultraviolet radiation in the sunlight in dangerous ways.

Smog, usually found in urban areas with large numbers of automobiles, forms when nitrogen oxides react with hydrocarbons in the air to produce aldehydes and ketones. Smog can cause serious health problems. Acid rain forms when sulfur dioxide and nitrous oxide transform into sulfuric acid and nitric acid in the atmosphere and come back to the Earth in precipitation. Acid rain has made numerous lakes so acidic that they no longer support fish populations.

Acid rain is also responsible for the decline of many forest ecosystems worldwide, including Germany's Black Forest and forests throughout the eastern United States. Estimates suggest that nearly 1,5 billion people worldwide lack safe drinking water and that at least 5 million deaths per year can be attributed to waterborne diseases.

Water pollution may come from the point sources or non point sources. The point sources discharge pollutants from the specific locations such as factories, sewage treatment plants, and oil tankers. The technology exists to monitor and regulate the point sources of pollution, although in some areas this occurs only sporadically.

Pollution from the non point sources occurs when a rainfall or snowmelt moves over and through the ground. As the runoff moves, it picks up and carries away pollutants such as pesticides and fertilizers, depositing the pollutants into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water. Pollution arising from the non point sources accounts for a majority of the contaminants in streams and lakes.

With almost 80 percent of the planet covered by oceans, people have long acted as if those bodies of water could serve as a limitless dumping ground for wastes. However, sewage, garbage, and oil spills have begun to overwhelm the diluting capabilities of the oceans, and most coastal waters are now polluted, threatening marine wildlife. Beaches around the world close regularly, often because the surrounding waters contain high levels of bacteria from sewage disposal.

Task 4. Remember the pronunciation and translation of the following words and word combinations:

to shield - захищати
solvent - розчинник
to destroy - руйнувати
extended - тривалий
consequence - наслідок, результат
depletion - виснаження, вичерпання, спустошення

to decline - зменшуватися, йти на спад
to increase [ˈɪŋkriːs] - збільшувати
substance - речовина
target - мета
to reduce - зменшувати, скорочувати
treaty - угода, договір
stringent [ˈstrɪndʒ(ə)nt] - строгий, обов'язковий, точний
prohibition [ˌprəʊhɪˈbɪʃ(ə)n] - заборона
to implement - виконати, здійснити
unprecedented [ʌnˈpresɪdentɪd] - беспрецедентний
estimate - прогноз, оцінка, припущення
release - випускати
precipitation - випадання опадів
waterborne - водний
sewage - *біол.* стічні води, каналізація
sporadically - час від часу
snowmelt - сніготанення
fertilizer - удобрение
contaminants - забруднюючі речовини
spill - викид
to overwhelm - *тут* завдавати непоправної шкоди

Vocabulary exercises

Task 5. Suggest the English for:

вимирання, каналізація, прогноз, угода, забруднюючі речовини, випускати, захищати, виснаження, заборона, місце існування, тривалий, строгий, виконати, здійснити, водний, розчинник, безпрецедентний, час від часу, випадання опадів, добриво, руйнувати, сніготанення, викид, корисні копалини, зменшувати, завдавати непоправної шкоди.

Task 6. Give Ukrainian equivalents to the following:

ozone layer, sunlight, to overwhelm, sporadically, drinking water, international pact, oil tankers, consequence, specific target, health problem, snowmelt, contaminant, to destroy, ultraviolet radiation, air-conditioning system, waterborne disease, fertilizer, sewage disposal, air pollution, aerosol sprays, stringent prohibitions, wildlife, coral reef.

Task 7. Arrange the following in pairs of antonyms:

thin, to destroy, poor, minority, health, to decrease, extended to appear, useful, to continue, point, cooling, thick, harmful, small, to build, to increase, short, warming, to stop, large, rich, to disappear, non point, disease, majority.

Task 8. Suggest synonyms to the words given below:

treaty, location, pact, spill, aim, sporadically, pollutant, to spill, shortage, garbage, to reduce, place, car, atmosphere, target, to release, forbiddance, periodically, prohibition, air, contaminant, to decline, automobile, emission, lack, litter.

Task 9. Find in the text the words which mean the following:

1. occurring at irregular intervals; having no pattern or order in time;
2. a hydrocarbon deposit such as petroleum, coal or natural gas derived from the accumulated remains of ancient plants and animals;
3. the area or environment where an organism or ecological community normally lives or occurs;
4. a self-propelled passenger vehicle that usually has four wheels and an internal-combustion engine used for land transport;
5. a pathological condition of a part, organ or system of an organism resulting from various causes such as infection, genetic defect or environmental stress, and characterized by an identifiable group of signs or symptoms;

6. to set free, to free, to discharge, to drop;
7. a substance in which another substance is dissolved forming a solution.

Task 10. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. to destroy	a) речовина
2. fertilizer	b) виконати, здійснити
3. to decline	c) вимирання
4. sewage	d) випадання опадів
5. precipitation	e) мета
6. emission	f) руйнувати
7. consequence	g) угода, договір
8. extinct	h) стічні води
9. substance	i) наслідок
10. treaty	j) викид, вихлоп
11. target	k) зменшуватися
12. to increase	l) добриво
13. to implement	m) збільшувати

Comprehension check

Task 11. Answer the questions:

1. What does the ozone layer serve to?
2. What did scientists discover in the 1970s?
3. What would increased ultraviolet radiation lead to?
4. When did an international pact called the Montreal Protocol on Substances that Deplete the Ozone Layer set specific targets for all nations?
5. How much time will it take for the hole over Antarctica to close completely?
6. What is the leading cause of plant and animals' extinction?
7. What can cause serious health problems?
8. How does the acid rain form?

Task 12. Agree or disagree with the statements using the following expressions:

Agreement	**Disagreement**
That's true.	That's wrong.
Exactly….	I don't agree with you.

1. The ozone layer, a thick band in the stratosphere (layer of the upper atmosphere), serves to shield the Earth from the Suns useful ultraviolet rays.
2. Because chlorine is affected by its interaction with ozone, each chlorine molecule has the ability to destroy a large amount of ozone for an extended period of time.
3. Additionally, the growth of the world's oceanic plankton, the base of most marine food chains, would decline.
4. Recent studies suggest that the global warming may decrease the amount of the ozone destroyed.
5. In 1947 an international pact called the Montreal Protocol on Substances that Deplete the Ozone Layer set specific targets for all nations to achieve in order to reduce the emissions of the chemicals responsible for the destruction of the ozone layer.
6. If the world's rain forests continue to be cut down at the current rate, they may completely disappear by the year 2050.
7. Smog can cause serious health problems.
8. Acid rain has made numerous lakes so acidic that they no longer support fish populations. Pollution arising from the non point sources accounts for a majority of the contaminants in streams and lakes.

Task 13. Translate the following sentences into Ukrainian. Pay attention to the italic words:

1. In the 1970s scientists discovered that chlorofluorocarbons (CFCs) – chemicals used in refrigeration, air-conditioning systems, *cleaning solvents*, and *aerosol sprays* – destroy the *ozone layer*.

2. The *consequences* of continued *depletion* of the ozone layer would be dramatic.
3. If plankton populations *decline*, it may lead to increased carbon dioxide levels in the atmosphere and thus to *the global warming.*
4. Many people had hoped that this *treaty* would cause the ozone loss to peak and begin to decline by the year 2000.
5. *Estimates* range that from 4,000 to as many as 50,000 species per year become *extinct.*
6. A significant portion of industry and transportation burns *fossil fuels* such as gasoline.
7. Although a vast number of substances contribute to *air pollution*, the most common air pollutants contain carbon, sulfur, and nitrogen.
8. The technology exists to monitor and regulate the point sources of pollution, although in some areas this occurs only *sporadically*.
9. As the runoff moves, it picks up and carries away pollutants such as pesticides and *fertilizers* depositing the pollutants into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water.
10. However, *sewage*, garbage, and *oil spills* have begun *to overwhelm* the diluting capabilities of the oceans and most coastal waters are now polluted threatening marine wildlife.

Task 14. Find the following numbers in the text. What do they refer to? Make a sentence about each number.

2030; 2000; 5; 1970; 1,5; 50; 50,000; 80; 1987; 4,000.

Task 15. Make the word search. Find 11 words that are taken from the text:

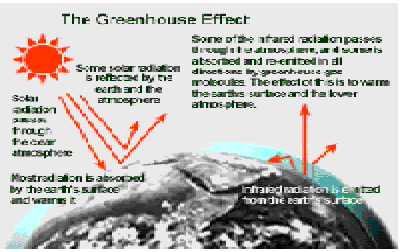
T	**E**	**X**	**T**	**I**	**N**	**C**	**T**	**A**	**T**	**I**	**O**	**N**
A	**P**	**R**	**E**	**C**	**I**	**P**	**I**	**T**	**A**	**H**	**A**	**B**
R	**A**	**F**	**E**	**M**	**I**	**S**	**S**	**I**	**F**	**E**	**E**	**I**
G	**C**	**E**	**O**	**C**	**E**	**A**	**N**	**O**	**U**	**S**	**T**	**T**
E	**I**	**R**	**S**	**P**	**I**	**L**	**L**	**N**	**E**	**T**	**A**	**A**
T	**D**	**T**	**I**	**L**	**I**	**Z**	**E**	**R**	**L**	**I**	**M**	**T**

(See answer key)

Reading activities

Task 16. Read, make the plan to the text. Write 8 questions to the text (general, special, alternative).

GREENHOUSE EFFECT



The term greenhouse is used in conjunction with the phenomenon known as the greenhouse effect*:*

- Energy from the sun drives the earth's weather and climate, and heats the earth' surface;
- In turn, the earth radiates energy back into space;
- Some atmospheric gases (water vapor, carbon dioxide, and other gases) trap some of the outgoing energy retaining heat somewhat like the glass panels of a greenhouse;
- These gases are therefore known as greenhouse gases;
- The greenhouse effect is the rise in temperature on the Earth as certain gases in the atmosphere trap energy.

Six main greenhouse gases are carbon dioxide (CO_2), methane (CH_4) (which is 20 times as potent a greenhouse gas as carbon dioxide), and nitrous oxide (N_2O) plus three fluorinated industrial gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6). Water vapor is also considered a greenhouse gas. Many of these greenhouse gases are actually life-enabling, for without them, heat would escape back into space and the Earth's average temperature would be a lot colder. However, if the greenhouse effect becomes stronger, then more heat gets trapped than needed, and the Earth might become less habitable for humans, plants, and animals. Carbon dioxide, though not the most potent of greenhouse gases, is the most significant one. Human activity has caused an imbalance in the natural cycle of the greenhouse effect and related processes.

NASA's Earth Observatory is worth quoting the effect human activity is having on the natural carbon cycle, for example: in addition to the natural fluxes of carbon through the Earth system, anthropogenic (human) activities, particularly fossil fuel burning and deforestation, are also releasing carbon dioxide into the atmosphere. When we mine coal and extract oil from the Earth's crust and then burn these fossil fuels for transportation, heating, cooking, electricity and manufacturing, we are effectively moving carbon more rapidly into the atmosphere than is being removed naturally through the sedimentation of carbon, ultimately causing atmospheric carbon dioxide concentrations to increase. Also by clearing forests to support agriculture we are transferring carbon

from the living biomass into the atmosphere (dry wood is about 50 percent carbon). The result is that humans are adding ever-increasing amounts of extra carbon dioxide into the atmosphere. Because of this, the atmospheric carbon dioxide concentrations are higher today than they have been over the last half-million years or longer.

Vocabulary exercises

Task 17. Read and translate given international words. Name part of speech.

term, phenomenon, effect, climate, to radiate, energy, atmospheric , gas, panel, temperature, atmosphere , natural , cycle , process, million, system, anthropogenic , transportation, electricity, effectively, concentration, biomass, observatory.

Task 18. Give Ukrainian equivalents to the following:

greenhouse effect, heating, deforestation, life-enabling, crust, ever-increasing, to escape, imbalance, vapor, significant, manufacturing, fossil fuel, animal, cooking, coal, space, habitable, oil.

Writing activities

Task 19. Answer the questions:

1. What is the greenhouse effect?
2. What are six main greenhouse gases?
3. What is the most significant one?
4. What has caused an imbalance in the natural cycle of the greenhouse effect and related processes?
5. Why are the atmospheric carbon dioxide concentrations higher today than they have been over the last half-million years or longer?

Task 20. Fill in the missing words:

1. Energy from the sun drives the earth's _____and climate, and heats the earth's_____.
2. Some atmospheric gases (water vapor, carbon dioxide, and other gases) trap some of the outgoing energy retaining _____somewhat like the glass panels of a greenhouse
3. The greenhouse effect is the rise in temperature on the Earth as certain gases in the _____trap energy.
4. If the greenhouse effect becomes stronger, then more heat gets trapped than needed, and the Earth might become less _____for humans, plants, and animals.
5. NASA's Earth Observatory is worth quoting the effect human activity is having on the natural carbon cycle, for example: in addition to the natural fluxes of carbon through the Earth system, anthropogenic (human) activities, particularly _____ _____burning and deforestation, are also releasing carbon dioxide into the atmosphere.
6. By clearing _____to support agriculture we are transferring carbon from the living biomass into the atmosphere.

Task 21. Find the words given below:

Greenhouse Gases

Anthropogenic
Carbon Dioxide
Chlorofluorocabons
Hydrofluorocarbons
Methane
Nitrous Oxide
Ozone
Perfluorocarbons
Sulfur Hexafluoride
Water Vapor

(See answer key)

UNIT 8. WATER POLLUTION

Pre-reading activities

Task 1. Read and translate given international words. Name part of speech.

organism, biological, adequate, problem, global, context, million, typically, natural, phenomena, volcanoes, storm, ecological, status, specific, spectrum, chemical, pathogen, physical, temperature, calcium, sodium, iron, manganese, concentration, material, toxic, ecosystem, organic, inorganic, chloroform, herbicide, hydrocarbon, industrial, phosphate, commercial, residential, metal, motor, individual.

Task 2. Give Ukrainian equivalents in the right-hand column to the words in the left-hands column.

1. volatile	a) зривати, розривати
2. acute	b) добриво
3. leaf	c) озеро
4. insecticide	d) послабляти, погіршувати
5. combustion	e) електропровідність
6. fertilizer	f) питна вода
7. subsequent	g) леткий
8. to impair	h) зміна
9. to discharge	i) інсектицид
10. to disrupt	j) стікати, витікати
11. conductivity	k) гострий
12. to undergo	l) горіння
13. drinking water	m) подальший
14. lake	n) лист
15. change	o) випробовувати, піддаватися

Task 3. Name 3 different items belonging to:

1. chemicals
2. inorganic water pollutants
3. bodies of water
4. organic water pollutants
5. natural phenomena
6. specific contaminants

Reading activities

Task 4. Read and translate the text

WATER POLLUTION

Water pollution is the contamination of water bodies such as lakes, rivers, oceans, and groundwater. All water pollution affects organisms and plants that live in these bodies of water and in almost all cases the effect is damaging either to individual species and populations but also to the natural biological communities. It occurs when pollutants are discharged directly or indirectly into the water bodies without adequate treatment to remove harmful constituents.

Water pollution is a major problem in the global context. It has been suggested that it is the leading worldwide cause of deaths and diseases, and that it accounts for the deaths of more than 14,000 people daily. Some 90% of China's cities suffer from some degree of water pollution, and nearly 500 million people lack access to safe drinking water. In addition to the acute problems of water pollution in the developing countries, industrialized countries continue to struggle with the pollution problems as well. Water is typically referred to as polluted when it is impaired by anthropogenic contaminants and either does not support a human use, like serving

as drinking water, and/or undergoes a marked shift in its ability to support its constituent biotic communities, such as fish. Natural phenomena such as volcanoes, algae blooms, storms, and earthquakes also cause major changes in water quality and the ecological status of water.

The specific contaminants leading to pollution in water include a wide spectrum of chemicals, pathogens, and physical or sensory changes such as elevated temperature and discoloration. While many of the chemicals and substances that are regulated may be naturally occurring (calcium, sodium, iron, manganese, etc.) the concentration is often the key in determining what is a natural component of water, and what is a contaminant. Oxygen-depleting substances may be natural materials such as plant matter (leaves and grass) as well as man-made chemicals. Other natural and anthropogenic substances may cause turbidity (cloudiness) which blocks light and disrupts plant growth.

Many of the chemical substances are toxic. Pathogens can produce waterborne diseases in either human or animal hosts. Alteration of water's physical chemistry includes acidity (change in pH), electrical conductivity, temperature, and eutrophication. Eutrophication is an increase in the concentration of chemical nutrients in an ecosystem to an extent that increases in the primary productivity of the ecosystem.

Contaminants may include organic and inorganic substances. Organic water pollutants include: detergents, disinfection by-products found in chemically disinfected drinking water such as chloroform, food processing waste which can include oxygen-demanding substances, fats and grease, insecticides and herbicides, a huge range of chemical compounds, petroleum hydrocarbons, including fuels (gasoline, diesel fuel, jet fuels, and fuel oil) and lubricants (motor oil), and fuel combustion byproducts, from stormwater runoff, tree and bush debris from logging operations, volatile organic compounds such as industrial solvents from improper storage. Inorganic water pollutants include: acidity caused by industrial discharges (especially sulfur dioxide from power plants), ammonia from food processing waste, chemical waste as industrial by-products, fertilizers containing nutrients-nitrates and

phosphates which are found in stormwater runoff from agriculture as well as commercial and residential use, heavy metals from motor vehicles and acid mine drainage.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

contamination - забруднення
damage - ушкодження, збиток
species - *біол.* вид, рід
pollutant - забрудник
discharge - викид
to discharge - стікати, витікати
treatment - лікування
harmful - шкідливий
disease - хвороба
acute - гострий
to impair - послабляти, погіршувати, псувати
to undergo - випробовувати, піддаватися
algae - морські водорості
earthquake - землетрус
discoloration - знебварвлення
turbidity - каламутність
to disrupt - зривати, розривати
alteration - зміна
conductivity - *фіз.* електропровідність
eutrophication - евтрофікація
subsequent - подальший
reduction - зменшення, скорочення
insecticide - засіб від комах, інсектицид
combustion - горіння, *хім.* окислення
volatile - *хім.* леткий

Task 6. Suggest the English for:

хімічна речовина, шкідливий, землетрус, хвороба, вид, збиток, бензин, паливо, забруднення, горіння, добриво, подальший, хімічна речовина, морські водорості, засіб від комах, зміна, виробничі викиди, знебварвлення, послабляти, погіршувати, псувати, зменшення, електропровідність, зберігання, питна вода, каламутність, підземні води, випробовувати, рослина, океан, смерть, підвищення.

Task 7. Give Ukrainian equivalents to the following:

discoloration, heavy metals, contaminant, fuel, animal hosts, pollution, motor vehicles, substance, groundwater, harmful, death, in addition, to struggle, leaves and grass, food waste, man-made chemicals, to disrupt, stormwater, plant growth, disease, alteration, to increase, drinking water, fat, chemical compounds, motor oil, fertilizer, to contain, agriculture, commercial and residential use, lack, acid mine drainage.

Task 8. Give the corresponding nouns:

to treat, to pollute, to produce, to suggest, to discolorate, to disinfect, to operate, to alter, to concentrate.

Task 9. Match the following words and expressions with their definitions:

1. pollution
2. ocean
3. species
4. disease
5. animal
6. fuel
7. to include

a) an abnormal condition of the body or mind that causes discomfort or dysfunction;
b) combustible matter used to maintain fire, as coal, wood, oil, or gas, in order to create heat or power;
c) any such living thing other than a human being;
d) to contain as a subordinate element, involve as a factor;
e) the introduction of harmful substances or products into the environment;
f) a group of plants or animals having similar appearance;
g) the vast body of salt water that covers almost three fourths of the earth's surface.

Task 10. Express the following in one word:

1. the measured amount of heat in a place or in the body;
2. a change, usually a slight change, in the appearance, character or structure of something;
3. material with particular physical characteristics;
4. a clear liquid, without colour or taste, which falls from the sky as rain and is necessary for animal and plant life;
5. a sudden violent movement of the Earth's surface, sometimes causing great damage;
6. an animal which lives in water, is covered with scales, and which breathes by taking water in through its mouth, or the flesh of these animals eaten as food.

Comprehension check

Task 11. Answer the questions:

1. What is water pollution?
2. Does water pollution affect organisms and plants or woods and fields?
3. Do natural phenomena such as volcanoes, algae blooms, storms, and earthquakes cause major changes in water quality and the ecological status of water?

4. What do the specific contaminants leading to pollution in water include?
5. What substances may cause turbidity which blocks light and disrupts the plant growth?
6. What is eutrophication?
7. What substances may include contaminants?
8. What fuel is the organic water pollutant?
9. Are acidity, ammonia, chemical waste, fertilizers, heavy metals organic or inorganic water pollutants?

Task 12. Agree or disagree with the statements using given clichés:

Agreement	**Disagreement**
Yes, I agree entirely here.	Perhaps. But don't you think…
That's exactly what I think.	I couldn't agree more.

1. Water pollution is the contamination of water bodies such as lakes, rivers, oceans, and groundwater.
2. All water pollution affects organisms and plants that live in these bodies of water and in almost all cases the effect is damaging either to individual species and populations but also to the natural biological communities.
3. Water pollution is not a major problem in the global context.
4. Some 60% of China's cities suffer from some degree of water pollution, and nearly 800 million people lack access to safe drinking water.
5. Natural phenomena such as volcanoes, algae blooms, storms, and earthquakes do not cause major changes in water quality and the ecological status of water.
6. The specific contaminants leading to pollution in water include a wide spectrum of chemicals, pathogens, and physical or sensory changes such as elevated temperature and discoloration.

7. Other natural and anthropogenic substances may cause turbidity (cloudiness) which blocks light and disrupts the plant growth.
8. Many of the chemical substances are not toxic.
9. Eutrophication is a decrease in the concentration of chemical nutrients in an ecosystem to an extent that increases in the primary productivity of the ecosystem.
10. Organic water pollutants include acidity caused by industrial discharges, ammonia from food processing waste, chemical waste, fertilizers containing nutrients – nitrates and phosphates.
11. Inorganic water pollutants include detergents, disinfection by-products found in chemically disinfected drinking water, food processing waste, fats and grease, insecticides and herbicides, a huge range of organohalides and other chemical compounds, petroleum hydrocarbons, including fuels and lubricants.

Writing activities

Task 13. Make up sentences:

1. Water pollution is
2. Pathogens can
3. Oxygen-depleting substances may be
4. Eutrophication is
5. Some 90% of China's cities
6. Inorganic water pollutants include:
7. Contaminants may include
8. The water contaminants include

a) an increase in the concentration of chemical nutrients in an ecosystem to an extent that increases in the primary productivity of the ecosystem.
b) suffer from some degree of water pollution, and nearly 500 million people lack access to safe drinking water.

c) organic and inorganic substances.
d) the contamination of water bodies such as lakes, rivers, oceans, and groundwater.
e) produce waterborne diseases in either human or animal hosts.
f) a wide spectrum of chemicals, pathogens, and physical or sensory changes such as elevated temperature and discoloration.
g) natural materials such as plant matter (leaves and grass) as well as man-made chemicals.
h) acidity caused by industrial discharges, ammonia, chemical waste, fertilizers, and heavy metals.

Task 14. Fill in the missing words:

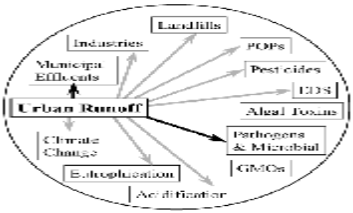
1. All water _____ affects organisms and plants that live in the bodies of water and in almost all cases the effect is damaging either to individual _____and populations but also to the natural biological _____.
2. It occurs when _____are discharged directly or indirectly into water bodies without adequate _____to remove harmful constituents.
3. It has been suggested that it is the leading worldwide cause of _____ and _____, and that it accounts for the _____ of more than 14,000 people daily.
4. In addition to the acute problems of water pollution in the _____ countries, industrialized countries continue to struggle with pollution problems as well.
5. Natural _____ such as volcanoes, _____, storms, and _____also cause major changes in water quality and the ecological status of water.
6. While many of the chemicals and substances that are regulated may be naturally occurring (calcium, sodium, iron, manganese, etc.) the _____is often the key in determining what is a natural component of water, and what is a contaminant.
7. Pathogens can produce waterborne _____in either human or animal hosts.

8. _____ of water's physical chemistry includes acidity (change in pH), electrical conductivity, temperature, and eutrophication.
9. Organic water pollutants include: detergents, disinfection by-products found in chemically disinfected drinking water such as chloroform, food processing _____, which can include oxygen-demanding substances, _____ and grease, insecticides and herbicides, a huge range of chemical compounds, petroleum hydrocarbons, including _____ (gasoline, diesel fuel, jet fuels, and fuel oil) and lubricants (motor oil), and fuel combustion by-products, from stormwater runoff, tree and bush debris from logging operations, volatile organic compounds, such as industrial _____, from improper storage.
10. Inorganic water pollutants include: acidity caused by industrial _____(especially sulfur dioxide from power plants), ammonia from food processing waste, chemical waste as industrial by-products, _____containing nutrients – nitrates and phosphates which are found in stormwater runoff from agriculture as well as commercial and residential use, heavy metals from motor _____and acid mine drainage.

Reading activities

Task 15. Read, make the plan of the text.

URBAN RUNOFF



During rain storms and other precipitation events the surfaces (built from materials such as asphalt, cement, and concrete) along

with rooftops carry polluted stormwater to storm drains, instead of allowing the water to percolate through soil. This causes lowering of the water table (because groundwater recharge is lessened) and flooding since the amount of water that remains on the surface is greater. Most municipal storm sewer systems discharge stormwater, untreated, to streams, rivers and bays.

Water running off these impervious surfaces tends to pick up gasoline, motor oil, heavy metals, trash, and other pollutants from roadways and parking lots as well as fertilizers and pesticides from lawns. Roads and parking lots are major sources of polycyclic aromatic hydrocarbons, which are created as combustion by-products of gasoline and other fossil fuels as well as of the heavy metals nickel, copper, zinc, cadmium, and lead. Roof runoff contributes high levels of synthetic organic compounds and zinc. Fertilizer use on residental lawns, parks and golf courses is a significant source of nitrates and phosphorus. As stormwater is channeled into storm drains and surface waters, the natural sediment load discharged to receiving waters decreases, but the water flow and velocity increases.

In fact, the impervious cover in a typical city creates five times the runoff of a typical woodland of the same size. When the area is urbanized, urban runoff then creates an unnatural year-round flow that hurts the vegetation, wildlife and riverbed of the waterway. Containing little or no sediment, urban runoff rushes down stream channels and creates severe erosion – increasing sediment loads at the mouth while severely incising the streambed upstream.

Vocabulary exercises

Task 16. Suggest the English for:

поверхня, важливий, річка, сталь, підвищуватися, рослинність, потік води, важкі метали, каналізаційна система, водостік, добриво, грунт, атмосферні опади, мідь.

Task 17. Give Ukrainian equivalents to the following:

to discharge, impervious, gasoline, motor oil, heavy, pollutant, trash, pesticide, source, combustion, organic compound, roadway, nickel, velocity.

Writing activities

Task 18. Fill in the missing words:

1. During rain storms and other precipitation events the surfaces along with rooftops carry polluted stormwater to storm _____, instead of allowing the water to percolate through _____.
2. Most municipal storm _____ _____ discharge stormwater, untreated, to streams, rivers and bays.
3. Water running off the impervious surfaces tends to pick up gasoline, motor oil, heavy metals, _____, and other _____ from roadways and parking lots as well as fertilizers and pesticides from lawns.
4. Roof runoff contributes high levels of synthetic organic _____ and zinc.
5. As stormwater is channeled into storm drains and surface waters, the natural _____load discharged to receiving waters decreases, but the water flow and _____ increases.
6. In fact, the impervious cover in a typical city creates five times the runoff of a typical _____ of the same size.

Task 19. Write 6 questions to the text (general, special, alternative).

MODULE C
UNIT 9. UKRAINE: POLLUTION

Pre-reading activities

Task 1. Read and translate the given international words. Name the part of speech.

material, energy, activity, product, industrial, republic, Europe, metallurgical, coke-chemical, sulphur dioxide, chronic, pollution, problem, atmosphere, automobile, transport, catalytic, serious, territory artery, fatal, risk, herbicide, pesticide, biologically, commercially, productive, municipal, ecological, dramatic, resolution, radioactive, isotope, caesium, iodine, strontium, plutonium, accident, radiation, maximum, spontaneous, abortion, defect, leukemia, medical, professional, production, region, laboratory.

Task 2. Make up sentences with the following words:

contamination
endowment
shallow
diversion
inflow
warning
isotope
caesium
iodine
host
occupancy

Task 3. Match the following words and expressions with their definitions:

1. to aggravate	to express a legal statement, etc. in a serious or official way;
2. to attain	dry dirt in the form of powder that covers surfaces inside a building, or very small dry pieces of soil, sand or other substances;
3. shallow	to make a bad situation worse;
4. to exceed	someone or something that supplies information;
5. dust	having only a short distance from the top to the bottom;
6. source	to be greater than a number or amount, or to go past an allowed limit;
7. to claim	to reach or succeed in getting something, to achieve.

Reading activities

Task 4. Read and translate the text

UKRAINE: POLLUTION

Pollution is the contamination of the environment, including air, water, and land with undesirable amounts of material or energy. Such contamination originates from human activities that create waste products. An industrial and intensively farmed republic, Ukraine contains some of the most polluted landscapes in Eastern

Europe. Pollution became evident in Ukraine with the industrial development in the 19th century.

Air pollution is especially severe in many of the heavily industrialized cities and towns of southeastern Ukraine, notably in Kharkiv, Luhansk, Donetsk, Dnipropetrovsk, and Zaporizhia. Coal-using industries, such as metallurgical coke-chemical plants, steel mills, and thermal power plants are major sources of high levels of uncontrolled emissions of sulphur dioxide, dust, unburned hydrocarbons, and other harmful substances. Other Ukrainian cities with major chronic air pollution problems include Kyiv, Alchevsk, Makiivka, and Odessa.

Over one-third of the emissions into the atmosphere originate from the automobile transport. That source, which attains overwhelming proportions in the cities with little industry, such as Uzhhorod; Yalta, Poltava, and Khmelnytskyi, is aggravated by the use of leaded gasoline and inefficient engines as well as a lack of catalytic converters.

Almost all surface waters of Ukraine belong to the Black Sea and the Sea of Azov basins. The high population density, heavy industrial development, and relatively low freshwater endowment of those basins, and the low governmental priority placed upon the environmental protection until very recently, have given rise to chronic and serious levels of water pollution throughout Ukraine. The Dniester and the Danube are included to the most polluted bodies of water in the territory of the former Soviet Union. Hundreds of small rivers supply water for three-quarters of the villages and half of Ukraine's cities. Widespread fear is growing in Ukraine that a substantial fraction of those water arteries are so polluted as to pose fatal health risks to the people who depend on them. About one-half of the chemical fertilizers, herbicides, and pesticides, applied in the fields are washed off into the rivers. Moreover, the surface runoff from industrial territories is highly contaminated.

One of the areas suffering most from the serious and chronic coastal water pollution is the Sea of Azov. That shallow and previously biologically rich and commercially productive body of water has experienced serious problems of the industrial and

municipal wastewater contamination and increased the levels of salinity since the early 1970s. A primary cause of the sea's ecological deterioration has been the diversion for purposes of irrigation (up to 80 percent) of fresh, but not necessarily pure, water inflow from the Don and the Kuban rivers. As a result the sea's salinity has increased by more than 40 percent since the 1950s. Despite repeated warnings and special government antipollution resolutions, the conditions in the Sea of Azov continue to deteriorate.

Contamination by various radioactive isotopes, such as caesium-137, iodine-131, strontium-90, plutonium-239, and plutonium-240, from the Chornobyl nuclear accident have affected the air, land, and water of Ukraine and the vast areas beyond it. Recorded but unreported radiation levels in Kyiv a few days after the accident exceeded the maximum allowable levels by a hundredfold. Press reports claim that the significant numbers of deaths by radiation sickness and elevated levels of spontaneous abortions, stillbirths, and birth defects and highly elevated rates of childhood leukemia have occurred in the affected areas. Those claims and other concerns are being researched by a host of scientists and medical professionals from Ukraine and other countries. Recent detailed field studies indicate that the significant areas of the agricultural and forest lands of Ukraine, Belarus, and Russia will remain unsafe for human occupancy and food production for upwards of eight thousand years. Nevertheless, thousands of people who were evacuated after the accident have returned to live and farm in these highly contaminated regions. Thus, the Chornobyl region, in fact, has become something of a living laboratory for the study of nuclear contamination.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

waste - зайвий, непотрібний
notably - особливо
coke - кокс
thermal power plant - теплоелектростанція

source - джерело
emission - виділення, розповсюдження
sulphur dioxide - двоокис сірки
dust - пил
hydrocarbon - вуглеводень
to attain - досягати
overwhelming - переважаючий
to aggravate - погіршувати
leaded gasoline - освинцьований бензин
inefficient engine - поганий двигун
converter - трансформатор
endowment - забезпечення
protection - охорона
body - *тут* басейн
fraction - частина
to pose - створювати
herbicide - гербіцид
pesticide - пестіцид
runoff - змив
shallow - мілкий
salinity - солоність
deterioration - погіршення
diversion - відхилення
inflow - прилив
warning - застереження
isotope - ізотоп
caesium - цезій
iodine - йод
strontium - стронцій
to exceed - перевищувати
to claim - стверджувати
elevated - підвищений
stillbirth - народження мертвого плоду
leukemia - лейкемія
host - велика кількість
occupancy - заселення
upwards of - понад

Task 6. Suggest the English for:

створювати, підвищений, вуглеводень, джерело, теплоелектростанція, мілкий, погіршення, відхилення, застереження, ізотоп, погіршувати, трансформатор, забруднення, освинцьований бензин, двоокис сірки, лейкемія, стверджувати, стронцій, цезій, велика кількість, заселення, понад, народження мертвого плоду, пестіцид, змив, прилив, солоність, охорона, забезпечення, частина, досягати, переважаючий, поганий двигун, зайвий, непотрібний, особливо, виділення, розповсюдження, пил, перевищувати.

Task 7. Give Ukrainian equivalents to the following:

evident, steel mills, living laboratory, contamination of the environment, air, coke-chemical plants, water, land, thermal power plants, uncontrolled emissions, harmful substances, leaded gasoline, nuclear accident, a lack of catalytic converters, dust, freshwater endowment, biologically rich, chemical fertilizers, deterioration, fatal health risk, high population density, widespread, overwhelming, diversion, stillbirth, radioactive isotope, surface water, municipal wastewater, salinity.

Task 8. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. notably	a) зайвий, непотрібний
2. leaded gasoline	b) змив
3 fraction	c) особливо
4. runoff	d) переважаючий
5. emission	e) теплоелектростанція
6. waste	f) охорона
7. to pose	g) кокс
8. coke	h) двоокис сірки

9. thermal power plant	i) виділення, розповсюдження
10. protection	j) частина
11. sulphur dioxide	k) створювати
12. overwhelming	l) освинцьований бензин

Comprehension check

Task 9. Answer the questions:

1. What is pollution?
2. When did pollution become evident in Ukraine?
3. In what cities and towns is air pollution especially severe?
4. What are the major sources of uncontrolled emissions of sulphur dioxide, dust, unburned hydrocarbons, and other harmful substances?
5. What are the most polluted bodies of water in the territory of the former Soviet Union?
6. What is a primary cause of the sea's ecological deterioration?
7. What can you say about the Chornobyl nuclear accident?
8. What do recent detailed field studies indicate?

Task 10. Work in pairs. Read the statements and agree or disagree with them:

1. An industrial and intensively farmed republic, Ukraine contains some of the least polluted landscapes in Eastern Europe.
2. Air pollution is especially severe in many of the heavily industrialized cities and towns of southeastern Ukraine, notably in Kharkiv, Luhansk, Donetsk, Dnipropetrovsk, and Zaporizhia.
3. Other Ukrainian cities with major chronic air pollution problems include Uzhhorod, Yalta, Poltava.
4. Almost all surface waters of Ukraine belong to the Black Sea and the Sea of Azov basins.

5. Widespread fear is growing in Ukraine that a substantial fraction of those water arteries are so polluted as to pose fatal health risks to the people who depend on them.
6. One of the areas suffering most from the serious and chronic coastal water pollution is the Black Sea.
7. A primary cause of the sea's ecological deterioration has been the diversion for purposes of irrigation (up to 30 percent) of fresh, but not necessarily pure, water inflow from the Don and the Kuban rivers.
8. Contamination by various radioactive isotopes, such as caesium-137, iodine-131, strontium-90, plutonium-239, and plutonium-240, from the Chornobyl nuclear accident have affected the air, land, and water of Ukraine and the vast areas beyond it.
9. The claims and other concerns are being researched by a host of scientists and medical professionals from Russia and other countries.
10. Thousands of people who were evacuated after the accident have returned to live and farm in these highly contaminated regions.

Task 11. Make up sentences:

1. Widespread fear is
2. About one-half of the chemical fertilizers are
3. Such contamination originates
4. The emissions into the atmosphere originate
5. Ukraine contains
6. Pollution is
7. The conditions in the Sea of Azov continue

a) some of the most polluted landscapes in Eastern Europe.
b) to deteriorate.
c) the contamination of the environment
d) growing in Ukraine.
e) washed off into rivers.
f) from human activities

g) from automobile transport.

Task 12. Fill in the missing words:

1. Coal-using industries, such as metallurgical coke-chemical plants, _____ _____, and thermal power plants, are major sources of high levels of uncontrolled _____of sulphur dioxide, dust, unburned hydrocarbons, and other harmful substances.
2. That source, which attains overwhelming proportions in the cities with little industry, such as Uzhhorod; Yalta, Poltava, and Khmelnytskyi, is aggravated by the use of _____ _____and inefficient engines as well as a lack of catalytic_____.
3. The Dniester and the Danube are included to the most polluted _____of water in the territory of the former Soviet Union.
4. About one-half of the chemical_____, herbicides, and pesticides, applied in the fields are washed off into_____.
5. That shallow and previously biologically rich and commercially productive body of water has experienced serious problems of the industrial and municipal _____ _____and increased the levels of salinity since the early 1970s.
6. As a result the sea's _____has increased by more than 40 percent since the 1950s.
7. Despite repeated _____and special government antipollution resolutions, the conditions in the Sea of Azov continue_____.
8. Recent detailed field studies indicate that the significant areas of agricultural and forest lands of Ukraine, Belarus, and Russia will remain unsafe for human _____and food production for upwards of eight thousand years.
9. Press reports claim that the significant numbers of deaths by radiation sickness and elevated levels of spontaneous abortions, _____, and birth defects and highly elevated

rates of childhood leukemia have occurred in the affected areas.

Writing activities

Task 13. Find out how well you recycle, reduce, and re-use at home. Read and answer yes or no all 15 questions:

1. If you take more food than you can eat, do you throw the leftovers in the trash?
2. Do you use paper cups and plates for cookouts or picnics?
3. Do you bring lunch to school in a paper or plastic bag and throw the bag away every day?
4. Do you throw away aluminum cans or plastic bottles?
5. Do you use just one side of your writing paper?
6. If you make a mistake when writing or drawing, do you throw away your piece of paper and get a new one?
7. Do you throw away clothes you've outgrown?
8. When you see papers on the floor or ground do you leave them there?
9. Do you buy lots of books and magazines instead of using the library?
10. Do you ask for or take a bag when buying small things like candy or gum?
11. Do you buy juice or chips in single serving packages?
12. Do you use paper towels for drying your hands or cleaning up spills?
13. Do you leave the light on in your room when you're not there?

14. Do you use a clean sheet of paper to make paper airplanes?
15. Do you throw away broken crayons?

(See answer key)

Task 14. Find the following numbers in the text. What do they refer to? Make a sentence about each number.

137, 131, 90, 239, 240; 19; 40; 1950; 80; 1970; 60-90.

Task 15. Make the word search. Find 8 words that are taken from the text:

H	**Y**	**D**	**R**	**O**	**C**	**A**	**R**	**B**
H	**O**	**S**	**T**	**B**	**O**	**D**	**Y**	**O**
F	**R**	**A**	**C**	**T**	**I**	**O**	**N**	**N**
P	**R**	**U**	**N**	**O**	**F**	**F**	**Y**	**G**
R	**S**	**A**	**L**	**I**	**N**	**I**	**T**	**N**
O	**T**	**E**	**C**	**T**	**I**	**O**	**N**	**I**
O	**V**	**E**	**R**	**W**	**H**	**E**	**L**	**M**

(See answer key)

UNIT 10. WASTE

Pre-reading activities

Task 1. Make up sentences with the following words:

hazardous
residue
mulch
agricultural waste
reduction
landfill site
disposal method

Task 2. Read and translate the given international words. Name the part of speech.

process, social, hospital, atmosphere, municipal, plastic, sort, global, electricity, commercial, industrial, clinical, management, bacteria, park, chemical, collection, organic, methane, geological, ton, method, to utilize, molecule, product, material, gas, energy, natural, metal, economic, production.

Task 3. Translate the following sentences into Ukrainian. Pay attention to the words in *italic*:

1. They're studying various ways to *recycle* garbage into fuel.
2. These are *hazardous* chemicals that can cause death if
3. inhaled.
4. The factory has been accused of discharging *effluent*
5. into the river.
6. We only use organic *fertilizer* in our gardens.
7. A furniture *plant* is a factory that employs hundreds of people.

Task 4. Read and translate the text

WASTE

The social and economic development of a country can cause an increase in pressures on its environment and increases the need for a reduction in environmentally damaging activities. Some of these damaging activities involve the production and disposal of waste. Waste is generated by all sorts of means. Most waste comes from the domestic and municipal consumption of goods, manufacturing, construction, sewage, agriculture and the generation and disposal of hazardous substances. Waste includes paper, plastics, glass, metals, foods, chemicals, oils, bricks, wood, soil, and effluent.

The more waste we generate, the more we have to dispose of. Some methods of waste disposal release air pollutants and greenhouse gases into the atmosphere. Waste recycling offers one means of reducing the impacts of waste disposal on the atmosphere, but there are other methods of waste disposal which are more environmentally friendly.

The most common disposal methods, particularly in the UK, are landfill and to a lesser extent incineration. Each year approximately 111 million tons of controlled waste (household, commercial and industrial waste) are disposed of in landfill sites in the UK. Some waste from sewage sludge is also placed in landfill sites, along with waste from mining and quarrying. There are over 4000 landfill sites in the UK. As landfill waste decomposes, methane is released in considerable quantities. Currently it is

estimated that over 1.5 million tons of methane are released by landfill sites in the UK each year. Methane is a strong greenhouse gas and contributes to the global warming. Furthermore, the leachate fluids formed from decomposing waste can permeate through the underlying and surrounding geological strata, polluting groundwater which may be used for the drinking water supplies. Incineration is the second largest waste disposal method in most countries. In the UK, approximately 5% of household waste, 7.5% of commercial waste, and 2% of industrial waste is disposed of by incineration. When burning waste, a large amount of energy, carbon dioxide and other potentially hazardous air pollutants is given off. Modern incinerators however, can use this waste energy to generate electricity and hence prevent the energy from being wasted. Incineration plants range from large scale, municipal waste incinerators to smaller clinical waste incinerators used in hospitals. During the 1990s many UK hospital incinerators were forced to close owing to tougher emissions legislation introduced by the 1990 Environmental Protection Act. Today, hospitals tend to share one large incinerator to dispose of the wastes for a number of hospitals.

A less common but more sustainable method of waste disposal is anaerobic digestion. In this process waste decomposes in an enclosed chamber, unlike in a landfill site. Digestion takes place in an oxygen-free environment. Bacteria thrive in this environment by using the oxygen that is chemically combined within the waste. They decompose waste by breaking down the molecules to form gaseous by-products (methane) and small quantities of solid residue.

Anaerobic sewage plants produce significant quantities of methane, which can be burnt to generate electricity. Liquid and solid organic fertilizers are also formed, and can be sold to cover operating costs. For several years, sewage sludge and agricultural waste has been treated by anaerobic digestion, and the process is now being used for municipal solid waste. It requires the biodegradable section of the waste to be separated from other material and put into digestion chambers. Currently, the UK has only a small number of plants, and each can handle only a few hundred tons of waste each year. However, the usage of anaerobic digestion as a sustainable waste disposal method is forecast to

increase. Many other countries already utilize anaerobic digestion to dispose of large amounts of waste. Denmark for example, treats 1.1 million tons of waste by anaerobic digestion every year.

As well as recycling waste, individuals can adopt more sustainable ways of disposing it. One way is to compost any organic waste such as food and garden waste. Organic waste breaks down over a few weeks into mulch which can be used as a soil fertilizer. Individual households have practiced small-scale composting for many years, and the UK Government is now encouraging this on a wider scale.

Task 5. Remember the pronunciation and translation of the following words and word ccombinations:

disposal - знищення, утилізація
recycling - повторне використання
sewage [ˈs(j)uːɪdʒ] - стічні води
sewage sludge - осад стічних вод
hazardous - небезпечний
effluent - стік, рідкі промислові відходи
landfill - закапування сміття
landfill site - звалище сміття
to a lesser extent - в меншій мірі
incineration [ɪnˌsɪnəˈreɪʃ(ə)n] - згорання
quarrying - здобич породи
leachate - стічні води, вода, що просочується в грунт із звалища
to permeate [ˈpɜːmɪeɪt] - проникати, проходити крізь, просочувати
anaerobic digestion - анаеробна обробка, анаеробне розкладання
residue [ˈrezɪdjuː] - залишок, речовина
biodegradable - розкладаний мікроорганізмами
mulch - перегній

Task 6. Suggest the English for:

розкладаний мікроорганізмами, утилізація, здобич породи, рідкі промислові відходи, перегній, осад стічних вод, звалище сміття, залишок, повторне використання, стічні води, небезпечний, проникати, анаеробне розкладання, згорання, закапування сміття, в меншій мірі.

Task 7. Give Ukrainian equivalents to the following:

greenhouse gas, disposal method, hazardous substance, solid, quarrying, anaerobic digestion, geological strata, air pollutant, incinerator, emission, global warming, mining, sewage sludge, solid residue, chamber, to generate electricity, organic waste, mulch, soil fertilizer, liquid, plant, recycling.

Task 8. Arrange the following in pairs of antonyms:

solid, large, wide, to dispose, less, domestic, to decrease, more, small, to increase, municipal, liquid, to utilize, narrow.

Task 9. Suggest synonyms to the words given below:

sewage
waste
to produce
interpenetrate
burning
hazardous

Task 10. Match the following words with their definitions:

1. to permeate	to inspire with courage, spirit, or hope;
2. plant	to spread or diffuse through;
3. to recycle	involving or exposing one to risk;

4. significant	a substance (as manure or a chemical mixture) used to make soil more fertile;
5. to encourage	a factory or workshop for the manufacture of a particular product;
6. hazardous	to reuse or make;
7. fertilizer	considerable.

Task 11. Find in the text the words which mean the following:

1. the process in sewage treatment by which organic matter in sludge is decomposed by anaerobic bacteria with the release of a burnable mixture of gases;
2. a system of trash and garbage disposal in which the waste is buried between layers of earth to build up low-lying land;
3. damaged, defective, or superfluous material;
4. a protective covering (as of sawdust, compost, or paper) spread or left on the ground to reduce evaporation, maintain even soil temperature, prevent erosion, control weeds, enrich the soil, or keep fruit (as strawberries) clean;
5. the force of impression of one thing on another: a significant or major effect;
6. something that remains after a part is taken, separated, or designated or after the completion of a process;
7. the business, occupation, or act of extracting useful material (as building stone) quarrying
8. waste material (as smoke, liquid industrial refuse, or sewage) discharged into the environment especially when serving as a pollutant.

Task 12. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. recycling	a) знищення, утилізація
2. biodegradable	b) стічні води
3. quarrying	c) звалище сміття
4. anaerobic digestion	d) залишок
5. disposal	e) в меншій мірі

6. sewage	f) анаеробна обробка
7. residue	g) розкладаний мікроорганізмами
8. to a lesser extent	h) повторне використання
9. landfill site	i) здобич породи

Comprehension check

Task 13. Answer the questions:

1. What can cause an increase in pressures on the environment and increases the need for a reduction in environmentally damaging activities?
2. Where does most waste come from?
3. What does waste include?
4. What do some methods of waste disposal release into the atmosphere?
5. What are the most common disposal methods?
6. How many landfill sites are there in the UK?
7. What is incineration?
8. What is anaerobic digestion?
9. What country treats 1.1 million tons of waste by anaerobic digestion every year?

Task 14. Agree or disagree with the statements:

1. The more waste we generate, the more we have to dispose of.
2. The most common disposal method, particularly in the UK, is anaerobic digestion
3. Each year approximately 111 million tons of controlled waste (household, commercial and industrial waste) are disposed of in landfill sites in the UK.
4. Currently it is estimated that over 2.5 million tons of methane are released by landfill sites in the UK each year.
5. Incineration is the third largest waste disposal method in most countries.
6. Modern incinerators can use the waste energy to generate electricity and hence prevent the energy from being wasted.

7. Anaerobic sewage plants produce significant quantities of methane, which can be burnt to generate electricity.
8. The usage of anaerobic digestion as a sustainable waste disposal method is forecast to decrease.
9. Organic waste breaks down over a few years into mulch which can be used as a soil fertilizer.

Task 15. Read and translate into Ukrainian:

HERE'S HOW YOU CAN HELP
THE ENVIRONMENT BY REDUCING WASTE:

1. Take small portions of food and go back for «seconds» if you are still hungry. Put leftover food in reusable storage containers to eat later.
2. Buy or make up your own "picnic basket" that includes reusable cups, plates, and silverware. Look for these items at garage sales.
3. Buy a lunch box. Get your friends to use lunch boxes too. Pack your food in reusable containers instead of waxed paper, sandwich bags, or aluminum foil.

4. Collect and recycle aluminum cans and plastic bottles. Recycling one aluminum can saves enough energy to keep a light bulb lit for 12 hours!
5. Use both sides of a piece of paper when writing letters or doing homework. If you only need to use one side, save the paper in a reuse box for future use. Make your paper last twice as long.
6. Use a pencil and erase any mistakes. If you need a perfect copy, practice on one of the papers from your reuse box and then copy it over.

7. Save your old clothes for a garage sale or give them to a charity. If they are ripped or torn and cannot be repaired, then use them for cleaning rags (cut off and save the buttons first).
8. Waste is everybody's problem and responsibility. Do your part by picking it up and disposing of it properly, perhaps even recycle it?
9. Get a library card and use it. Books and magazines can be used many times by the whole community instead of just once by you.

10. After you buy a small item, take it home in your pocket. You do not really need a bag. If your items are too large for your pocket, then bring a reusable shopping bag.
11. Buy in bulk or buy larger packages and put the amount you need in reusable containers. Buying in bulk is usually cheaper than buying individually wrapped servings and requires less packaging.
12. Use a hand towel for drying your hands and dish cloth or sponge for wiping up spills. They can be cleaned and used again instead of being used once and thrown away.
13. Save energy by turning off lights, radios and stereos when you're not using them.

14. Make your paper airplanes with a piece of paper from your reuse box and save the clean sheet of paper for writing.
15. Save broken crayons in a can for future coloring or art projects. Buy a crayon sharpener to make points on round edges.

Task 16. Find the following numbers in the text. What do they refer to? Make a sentence about each number.

111, 1.1, 2, 4000, 1.5, 5, 7.5, 1990.

Task 17. Read, make the plan to the text.

WASTE RECYCLING

The definition of recycling is to pass a substance through a system that enables that substance to be reused. Waste recycling involves the collection of waste materials and the separation and clean-up of those materials. Recycling waste means that fewer new products and consumables need to be produced, saving raw materials and reducing energy consumption.

In the UK, the household and commercial sectors have relatively low recycling rates. This is in comparison with some other wastes, such as construction and demolition waste and sewage sludge. The Government is hoping to increase the amount of household waste that we recycle to 33% by 2015. Some of the materials that we can recycle include paper, plastics, metals (such as aluminium cans) and tyres.

The paper industry generates vast quantities of waste in the form of paper off-cuttings and damaged paper rolls. This paper can be put back into the pulping process and recycled. Paper recycling in the UK became popular during the 1990s. Nearly a million tons of paper from household waste is now recycled each year. Although paper makes up over one third of all household waste recycled, this is still no more than about 10% of the total paper consumed. In contrast, over 50% of paper waste paper produced by the newspaper industry is currently being recycled. To encourage the public to recycle waste paper, many councils have arranged house to house collection schemes. Separate bins and containers are provided specifically for paper. They are collected at regular intervals and

taken to be recycled. Other recycling depots for paper can be found at municipal centres and supermarkets.

Approximately 6 to 8% of the UK household waste comprises of glass jars and bottles. However, the largest producers of waste glass bottles are hotels and pubs, as the vast majority of drinks are bottled. A large proportion of glass is collected in bottle banks and taken to be recycled. There are over 20,000 bottle banks in the UK, and they are mainly found in car parks and at supermarkets. There are usually three bottle banks, one for each colour of glass: clear, green and brown. The UK currently recycles about one third of its glass. This is far behind glass recycling rates in other European countries. Switzerland and the Netherlands for example have recycling rates as high as 80%.

Plastics make up a large amount of waste, since they are available in numerous forms. There are two main types of plastic: thermoplastics, which are the most common; and thermosetts. Thermoplastics melt when heated and can therefore be remoulded. This enables thermoplastics to be recycled relatively easily. In Western Europe the largest amounts of plastic occur in the form of packaging. Plastic waste tends to be sorted by hand, either at a materials recycling facility or the householder can separate it. This may then be taken to a plastic recycling point or collected by the council. The UK produces approximately about 4.5 million tons of plastic waste each year. Most of this waste arises from packaging. The UK has a plastics recycling rate of only 3%. In Germany the recycling rate for plastic is 70%.

The UK has a recycling rate of approximately 60% for iron and steel. Most of this waste comes from scrap vehicles, cooker, fridges and other kitchen appliances. It is estimated that the metal content of household waste is between 5 and 10%. It is mainly made up of aluminium drinks cans and tin-plated steel food cans. Aluminium recycling is widely established in the UK. It is an expensive metal and can therefore produce high incomes for recycling schemes. Copper, zinc and lead are also recycled in the UK. At present, over a third of aluminium drinks cans are recycled. Some other countries have very high recycling figures for

aluminium drinks cans. The USA and Australia for example, recycle nearly two thirds.

Every year in the UK between 25 and 30 million scrap tyres are generated. Approximately 21% of these tyres are retreaded and reused. The old tread is ground off the tyre and replaced with a new tread. However, about half of all used tyres are dumped in landfill sites throughout the country. Other tyres may be incinerated.

Vocabulary exercises

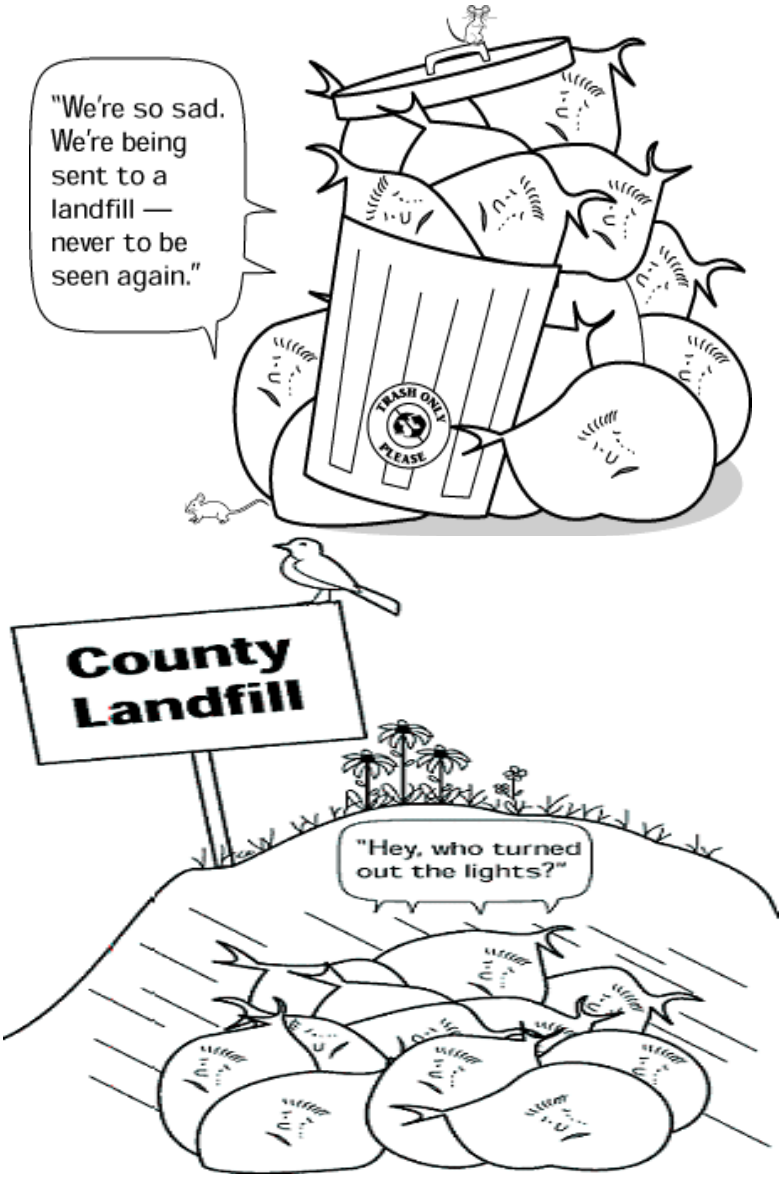
Task 18. Read and translate the given international words. Name the part of speech.

System, collection, material, product, energy, commercial, sector, construction, plastic, metal, aluminium, industry, form, process, public, scheme, container, interval, municipal, centre, supermarket, type, thermoplastic, million.

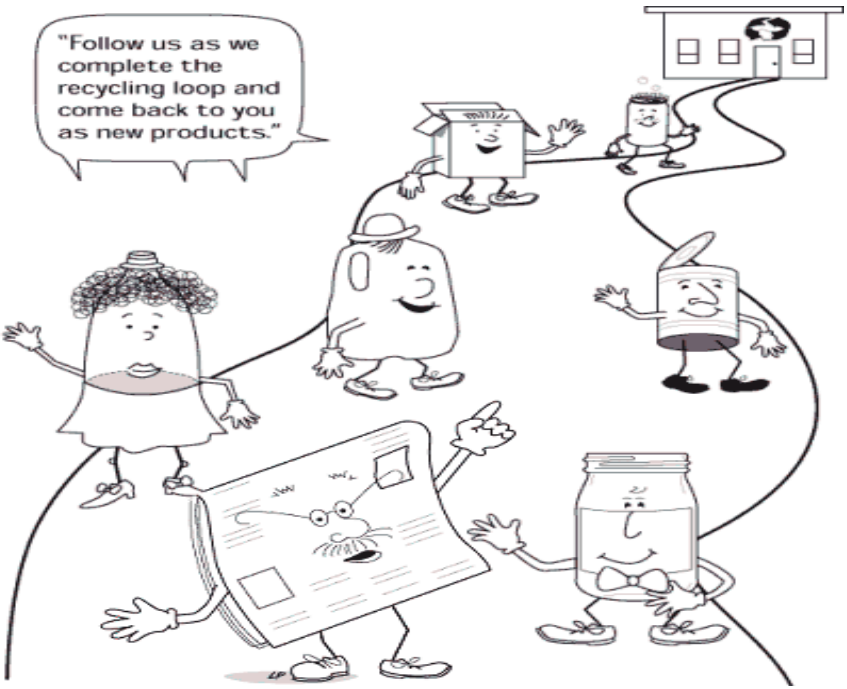
Task 19. Give Ukrainian equivalents to the following:

substance, sewage sludge, to encourage, kitchen appliances, tyre, copper, demolition waste, municipal centre, numerous forms, aluminium can, paper, approximately, in comparison, plastic, vast majority, lead, landfill site, fridge, energy, iron, consumption, expensive metal, raw material, glass jars, cooker, household waste, newspaper, steel.

Task 20. Look at the pictures and make up a short story:




"We're so happy. We're going to be made into something new."
RECYCLE


"Follow us as we complete the recycling loop and come back to you as new products."

Writing activities

Task 21. Complete the following sentences:

1. Of, that, we, tyres, recycle, paper, some, include, can, plastics, the, metals, materials, and.
2. The, put, paper, can, be, back, into, and, the, pulping, recycled, process.
3. Specifically, bins, and, separate, for, containers, provided, are, paper.
4. Recycles, UK, currently, one, about, the, its, third, of, glass.

5. Rates, Switzerland, as, and, 80%, Netherlands, have, the, recycling, high, as.
6. Of, packaging, the, waste, arise, most, from.
7. Most, cooker, of, waste, this, comes, scrap, vehicles, from, fridges.
8. Zinc, copper, are, the, recycled, and, lead, in, UK, also.
9. These, reused, approximately, are, 21%, tyres, of, retreaded, and.

Task 22. Fill in the missing words:

1. Waste _____involves the collection of waste materials and the separation and clean-up of those materials.
2. The Government is hoping _____the amount of household waste that we recycle to 33% by 2015.
3. _____the public to recycle waste paper, many councils have arranged house to house collection schemes.
4. Approximately 6 to 8% of the UK household waste comprises of _____ _____and bottles.
5. There are two main types of plastic:_____, which are the most common; and thermosetts.
6. Plastic waste tends to be sorted by hand, either at a materials recycling facility or the householder can _____it.
7. _____recycling is widely established in the UK.
8. Every year in the UK between 25 and 30 million scrap _____ are generated.
9. About half of all used tyres are dumped in _____ _____throughout the country.

UNIT 11. OZONE DEPLETION

Pre-reading activities

Task 1. Read and translate the given international words. Name the part of speech.

ozone, result, chemical, reaction, respiratory, problem, atmosphere, region, stratosphere, radiation, ultraviolet, concentration, variation, energy, volcanic, continent, global, protocol, international, cataract, microscopic, rice, soya, polymer, global, climate, control, individuals

Task 2. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. cancer	a) викид, вихлоп
2. extinguisher	b) в результаті
3. foam	c) щит, захист
4. populous	d) поправка
5. crop	e) вогнегасник
6. disease	f) сільськогосподарська культура
7. shield	g) поролон
8. emission	h) таким чином
9. amendment	i) хвороба
10. consequently	j) рак
11. thereby	k) людний, густонаселений

Task 3. Answer the questions:

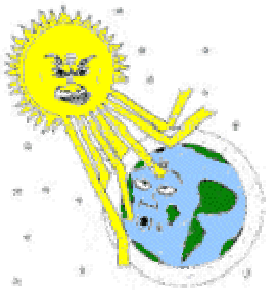
1. What does ozone do good or harm?
2. What may cause a significant destruction of ozone in the stratosphere?
3. When was the evidence of a large «ozone hole» discovered above the continent of Antarctica?

4. When was the Montreal Protocol on Substances that Deplete the Ozone Layer implemented?
5. What can cause a variety of health problems in humans, including skin cancers, eye cataracts and a reduction in the body's immunity to disease?
6. What may affect the global climate?
7. What can we do to protect the ozone layer?

Reading activities

Task 4. Read and translate the text

OZONE DEPLETION



Ozone is both beneficial and harmful to us. Near the ground, ozone forming as a result of chemical reactions involving traffic pollution and sunlight may cause a number of respiratory problems, particularly for young children. However, high up in the atmosphere in a region known as the stratosphere, ozone filters out incoming radiation from the Sun in the cell-damaging ultraviolet (UV) part of the spectrum. Without this ozone layer, life on the Earth would not have evolved in the way it has. Concentrations of ozone in the stratosphere fluctuate naturally in response to variations in weather conditions and amounts of energy being released from the Sun, and to major volcanic eruptions. Nevertheless, during the 1970s it was realized that the man-made emissions of CFCs and other chemicals used in refrigeration, aerosols and cleansing agents may cause a significant destruction of ozone in the stratosphere, thereby letting

through more of the harmful ultraviolet radiation. Then in 1985 evidence of a large «ozone hole» was discovered above the continent of Antarctica during the springtime. This has reappeared annually, generally growing larger and deeper each year. More recently, fears have emerged about the significant ozone depletion over the Arctic, closer to the more populous regions of the Northern Hemisphere.

In response to this and additional fears about more widespread global ozone depletion, the Montreal Protocol on Substances that Deplete the Ozone Layer was implemented in 1987. This international treaty called for participating the developed nations to reduce the use of CFCs and other ozone depleting substances. In 1990 and again in 1992, subsequent Amendments to the Protocol brought forward the phase out date for CFCs for the developed countries to 1995.

Protecting the ozone layer is essential. Ultraviolet radiation from the Sun can cause a variety of health problems in humans, including skin cancers, eye cataracts and a reduction in the body's immunity to disease. Furthermore, ultraviolet radiation can be damaging to the microscopic life in the surface oceans which forms the basis of the world's marine food chain, certain varieties of crops including rice and soya, and polymers used in paints and clothing. A loss of ozone in the stratosphere may even affect the global climate.

The international agreements and other legislation have gone a long way to safeguarding this life-supporting shield. Nevertheless, to have a real and long-lasting success, everyone must become part of the solution. Individual efforts taken together can be powerful forces for environmental change. There are a number of things that we, as individuals, can do to protect the ozone layer. These include proper disposal of the old refrigerators, the use of halon-free fire extinguishers and the recycling of foam and other non-disposable packaging. Finally, we should all be aware that whilst the emissions of ozone depleters are now being controlled, the ozone layer is not likely to fully repair itself for several decades. Consequently, we should take precautions when exposing ourselves to the Sun.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

depletion [dɪˈpliːʃ(ə)n] - руйнування
beneficial - корисний
to fluctuate [ˈflʌktʃʊeɪt] - змінюватися, колебаться
eruption - виверження
thereby - таким чином
populous - людний, густонаселений
to reduce - зменшувати
amendment - поправка
essential - обов'язковий
cancer - рак
crop - сільськогосподарська культура
to safeguard - охороняти, захищати
shield - щит, захист
extinguisher - вогнегасник
foam - піна, поролон
consequently - в результаті
precaution - обережність, застереження

Vocabulary exercises

Task 6. Suggest the English for:

emission, skin cancer, beneficial, precaution, consequently, long-lasting success, widespread, traffic pollution, life-supporting shield, cell-damaging ultraviolet, disease, ozone depletion, environmental change, international agreement, fire extinguisher, to fluctuate, health problem, volcanic eruption, chemical reaction.

Task 7. Give Ukrainian equivalents to the following:

виверження, сільськогосподарська культура, поролон, рак, руйнування, поправка, таким чином, людний, викид, зменшувати, обов'язковий, отже, колебаться, захищати, вогнегасник, обережність, шкідливий, хвороба, щит, корисний.

Task 8. Arrange the following words in pairs of synonyms:

to safeguard, crowded, all-important, crop, treaty, populous, to protect, shield, agreement, essential, safeguard, harvest.

Task 9. Match the following words and expressions with their definitions:

1. depletion	to shift back and forth uncertainly;
2. populous	to diminish in size, amount, extent, or number;
3. to fluctuate	to make safe;
4. to safeguard	good, helpful;
5. eruption	densely populated;
6. to reduce	the act of decreasing something markedly;
7. beneficial	explosion;
8. precaution	a measure taken beforehand to prevent harm.

Comprehension check

Task 10. Agree or disagree with the statements:

1. Near the ground, ozone forming as a result of chemical reactions involving traffic pollution and sunlight may cause a number of respiratory problems, particularly for adults.
2. Concentrations of ozone in the stratosphere fluctuate naturally in response to variations in weather conditions and amounts of energy being released from the Sun, and to major volcanic eruptions.
3. During the 1930s it was realized that man-made emissions of CFCs and other chemicals used in refrigeration, aerosols and cleansing agents may cause a significant destruction of ozone in the stratosphere, thereby letting through more of the harmful ultraviolet radiation.

4. Fears have emerged about significant ozone depletion over the USA, closer to the more populous regions of the Northern Hemisphere.
5. In 1990 and again in 1992, subsequent Amendments to the Protocol brought forward the phase out date for CFCs for the developed countries to 1998.
6. Ultraviolet radiation can be damaging to microscopic life in the surface oceans which forms the basis of the world's marine food chain, certain varieties of crops including rice, and polymers used in paints and clothing.
7. To protect the ozone layer we can do a number of things including proper disposal of old refrigerators, the use of halon-free fire extinguishers.

Task 11. Translate the following sentences into Ukrainian. Pay attention to the words in *italic*:

1. Such activities as logging and mining *deplete* our natural resources.
2. The ozone *depletion* potential of a chemical compound is the relative amount of degradation to the *ozone layer* it can cause.
3. The medicine *reduces* the risk of infection.
4. The *eruption* of the volcano Krakatoa was one of the most violent in the global history.
5. *Emission* is determined by kinetic temperature and emissivity.
6. In accordance with a *treaty* between the United States and the tribes of the Pacific Northwest, commercial fishing of certain kinds of salmon is limited to Native Americans.
7. They sprayed the *crops* with a pesticide.
8. The *fire extinguisher* is filled with *foam*.

Task 12. Fill in the missing words:

1. Concentrations of ozone in the stratosphere _____naturally in response to variations in weather conditions and amounts of energy being released from the Sun, and to major volcanic eruptions.

2. High up in the atmosphere in a region known as the stratosphere, ozone filters out incoming radiation from the Sun in the _____ultraviolet (UV) part of the spectrum.
3. In 1985 evidence of a large _____ _____was discovered above the continent of Antarctica during the springtime.
4. This international _____called for participating the developed nations to reduce the use of CFCs and other ozone depleting substances.
5. Ultraviolet radiation from the Sun can cause a variety of health problems in humans, including skin _____, eye cataracts and a reduction in the body's immunity to_____.
6. Ultraviolet radiation can be damaging to the microscopic life in the surface oceans which forms the basis of the world's marine food chain, certain varieties of _____including rice and soya, and polymers used in paints and clothing.
7. International _____and other legislation have gone a long way to safeguarding this life-supporting_____.
8. Individual efforts taken together can be powerful forces for _____ change.
9. There are a number of things that we, as individuals, can do _____ the ozone layer.
10. We should take _____when exposing ourselves to the Sun.

Task 13. Make the word search. Find 9 words that are taken from the text:

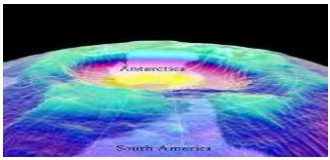
H	**D**	**C**	**R**	**O**	**P**
A	**I**	**C**	**A**	**N**	**D**
R	**S**	**C**	**E**	**R**	**L**
M	**E**	**A**	**S**	**E**	**E**
F	**U**	**L**	**S**	**H**	**I**

(See answer key)

Reading activities

Task 14. Read, make the plan to the text.

OZONE HOLE



Ozone depletion occurs when the natural balance between the production and destruction of stratospheric ozone is tipped in favour of destruction. Although natural phenomena can cause temporary ozone losses, chlorine and bromine released from the man-made synthetic compounds such as CFCs are now accepted as the main cause of this depletion.

A common misconception is that there is an ozone hole above us in the sky which is letting in harmful ultraviolet (UV) radiation from the Sun. Ozone depletion, in fact, is occurring all over the world due to man-made pollution, at levels within the stratosphere, 19 to 30 km above the Earth's surface. However, in certain parts of

the world, ozone depletion is particularly severe, and it is in the regions where the term "ozone hole" strictly applies.

Every September and October during the Southern Hemisphere springtime, significant ozone destruction is observed in the stratosphere above Antarctica, with losses of up to 60%. The levels of ozone are measured in Dobson Units (D.U.). The average amount of stratospheric ozone throughout the world is about 300 D.U. Ozone concentrations over Antarctica during the period of the greatest depletion usually fall well below 200 D.U. When ozone concentrations are plotted on a map, the presence of a large ozone hole over the continent is striking.

The formation of the ozone hole over Antarctica is a consequence of the special atmospheric conditions which occur there, in particularly the very low stratospheric temperatures (below -80°C), the isolated wind patterns and the presence of continuous sunlight after the September equinox. Every summer (December to January) the hole repairs itself when stratospheric temperatures rise and the air above Antarctica mixes with the rest of the world's atmosphere. This cycle of ozone hole formation and reparation is repeated every year. The ozone hole over Antarctica has been forming every year since the early 1970s. In recent years the hole has become both larger and deeper, in the sense that more and more ozone is being destroyed.

Every March to April during the Northern Hemisphere springtime similar, but less pronounced ozone hole is formed above the Arctic. The natural circulation of wind - the polar vortex - which isolates Antarctica from the rest of the world during the Southern Hemisphere winter and early spring, contributing to the ozone loss there, is much less developed in the Northern Hemisphere above the Arctic. In addition, stratospheric temperatures there are not as low as in the Antarctic, and consequently the loss of ozone is not as severe. However, the formation of even a moderate ozone hole above the Arctic region can give cause for considerable concern due to the greater populations in the higher latitudes of the Northern Hemisphere.

Vocabulary exercises

Task 15. Find the following numbers in the text. What do they refer to? Make a sentence about each number.

80, 300 , 30 , 200, 19, 1970.

Task 16. Give Ukrainian equivalents to the following:

natural balance, destruction, temporary ozone loss, synthetic compounds, harmful ultraviolet radiation, the Earth's surface, consequence, atmospheric condition, sunlight, cycle, natural circulation of wind, considerable concern.

Writing activities

Task 17. Make up sentences with the following words:

ozone depletion
hole
pollution
world
temperature
to repair
population

Task 18. Write 8 questions to the text (general, special, alternative).

UNIT 12. SOIL CONTAMINATION

Pre-reading activities

Task 1. Give Ukrainian equivalents to the following:

pollution, alteration, environment, rupture, fuel, percolation, surface, solvent, heavy metal, degree of industrialization, soil contamination, health risk, legal framework, developing countries, next generation, the major concern, direct contact, inhalation, health consequences, vulnerability, carcinogenic, hazardous to young children, kidney damage, skin rash, liver toxicity, neuromuscular blockage, headache, eye irritation, chronic exposure.

Task 2. Read and translate the given international words. Name the part of speech.

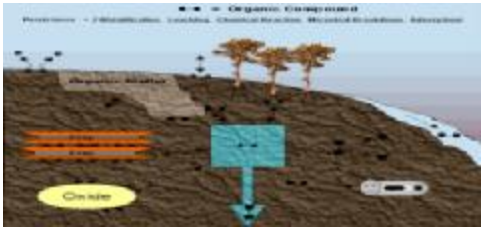
chemical, natural, type, typically, pesticide, industrial, metal, phenomenon, industrialization, risk, contact, computer, model, legal, problem, iceberg, administration, kilometer, economically, park, mechanism, herbicide, nervous, system, benzene, concentration, leukemia, toxicity, organophosphate, spectrum, effect, dosage.

Task 3. Make up sentences with the following words:

1. contamination
2. soil
3. landfill
4. lead
5. pathway
6. vapor immense
7. inhalation
8. carcinogenic
9. irreversible

Task 4. Read and translate the text

SOIL CONTAMINATION



Soil pollution is caused by the presence of man-made chemicals or other alteration in the natural soil environment. This type of contamination typically arises from the rupture of underground storage tanks, application of pesticides, percolation of contaminated surface water to subsurface strata, oil and fuel dumping, leaching of wastes from landfills or direct discharge of industrial wastes to the soil. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals. This occurrence of this phenomenon is correlated with the degree of industrializations and intensities of chemical usage. The concern over soil contamination stems primarily from health risks, from direct contact with the contaminated soil, vapors from the contaminants, and from secondary contamination of water supplies within and underlying the soil.

It is in North America and Western Europe that the extent of contaminated land is most well known, with many of the countries in these areas having a legal framework to identify and deal with this environmental problem; this, however, may well be just the tip of the iceberg with the developing countries very likely to be the next generation of new soil contamination cases.

The major concern is that there are many sensitive land uses where people are in the direct contact with soils such as residences, parks, schools and playgrounds. Other contact mechanisms include contamination of drinking water or inhalation of soil contaminants

which have vaporized. There is a very large set of health consequences from exposure to soil contamination depending on pollutant type, pathway of attack and vulnerability of the exposed population. Chromium and many of the pesticide and herbicide formulations are carcinogenic to all populations. Lead is especially hazardous to young children, in which group there is a high risk of the developmental damage to the brain and nervous system, while to all populations kidney damage is a risk.

Chronic exposure to benzene at sufficient concentrations is known to be associated with higher incidence of leukemia. Mercury and cyclodienes are known to induce higher incidences of kidney damage, some irreversible. Cyclodienes are linked to liver toxicity. Organophosphates and carbamates can induce a chain of responses leading to neuromuscular blockage. Many chlorinated solvents induce liver changes, kidney changes and depression of the central nervous system. There is an entire spectrum of further health effects such as headache, nausea, fatigue, eye irritation and skin rash for the above cited and other chemicals. At sufficient dosages a large number of soil contaminants cause death.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

soil - земля, грунт
rupture - руйнування
percolation - просочування
dumping - скидання
leaching - вилуговування
lead - свинець
concern - занепокоєння, побоювання
to stem - виникати
vapor - випар
extent - міра
framework - структура
immense - величезний
inhalation - вдихання
pathway - шлях

vulnerability - уразливість
carcinogenic [ˌkɑːsɪnəˈdʒenɪk] - канцерогенний
hazardous - ризикований
benzene - бензол
incidence - частота захворювань
to induce - вызывать
rash - висип
nausea [ˈnɔːzɪə] - нудота
irreversible - безповоротний

Vocabulary exercises

Task 6. Suggest the English for:

забруднення, здоров'я, хімічний, просочування, мозок, механізм, величезний, шлях, вдихання, печінка, безповоротний, земля, міра, частота захворювань, країни, що розвиваються, наслідок, випар, свинець, нудота, важкий метал, структура, головний біль, вилуговування, уразливість, шкіра, канцерогенний, ризикований, роздратування, звалище сміття, виникати, бензол, руйнування, школа, питна вода, грунт, зміна, скидання, висип.

Task 7. Arrange the following in pairs of antonyms:

inhalation, direct, next, irreversible, old, high, presence, light, exhalation, low, health, previous, absence, indirect, heavy, disease, young, reversible.

Task 8. Arrange the following words in pairs of synonyms:

rupture, soil, hazardous, pollution, fatigue, alteration, large, destruction, hazard, to induce, big, dangerous, to produce, risk, earth, contamination, tiredness, change.

Task 9. Find in the text the words which mean the following:

1. the act of polluting, pollution;
2. the upper stratum of the earth; the mold, or that compound substance which furnishes nutriment to plants, or which is particularly adapted to support and nourish them;
3. an eruption or efflorescence on the body;
4. a stomach distress with distaste for food and an urge to vomit;
5. one of the elements, a heavy, pliable, inelastic metal, having a bright, bluish color, but easily tarnished;
6. the organ or seat of intellect; hence, the understanding;
7. a colorless volatile flammable toxic liquid aromatic hydrocarbon C_6H_6 used in organic synthesis, as a solvent, and as a motor fuel;
8. danger, imminence, risk, threat, trouble;
9. to produce or cause;
10. the act of breaking apart, or separating;
11. a substance in the gaseous state as distinguished from the liquid or solid state.

Comprehension check

Task 10. Answer the questions:

1. What is soil pollution caused by?
2. What does the concern over soil contamination stem primarily from?
3. Where is the extent of contaminated land well known most?
4. What formulations are carcinogenic to all populations?
5. What is especially hazardous to young children?
6. What induces liver, kidney changes and depression of the central nervous system?
7. What can cause death?

Task 11. Complete the following sentences

1. Pollution, presence, caused, the, is, of, chemicals soil, by.
2. Petroleum, chemicals, common, pesticides, most, the, are, solvents, lead.
3. Mechanisms, water, include, contact, of, contamination, drinking.
4. Health, there, a, very, is, set, consequences, of, large.
5. Children, especially, is, young, hazardous, lead, to.
6. Toxicity, are, cyclodienes, liver, linked, to.
7. Chlorinated, many, induce, liver, solvents, changes.

Task 12. Define statements: True or False

1. The soil pollution is caused by the presence of man-made chemicals or other alteration in the natural soil environment.
2. The concern over soil contamination stems primarily from health risks.
3. Lead is especially hazardous to adults.
4. Chronic exposure to benzene at sufficient concentrations is known to be associated with higher incidence of liver changes.
5. Many chlorinated solvents induce leukemia, and depression of the central nervous system.
6. At sufficient dosages a large number of soil contaminants cause headache, nausea, fatigue.

Task 13. Make up sentences:

1. The concern over soil contamination stems
2. Other contact mechanisms include
3. The most common chemicals are
4. Chronic exposure to benzene is known
5. Cyclodienes are
6. Chromium is
7. A large number of soil contaminants
8. Mercury and cyclodienes are

a) known to induce higher incidences of kidney damage, some irreversible.
b) carcinogenic to all populations.
c) contamination of drinking water or inhalation of soil contaminants which have vaporized.
d) petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals.
e) to be associated with higher incidence of leukemia.
f) linked to liver toxicity.
g) primarily from health risks
h) cause death.

Reading activities

Task 14. Read, make the plan to the text.

SOIL CONTAMINATION IN THE UNITED STATES OF AMERICA

Until about 1970 there was little widespread awareness of the worldwide scope of soil contamination or its health risks. In fact, the areas of concern were often viewed as unusual or isolated incidents. Since then, the U.S. has established guidelines for handling hazardous waste and the cleanup of soil pollution. In 1980 the U.S. Superfund/CERCLA established strict rules on legal liability for soil contamination. Not only did CERCLA stimulate identification and cleanup of thousands of sites, but it raised awareness of property buyers and sellers to make soil pollution a focal issue of land use and management practices.

While estimates of remaining soil cleanup in the U.S. may exceed 200,000 sites, hundreds of new sites are identified each year, and in other industrialized countries there is a lag of identification and cleanup functions. Even though their use of chemicals is lower than industrialized countries, often their controls and regulatory framework is quite weak. For example, some persistent pesticides that have been banned in the U.S. are in widespread uncontrolled use in the developing countries. It is worth noting that the cost of cleaning up a soil contaminated site can range from as little as about $10,000 for a small spill, which can be simply excavated, to millions of dollars for a widespread event, especially for a chemical that is very mobile such as perchloroethylene.

Writing activities

Task 15. Write Ukrainian equivalents to the following:

widespread awareness, soil contamination, guideline, hazardous waste, focal issue, legal liability, strict rules, isolated incidents, health risks, soil cleanup, industrialized countries, weak, regulatory framework, identification, persistent pesticides.

Task 16. Make up sentences with the following words:

awareness
buyer
industrialized countries
contamination
soil
pesticides
hazardous

Task 17. Find the following numbers in the text. What do they refer to? Make a sentence about each number.

1970, 10,000, 1980, 200,000.

UNIT 13. GLOBAL WARMING

Pre-reading activities

Task 1. Read and translate the given international words. Name the part of speech.

temperature, instrument, atmosphere, period, carbon dioxide, methane, energy, transportation, phenomena, global, gas, atmospheric, concentration, natural, effect, natural, climate, change, period, computer, to demonstrate, real, model, context, ecosystem, social, economic, climatic, stress, region, protocol, international, nation, period, concept, practical, energy, product.

Task 2. Match the following words with their definitions:

1. to enhance	demolition;
2. interference	acting in conjunction;
3. to influence	a goal to be achieved;
4. measurement	something that produces confusion;
5. suitably	to increase or improve in value, quality, desirability, or attractiveness;
6. extinction	to affect or alter by indirect or intangible means;
7. concurrent	matching;
8. target	dimension.

Task 3. Translate the following sentences into Ukrainian. Pay attention to the words in *italic*:

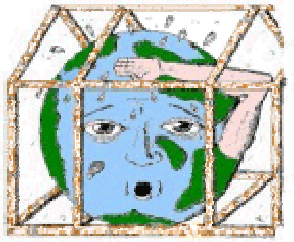
1. The instruments provide accurate *measurement* of atmospheric conditions.
2. Take all these temperatures and find their *average*.
3. There is some *concern* that the economy might worsen.
4. The company is looking to *enhance* its earnings potential.
5. Scientists are concerned about the *rapid* disappearance of the island's coral reefs.

6. Mass *extinctions* of prehistoric animals are known to have occurred.
7. The weather forecast calls for some sort of frozen *precipitation* tomorrow – either snow or sleet.
8. The world's supply of oil is not *inexhaustible*.

Reading activities

Task 4. Read and translate the text

GLOBAL WARMING



Measurements of temperature taken by instruments all over the world, on land and at sea have revealed that during the 20th century the Earth's surface and lowest part of the atmosphere warmed up on average by about 0.6°C. During this period, man-made emissions of greenhouse gases, including carbon dioxide, methane and nitrous oxide have increased, largely as a result of the burning of fossil fuels for energy and transportation, and land use changes including deforestation for agriculture. In the last 20 years, the concern has grown that these two phenomena are, at least in part, associated with each other. That is to say, the global warming is now considered most probably to be due to the increases in greenhouse gas emissions and concurrent increases in atmospheric greenhouse gas concentrations, which have enhanced the Earth's natural greenhouse effect. Whilst other natural causes of climate change can cause the global climate to change over similar periods of time, the computer models demonstrate that in all probability there is a real discernible human influence on the global climate.

If the climate changes as the current computer models have projected, the global average surface temperature could be anywhere from 1.4 to 5.8°C higher by the end of the 21st century than in 1990. To put this temperature change into context, the increase in the global average surface temperature which brought the Earth out of the last major ice age 14,000 years ago was of the order of 4 to 5°C. Such a rapid change in climate will probably be too great to allow many ecosystems to suitably adapt, and the rate of species extinction will most likely increase. In addition to impacts on wildlife and species biodiversity, human agriculture, forestry, water resources and health will all be affected. Such impacts will be related to changes in precipitation (rainfall and snowfall), sea level, and the frequency and intensity of extreme weather events, resulting from the global warming. It is expected that the societies currently experiencing the existing social, economic and climatic stresses will be both worst affected and least able to adapt. These will include many in the developing world, low-lying islands and coastal regions, and the urban poor.

The Framework Convention on Climate Change (1992) and the Kyoto Protocol (1997) represent the first steps taken by the international community to protect the Earth's climate from dangerous man-made interference. Currently, the nations have agreed to reduce greenhouse gas emissions by an average of about 5% from 1990 levels by the period 2008 to 2012. The UK, through its Climate Change Programme, has committed itself to a 12.5% cut in greenhouse gas emissions. The additional commitments for further greenhouse gas emission reduction will need to be negotiated during the early part of the 21st century, if the levels of greenhouse gas concentrations in the atmosphere are to be stabilized at reasonable levels. The existing and future targets can be achieved by embracing the concept of sustainable development – the development today that does not compromise the development needs of future generations. In practical terms, this means using resources, particularly fossil-fuel-derived energy, more efficiently, re-using and recycling products where possible, and the developing renewable forms of energy which are inexhaustible and do not pollute the atmosphere.

Task 5. Remember the pronunciation and translation of the following words and word combinations:

measurement [ˈmeʒəmənt] - вимір
average - середній, в середньому
deforestation - вирубування лісу
concern - занепокоєння, турбота
due to - в зв'язку с
greenhouse gas - парниковый газ
concurrent [kənˈkʌrənt] - співпадаючий, такий, що перетинається, діє одночасно
to enhance - збільшувати, посилювати, покращувати, підвищувати
discernible [dɪˈsɜːnəbl] - видимий, помітний, явний
to influence - впливати
rapid - швидкий
suitably - відповідно
biodiversity - біологічна різноманітність
precipitation - опади
interference [ˌɪntəˈfɪ(ə)rəns] - втручання, перешкода
to negotiate - обговорити умови, влаштовувати, залагоджувати
target - мета
to embrace - включати, містити в собі, охоплювати
sustainable - екологічно раціональний
inexhaustible - невичерпний

Vocabulary exercises

Task 6. Suggest the English for:

невичерпний, мета, в середньому, парниковий газ, екологічно раціональний, вирубування лісу, що діє одночасно, опади, збільшувати, видимий, впливати, швидкий, відповідно, вимирання, біологічна різноманітність, вирубування лісу, вимір, в зв'язку з.

Task 7. Give Ukrainian equivalents to the following:

The earth's surface, man-made emission, greenhouse gas, fossil fuel, deforestation, agriculture, global warming, concurrent increase, natural cause, climate change, similar period of time, discernible human influence, computer model, surface temperature, rapid change ecosystem, species extinction, wildlife, water resource, rainfall, sea level, climatic stress, low-lying islands, coastal regions, international community, dangerous man-made interference, additional commitment, reasonable level, future target, future generations, inexhaustible, to pollute the atmosphere.

Task 8. Express the following in one word:

1. a single value (as a mean, mode, or median) that summarizes or represents the general significance of a set of unequal values;
2. the action or process of clearing of forests;
3. an uneasy state of blended interest, uncertainty, and apprehension;
4. warming of the surface and lower atmosphere of a planet that is caused by conversion of solar radiation into heat in a process involving selective transmission of short wave solar radiation by the atmosphere, its absorption by the planet's surface, and reradiation as infrared which is absorbed and partly reradiated back to the surface by atmospheric gases;
5. marked by a fast rate of motion, activity, succession, or occurrence;
6. the existence of many different kinds of plants and animals in an environment efforts to preserve biodiversity;
7. a deposit on the earth of hail, mist, rain, sleet, or snow;
8. to arrange for or bring about through conference, discussion, and compromise;
9. to take in or include as a part, item, or element of a more inclusive whole.

Task 9. Give Ukrainian equivalents in the right-hand column to the words in the left-hand column.

1. target	a) екологічно раціональний
2. biodiversity	b) опади
3. inexhaustible	c) парниковый газ
4. precipitation	d) мета
5. to embrace	e) співпадаючий, такий, що діє одночасно
6. concurrent	f) невичерпний
7. due to	g) включати, містити в собі, охоплювати
8. concern	h) втручання, перешкода
9. interference	i) в зв'язку з
10. sustainable	j) біологічна різноманітність
11. greenhouse gas	k) занепокоєння, турбота

Comprehension check

Task 10. Answer the questions:

1. When have man-made emissions of greenhouse gases increased?
2. What is the global warming now considered to be?
3. What do the computer models demonstrate?
4. What global average surface temperature could be by the end of the 21st century?
5. Why will the rate of species extinction most likely increase?
6. What impacts will be related to changes in precipitation, sea level, and the frequency and intensity of extreme weather events?
7. How can the existing and future targets be achieved?
8. What country has committed itself to a 12.5% cut in greenhouse gas emissions?

Task 11. Decide whether the following statements are true or false:

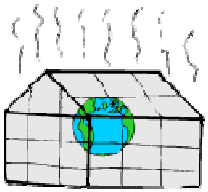
1. Measurements of temperature taken by instruments all over the world, on land and at sea have revealed that during the 20th century the Earth's surface and lowest part of the atmosphere warmed up on average by about 5°C.
2. In the last 50 years, the concern has grown that these two phenomena are, at least in part, associated with each other.
3. Whilst other natural causes of climate change can cause the global climate to change over similar periods of time, the computer models demonstrate that in all probability there is a real discernible human influence on the global climate.
4. If the climate changes as the current computer models have projected, the global average surface temperature could be anywhere from 1.4 to 5.8°C higher by the end of the 21st century than in 1990.
5. A slow change in climate will probably be too great to allow many ecosystems to suitably adapt, and the rate of species extinction will most likely increase.
6. In addition to impacts on wildlife and species biodiversity, human agriculture, forestry, water resources and health will all be affected.
7. The Framework Convention on Climate Change (1997) and the Kyoto Protocol (1999) represent the first steps taken by the international community to protect the Earth's climate from dangerous man-made interference.
8. The UK, through its Climate Change Programme, has committed itself to a 17% cut in greenhouse gas emissions.
9. In practical terms, this means using resources, particularly fossil-fuel-derived energy, more efficiently, re-using and recycling products where possible, and the developing renewable forms of energy which are inexhaustible and do not pollute the atmosphere.

Task 12. Fill in the missing words:

1. During this period, man-made _____of greenhouse gases, including carbon dioxide, methane and nitrous oxide have increased, largely as a result of the burning of _____ _____for energy and transportation, and land use changes including _____for agriculture.
2. _____ _____is now considered most probably to be due to the increases in greenhouse gas emissions and concurrent increases in atmospheric greenhouse gas concentrations, which have enhanced the Earth's natural greenhouse effect.
3. To put this temperature change into context, the increase in the global _____surface temperature which brought the Earth out of the last major ice age 14,000 years ago was of the order of 4 to 5°C.
4. Such impacts will be related to changes in _____(rainfall and snowfall), sea level, and the frequency and intensity of extreme weather events, resulting from global warming.
5. Currently, _____have agreed to reduce greenhouse gas emissions by an average of about 5% from 1990 levels by the period 2008 to 2012.
6. The additional commitments for further greenhouse gas emission reduction will need to be negotiated during the early part of the 21st century, if the levels of greenhouse gas _____in the atmosphere are to be stabilized at reasonable levels.
7. Existing and future _____can be achieved by embracing the concept of _____ development – the development today that does not compromise the development needs of future generations.

Task 13. Read, make the plan to the text. Write 5 questions to the text (general, special, alternative).

GREENHOUSE EFFECT



The Sun, which is the Earth's only external form of heat, emits solar radiation mainly in the form of shortwave visible and ultraviolet (UV) energy. As this radiation travels toward the Earth, 25% of it is absorbed by the atmosphere and 25% is reflected by the clouds back into space. The remaining radiation travels unimpeded to the Earth and heats its surface. The Earth releases a lot of energy it has received from the Sun back to space. However, the Earth is much cooler than the Sun, so the energy re-emitted from the Earth's surface is much weaker, in the form of invisible longwave infrared (IR) radiation, sometimes called heat.

Greenhouse gases like water vapour, carbon dioxide, methane and nitrous oxide trap the infrared radiation released by the Earth's surface. The atmosphere acts like the glass in a greenhouse, allowing much of the shortwave solar radiation to travel through unimpeded, but trapping a lot of the longwave heat energy trying to escape back to space. This process makes the temperature rise in the atmosphere just as it does in the greenhouse.

This is the Earth's natural greenhouse effect and keeps the Earth 33°C warmer than it would be without an atmosphere, at an average 15°C. In contrast, the moon, which has no atmosphere, has an average surface temperature of -18°C. During the last 200 years the mankind has been releasing extra quantities of greenhouse gases which are trapping more heat in the atmosphere. Over the same time period the climate of the Earth has warmed, and many scientists now

accept that there is a direct link between the man-made enhancement of the greenhouse effect and the global warming.

Vocabulary exercises

Task 14. Read and translate the given international words. Name the part of speech.

form, radiation, ultraviolet, energy, atmosphere, gas, process, temperature, natural, effect, period.

Task 15. Give Ukrainian equivalents of the following:

external, form of heat, solar radiation, shortwave, to reflect, cooler, surface, longwave infrared radiation, water vapour, in contrast, mankind, extra quantities, man-made enhancement, direct link.

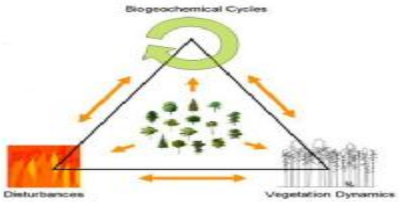
Writing activities

Task 16. Complete the following sentences

1. The, emits, radiation, solar, Sun.
2. Releases, Earth, of, a, energy, the, lot.
3. Much, Earth, the, the, is, than, cooler, Sun.
4. Like, in, the, acts, atmosphere, the, a, greenhouse, glass.
5. Has, surface, temperature, an, moon, average, the, of, -18°C.
6. Effect, enhancement, there, warming, is, the, of, direct, link, between, a, the, man-made, greenhouse, and, global.

TEXTS FOR INDIVIDUAL READING

BIOGEOCHEMISTRY



Ecologists study and measure nutrient budgets to understand how these materials are regulated and flow through the environment. This research has led to an understanding that there is a global feedback between ecosystems and the physical parameters of this planet including minerals, soil, pH, ions, water, and atmospheric gases.

There are six major elements, including H (hydrogen), C (carbon), N (nitrogen), O (oxygen), S (sulfur), and P (phosphorus) that form the constitution of all biological macromolecules and feed into the Earth's geochemical processes. From the smallest scale of biology the combined effect of billions upon billions of the ecological processes amplify and ultimately regulate the biogeochemical cycles of the Earth. Understanding the relations and cycles mediated between these elements and their ecological pathways has significant bearing toward understanding the global biogeochemistry.

Ecosystem functions such as these feed back significantly into the global atmospheric models for carbon cycling. Loss in the abundance and distribution of biodiversity causes the global carbon cycle feedbacks that are expected to increase rates of the global warming in the next century.

The global warming melting large sections of permafrost creates a new mosaic of flooded areas where decomposition emits methane (CH4). Hence, there is a relationship between the global warming, decomposition, and respiration in soils and wetlands producing significant climate feedbacks and alters the global

biogeochemical cycles. There is concern over methane increases in the atmosphere in context of the carbon cycle, because methane is also a greenhouse gas that is 23 times more effective at absorbing long-wave radiation on a 100 year time scale.

ECOLOGICAL NICHE

The ecological niche is a central concept in ecology. There are many definitions of the niche dating back to 1917, but George Evelyn Hutchinson made conceptual advances on the concept in 1957 and introduced the most widely accepted definition: «The niche is the set of the biotic and abiotic conditions in which a species is able to persist and maintain stable population sizes». There are two differentiated kinds of the ecological niche known as the fundamental and the realized niche.

The fundamental niche describes the abiotic conditions under which a species is able to persist. The realized niche is the set of the conditions under which a species persists in the context of other resource competitors or predators. Organisms fit into a particular ecological niche according to their functional traits. A trait is a measurable property of an individual that strongly influences its performance. Equally important to the concept of niche is habitat. The habitat describes the environment over which a species is known to occur and the type of the community that is formed as a result. For example, the habitat might refer to an aquatic versus terrestrial environment that can be further categorized as montane or alpine. Organisms are subject to the environmental pressures, but they are also the modifiers of their habitats.

The regulatory feedback relationship between organisms and their environment can significantly modify the conditions from a local scale (e.g. a pond) to the global scale (e.g. Gaia) and they can also modify the conditions over time even after an organism has

passed away, such as the remnants of an old beaver dam or silica skeleton deposits from marine organisms.

This process of ecosystem engineering has also been called a niche construction. Ecosystem engineers are defined as: «...organisms that directly or indirectly modulate the availability of resources to other species, by causing physical state changes in biotic or abiotic materials. In so doing they modify, maintain and create habitats». Although it has long been understood that organisms modify their environment, the ecological engineering concept has stimulated a new appreciation for the degree of modification and the influence organisms have on the ecosystem and evolutionary process.

The niche construction concept highlights a previously under appreciated feedback mechanism of natural selection imparting forces on the abiotic niche. For example, many ant and termite species regulate temperature by plugging nest entrances at night or in the cold, by adjusting the height or shape of their mounds to optimize the intake of the suns rays, or by carrying their brood around their nest to the place with the optimal temperature and humidity for the brood's development».

WHAT IS THE BIGGEST ECOLOGICAL PROBLEM IN THE UNITED STATES?

The United States has never been a synonym for the country that gives a lot of importance to ecology. In fact, it is quite the opposite, and many people around the globe will point fingers at the United States saying how the Americans are the ones most responsible for the current ecological condition of our planet. This is because America was for very long time the world's biggest CO2 polluter, and was just recently overtaken by China, the country that now holds this infamous title.

Almost all ecological problems in the United States have one origin, namely the fossil fuels. Fossil fuels like oil and coal are traditional energy sources in the United States, and as many of you probably already know fossil fuels when burning release harmful greenhouse gases, most notably CO_2, that are mostly responsible for the climate change problem. The United States are the world's largest industrial force, and has been such for almost a century now, meaning the U.S. CO_2 emissions have mostly contributed to the current global ecological problems like the climate change.

Despite being in new millennium, old habits apparently still take some time to die, and money is in America still much more important than our environment, and the current ecological condition of our planet. With president Obama, many environmentalists started feeling the wind of change but things are still not going in the right direction, and fears that precious industry will perhaps experience short-term losses are still preventing immediate environmental action, meaning even more delays, and even more political promises are on agenda.

THERMAL POLLUTION
(Part 1)

Thermal pollution is the degradation of water quality by any process that changes ambient water temperature. A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacturers. When water used as a coolant is returned to the natural environment at a higher temperature, the change in temperature impacts organisms by (a) decreasing oxygen supply, and (b) affecting ecosystem composition. Urban runoff stormwater discharged to surface waters from roads and parking lots--can also be a source of the elevated water temperatures. Humans are a major cause of this. When a power plant first opens or

shuts down for repair or other causes, fish and other organisms adapted to particular temperature range can be killed by the abrupt rise in water temperature known as «thermal shock». Thermal pollution can also be caused by the release of very cold water from the base of reservoirs into warmer rivers. This affects fish (particularly their eggs and larvae), macroinvertebrates and river productivity.

Elevated temperature typically decreases the level of dissolved oxygen (DO) in water. The decrease in levels of DO can harm aquatic animals such as fish, amphibians and copepods. Thermal pollution may also increase the metabolic rate of aquatic animals, as enzyme activity, resulting in these organisms consuming more food in a shorter time than if their environment were not changed. An increased metabolic rate may result in food source shortages, causing a sharp decrease in a population.

THERMAL POLLUTION
(Part 2)

Changes in the environment may also result in a migration of organisms to another, more suitable environment and to in-migration of fishes that normally only live in warmer waters elsewhere. This leads to the competition for fewer resources; the more adapted organisms moving in may have an advantage over organisms that are not used to the warmer temperature. As a result one has the problem of compromising food chains of the old and new environments.

Biodiversity can be decreased as a result. It is known that the temperature changes of even one to two degrees Celsius can cause significant changes in organism metabolism and other adverse cellular biology effects. Principal adverse changes can include rendering cell walls less permeable to necessary osmosis, coagulation of cell proteins, and alteration of enzyme metabolism.

These cellular level effects can adversely affect mortality and reproduction. Primary producers are affected by warm water because higher water temperature increases the plant growth rates,

resulting in a shorter lifespan and species overpopulation. This can cause an algae bloom which reduces the oxygen levels in the water. The higher plant density leads to an increased plant respiration rate because the reduced light intensity decreases photosynthesis.

This is similar to the eutrophication that occurs when watercourses are polluted with the leached agricultural inorganic fertilizers. A large increase in temperature can lead to the denaturing of life-supporting enzymes by breaking down hydrogen- and disulphide bonds within the quaternary structure of the enzymes.

The decreased enzyme activity in the aquatic organisms can cause such problems as the inability to break down lipids, which leads to malnutrition. In limited cases, warm water has little deleterious effect and may even lead to improved function of the receiving aquatic ecosystem. This phenomenon is seen especially in seasonal waters and is known as thermal enrichment. An extreme case is derived from the aggregational habits of the manatee, which often uses power plant discharge sites during winter.

Projections suggest that manatee populations would decline upon the removal of these discharges. The temperature can be as high as 70° Fahrenheit for freshwater, 80° F for saltwater and 85° F for tropical fish. Releases of unnaturally cold water from reservoirs can dramatically change the fish and macroinvertebrate fauna of rivers, and reduce river productivity. In Australia, where many rivers have warmer temperature regimes, native fish species have been eliminated, and macroinvertebrate fauna have been drastically altered and impoverished. The temperatures for freshwater fish can be as low as 50° F, saltwater 75° F, and tropical 80° F.

PHENOLOGY (SEASONAL EFFECTS)

Perceiving the Earth as a system begins when we first feel the warmth from the sunshine or get wet standing in the rain. Understanding the Earth as a system requires a quantitative exploration of the connections among all parts (atmosphere, hydrosphere, lithosphere, and biosphere) of the system. The measurements of the Globe Programme provide students with the means to begin this exploration for themselves.

The processes comprising the global environment are interconnected. Many of the major environmental issues of our time have driven scientists to study how these connections operate on a global basis - to understand the Earth as a system.

Scientists do not know all the Earth system connections yet, but they keep working to gain a more complete understanding. As students conduct the full range of the globe measurements, they should gain a perception that the environment is the result of interplay among many processes that take place locally, regionally, and globally on time scales ranging from seconds to centuries.

Phenology is the study of living organisms' response to the seasonal changes in their environment. The change in the period between greenup and senescence, often synonymous with the growing season, may be an indication of the global climate change. Broad-area estimates of the lengths of growing seasons are primarily based on the satellite data. However, remote sensing estimates from satellites are not exact because the actual behaviour of the plants must be inferred from the collective appearance of their foliage.

The globe student observations will help scientists validate their estimates of the global greenness values that they derive using the satellite data. Monitoring the length of the growing season is important for society so that it can better adapt to variations in the length of the growing season and to other impacts of the climate change, which may affect food production, economic growth, and human health.

BIOMES AND ECOSYSTEMS

Biomes are the large regions of the world with similar plants, animals, and other living things that are adapted to the climate and other conditions. Explore the links below to learn more about different biomes. A biome is made of many similar ecosystems. An ecosystem is often much smaller than a biome, although the size varies.

Ecosystems are the interactions between the living things and the nonliving things in a place. In an ecosystem, the plants, animals, and other organisms rely on each other and on the physical environment – the soil, water, and nutrients, for example. Even though they are living in the same place, each species in an ecosystem has its own role to play. This role is called a niche. The niche for one species might be to climb trees and eat their fruit, while the niche for another species might be to hunt for small rodents. For a tree, a niche might be to grow tall and make food with the Sun's energy through the process of photosynthesis. If the niche of two species is very similar, they might compete for food or other resources. Sometimes ecosystems get out of balance. If, for example, it rains a lot and a type of bird that thrives with extra water increases in numbers, other species in the ecosystem might be crowded out. The birds might take food or space or other resources from other species. They might eat all the food.

Sometimes an ecosystem naturally gets back into balance. Other times an ecosystem will become more and more out of balance. Today, human actions are having an impact on ecosystems all over the world. Making buildings and roads, fishing and farming all have an impact on ecosystems. Pollution on land, air pollution, and water pollution is sending many ecosystems out of balance too.

THE OCEAN BIOME

The ocean holds the largest of the Earth's biomes. It covers 70% of the planet's surface.

Life in the ocean is diverse. The smallest creatures that call the ocean home are so tiny that they can only be seen with a microscope. The largest creatures are blue whales, which can be as much as 34 meters (110 feet) long. There are many different ways to live in the ocean, too. Some animals travel huge distances through the ocean water. Others stay in the same place on the ocean floor their entire lives. Some burrow beneath the sand while others float near the surface.

The ocean is not the same everywhere. There are many different ecosystems within the ocean depending on such conditions as the water temperature, the amount of sunlight that filters through the water, and the amount of nutrients.

The sunlight breaks through the top layer of the ocean water. It can make its way as deep as 200 meters (656 feet). Almost all marine life (about 90%) lives within this top, sunlit layer of the ocean. There, phytoplankton, algae, and plants like seagrass make their own food through the process of photosynthesis and are the start of most marine food chains.

The temperature of the ocean water varies depending on its location. Water near the Polar Regions is colder than water near the equator. Water that is deep in the ocean is colder than water that is near the ocean surface. Many animals and other organisms can only survive at certain temperatures. Others are able to survive at a range of temperatures and can live in more places in the ocean.

THE TUNDRA BIOME

In the very cold places of the world, survival isn't easy. The soil is frozen, its top surface thawing only during summer, and no trees can grow. Yet plants and animals that are adapted for the harsh conditions thrive. This biome is called the tundra. Most of the world's tundra is found in the North Polar Region. It is called the Arctic tundra. There is a small amount of the tundra on the parts of Antarctica that are not covered with ice. Plus, the tundra is found on high altitude mountains and is called the alpine tundra.

Permafrost is the term given to frozen soil. During the winter months, permafrost reaches the surface of the tundra. It is very cold during the winter, with temperatures reaching -60 degrees Fahrenheit (-51 degrees Celsius). Very few animals are active in these harsh conditions.

In the summer time, the tundra changes. The Sun is out almost 24 hours a day, so the tundra starts to warm up. The permafrost melts at the surface, and plant life grows. However, the permafrost only disappears for a few inches below the surface. There isn't enough soil for trees to grow, so only small plants are found in the tundra.

At the same time, a variety of animals come out to feast on the plants. Insects come to feed on the animals, and birds appear to enjoy the insects.

THE TAIGA BIOME

«Taiga» is a Russian word meaning dense evergreen forest. The taiga biome, the largest biome on land, is full of dense evergreen forests. Located just south of the tundra in the northern parts of Europe, Asia, and North America, these forests of conifer trees are also known as boreal forests.

It is very cold and snowy in the taiga during winter, with below freezing average temperatures. While it is not uncommon for temperatures to dive below freezing during the summer as well, it is generally warmer then. Days are long during summer in the taiga, ice thaws, snow melts, and it is often rainy.

Conifer trees like spruce and fir thrive in this climate. The trees grow close together. This protects them from cold and wind. Their dark color makes their albedo low and they absorb solar energy readily, keeping them a bit warmer. There are a few deciduous tree species that can live in the taiga as well including birch and aspen, but they are not common.

Many animals make their home in the taiga for at least part of the year. Some stay year-round. In the summer, birds and insects are abundant. Many bird species migrate to the taiga and breed and nest there during summer. Other birds, such as sparrows and crows, stay in the taiga year-round. Mammals include herbivores like rabbits and voles as well as carnivores such as lynx, wolverines, and bobcats.

TEMPERATE FORESTS

The temperate forest biome is found in the regions where winters are cold and summers are warm. The regions with this climate are common in the mid-latitudes, far from both the equator and the poles. Tropical rainforests are in the regions that are consistently warm all year long, close to the equator.

Temperate forests are almost always made of two types of trees, deciduous and evergreen. Deciduous trees are trees that lose their leaves in the winter. Evergreens are trees that keep their leaves all year long, like pine trees. Forests can either have deciduous trees, evergreens, or a combination of both. Another kind of forest is a temperate rain forest. These are found in California, Oregon and Washington in the United States. These forests are made of redwoods and sequoias, the tallest trees in the world.

The amount of rainfall in an area determines if a forest is present. If there is enough rain to support trees, than a forest will usually develop. Otherwise, the region will become grassland.

TROPICAL RAINFORESTS

Tropical rainforests are home to thousands of species of animals, plants, fungi and microbes. Scientists suspect that there are many species living in rainforests that have not yet been found or described.

There are areas of rainforests where plants are densely packed. Areas where sunlight can reach the surface are full of interesting plants. In other areas a canopy, made of the branches and leaves of tall trees, shades the ground below, preventing smaller plants from growing.

Rainforests get their name because they receive a lot of rain - an average of 80 inches (203 cm) a year! Rainforests are found at and near the equator, where it is always warm and muggy. The temperature doesn't change very much during the year.

THE DESERT BIOME

Deserts are full of interesting questions. How can anything survive in a place with hardly any water? Why is it so dry to begin with?

You can find at least one desert on every continent except Europe. Each desert is different in some way, but they all have one thing in common. In order for an area of land to be considered a desert, it must receive less than 10 inches of water a year.

Clouds are scarce in deserts. Without clouds, there can't be rain, snow, or any other precipitation. Clouds also shade the land, so without them, the desert gets mighty hot as the Sun beats down during the day. At night, the desert can become very cold, because there isn't moisture in the air to hold onto the heat.

The geology of each desert is unique. Some deserts have sand dunes – the great waves of sand weathered from rock that move over time as wind blows the sediment. Other deserts have no dunes but instead have the unique rock formations carved by the wind and streams that only flow at times when there is moisture.

Many plants and animals survive in these vast, dry lands. Learn more about life in the desert by exploring the links below.

DESERT MAMMALS

There are several species of mammals in the desert. They range in size from a few inches to several feet in length. Like other desert wildlife, mammals have to find ways to stay cool and drink plenty of water.

Many desert mammals dig holes in the ground and stay there during the hot days. They return to the surface at night to feed. Hamsters, rats and their relatives live in holes. Not only do the burrows keep the animals cool, they are also a great place to store food.

Of course, not all animals live in holes in the ground. The kangaroo and spiny anteater both live in the Australian desert region. Spiny anteaters are unusual mammals because they lay eggs. The desert is also full of wild horses, foxes and jackals, which are part of the canine family. And we can't forget the cats. Lions are found all over the deserts of southern Africa.

DESERT PLANTS

Surprisingly, there are many species of plants that survive in the desert. Most of them are succulents, which means they store water. Others have seeds that lay in the sand until rain comes. Regardless, these plants find a way to get water and protect themselves from the heat.

The most famous desert plant is the cactus. There are many species of cacti. The saguaro cactus is the tall, pole shaped cactus you see on television. The saguaro can grow up to 40 feet tall. It can hold several tons of water inside its soft tissue. Like all cacti, the saguaro has a thick, waxy layer that protects it from the Sun.

Other succulents include the desert rose and the living rock. This strange plant looks like a spiny rock. It's disguise protects it from predators. The welwitschia is a weird looking plant. It has two long leaves and a big root. This plant is actually a type of tree and it can live for thousands of years.

There are many other kinds of desert plants. Even in the worst conditions, these plants continue to thrive.

GRASSLANDS

Over one quarter of the Earth's surface is covered with the grasslands. The grasslands are found on every continent except Antarctica, and they make up most of Africa and Asia. There are several types of the grassland and each one has its own name. Prairies, plains and savannas are all grasslands.

The grasslands develop where there isn't enough rain for forests but too much rain for deserts. The grasslands are filled with - you guessed it - grass. There are many types of grass, though. Fields of wheat are considered the grasslands, even though they are often cultivated by people. Grass is special because it grows underneath the ground. During cold periods the grass can stay dormant until it warms up.

ANSWER KEY

UNIT 1 Task 14

ecology, desert, fungi, heat, environment, moisture, approach, grassland, biome

UNIT 3 Task 13

wheat, rainfall, ecosystem, atmosphere, organism

UNIT 4 Task 18

1. the sun; 2. all of the above; 3.petroleum; 4. they were formed from the buried remains of plants and tiny animals that lived hundred of millions of years ago; 5. petroleum; 6. it's portable; 7. carbon dioxide; 8. can be replenished by nature in a short period of time.

UNIT 5 Task 14

strata, deciduous, spruce , oyster, foliage, diversity, plant

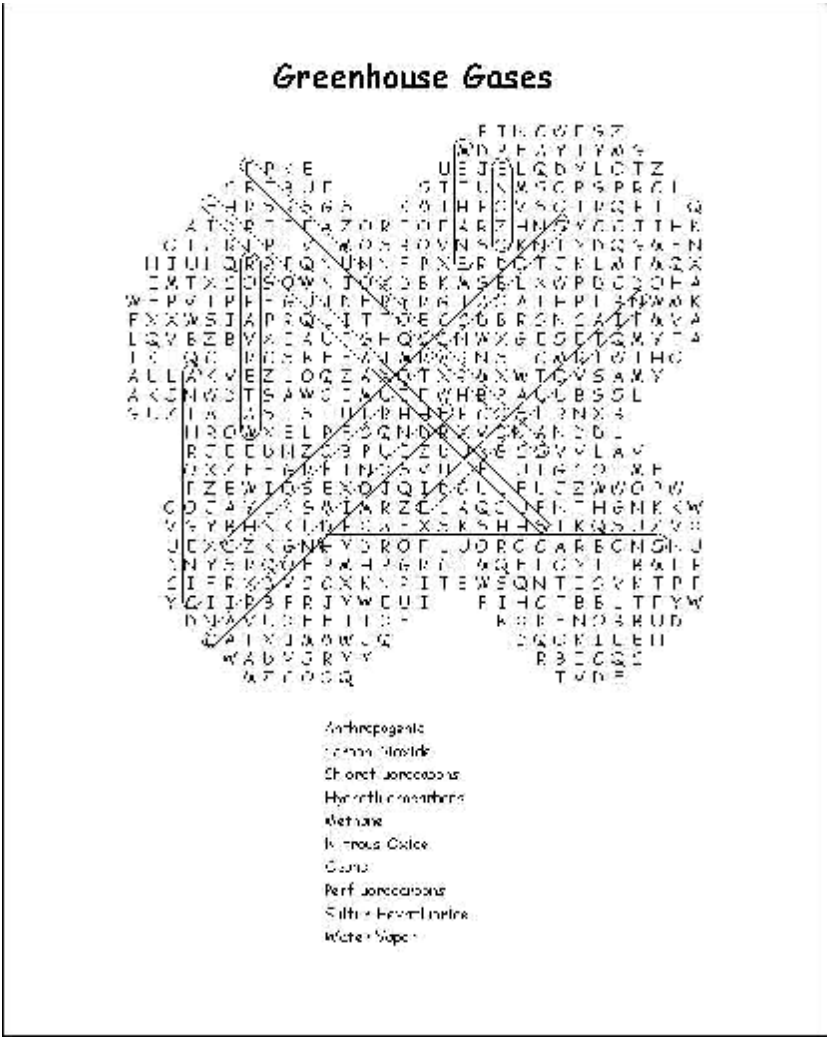
UNIT 6 Task 12

1. He wanted to grow a power plant.
2. They're blown away!
3. He was shocked!
4. Goes fission.
5. They can both use a switch hitter.
6. Midnight oil.
7. They all like sun, wind, and water.
8. The fuel cells.
9. Brain power!
10. We need rays!
11. None! They're smart enough to use energy-efficient compact fluorescent bulbs, which rarely need to be replaced.

UNIT 7 Task 15

estimate, extinct, emission, fuel, precipitation, fertilizer, spill, target, habitat, acid, ocean

Task 21



UNIT 9 Task 13

If you have 10 or more «no» answers, congratulations, you are really helping conserve resources.

Task 15

overwhelming
body
fraction
runoff
salinity
host
hydrocarbon
fraction

UNIT 11 Task 13

crop
shield
cancer
disease
harmful

RECOMMENDED LITERATURE

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Навчальне видання

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