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ПРОБЛЕМЫ ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ

Учебно-практическое пособие по обучению чтению
на английском языке

ВлГУ
ИЗДАТЕЛЬСТВО

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Посвящено различным проблемам охраны окружающей среды. Цель пособия – подготовить студентов к чтению оригинальной литературы на английском языке по одной из актуальных тем современности – охране окружающей среды.

Предназначено для студентов вузов, обучающихся по направлению 05.03.06 «Экология и природопользование».

Рекомендовано для формирования профессиональных компетенций в соответствии с ФГОС ВО.

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PREFACE

Пособие построено по тематическому принципу и включает следующие темы: взаимоотношения человека и окружающей среды, охрана атмосферы, земли и воды, проблемы шума, радиации, загрязнения продуктов питания, переработка промышленных и бытовых отходов, влияние антропогенных факторов на здоровье людей и др.

В пособии использованы тесты из оригинальной зарубежной литературы. Аутентичные тексты подобраны с учётом их познавательной ценности, актуальности и воспитательного значения. Они информативны и отражают последние достижения в области охраны окружающей среды.

Пособие включает 15 тематических модулей: текст А – для изучающего чтения и текст В – для ознакомительного чтения. Каждый модуль предваряет тематический список слов для активного усвоения и понимания текста А, предтекстовых и послетекстовых упражнений к нему, которые предусматривают работу с терминологическим словарём пособия, а также проверку понимания прочитанного. Текст В также снабжён упражнениями, способствующими выработке навыка обобщения и компрессии текста. Также представлены и тексты для дополнительного чтения.

UNIT I

MAN AND NATURE

I. Remember the following words and word combinations from the text:

1. to constitute - составлять
2. to recycle - рециркулировать
   cycle - цикл
   recycling - рециркуляция
3. to be relevant to something - иметь отношение к чему-либо
4. to maintain - сохранять
   maintenance - сохранение
5. dynamic equilibrium - динамическое равновесие
6. to disturb - нарушать
7. disturbance - нарушение
8. to subject to changes - подвергаться изменениям
9. to make suggestions - делать предложения
10. fossil fuel - ископаемое топливо
11. consequence - последствие
12. to predict - предсказывать, прогнозировать
13. to be under attack - находиться под влиянием
14. to exert influence upon - оказывать влияние на
15. to alter - изменять
16. to upset ecological balance - нарушать экологическое равновесие
17. secure world - безопасный мир
18. to superimpose - накладывать
19. to relate to - относиться к
20. rise in sea level - повышение уровня моря

II. Match each word in A with its synonym in B:

A. to change, influence, combustion, equilibrium, to lead to, to destroy, to maintain, to upset, to increase;

B. to result in, to destruct, to alter, attack, burning, balance, to raise, to support, to disturb.

III. Match adjectives in A with nouns in B and translate the phrases into Russian:

A. natural, ecological, global, substantial, human, abnormal, serious, atmospheric, solar;

B. material, environment, cycle, state, balance, temperature, influence, activity, quantities, suggestion, pollution, absorption, energy, world, needs, systems.

IV. Find the English equivalents for the following Russian words and word combination in the right column:

1. сохранение окружающей среды	1. lowering of earth's temperature
2. состояние динамического равновесия	2. a catastrophic rise in sea levels
3. парниковый эффект	3. to meet one's needs
4. повышение концентрации диоксида углерода	4. greenhouse effect
5. подвергаться изменениям	5. melting of ice-caps
6. сгорание ископаемого топлива	6. combustion of fossil fuels
7. плавление ледового покрова	7. to subject to changes
8. удовлетворять потребности чьи-либо	8. increase of carbon dioxide concentration
9. катастрофическое повышение уровня моря	9. state of dynamic equilibrium
10. понижение температуры земли	10. maintenance of an environment

V. Translate the following sentences with the Passive Voice into Russian:

1. Pollution is not easily defined.
2. The disturbance of the natural state of equilibrium may be generated by man's activity.
3. We must build a secure world in which human needs are met without destroying natural systems.
4. Quite recently serious suggestions are being made to the fact of disturbance of ecological balance by man.
5. Pollution can be taken as the presence of abnormal quantities of material due to disturbance of natural state of equilibrium.

VI. Read the text below carefully to find out interaction of man with nature.

Text 1A

MAN AND NATURE

"Only within the moment of time represented by the present century has one species - man - acquired significant power to alter the nature of the world."
- Rachel Carson.

The natural environment of earth constitutes a closed system in which basic components are constantly recycled. The energy source for the recycling is the sun.

Examples of such natural cycles are those related to carbon, nitrogen, oxygen and water all of which are highly relevant to the maintenance of an environment conductive to life. The whole system is in a state of dynamic equilibrium and is thus subject to change if disturbing influences are super-imposed. Pollution is not easily defined, but, in one sense, can be taken as

the presence of abnormal quantities of a material due to disturbance of the natural state of equilibrium. Such a disturbance might well be generated by man's activities, with his increasing knowledge and power to manipulate matter and energy, he is able to exert substantial influences upon his own environment.

In the late twentieth century, serious suggestions are being made that human activities may start to upset the fundamental ecological balance of this planet. A typical debate of this nature concerns the so-called "Greenhouse Effect", based on the hypothesis that increasing concentrations of carbon dioxide from the combustion of fossil fuels will alter the balance of recycling maintained by plant photosynthesis and ocean absorption leading to atmospheric levels 20 to 25% above the present average of about 300 p.p.m. by the end of the century.

It is suggested that one consequence of such an increase could he a raising of the global temperature because of the increased atmospheric absorption of solar energy re-radiated from the earth's surface at longer wavelengths leading to a catastrophic rise in sea levels caused by melting of the polar ice-caps. The opposing view predicts equally serious results from an eventual lowering of the earth's temperature through the reflection of the sun's heat by smoke and particulate matter in the air.

As you see, today the natural world which we share with all other forms of life on this planet is under attack. That is why it is necessary for all nations of the world act decisively to alter trends noted above and to build an environmentally secure world one in which human needs and wants are met without destroying natural systems.

Notes:

1. polar ice-caps - полярные льды
2. greenhouse effect - парниковый эффект
3. to meet one's needs - удовлетворять чьи-либо потребности
4. particulate matter - вещество в виде мельчайших частиц
5. abnormal quantities - ненормальные количества
6. 300 p.p.m. (parts per million) - 300 частей на миллион

VII. Answer the following questions about the text:

1. What does the natural environment of earth constitute?
2. What are the examples of natural cycles?
3. Is the whole system in a state of dynamic equilibrium?
4. What is pollution?
5. What is Greenhouse Effect?
6. What could the consequences of Greenhouse Effect be?
7. The natural world is under constant attack now, isn't it?
8. What is it necessary to do to make out earth a secure place to live in?

VIII. Read the sentences which follow and decide whether they are true or false. Use the following phrases to express your agreement or disagreement.

Agreement	**Disagreement**
I think so	I don't think so
I believe so	I'm afraid not
I agree on this point	I don't agree on this point
That's right	That's wrong

1. The national environment is a closed system in which basic components are recycled.
2. Pollution is easily defined.
3. Man is able to exert influence upon his own environment.

4. The ecological balance is not disturbed by the economic activity of man.
5. Greenhouse Effect results from the emission of increased concentrations of carbon dioxide from combustion of fossil fuels.
6. The consequences of Greenhouse Effect would not be serious for mankind.

IX. Read the text, try to get it as a whole.

Text 1B

MAN AND ENVIRONMENT

Human beings, as a species, are the dominant from of life on earth today. Inhabiting every continent, exploring space, creating giant cities, bringing water to the desert-man often deceived himself into believing he is all-powerful. Yet a half-million years of cultural evolution cannot alter the fact that man like all other living organisms is bound up in the web of interrelationships which characterize life on this planet. Human health, well-being, and indeed survival are dependent on the health and integrity of the whole environment which sustains us. There are some trends which will pose very difficult problems within the near future.

They are:

1. ***Population.*** The present world population will continue to grow. While the rate of growth will slow very slightly, growth in total numbers each year will be faster than it is now, about 100 million being added each year. A full 90% of this growth will occur in the poorest countries which are finding it difficult to provide the amenities to their present populations.

2. ***Food Production.*** Worldwide, food production is projected to increase each year. However, the largest portion of this increase will occur in the richer countries whose populations for the most part are already well fed. In the food-short countries of South Asia, the Middle East, and tropical Africa, per capita food consumption will remain at present in adequate levels or even decline. Real prices for food are expected to double.

3. ***Natural Resources.*** Nonfuel mineral resources appear sufficient to meet demands in the nearest future but further discoveries and investments will be needed to maintain reserves. Some mineral resources may become uneconomic because of rising prices. Three-fourths of the world's mineral production will continue to be consumed by the industrial countries. Fossil fuel resources and uranium theoretically will last several centuries, but they are not evenly distributed and pose serious environmental and economic problems.

4. ***Water.*** Shortages will become more severe; population growth alone will result in a doubling of water demand and still greater increases will be necessary to improve standards of living. Over-pumping of ground water, poor land use practices will increase runoff, and pollution of existing water supplies all reduce the availability of water at a time of rising need.

5. ***Forests.*** Loss of forests will continue over the next 20 years as demand for timber, pulp and firewood increases. Most of the loss will occur in the biologically rich tropical forests of Asia, Africa and South America.

6. ***Wildlife.*** Rates of extinction will increase sharply, resulting in the loss of hundreds of thousands of species (perhaps 20% of all species on earth), especially in the tropical forest regions.

7. ***Pollution.*** Increased emissions of carbon dioxide and chlorofluorocarbons in the atmosphere are threatening to alter the world's climate and upper atmosphere significantly by 20-50%. Acid rain from the burning of fossil fuels is affecting ever-wider areas with damage to lakes, soils and crops. Toxic and radioactive wastes continue to be spawn into the air, dumped into waterways, or carelessly buried, presenting health and safety problems in a growing number of countries.

This gloomy outlook is not a prediction of inevitable future events, but rather a projection of what can reasonably be expected if very real problems are ignored.

X. Find answers to the following questions in the text:

1. What is the dominant form of life on earth?
2. In what way did man often deceive himself?
3. What are human health, well being and survival dependent on?
4. What kind of a problem will the world population growth pose?
5. What is expected in the near future if these problems are ignored?

XI. Find sentences characterizing the following:

1. man's rapid alterations of the basic foundations of environment;
2. figures of the population growth each year;
3. per capita food consumption in food-short countries;
4. the predictions of using fossil fuel resources;
5. the reason of a doubling of water demand.

XII. Say which of the following statements are true according to the text:

1. Man like all other living organisms is bound up in the web of interrelationships which characterize life on this plant.
2. A 20% of the population growth will occur in poorest countries.

3. The largest portion of food production increase will occur in the richer countries.
4. No further discoveries and investments will be needed to maintain reserves of natural resources.
5. Greater increases of water will be necessary to improve standards of living.
6. Loss of forests will continue over the next 20 years.

UNIT II

INTRODUCTION TO ECOLOGY

I. Remember the following words and word combinations from the text:

1. to define - определять
   definition - определение
2. to interpret - объяснять
3. relationships - связи, интерпретации, толкования
4. to recognize - признавать
5. unity - единство
6. abiotic(not-living) components - абиотические (неживые) компоненты
7. to refer to - относиться
8. to interact - взаимодействовать
   interaction - взаимодействие
9. a natural grouping - природное группирование
10. biotic community - биотическое сообщество
11. species - вид, виды
12. population - популяция
13. entity - существо, организм
14. to adapt to - приспосабливаться
15. to reduce - уменьшать
16. ecological niche - экологическая ниша
17. to signify - означать, значить
18. to play a definite role - играть определенную роль

II. Translate the following word combinations into Russian:

natural area, the study of plants and animals, the concept of ecosystem, the entire planet earth, to interpret ecology, microscopic diatoms, the basic functional unit, environmental changes, biotic community, to reduce competition, static entity, natural selection, the process of evolution, living space, to adapt to specific environment, the way of life, to maintain an overall balance.

III. Find the English equivalents for the following Russian words and word combinations in the right column:

1. играть определенную роль	1. way of life
2. изменение условий окружающей среды	2. natural selection
3. экосистема	3. functional stability
4. среда обитания	4. ecological niche
5. популяция	5. unity
6. абиотическое сообщество	6. the same species
7. связи	7. to term
8. основная функциональная единица	8. basic functional unit
9. называть	9. relationships
10. одинаковые виды	10. abiotic community
11. единство	11. population
12. экологическая ниша	12. habitat
13. функциональная стабильность	13. ecosystem
14. природная селекция	14. environmental changes
15. образ жизни	15. to play a definite role

IV. Match each word in A with its synonym in B:

A. relationships, non-living species, to achieve, different, to change, to signify, definition, fundamental, the same species, to reduce, synthetic.

B. to decrease, identical species, basic, determination, to alter, various, to mean, to reach, ties, abiotic species, artificial.

V. Translate the following sentences into Russian. Define the tenses.

1. A few years ago, the average person would not have the slightest idea of the term ecology.
2. Ecosystem refers to any natural area where living things are interacting with the chemical and physical factors in the environment.
3. A natural grouping of different kinds of plants and animals is termed as a Biotic Community.

4. Through the process of evolution and natural selection, plants and animals have become better adapted to the specific environment.
5. In such a way every species of an ecosystem has a definite role to play to maintain an overall balance in the system.

VI. Read the text below carefully to find out the main concepts of ecology.

Text 2A

INTRODUCTION TO ECOLOGY

"The most important fact about spaceship Earth: an introduction book didn't come with it"
- Buckminster Fuller

A few years ago, the average person would not have the slightest idea of this term. Today the word is on everyone's lips. According to the definition ecology is the science of the relationships between organisms and their environment. Recognizing the fundamental unity between living organisms and non-living (or abiotic) components of the environment, scientists established the concept of the Ecosystem as the basic functional unit in ecology. Essentially, the term ecosystem refers to any natural area where living things are interacting with the chemical and physical factors in the environment. The entire planet earth can be considered an ecosystem as long as living and non-living elements

are present and interacting to achieve some sort of functional stability. A natural grouping of different kinds of plants and animal within any given habitat is termed by ecologists a Biotic Community. Biotic Community like ecosystem is a broad term which can be used to describe natural groupings of widely differing sizes from the various microscopic diatoms to hundreds of species of trees, wild flowers, birds, etc.

Individuals of the same species living together within a given area are referred to as a Population. A Population within the biotic community of a region is not a static entity but is continually changing in size in response to environmental changes.

Within any biotic community each species occupies its own particular place in space and time, different from any other member of the community. Through the processes of evolution and natural selection plants and animal have become better adapted to the specific environments in which they live. In order to reduce competition between species for food and living space, groups of organisms have become increasingly specialized for life in a particular Ecological Niche; the term “niche” signifying not only the physical space that the species occupies, but also its way of life. In such a way every species of an ecosystem has a definite role to play to maintain an overall balance in the system.

Notes:

1. to be on everyone’s lips - быть у всех на устах
2. in relation to - относительно
3. essentially - по существу
4. in response to - в ответ на
5. in order to - для того, чтобы
6. in such a way - таким образом
7. according to - согласно

VII. Answer the following questions about the text:

1. What is the definition of ecology?
2. What is the basic functional unit in ecology?
3. What does the term ecosystem refer to?
4. How can the entire planet earth be considered?
5. What does the Biotic Community mean?
6. What is the population?
7. What place does each species occupy in any biotic community?
8. What does the term Ecological Niche signify?
9. What role does every species have to play in the system?

VIII. Think and say about:

1. ecology as a science;
2. the entire planet earth as an ecosystem;
3. Biotic Community we live in;
4. the position and role of each species in a Biotic Community.

IX. Read the text try to get it as a whole.

Text 2B

INTER-RELATEDNESS OF LIFE

When astronauts Neil Armstrong and "Buzz" Aldrin became the first humans to land on the Moon and gazed back at their home planet more than 200,000 miles away, they were filled with a sense of wonder at the beauty and uniqueness of Earth. Of all the heavenly bodies of which we are aware, our planet is neither the largest nor the smallest, the hottest nor the coldest, yet it is extraordinary in one vital respect – in all the universe earth is the only planet known to support life. Within that narrow film of air and water which envelops the surface of the globe, exists what ecologists call the Biosphere – that portion of the earth where life occurs.

For all practical purposes the physical extent of the biosphere is even more limited than just described. Even though the deep ocean, trenches possess a number of bizarre aquatic species and the greatest numbers of

living things are found in the region extending from the permanent snow line of tropical and subtropical mountain ranges (about 20,000 feet above sea level) to the limit of light penetration in the clearest oceans (about 600 feet deep). Here a vast variety of plant, animal and microbial life can be found – perhaps as many as 10 million different species living today. These species interact both with each other and with their physical environment, over very long periods of time they become modified in response to environmental pressures and, in turn, they themselves modify their physical surrounding.

The first living organisms on earth (probably forms similar to bacteria) are now thought to have arisen more than 3.5 billion year ago on a planet whose environment was considerably different from that of the present-day world. The life activities of those early organisms, feeding upon and reacting with the chemical compounds in the waters where they first arose were responsible for the creation of the modern atmosphere, which made possible the emergence of higher forms of life. The first primitive organisms evolved in a world are devoid of atmospheric oxygen but rich in carbon dioxide. This carbon dioxide in turn provided a carbon source for the evolutionary more advanced photosynthetic organisms. The latters could produce their own food by utilizing the sun's energy to convert carbon dioxide and water into carbohydrates releasing oxygen as a waste product. It was through the action of such photosynthetic organisms that the earth's atmosphere

gradually became an oxygen-rich one, permitting the development of the types of life with which we are familiar today. In this way, the life activities of one group of organisms profoundly altered the environment and created conditions which facilitated the emergence of other forms of life. The ability of living things to modify their surroundings and the tendency of other organisms to respond positively or negatively to such changes has been a constant feature of evolutionary progression throughout the ages and remains so today.

X. Find answers to the following questions in the text:

1. Who became the first humans to land on the Moon?
2. In what sense is our Earth extraordinary?
3. Where are the greatest numbers of living things found?
4. How do living species of the biosphere interact with each other?
5. When did the first living organisms on earth appear?
6. What were these early organisms responsible for?
7. What substance provided a carbon source for more advanced photosynthetic organisms?
8. In what way did the earth's atmosphere become an oxygen-rich one?
9. What has been a constant feature of evolutionary progression throughout the ages and remains today?

XI. Find information concerning the following statements in the text:

1. the impression of the earth on the first humans landed on the moon;
2. the definition of the biosphere;
3. the area with 10 million different species living today;
4. the composition of the first primitive organisms;
5. the role of life activities of one group of organisms in alteration the environment;
6. the ability of living things to modify their environment.

XII. Think and find arguments to prove that:

1. the Earth is only planet known to support life;
2. 3.5 billion years ago the environment was different from that of the present-day world;
3. physical environment has become modified in response to environmental pressures over very long periods of time.

UNIT III

ATMOSPHERIC POLLUTION

I. Remember the following words and word combinations from the text:

1. to exercise control over smth - осуществлять контроль над чем-либо
2. influx - наплыв, приток
3. consumption of fuel - потребление топлива
4. discharge - удаление, сброс
5. waste products - отходы, сточные воды
6. to arise problems - создавать проблемы
7. supply of air - подача воздуха
8. to ensure - обеспечивать
9. furnace design - конструкция печи
10. complete combustion reaction - реакция полного сгорания
11. to pollute - загрязнить
    pollution - загрязнение
    pollutant - загрязнитель
12. accidental leak - случайная утечка
13. spillage - разлив
14. storage - хранение
15. transport accidents - транспортные аварии
16. toxic by-products - токсичные побочные продукты
17. to ignore - игнорировать
18. to encourage - поддерживать
19. to strive - стремиться
20. to halt - останавливать
21. to deteriorate - ухудшать
    deterioration - ухудшение
22. to impede - препятствовать, задерживать

II. Match each word in A with its synonym in B:

A. effect, to exercise, discharge, essential, supply, combustion, potential, to occur, to lead to, to encourage, deterioration, sufficient;

B. enough, degradation, to support, to result in, to take place, opportunity, burning, feeding, important, release, to carry out, influence.

III. Give the Russian equivalents for the following English words and word combinations:

air pollution effects, sufficient supply of air, complete fuel combination, secondary pollution, transport accidents, distribution of chemical pollution, discharge of waste products, furnace design, toxic by-products, the waste gas.

IV. Find the English equivalents for the following Russian words and word combinations in the right column:

1. производственный процесс	1. to arise problems
2. производство вредных соединений	2. to ignore the air pollution
3. вредные влияния	3. to encourage scientists the world over
4. ухудшение качества воздуха	4. the air pollution–health connection
5. экономическое развитие	5. to pose a special hazard to health
6. создавать особую опасность для здоровья	6. ill effects
7. связь загрязнений воздуха со здоровьем человека	7. economic development
8. поддерживать ученых всего мира	8. deterioration of air quality
9. игнорировать загрязнения воздуха	9. production of harmful components
10. создавать проблемы	10. industrial process

V. Answer the questions using the words suggested (use the Present Perfect Tense):

Model: What problem has become a very serious one in modern times?

The problem of air pollution has become a very serious one in modern times.

1. Why has the discharge of waste products to the atmosphere greatly increased?

(because of the influx of people into towns and the development of new industrial processes)

2. What air pollutants have posed a special hazard to public health?

(some harmful compounds)

3. What ill effects has air pollution resulted in?

(eye, nose and throat irritation, chest pains, coughing, headaches, etc.)

4. What has the world public encouraged scientists for?

(halting further deterioration of air quality)

VI. Read the text below carefully to find out problems relating to air pollution.

Text 3A

POLLUTION OF THE ATMOSPHERE

"If you visit American city,
You will find it very pretty
just two things of which you must beware:
don't drink the water and don't breathe the air."
- Tom Lehrer lyrics from "Pollution"

The effects of air pollution have been noted for centuries, six hundred years ago legislative control was exercised in Britain over smoke. Now this problem is becoming much more serious. The influx of people into towns, accompanied by the development of new industrial processes, has greatly

increased the consumption of fuel and the consequent discharge of increasing volumes of waste products to the atmosphere.

In modern times the problems that may arise from the burning of fuels for heat production are, for the most part, well understood and can be controlled. The essential principles are to provide a sufficient supply of air, mix it with the fuel and ensure that furnace design allows adequate time for the complete combustion reaction to take place before discharging the waste gas.

The potential for distribution of chemical pollution into the environment exists from accidental leaks or spillages, evaporation during storage, transport accidents or escape from the manufacturing process itself. Secondary pollution may occur when materials are used for formulation of other products or from the evolution of toxic by-products. Mixtures of pollutants may lead to the production of more (or less) harmful compounds. These air pollutants pose a special hazard to public health. Some of the ill effects of air pollution are eye, nose and throat irritation, chest pains, coughing, difficulty in breathing, headaches, etc. That is why the world public should not ignore the air pollution – health connection and encourage scientists the world over who strive to halt further deterioration of air quality without impeding industrial productivity and economic development.

Notes:

1. to pose a special hazard - создавать особую опасность
2. for the most part - большей частью
3. air pollution-health connection - связь загрязнений воздуха со здоровьем
4. ill effects - вредные влияния

VII. Answer the following questions about the text:

1. What effects have been noted for centuries?
2. What kind of control was exercised in Britain six hundred years ago?
3. Why has the problem of air pollution become a serious one?
4. What problems may arise in modern times?
5. What are the essential principles of burning the fuel?
6. What are the potentials for distribution of chemical pollution into the environment?
7. Where may secondary pollution occur?
8. What are the ill effects of air pollution?
9. The world public should not ignore the air pollution-health connection, should it?
10. Who must halt further deterioration of air quality?

VIII. Fill in the blanks with information taken from the text:

1. Effects … have been noted for centuries.
2. In modern times problems arise from burning of fuels for …
3. The potential for distribution of … into the environment exists from accidental leaks.
4. Air pollutants … to public health.
5. World public should encourage scientists who strive to halt …

IX. Read the text, try to get it as a whole.

Text 3B

AIR POLLUTION

Humans have been coping with a certain amount of polluted air ever since primitive Homo Sapiens sat by the warmth of a smoky fire in his Paleolithic cave. An inevitable consequence of fuel combustion, air pollution mounted as a source of human discomfort as soon as man began to live in towns and cities. It has become an extremely serious problem on

a world-wide basis during the past century for two primary reasons: 1) there has been an enormous increase in world population particularly in urban areas and 2) since the early 1800s the rapid growth of energy – intensive industries and rising levels of affluence in the developed countries has led to record levels of fossil fuel combustion.

Prior to the 20th century problems related to air pollution were primarily associated in the public mind, at least, with the city of London. As early as the 13th century small amounts of coal from Newcastle were being shipped grew, wood supplies diminished and coal burning increased, in spite of the protestations of both monarchs and private citizens who objected to the odor of coal smoke. Nevertheless, English coal consumption increased even faster that the rate of population growth and by the 19th century London's thick "pea-soup" fogs had become a notorious trade-mark of the city.

The same conditions which had made London the air pollution capital of the world began to prevail in the United States as well as during the 19th and early 20th centuries. The Chicago City in 1881 passed the nation's first smoke ordinance. Pittsburgh, once one of the smokiest cities in the U.S., was the site of pioneer work at the Mellon Institute on the harmful impact of smoke both on property and human health. It spite of gradually increasing public awareness of the problem, levels of air pollution continue to increase. Although large scale fuel switching from coal to natural gas and oil has significantly reduced smoky conditions in many American cities, other newer pollutants – products of the automobiles – have assumed worrisome levels. Today foul air has become a problem of global proportions; no longer one has to travel to

London or Pittsburgh or Los Angeles to experience the respiratory irritation or the aesthetic distress which a hazy, contaminated atmosphere can provoke. Nowadays metropolitan areas in the world – New York, Rome, Athens, Bombay, Tokyo, Mexico City, industrialized and developing nations alike are gripping with the problem of how to keep out air clean.

X. Find answers to the following questions in the text:

1. How long have humans been coping with a certain amount of polluted air?
2. Why did air pollution mount as a source of human discomfort?
3. What are the primary reasons for this?
4. What were problems related to air pollution associated with prior to the 20th century?
5. What had become a notorious trade-mark of London by the 19th century?
6. What condition relating air pollution prevailed in the United States in the 19th century?
7. What were the reasons of reduction of smoky conditions in many American cities?
8. What problem has become that one of global importance?

XI. Find information confirming the following statements:

1. an inevitable consequence of fuel consumption is a source of human discomfort;
2. problems related to air pollution were primarily associated with the city of London before the 20th century;
3. the reason why Pittsburgh was the site of pioneer work at the Mellon Institute on the harmful impact of smoke;
4. products of automobiles have assumed worrisome levels.

XII. Say which of the following statements are true according to the text:

1. Air pollution has become an extremely serious problem on a world-wide basis.
2. As early as the 13th century large amounts of coal from Newcastle were being shipped into London for fuel.
3. English coal consumption increased even faster that the rate of population growth.
4. In 1881 the Chicago City passed the nation's first smoke ordinance.
5. Large-scale fuel switching from coal to natural gas and oil has increased smoky conditions in many American cities.

UNIT IV

AIR POLLUTION

I. Remember the following words and word combinations from the text:

1. to vary - изменяться
   various - различный
   variety - разнообразие
2. diverse - разнообразный
3. air contaminants - загрязнители воздуха
4. to contribute to - способствовать, содействовать
5. to release - выбрасывать
6. to decay - разлагать
7. volatile hydrocarbons - летучие углеводороды
8. to proliferate - распространяться
9. transportation networks - транспортные сети
10. electric power plant - электростанция
11. to offend - нарушать
    offender - нарушитель
12. metal smelters - металлоплавильные заводы
13. oil refineries - нефтеочистительные заводы
14. pulp and paper mill - целлюлозно-бумажная фабрика
15. ranking - категория, класс
16. to cause - вызывать
17. exhaust fumes - выхлопные газы
18. to have impact on - воздействовать на

II. Match each word in A with synonym in B:

A. contaminant, amounts, to proliferate, importance, considerable, level, to release, man-made, plant, various, impact;

B. standard, influence, to liberate, significance, different, works, to spread, artificial, quantities, pollutant, significant.

III. Give the Russian equivalents for the following English words and word combinations:

air contaminants, pollutant gases, natural origin, volatile hydrocarbons, man-made emission, offender, transportation networks, oil refineries, plant species, product of oxidation, exhaust fumes, initial substance, to have impact on human health.

IV. Give the English equivalents for the following Russian words and word combinations in the right column:

1. извержение вулкана	1. metal smelter
2. газ-метан	2. refuse burning
3. целлюлозно-бумажная фабрика	3. to contribute to air pollution
4. пыльные бури	4. metropolitan areas
5. большие концентрации загрязнителей	5. sources of air pollution
6. источники загрязнения воздуха	6. large concentrations of air contaminants
7. территории города	7. dust storms
8. способствовать загрязнению воздуха	8. pulp and paper mill
9. сжигание твердых отходов	9. methane gas
10. металлоплавильный завод	10. volcanic eruption

V. Change the sentences into the Present Simple Passive:

Model: Automobiles emit exhaust-fumes into the atmosphere. Exhaust fumes are emitted by automobiles into the atmosphere.

1. Electric Power Plants burn coal or oil.
2. One polluting factory causes contamination of air in the whole community.
3. The quality of air influences the human health.
4. Plant species produce hydrocarbons.
5. The products of oxidation of exhaust fumes pollute city air.

VI. Read the text below carefully to find out sources of air pollution.

Text 4A

SOURCES OF AIR POLLUTION

"The inhabitants of planet Earth are quietly conducting a gigantic environmental experiment. So vast and so sweeping will be the impacts of this experiment that, were it brought before any responsible council for approval, it would be firmly rejected as having potentially dangerous consequences. Yet, the experiment goes on with no significant interference from any jurisdiction or nation. The experiment in question is the release of carbon dioxide and other so-called greenhouse gases to the atmosphere."
-Wallace Broucker geochemist, Columbia University

Where is all this dirty air coming from?

Not surprisingly, the sources of air pollution are quite diverse and vary in importance from one region to another.

Some air contaminants are of natural origin: volcanic eruptions, forest fires, and dust storms periodically contribute large quantities of pollutant gases and particles to the atmosphere. Considerable amounts of methane gas are released into the air when organic matter decays in the absence of oxygen and some plant species produce volatile hydrocarbons. However, most of pollutants come from man-made emission sources which have proliferated with the development of industries and transportation networks.

At present the largest sources of air pollution, in order of importance, are:

Transportation primary automobiles and trucks.

Electric Power Plants which burn coal or oil.

Industry- the major offenders being steel mills, metal smelters, oil refineries, pulp and paper mills.

Of less importance now than in the past decade is the contribution made by heating of homes and buildings and refuse burning. The general trend toward heating with oil, gas or electricity instead of with coal greatly reduced pollution from space heating.

Within any one region or community, of course, the relative importance of various emission sources may differ from the rankings noted above. In most metropolitan areas, automobiles contribute by far to the largest amount of air pollutants: in small towns, by contrast, significant levels of contamination may be caused by just one polluting factory.

City air is polluted not only by exhaust fumes but also by the products of their oxidation often more toxic than the initial substance. One of them is ozone which is useful in small quantities, but is deadly poisonous in large concentrations. And, of course, the unfortunate fact is that the quality of air we breathe has a measurable impact on human health.

Notes:

1. not surprisingly - неудивительно
2. volcanic eruption - извержение вулкана
3. to be of natural origin - быть природного происхождения
4. man-made emission sources - искусственные источники выбросов
5. instead of - вместо
6. of less importance - менее важный
7. by far - намного
8. by contrast - в противоположность
9. in order of importance - в порядке важности

VII. Answer the following questions about the text:

1. What air contaminants are of natural origin?
2. When is methane gas released into the air?
3. What sources do must air pollutants come from?
4. What reduced air pollution?
5. What may significant levels of contamination be caused by?
6. What is the city air polluted by?
7. And, of course, the quality of air has a great impact on human health, hasn't it?

VIII. Read the sentences which follow and decide whether they are true or false. Use the following phrases to express your agreement or disagreement:

Agreement	**Disagreement**
I think so	I don't think so
I believe so	I'm afraid not
I agree on this point	I don't agree on this point
That's right	That's wrong

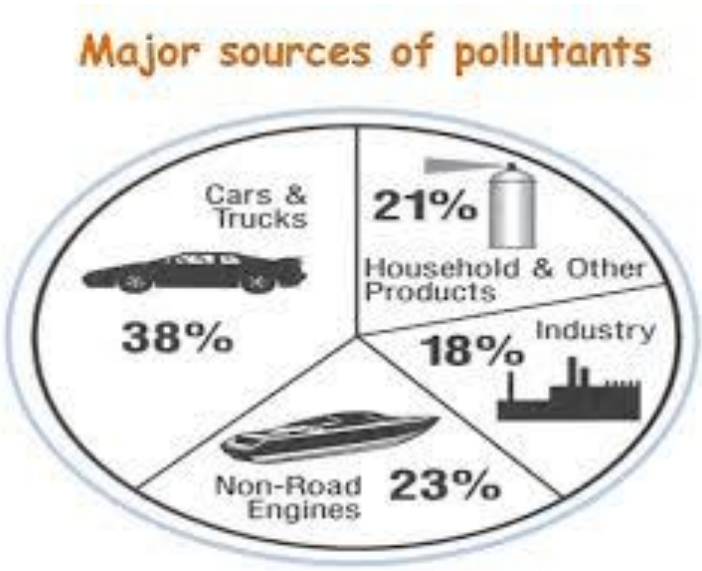
1. The sources of air pollution vary from one region to another.
2. There are no air contaminants of natural origin.
3. Methane gas is released into the air when organic matter decays in the absence of oxygen.
4. The largest sources of air pollution are transportation, electric power plant and industry.
5. Heating of homes does not contribute to air pollution.
6. City air is polluted only by exhaust fumes of automobiles.

IX. Read the text, try to get it as a whole.

Text 4B

MAJOR AIR POLLUTANTS

Air pollution, of course, is no single entity; thousands of gaseous liquid and solid compounds contribute to the atmospheric mess. The nature of some of these substances is well-known while others are only now being studied and their threat to human health assessed. The most common and widespread air pollutants include 7 which the federal government has designated criteria pollutants requiring the Environmental Protection Agency (EPA) to gather scientific and medical information on their environment and human health effects. These are 7 pollutants for which National Ambient Air Quality Standards (NAAQS) have been set, specifying the maximum levels of concentration of these pollutants allowable in the out-door air. The seven criteria air pollutants are:



Total Suspended Particulates (TSP) – TSP, often refers to simply as "particulate matter" includes all pollutants which occur either in solid or liquid form including dust, soot, pollen, and compounds containing nitrogen, sulfur and metals.

TSP is generated by a wide variety of activities – fuel combustion, road traffic, agricultural activities, certain industrial processes and natural abrasion.

Sulfur Dioxide (SO_2). The major source of this colorless pollutant gas is fuel combustion inasmuch as sulfur is present to a greater or lesser degree as an impurity in coal and fuel oil. When these sulfur – containing fuels are

burned, the sulfur is oxidized to form SO_2. By itself sulfur dioxide is not harmful, but it readily reacts with water vapor in the atmosphere to form other sulfur compounds such as sulfuric acid, sulfates which irritate the respiratory system, corrode metals and kill plants.

Carbon Monoxide (CO). No other pollutant gas is found at such high concentrations in the urban atmosphere as is the extremely toxic, odorless and colorless carbon monoxide. Any type of incomplete combustion produces CO, but the most significant source in terms of urban air pollution is automobile emissions. Depending on the concentration of CO in the air and the length of exposure, inhalation of carbon monoxide can result in adverse health effects ranging from mild headaches or dizziness at relatively low levels of exposure to death at high levels.

Nitrogen Dioxide (NO_2) is formed when combustion occurs at very high temperatures. Nitrogen dioxide is the only criteria pollutant gas which is colored. It causes lung irritation and can increase susceptibility to acute respiratory ailments such as pneumonia and influenza.

Ozone (O_3) – The main constituent of a group of chemical compounds known as Photochemical Oxidants, ozone and various aldehydes are considered to be auto-associated pollutants even though they are not emitted directly from tail pipe into the atmosphere. Instead, these substances form a complex series of chemical reactions when nitrogen dioxide and hydrocarbons from auto exhausts react with oxygen and sunlight to produce chemicals dubbed Photochemical Smog. This colorless gas causes irritation of the respiratory system, causing coughing, choking and reduced lung capacity. Ozone also cracks rubber, deteriorates fabrics and causes paint to fade.

Hydrocarbons (HC) – over 1000 different compounds containing hydrogen and carbon atoms in various combinations, hydrocarbons include liquid, gaseous and solid forms. Hydrocarbons are included among the criteria air pollutants chiefly because of their role as catalysts in the formation of photochemical smog. In addition to auto emissions major

contributors to hydrocarbon pollution include vapors from gasoline stations, oil refineries, painting and dry cleaning operations.

Lead (PB) – Lead is a potent human poison. Lead levels in the general environment have increased sharply, primarily due to lead – containing auto emissions. Other sources of environmental contamination include emissions from metal smelters and lead-containing paints and glazes.

X. Find answers to the following questions in the text:

1. What substances contribute to atmospheric mess?
2. How are 7 widespread air pollutants designated?
3. What do Natural Ambient Air Quality Standards specify?
4. What do Total Suspended Particulates include?
5. What is the main source of sulfur dioxide?
6. What can you say about the main source of carbon monoxide in urban atmosphere?
7. What is nitrogen dioxide impact on human health?
8. What does ozone cause?
9. Why are hydrocarbons included among the criteria air pollutants?
10. What is the increase of lead levels in the general environment due to?

XI. Find sentences characterizing the following:

1. the body responsible for gathering information on the environment and human health effects;
2. activities by which TSP is generated;
3. products of the reaction of sulfur dioxide with water vapor;
4. the results of inhalation of carbon monoxide;
5. the effect of nitrogen dioxide on human health;
6. the main auto-associated pollutants;
7. major contributors to hydrocarbon pollution;
8. sources of environment contamination by lead.

XII. Choose the terms characterizing each air pollutant:

1. total suspended particulates;
2. sulfur dioxide;
3. carbon monoxide;
4. nitrogen dioxide;
5. ozone;
6. hydrocarbons;
7. lead

UNIT V

NOISE POLLUTION

I. Remember the following words and word combinations from the text:

1. to reveal - показывать, обнаруживать
2. to view - рассматривать, смотреть на
3. city dwellers – urban residents - городские жители
4. noise – generating home appliances - бытовые приборы, создающие шум
5. sale - распродажа
6. highway - большая дорога, шоссе
7. office and factory equipment - офисное и заводское оборудование
8. motorized yard tools - моторизованные инструменты
9. to purchase - покупать
10. projections - проекты, прогнозы
11. to estimate - оценивать
12. average level - средний уровень
13. to be well – acquainted with - быть хорошо знакомым с
14. annoyance - раздражение
15. irritation - гнев, раздражение
16. to undermine - разрушать
17. hearing loss - потеря слуха
18. exposure to noise - воздействие шумом
19. physical ailment - физическое нездоровье
20. heart rate - сердечный ритм
21. high blood pressure - высокое кровяное давление
22. headache - головная боль
23. ulcer - язва
24. to conduct a study - проводить исследование

25. to assume - предполагать, допускать
26. maternal hormones - материнские гормоны
27. fetal growth - рост зародыша

II. Match each word in A with its synonym B:

A. study, annoyance, level, issue, to reveal, to view, to purchase, to generate, hazard, increase, to conduct, undermining, rapidly, to make up, suggest.

B. to assume, to compose, quickly, investigation, irritation, standard, problem, to show, to consider, to buy, to create, threat, rise, to carry out, destruction.

III. Give the Russian equivalents for the following English words and word combinations:

to take a Gallup poll, urban residents, noise sources, sales of office and factory equivalent, home appliances, motorcycles, outdoor noise, population density, public health hazard, increase of heart rate.

IV. Find the English equivalents for the following Russian words and word combinations in the right column:

1. проводить исследование
2. физическое и психологическое благосостояние
3. воздействие шумом
4. быть хорошо знакомым с
5. средний уровень шума
6. 4-цилиндровый бензиновый двигатель
7. потеря слуха
8. физическое нездоровье
9. вызывать стресс
10. высокое кровяное давление

1. high blood pressure
2. to induce stress
3. physical ailment
4. hearing loss
5. 4-cylinder gasoline engine
6. average level of noise
7. to be well-acquainted with
8. exposure to noise
9. physical and psychological well-being
10. to conduct a study

V. Translate the following sentences into Russian paying particular attention to the Participle I and II.

1. A Gallup poll taken among urban residents revealed that most city dwellers consider noise as the most important issue.
2. Projections prepared for the U.S. Department of Transportation estimate that the number of automobiles will increase by 0,6-0,7% yearly.
3. Hearing loss is the most obvious health threat posed by noise pollution.
4. Exposure to noise induces physical ailments including an increase in heart rate, high blood pressure, etc.
5. A study conducted in Japan suggests that expectant mothers, living in noisy environment are more likely to give birth to underweight babies that are women from quieter areas.

VI. Read the text below carefully to find out noise effects upon people's health.

Text 5A

NOISE

"An inability to stay quiet ….
is one of the most conspicuous
failings of mankind."
- Bagehot, Physics and Politics, 1876

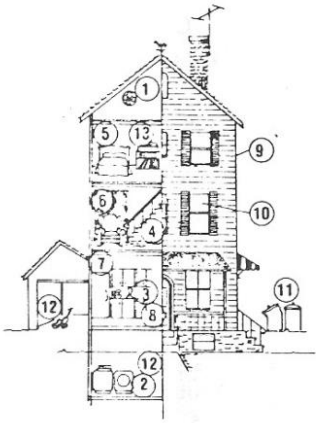
A few years ago a Gallup poll taken among urban residents revealed that most city dwellers view excessive noise as second only to water pollution among the environmental issues of greatest concern to them. The sources of noise are extremely varied and have been rapidly increasing in number during the past two decades as more cars, trucks and motorcycles crowd out streets and highways, as more noise – generating home appliances

and motorized yard tools are purchased, and as sales of office and factory equipment boom.

For the most part, levels of outdoor noise are directly to population density – the larger the city, the noisier conditions are likely to be. One of the two most important sources of excessive community noise, urban traffic, is expected to increase considerably during the next two decades. Projections prepared for the U.S. Department of Transportation estimate that the number of automobiles on the road will increase by 0,6-0,7% yearly and that average levels of automobile noise will also rise as diesel engines and 4-cylindew gasoline engines make up an ever – larger proportion of the motor fleet.

Fig. 13-5

What You Can Do to Quiet Your Home and Yourself from Noise



Inside

1. Install exhaust fan on rubber mounts
2. Use vibration mounts under electrical appliances like washer, dryer, and dishwasher
3. Put foam pads under blenders, mixers, and other small appliances (also your typewriter!)
4. Use wall to wall and stair carpeting with felt or rubber padding to dampen noise.
5. Use acoustical tile, spaced below ceiling
6. Install drapes to absorb sound
7. Buy quiet appliances
8. Install floor vinyl or thick linoleum to dampen sound

Outside

9. Eliminate noise leaks in walls by sealing holes or cracks
10. Caulk windows and install storm windows to cut down outside noise
11. Replace metal garbage cans with plastic ones

Protecting Your Ears

12. Wear ear protectors when you are using very noisy equipment or tools
13. Keep the stereo volume down

Source: Adapted from National Bureau of Standards Handbook 119, "Quieting—A Practical Guide to Noise Control, 1976."

While most people are well-acquainted with the feelings of annoyance and irritation which unwanted sounds can arouse, noise today has become a public health hazard because it is invisibly undermining the physical and psychological well-being of millions of people around the world. Hearing loss is the most obvious health threat posed by noise pollution but it is by no means the only one. Exposure to noise induces stress and stress can lead to variety of physical ailments including an increase in heart rate, high blood pressure, ulcers and headaches. A study conducted in Japan suggests that expectant mothers living in noisy environment are more likely to give birth to underweight babies than are women from quieter areas. It is assumed that stress caused by high noise levels affected the production of certain maternal hormones responsible for fetal growth.

Notes:
1. Gallup poll - опрос общественного мнения
2. for the most part - большей частью
3. US Department of Transportation - Департамент транспорта США
4. public health hazard - опасность для здоровья
5. to give birth to underweight baby - родить недоношенного ребенка

VII. Answer the following questions about the text:
1. What did a Gallup poll reveal?
2. What are the sources of noise?
3. What are the levels of outdoor noise related to?
4. What do projections prepared for the U.S. Department of Transportation estimate?
5. What has noise become today?
6. How can noise affect human health?
7. What does a study conducted in Japan suggest?

VIII. Think and say about:
1. sources of noise pollution;
2. reasons of increase of outdoor noise;
3. noise effect on human health.

IX. Read the text, try to get it as a whole:

Text 5B

NOISE CONTROL EFFORTS

The most encouraging prospects for countering the growing problem of noise is based on increasing awareness of the problem and the will deal with it. A step forward was taken in 1978, when member countries of the Organization of Economic Cooperation and Development formulated proposals for future noise abatement policies. They recognized the importance of the control of noise at source and publicity of the performance

of appliances in this respect as part of a general plan to improve consciousness and education of the public. Emphasis was given to the development of progressively more stringent standards.

Noise in industry can be controlled in many instances, without unreasonable levels of expenditure. Such a program has been undertaken at a Swedish factory. Finance was allocated over a period of several years for the improvement of working conditions, including noise surveys, remedial works and follow-up monitoring. The incentive to produce quiet machines has been greatly promoted by purchasers demanding that they meet specified acoustic performance standards. The program envisages 8 db (A) reduction in noise emission from a machine, achieved at a cost representing only 0,5% of the initial price, demonstrating that improvements need not always be costly.

Cost remains a problem, however, in dealing with road traffic noise. Vehicle noise arises principally from the engine and mechanical components, including the cooling fan and from tires and exhaust systems. Progress in the design of quieter vehicles is expected to provide some relief as long as traffic flows do not increase but it will take many years for the effect to spread throughout the total vehicle population.

Aircraft noise imposes a considerable burden on the community as well. Britain is a small country with limited scope for sitting airports away from urban areas and, compared with the United States, aircraft cause more annoyance per passenger mile.

But railway noise is less annoying than similar levels from other transport sources. One possible explanation is that mankind has learned to live with railways for a long time.

So noise is a potential hazard to physical health. There is clear evidence that levels in excess of 90 db (A) received over an extended period are injurious to hearing and damage may be sustained much earlier at higher levels.

X. Find answers to the following questions in the text:

1. What step forward was taken by the Organization of Economic Cooperation and Development in 1978?
2. What did they recognize?
3. What was emphasis given to?
4. What kind of a program has been undertaken at a Swedish factory?
5. What does the program envisage?
6. What does vehicle noise arise from?
7. What is the role of aircraft noise in the life of the community?
8. Where does aircraft cause more annoyance in Great Britain or the USA?
9. Why is railway noise less annoying than similar levels from other transport sources?
10. Which noise levels are injurious to hearing?

XI. Find information concerning the following statements in the text:

1. noise in industry can be controlled in many instances;
2. such a program includes improvement of working conditions;
3. the program envisages that the improvements need not be always costly;
4. aircraft noise imposes a considerable burden on the community;
5. noise is a potential hazard to physical health.

XII. Think and find arguments to prove that:

1. control of noise is a part of a general plan to improve consciousness and education;
2. purchasers of giant machines demanded that they met specified acoustic performance standards;
3. vehicle noise arises principally from many sources.

UNIT VI

RADIATION

I. Remember the following words and word combinations from the text:

1. electro-magnetic radiation - электромагнитная радиация
2. visible light - видимый свет
3. tanning - загар
4. cause of burns - причина ожогов
5. skin cancer - рак кожи
6. infra – red radiation - инфракрасное излучение
7. to be associated with - быть связанным с
8. furnace operation - работа печи
9. welding - сварка
10. tinted lenses - темные линзы
11. laser beams - лучи лазера
12. setting out construction works - наладка строительных работ
13. accurate alignment - точная регулировка
14. to range - колебаться в известных пределах
15. retina of the eye - сетчатка глаза
16. adequate warning signs - соответствующие знаки предупреждения
17. microwave oven - микроволновая печь
18. catering industry - общественное питание
19. microwave irradiation - микроволновое излучение
20. to define risk zones - определитель зоны риска

II. Match each word in A with its synonym in B:

A. familiar, common, operation, to emit, to result in, to associate, cause, to change, hazard, to view, oven;

B. furnace, to watch, danger, to vary, reason, to connect, to lead, to radiate, work, general, known.

III. Match adjectives in A with nouns in B and translate the phrases into Russian:

A. visible, infra-red, ultraviolet, industrial, high, various, considerable, harmless, severe, safe, nervous, adequate;

B. light, radiation, hazard, intensity, stages, distance, destruction, instruments, system, signs.

IV. Find the English equivalents for the following Russian words and word – combinations in the right column:

1. электромагнитное излучение	1. long exposure
2. известная причина ожога	2. catering industry
3. работа печи	3. to define risk zones
4. лучи лазера	4. microwave oven
5. ультрафиолетовый свет	5. warning signs
6. накладка строительных работ	6. retina of the eye
7. рак кожи	7. skin cancer
8. сетчатка глаза	8. setting out construction works
9. знаки предупреждения	9. ultraviolet light
10. микроволновая печь	10. laser beams
11. определять зоны риска	11. furnace operation
12. общественное питание	12. a familiar cause of burn
13. длительное воздействие	13. electro-magnetic radiation

V. Translate the following sentences into Russian. Define the types of Subordinate Clauses.

1. All forms of electro-magnetic radiation are dangerous if the intensity is too high.

2. Ultraviolet light which causes tanning of the skin is a familiar cause of burns.

3. Exposure to ultraviolet light results in melanoma, a type of skin cancer which is more common to persons living in countries where the sunlight is very strong.
4. Laser beams are now in common use for setting out construction works where accurate alignment of structures is necessary.
5. Protection of the skin is important particularly when it is necessary to view furnace operations.

VI. Read the text below carefully to find out different kinds of radiation and their effects on people's health.

Text 6A

RADIATION

"The release of atom power
has changed everything except
one way of thinking."
- Albert Einstein

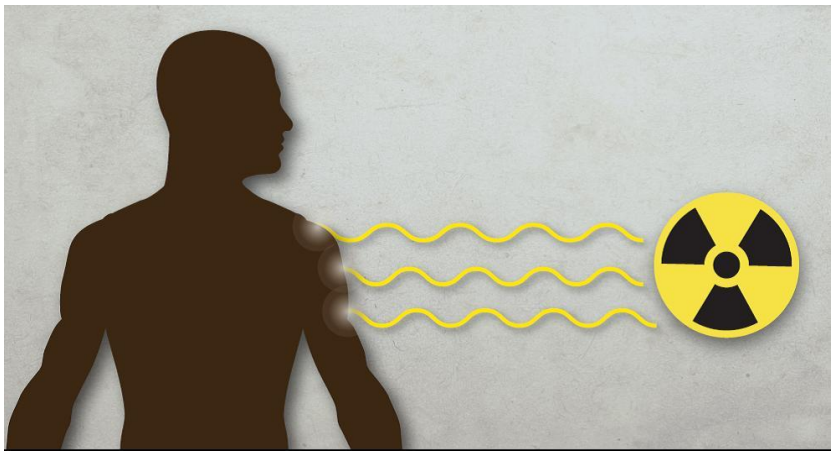
All forms of electro-magnetic radiation, even visible light, are potentially dangerous if the intensity is too high. Ultraviolet light, the component of sunlight which causes tanning of the skin is a familiar cause of burns (sunburn).

Exposure to ultraviolet light results in melanoma, a type of skin cancer which is more common to persons who live in countries where the sunshine is particularly strong.

Infra-red radiation is a common industrial hazard, being emitted by any red – hot material, so is frequently associated with furnace operations and welding. The radiation causes skin burns similar to the various stages of sunburn and, after very long exposure, cataracts in

the lenses of the eyes. Protection of the skin is therefore important, also the use of tinted lenses, for example, when viewing furnace operations.

Laser beams are now in common use for setting out construction works where accurate alignment of structures over considerable distances is necessary. Laser beams vary in hazard according to frequency and power and the effects may range from harmless to severe destruction of tissue, especially the retina of the eye. Protection consists of the selection of the safest instruments, the separation of the beam and personnel by barriers and adequate warning signs.



Microwaves are being used around airfields in association with radar and other communications equipment and in the catering industry as the use of microwave ovens becomes more popular. Microwaves range in length from about 1 mm to 1 m or a frequency of 300 MHz to 300 GHz. Changes in the central and peripheral nervous systems have been observed as a result of microwave irradiation. Protection of exposed individuals is difficult and is best achieved by limiting the numbers of people exposed and defining risk zones of radiation.

Notes:

1. to be in common use - обычно использоваться
2. similar to - подобно
3. according to - согласно, в соответствии
4. in association with - в сочетании с

VII. Answer the following questions about the text:

1. Why is electro-magnetic radiation dangerous for man?
2. What is a familiar cause of burns?
3. What does exposure to ultraviolet light result in?
4. What persons is the skin cancer common to?
5. What kind of radiation is a common industrial hazard?
6. Where are laser beams used?
7. How do laser beams vary?
8. What does protection against radiation consist of?
9. How are microwaves being used now?

VIII. Read the sentences which follow and decide whether they are true or false. Use the following phrases to express your agreement or disagreement.

Agreement	**Disagreement**
I think so	I don't think so
I believe	I'm afraid not
I agree on this point	I don't agree on this point
That's right	That's wrong

1. Visible light is not dangerous for human health.
2. Exposure to ultraviolet light results in skin cancer.
3. Infra-red radiation is a common industrial hazard.
4. The radiation causes cataracts in the lenses of the eyes.
5. Laser beams vary in hazard according to frequency and power.
6. Microwave ovens are not widely used in our homes.

IX. Read the text, try to get it as a whole.

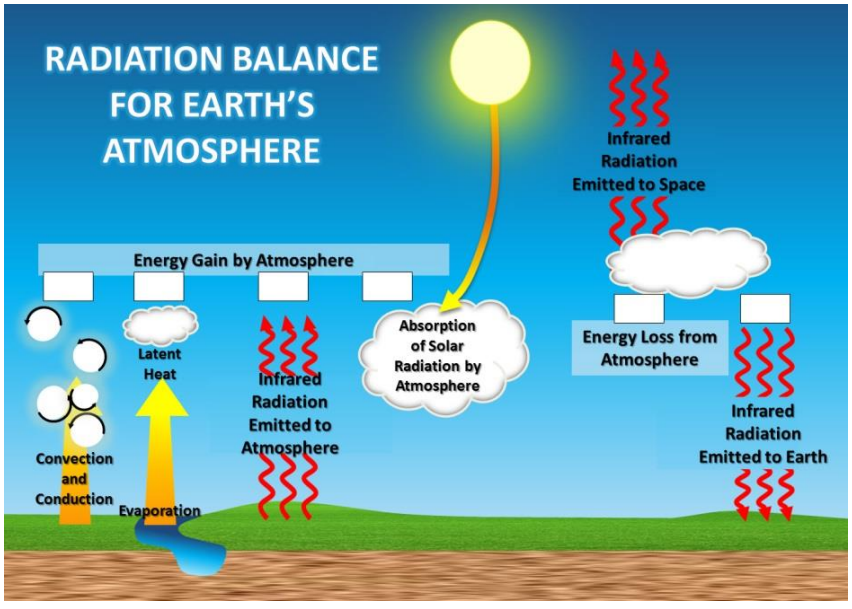
Text 6B

RADIATION BALANCE

In addition to providing the major source of certain chemical elements necessary for life, the atmosphere performs a vital role in controlling the earth's surface environment by regulating both the quality and quantity of solar radiation which enters and leaves the biosphere.

The source of all energy on earth, of course, is the sun, but solar energy can be subdivided into several categories, depending on wave length of the various forms of radiation involved: ultraviolet rays, visible light rays and infrared rays (heat).

These forms of electromagnetic radiation travel outward from the sun at a rate of 186.000 miles (3000.000 km) per second, taking slightly over 9 minutes to reach the earth. Although none of sun's energy is lost as it travels through space, once it begins to penetrate earth's atmosphere, both a depletion and diversion of solar radiation begin to occur.



Most of the ultraviolet radiation present in sunlight is absorbed by the ozone layer as it passes through the stratosphere. The ozone layer itself is actually created by ultraviolet light since UV radiant energy causes ordinary oxygen molecules to break apart releasing single atoms of oxygen which then react with intact oxygen molecules to form ozone.

Since ultraviolet radiation can have serious adverse effects on living organisms, the existence of ozone layer is of great biological significance.

Visible light rays and infrared radiation penetrate through the upper stratosphere unaffected by the ozone layer. However, as the atmospheric gas molecules increase in density closer to the earth, these molecules cause a random scattering of the incoming visible light waves. Entering the troposphere, additional scattering and reflection of visible light waves occur due to contact with dust particles and clouds. Some amounts of incoming solar radiation are lost by reflection from the upper surfaces of clouds, oceans or from the land. This heat adsorption results in the loss of as little as 20% of the incoming solar radiation. On a global yearly average it is estimated that the earth-atmosphere system absorbs about 68% of total incoming solar radiation, 32% of it being lost.

In order to maintain a global balance, energy absorbed by the earth from incoming sunlight must be equaled by outward radiation of energy from the earth's surface. While incoming and outgoing units of radiation are often not in balance at any one particular time and place (indeed, such unbalances provide the forces behind, our constantly – changing weather patterns), an equilibrium of such units for the world as a whole during any given year exists resulting in the maintenance of annual average global temperatures which fluctuate very little from year to year. One of the most pressing concerns among atmospheric scientists today is that human activities may be altering the global radiation balance in ways which may have far-reaching climatic consequences.

X. Find answers to the following questions in the text:

1. What role does the atmosphere perform in controlling the earth's surface environment?
2. What is the source of all energy on earth?
3. What categories can the solar energy be subdivided into?
4. How do these forms of electromagnetic radiation travel?
5. What happens when solar energy begins to penetrate earth's atmosphere?
6. In what way is the ozone layer created?
7. Why is the ozone layer of great biological significance?
8. When do scattering and reflection of visible light waves occur?
9. What does the heat absorption result in?
10. What is it necessary to do for maintenance of global balance?
11. What is one of the most pressing concerns among atmospheric scientists?

XI. Find information confirming the following statements:

1. the atmosphere regulates both the quality and quantity of solar radiation which enters and leaves the biosphere;
2. the various forms of radiation involve ultraviolet rays, visible light rays and infrared rays;
3. the ultraviolet radiation present in sunlight is absorbed by the ozone layer as it passes through the stratosphere;
4. ultraviolet radiation can have serious adverse effects on living organisms;
5. the reasons of additional scattering and reflection of visible light waves entering the troposphere;
6. the ways of maintaining global radiation balance.

XII. Say which of the following statements are true according to the text:

1. the source of all energy on earth is the sun;
2. the sun's energy is lost as it travels through space;
3. ultraviolet radiant energy causes ordinary oxygen molecules to break apart;
4. visible light rays and infrared radiation penetrate through the upper stratosphere;
5. incoming and outgoing units of radiation are often in balance.

UNIT VII

FOOD

I. Remember the following words and word combinations from the text:

1. to acquire understanding - достигать понимания
2. food hygiene - гигиена продуктов питания
3. to appreciate - оценивать
4. public concern - забота общественности
5. food supply - снабжение продуктами питания
6. pesticide residues - остатки пестицидов
7. harvesting processing - переработка урожая
8. to make efforts - предпринимать усилия
9. to incorporate - включать
10. food additives - пищевые добавки
11. to modify - видоизменять
12. nutritive value - питательная ценность
13. to be suspicious of - быть подозрительным
14. adverse effect - вредное воздействие
15. lecithin - лецитин
16. to improve - улучшать
17. to quarrel - придираться, спорить
18. carcinogenic - канцерогенный
19. texture - макро- или микроструктура
20. readily available - легкодоступный

II. Translate the following word combinations into Russian:

food contaminants, adverse effect, pesticide residues, nutritive value, human health, food supply, carcinogenic substance, natural sources, food hygiene, food additives, to make efforts, food microbiology, the number of chemicals, to process crops.

III. Find the English equivalents for the following Russian words and word combinations in the right column:

1. достичь понимания	1. food hygiene
2. забота общественности	2. contamination
3. присутствие загрязнителей	3. cosmetic purposes
4. стадия упаковки	4. natural vitamins
5. токсичные вещества	5. readily available
6. быть подозрительным относительно добавок	6. to be suspicious of additives
7. легкодоступный	7. toxic substances
8. природные витамины	8. packaging stage
9. косметические цели	9. the presence of contaminants
10. загрязнение	10. public concern
11. гигиена продуктов питания	11. to acquire understanding

IV. Match each word in A with its antonym in B:

A. to reduce, to improve, natural, expensive, presence, understanding, adverse, to incorporate, human, toxic;

B. non-toxic, inhuman, to exclude, favorable, misunderstanding, synthetic, to deteriorate, absence, to increase, cheap.

V. Translate the following sentences into Russian with the Passive Voice:

1. A clear understanding of microbiology and chemistry of food has been acquired quite recently.
2. Every effort should be made to keep out food as free from contamination as possible.
3. Many substances that can be termed “additives” have been in use for thousands of years.
4. Lecithin is used to achieve the desired consistency in products.

5. Some food additives are factory made but are chemically the same as their natural analog.

VI. Read the text below carefully to find out different kinds of food contaminants.

Text 7A

FOOD QUALITY

"There was never the least attention paid to what was cut up for sausage; there would come all the way back from Europe old sausage that had been rejected, and that was moldy and white – it would be dosed with borax and glycerine, and dumped into the hoppers, and made over again for home consumption".

- The jungle by Upton Sinclair, 1904

-

Although a clear understanding of the microbiology and chemistry of food has only been acquired in comparatively recent times, the principles of food hygiene have long been appreciated and applied.

Within recent years the main public concern regarding food quality is the presence of contaminants and additives in our modern food supply.

Food contaminants are substances accidentally incorporated into food. They include dirt hair, insect fragments, pesticide residues, etc, which are introduced into food during the harvesting processing or packaging stage. Certainly every effort should be made to keep our foods as free from contamination as possible,

however, it has never been and probably never will be, possible to grow harvest and process crops that are totally free of natural defects.

The other group of food contaminants incorporates many food additives, substances intentionally added to food to modify its taste, color, texture, nutritive value, appearance, resistance to deterioration, etc. Many food products could not exist in a world free of additives. Nevertheless, many people are suspicious of additives with long unfamiliar names.

However, there's nothing evil about using additives because they have no adverse effect on human health and perform a useful function. Many substances that can be termed "additives" have been in use for thousands of years – sugar, salt and spices constitute just a few examples. Some additives come from natural sources, for example, lecithin, derived from soybeans is used to achieve the desired consistency in products such as cake mixes, ice cream and chocolate milk. Other food additives are factory – made but are chemically the same as their natural analogs. The synthetic vitamins and minerals added to foods to improve nutritive value are examples of these; identical in chemical composition to natural vitamins and minerals found in food, they are used because they are less expensive and more readily available.

Most people don't quarrel about additives used for these purposes. The concern of scientists is to reduce the number of chemicals used as food additives for purely cosmetic purposes because many of them are toxic, carcinogenic, or both.

Notes:
1. nothing evil - ничего дурного
2. within recent years - в последние годы
3. accidentally – случайно

VII. Answer the following questions about the text:
1. The principles of food hygiene have long been applied, haven't they?

2. What is the main public concern regarding food quality within recent years?
3. What are food contaminants?
4. What do they include?
5. What is the other group of food contaminants?
6. What function do additives perform?
7. What do additives come from?
8. What is the concern of scientists relating food additives?

VIII. Fill in the blanks with information taken from the text:
1. Food contaminants are substances … into food.
2. Certainly every effort … to keep our food as free from contamination as possible.
3. Many food additives … to food.
4. Some people are suspicions of additives with …
5. There is … about using additives.
6. The synthetic vitamins and minerals are added to food to …

IX. Read the text, try to get it as a whole.

Text 7B

FOOD

Food can be a vehicle for the transmission of pathogenic organisms by both toxic and infective mechanisms. Toxic food poisoning occurs when body tissues are subjected to the toxins or poisonous waste products, arising from the previous multiplication of bacteria in food. Infective food poisoning is due to specific food – borne infections and parasitic infections involving attacks on the body by active hostile agents.

The most common source of toxic food poisoning is the staphylococcus group of organisms, frequently found is abscesses and

infected cuts and often carried without apparent ill-effect in the nasal secretions of many people. Given an appropriate high – protein growth medium, such as meat or milk products and a suitable temperature, 5-60°C, exponential growth takes place. Once the toxins are produced they are stable even at temperatures which are high enough to destroy the parent bacteria and may not be broken down even at 100°C. They survive cooking processes as well as refrigeration. This group is a strong candidate for suspicion in any case showing symptoms of abnormal pain. The condition is very rarely fatal but risks increase in the young, the aged and those already in poor health.

By far the most serious form of toxic food poisoning of bacterial origin is caused by clostridium botulinum – botulism. The organism is widely distributed in the environment and contamination of raw food is not uncommon, but heat treatment during processing is usually sufficient to kill the bacteria, though not necessarily any spores. Production of toxin, which is one of the most powerful poisons known requires a long period of storage under anaerobic conditions with abundant moisture and more than moderate acidity. Good canning practice will ensure the destruction of C botulinum by holding the entire contents of the can above the organism's thermal death point of 116°C for 10 minutes, or higher temperatures for less time. Cases of botulism, which involve severe and often fatal neurotoxin effects are generally associated with unsatisfactory canning techniques. The toxin can, however, be destroyed by subsequent heating.

Preservation techniques have, from the earliest times, helped the restricted seasonal availability of food. Dehydration, by removing moisture deprives microorganisms of a pre-requisite to growth, and in early times was accomplished through sun and air. Modern industry makes wide use of accelerated freeze-drying, in which the water content of quickly frozen products is sublimated directly to the vapor state preserving the cellular structure of the food. Pickling in vinegar or brine is a traditional method of creating an environment inhospitable to spoilage and pathogenic organisms.

Pasteurization involves relatively mild heat treatment of milk and other beverages to destroy likely pathogens and reduce the population of spoilage organisms.

Sterilization, by employing higher temperatures, greatly extend storage life and still higher temperatures of ultra-heat treatment enable milk to be kept for months without refrigeration. The sterilization of bacterial populations at a low level by deep-freezing has been practiced for decades commercially and now finds wide domestic application.

Irradiation is carried out to inhabit the sprouting of vegetables as well as to destroy pathogenic organisms and insect pest.

These valuable techniques have been supplemented by chemical preservation and further substances have been developed to improve flavor, texture and appearance.

X. Find answers to the following questions in the text:

1. When does toxic food poisoning occur?
2. What is the most common source of toxic food poisoning?
3. Under what conditions does toxins growth take place?
4. Can toxins be broken down at 100°C?
5. What is the most serious form of toxic food poisoning of bacterial origin caused by?
6. What process is usually sufficient to kill bacteria?
7. What techniques will ensure destruction of C botulinum?

XI. Find sentences characterizing the following:

1. food as a vehicle for transmission of pathogenic organisms;
2. the conditions of survival of toxins in food;
3. the bacterial origin of toxic food poisoning;
4. food preservation techniques preventing microorganisms growth in food;
5. the role of pasteurization and irradiation in preservation of food.

XII. Choose the terms relating to creation of environment inhospitable to spoilage and pathogenic organisms by means of:

1. heat treatment;
2. canning practice;
3. dehydration;
4. pasteurization;
5. sterilization;
6. irradiation.

UNIT VIII

WATER RESOURCES

I. Remember the following words and word combinations from the text:

1. water supply - водоснабжение
2. magnitude - размер, величина
3. precipitation - осадки, осаждение
4. evaporation - испарение
5. to transpire - потеть
   transpiration - транспирация, потение
6. to contribute to - содействовать, способствовать
7. runoff - сток, поверхностный сток
8. ground storage - аккумулирование подземных вод
9. to fill demands - удовлетворять потребности
10. to store - хранить
    storage - хранение, накопление
11. to consume - потреблять
    consumption - потребление, расход
12. toilet flushing - смыв туалета
13. sewage system - система сточных вод
14. irrigation - орошение, полив
15. to mention - упоминать, ссылаться на
16. domestic use - хозяйственное использование
17. municipal system - муниципальная система
18. well - колодец
19. municipal supply - снабжение муниципального хозяйства
20. fire extinguishing - тушение пожара
21. to maintain - поддерживать, сохранять
    maintenance - поддержание, сохранение

22. to withdraw - удалять
withdrawal - удаление
23. household purposes - цели домашнего хозяйства
24. garden sprinkling - поливка сада

II. Match each word in A with its synonym in B:

A. magnitude, vaporization, demands, vapor, use, to be concerned with, municipal, to keep to mind, to sprinkle, to call, main;

B. principal, to water, to name, to deal with, urban, to remember, utilization, steam, needs, evaporation, value.

III. Give the Russian equivalents for the following English words and word combinations:

water supply, sewage system, household purposes, ground storage, actual consumption, surface runoff, garden sprinkling, fire extinguishing, well supply, public-building use, municipal system.

IV. Find the English equivalents for the following Russian words and word combinations in the right column:

1. содержание общественных парков	1. washing dishes
2. смыв туалета	2. to fill demands
3. потребление, расход воды	3. withdrawal
4. полив	4. street cleaning
5. потение	5. industrial use
6. осадки	6. precipitation
7. промышленное использование	7. transpiration
8. мытье улиц	8. irrigation
9. удаление	9. water consumption
10. удовлетворять потребности	10. toilet flushing
11. мытье посуды	11. maintenance of public parks

V. Each sentence is the answer to a question. Make the question with the interrogative word suggested.

Model: Almost three-fourths of the total precipitated water is returned to the atmosphere by evaporation (How much).

How much water is returned to the atmosphere by evaporation?

1. You try to put the water near the plant roots when you sprinkle your garden (when).
2. Irrigation is a consumptive use of water because water is lost to further use (why).
3. Water in the home is used for drinking, cooking, washing clothes, dishes and bathing (what for).
4. The largest use of water from municipal systems is by industry (what).
5. Fire extinguishing, street cleaning are the other classes of water use (what).

VI. Read the next below carefully to find out existing water resources and their use.

Text 8A

AMOUNT OF WATER AVAILABLE AND ITS PRESENT USE

"All the rivers run into the sea; yet the sea is not full; to the place from whence the rivers come, thither they return again"
- Ecclesiastes 1:7

Let us consider the magnitude of total water supply and its relation to present use.

Each country receives water as precipitation. Almost three-fourths of the total precipitated water is returned to the atmosphere by evaporation and

transpiration. The remaining one-fourth contributes to runoff and ground storage and constitutes the water available for withdrawal use. Water that goes into ground storage or surface runoff is the total supply available to fill human demands.

How much is used for various purposes? When water use is discussed, one must keep in mind that some uses result in actual consumption or loss of water to the atmosphere as vapor. For example, when you sprinkle your garden you try to put the water near the plant roots. Because water taken by the plant is transpired to the atmosphere as vapor, the water is consumed or lost to further use by man. Irrigation may, therefore, be called a consumptive use because to a great extent water is lost to further use.

In contrast, water used for normal household purposes such as bathing, dishwashing, and toilet flushing is not consumed but must be returned to the surface streams through the sewage system. For this reason municipal and industrial uses are considered generally no consumptive in contrast to irrigation, which is the largest consumptive use.

We are always most concerned with things which apply to us individually. In discussing water use it is necessary, therefore, to mention some details of water use in the home. Water in the home is used for drinking, cooking, washing clothes and dishes, and bathing. The second principal use is for toilet flushing and a third is lawn and garden sprinkling. Together these are called domestic use.

Though we think of water use in the home as the principal reason for having a municipal system, the largest use of water from municipal systems

is by industry. There are many industrial plants which find it more economical to buy water from the city than to provide individual supplies from wells or reservoirs.

Besides domestic and industrial uses there are two other main classes of water use of municipal supplies. This includes fire extinguishing, street cleaning, public-building use, and maintenance of public parks.

Notes:

1. to keep in mind - помнить
2. in contrast - по сравнению с, в противоположность чему-либо
3. to a great extent - в значительной степени

VII. Answer the following questions about the text:

1. In what form does every country receive water?
2. How much water is returned to the atmosphere by evaporation?
3. What is the actual consumption of water?
4. What is water used for in the normal household?
5. What is the largest consumptive use of water?
6. What is the second principal water use in our homes?
7. What is the largest use of water from municipal systems?
8. What are other two main classes?

VIII. Think and say about:

1. sources of total water supply;
2. water used for household purposes;
3. industrial use of water.

IX. Read the text, try to get it as a whole.

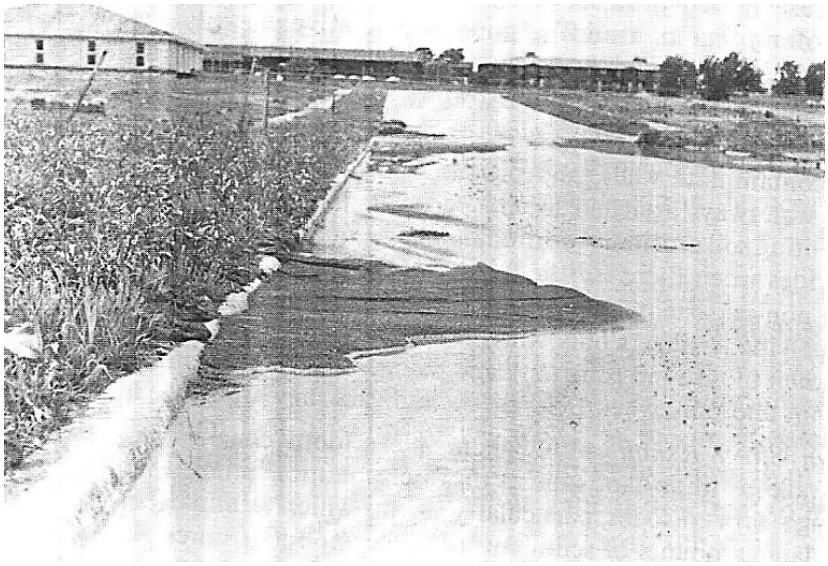
Text 8B

PURE WATER

The importance of clean water supplies to the health of the community can hardly be overstressed and, worldwide, remains a substantial public health problem. Obviously, drinking water must be of high quality and present no risk to the consumer by its chemical, biological or micro-biological content.

Only a small proportion of daily water consumption is attributable to drinking, but personal washing, laundering and food preparation all require pure water supplies for the protection of health. The carriage of sewage is another important facet of the relationship of water to health.

Water is constantly in the process of being recycled by nature evaporation from rivers, lakes and oceans leading to precipitation and providing fresh distilled supplies to the earth's surface. Bacteria play a key



role in breaking down polluting matter and rendering it innocuous and their activities which are undertaken quite naturally in water courses have been harnessed for useful application in a concentrated way in sewage treatment plants. The consumption of water in industrialized countries now amounts to 200-500 l. per person per day and clearly, nature

requires some assistance in the purification cycle, faced with the quantity of waste water from both personal and industrial use which this volume of consumption implies.

The manifold sources of water supplies - reservoirs , wells, rivers - are all subjected to pollution which must be dealt with before the water is fit for use.

Rivers, in particular, may be subject to a lengthy list of possible pollution sources, with wide diversity in the nature of the contaminants.

Industrial waste discharges: acids, alkalis, metals, salts, product waste, all other forms of chemical pollution, rinse water, spillages.

Sewage disposal: suspended/dissolved organic material, inorganic material, microorganisms, detergent, metals.

Tip leachate: organic material decomposing matter, dumped materials.

Drainage from surface: grit, oil, tar, spilt, chemicals.

Agricultural waste: organic material, pesticides, fertilizers.

Thermal pollution: detrimental to the reproduction, growth, freedom of movement and healthiness of fish.

Here are some examples showing how various contaminants in drinking water can affect human health.

In New Delhi, India, drinking water from a river contaminated with untreated sewage led to an epidemic of 28.000 cases of infectious hepatitis. Although the water had been filtered and chlorinated to kill bacterial pathogens, the hepatitis virus survived this treatment, resulting in the disease outbreak.

In Perham, Minnesota, eleven out of thirteen employees at a new office – warehouse complex became seriously ill with gastrointestinal problems soon after beginning work in the recently opened premises. Two of the victims had to be hospitalized and were diagnosed as suffering from

arsenic poisoning. It was subsequently discovered that the new well which had been drilled to supply the building with drinking water was located just 20 feet from a long – forgotten village dump where almost 40 years earlier, farmers had dumped approximately 50 pounds of arsenic – containing grasshopper bait. At one spot arsenic concentration in the soil was as high as 40%, while an analysis of well water supplies showed arsenic concentrations of 21.000 parts per billion (safe drinking water standards for arsenic are set at 50 ppb).

X. Find answers to the following questions about the text:

1. What is a substantial public health problem nowadays?
2. What kind of water is required for personal washing, laundering and food preparation?
3. Water is constantly in the process of being recycled by nature, isn't it?
4. What role do bacteria play in breaking down polluting matter?
5. What is the consumption of water in industrializes countries?
6. Why does nature require some assistance in the purification cycle?
7. What are the pollution sources of rivers?
8. Give some examples of drinking water contaminants effect on human health?

XI. Find information concerning the following statements in the text:

1. the importance of clean water supplies to the health of the community can hardly be overstressed worldwide;
2. drinking water must be of high quality and present no risk to the consumer;
3. the carriage of sewage is another important facet of the relationship of water to health;
4. water sources supplies are all subjected to pollution;

5. evaporation from rivers, lakes and oceans leads to precipitation and provides fresh distilled supplies to the earth's surface.

XII. Think and find arguments to prove that:

1. only a small proportion of daily water consumption is attributable to drinking;
2. pure water supplies are required for the protection of health;
3. nature requires some assistance in the purification cycle;
4. reservoirs, well and river may be subjected to different pollution sources.

UNIT IX

WATER POLLUTION

I. Remember the following words and word combinations from the text:

1. impurities - примеси
2. suitability - пригодность
3. palatability - приятный вкус
4. solvent - растворитель
5. to pick up - подбирать, принимать
6. to cleanse - чистить
7. sediment - осадок
   sedimentation - осаждение, отстаивание
8. to believe - думать, полагать
   belief - мнение
9. to purify - очищать
   purification - очистка
   purifier - очиститель
10. to be false - быть неправильным
11. safe water - безопасная вода
12. to disinfect - дезинфицировать
    disinfection - дезинфекция
    disinfectant - дезинфектант
13. chlorine – yielding compounds - соединения, дающие хлор
14. to be available - быть пригодным
15. to handle - обращаться
16. chlorination - хлорирование
17. shock chlorination - залповое хлорирование
18. nuisance - негативный раздражитель
19. disease – causing organisms - организмы, вызывающие заболевания
20. chlorine carrier - хлороноситель
21. to pump - откачивать, перекачивать

22. the well bore - скважина
23. ion – exchange process - ионообменный процесс
24. to treat - очищать
    treatment - очистка
25. aeration - аэрация, проветривание

II. Match each word in A with its synonym in B:

A. to affect, odor, to treat, common, contamination, clean, hazardous, quantity, tank, way, adversely, easily, to lead to;

B. to result in, readily, unfavorably, to influence, smell, to purify, general, pollution, pure, dangerous, amount, container, method.

III. Match adjectives an A with nouns in B and translate the phrases into Russian:

A. nature, safe, strong, pure, private, hazardous, additional, good, high, useful, municipal, unpleasant;

B. source, water, disinfectant, system, compound, treatment, solvent, odor, temperature, liquid, quantity, precipitation.

IV. Find the English equivalents for following Russian words and word combinations in the right column:

1. содержать примеси	1. sedimentation
2. приятный вкус	2. shock chlorination
3. имеющиеся в наличии растворители	3. water distribution system
4. вода, фильтруемая почвой	4. ion-exchange process
5. соединения, дающие хлор	5. disease – causing organisms
6. дизенфектант воды	6. purification of water
7. частные водосистемы	7. private water systems
8. очистка воды	8. water disinfectant
9. организмы, вызывающие заболевания	9. chlorine - yielding compounds
10. ионообменный процесс	10. water filtered through soil

11. система распределения воды	11. solvents available
12. залповое хлорирование	12. pleasant taste
13. отстаивание	13. to contain impurities

V. Translate the following sentences into Russian with Passive Voice:

1. Water may be cleansed as it flows over filters;
2. Contaminated water must be disinfected before using for many purposes;
3. Chlorine gas is often used for municipal water disinfection;
4. Additional treatment may be provided based upon water quality;
5. Most impurities are picked up naturally;
6. Two methods of disinfection are suggested for private water systems.

VI. Read the text below carefully to find out different water treatment techniques:

Text 9A

WATER TREARMENT

"Praise be Thou my Lord for
Sister Water who is very useful,
precious and chaste."
- Canticle of Brother
Son 1225,
St. Francis
of Assisi

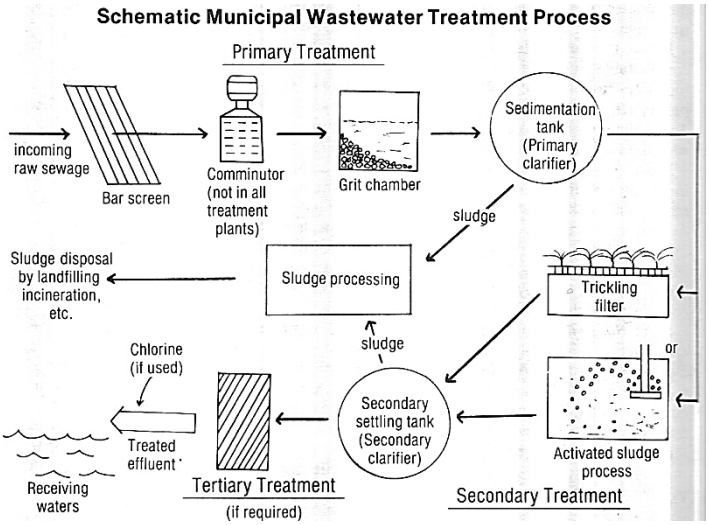
All water from nature sources contains impurities. Some of these impurities adversely affect the usefulness and suitability of water, while others may improve its palatability.

Pure water is tasteless, colourless, and odourless, and is one of the best solvents available. Because pure water is such a good solvent, it picks up

impurities easily. Most impurities are picked up naturally, but some are added, either accidentally or intentionally, by man.

Water may be cleansed or polluted as it flows over or filters through soil or other material; it may pick up or lose bacteria, it may dissolve or loss chemicals, minerals and sediment.

The belief that flowing or soil-filtered water has purified itself is false and leads to an unjustified feeling about safe water. Clear water is not necessarily safe water.



Contaminated water must be disinfected before using for most purposes. Two methods of disinfection are currently suggested as superior for private water systems:

1. adding chlorine yielding compounds; or 2. heating the water to prescribed temperatures. Chlorine is the most commonly used water disinfectant. It is available in liquid, powder, gas and tablet form. Chlorine gas is often used for municipal water disinfection, but should not be used for private water systems as it is very hazardous to handle. Heat disinfection is useful for small quantities of water.

Another way to purify water is chlorination. Shock chlorination is the placing of strong chlorine solution into a well or other water source and the complete water distribution system to kill nuisance and disease-causing organisms.

The best way to add the chlorine into a drilled well is to pump water into a tank or other container that holds more water than is stored within the well bore. Mix the chlorine carrier with the water in the tank and then let the tank contents flow into the well.

Based upon water quality, additional treatment may be provided. The additional treatments could be: aeration, sedimentation, lime-soda process, ion-exchange process, electrodialysis, distillation, filtration, neutralization, etc.

Notes:

1. accidentally - случайно
2. intentionally - намеренно, умышленно
3. unjustified feeling - неоправданное, необъяснимое ощущение

VII. Answer the following questions about the text:

1. What does all water contain?
2. Do these impurities adversely affect water?
3. What properties does pure water have?
4. Water is a good solvent, isn't it?
5. When may water be cleansed?
6. What two methods of disinfection are suggested?
7. What is the most commonly used disinfectant?
8. What is shock chlorination?
9. What is the best way to add chlorine carrier into a drilled well?
10. What could the additional treatment be?

VIII. Read the sentences which follow and decide whether they are true or false. Use the following phrases to express your agreement or disagreement:

Agreement	**Disagreement**
I think so	I don't think so
I believe so	I'm afraid not
I agree on this point	I don't agree on this point
That's right.	That's wrong.

1. Water may be polluted when it flows through soil.
2. Water does not pick up many impurities.
3. Contaminated water must be disinfected.
4. Three methods of water disinfection are suggested.
5. Clear water is a safe water.
6. Additional treatment of water may not be provided.

IX. Read the text, try to get it as whole.

Text 9B

THE BLOOMINGTION WATER TREATMENT PLANT

In 1929 Bloomington was a small town of 30.000 people set in the heart of Illinois. To provide for the needs of the community and the surrounding area nearby Money Creek was impounded, creating Lake Bloomington, and a modest water treatment plant was built.

Growth and changes in America over the next fifty years were reflected in Bloomington Agriculture made room for industry and business flourished. In 1954, and again in 1964 the City's water treatment facilities expanded to keep pace with increasing demands.

In 1985 Bloomington was selected as the site for the Diamond Star Auto Assembly Plant, a joint venture of Chrysler Corporation and Mitsubishi Motors. This new industry promised 3.000 new jobs for the community. The opportunity to diversify and invigorate the region's economy placed a heavy burden on the water treatment plant.

The 1929 plant provided 4 mgd of potable water to the City of Bloomington. With two additions the plant was providing 12 mgd by 1985. Commitments made by the State of Illinois and the City of Bloomington meant that in only 18 months the City needed to renovate and expand the 55 years old structure to increase its water treatment capacity to 20 mgd.

Accomplishing this task required a fast track approach to both design and construction. In just three months, 9.000 man-hours were spent

preparing 167 contract drawings. Within 400 days construction was completed at a cost of nearly $ 135 million.

Inside the facility reveals state-of-the-air technology. The Bloomington plant displayed the largest use of conical clarifiers, and technology which offers the benefits of clarification without moving parts and reduces maintenance and energy costs. The entire instrumentation system was replaced with modern equipment. Modernization of the heating and cooling systems provided efficiency and significant cost savings.

The facility received praise from the professional community. In presenting an Engineering Achievement Award to Consoer Townsend and Associate for the design and construction management the Consulting Engineers Council of Illinois cited rapid design and the plant's positive effect on the local economy and environment.

Today, the facility also draws water from Lake Evergreen and serves not only residents and businesses in the City of Bloomington, but the villages of Hudson and Towanda and customers in the Bloomington Township Water District as well. The plant expansion will allow the City to provide water to these communities and, in the future, to furnish water to other areas in Mrlean County well into the next century.

The Bloomington Water Treatment Plant operates in the following way.

Raw water is pumped from Lake Bloomington and Lake Evergreen to the treatment facility's new rapid mix basins. Carbon is added (for taste and odor) along with ferric sulphate (to form settleable solids), lime (to soften the water), ammonia (to form a chloramine) and chlorine (to disinfect). The water and chemicals are mixed and sent to the settling basins. Polymer is added at this point to facilitate the settling of the solids.

After the solids settle out in the settling basins and the sludge is withdrawn from the bottom and pumped to the sludge lagoons, the water flows through both the original filters and the new filters of

anthracite and sand over a gravel bed to remove any minute particles which still remain. The water runs into the clear wells and then to the two million gallon reinforced, concrete, underground reservoir. Hydrofluosilicic acid and chlorine are added to prevent both tooth decay and to disinfect.

Finished potable water is sent via high service pumps through three transmission mains to the villages of Hudson, Towanda, the Bloomington Township Water District and the City of Bloomington.

X. Find answers to the following questions in the text:

1. When was a modest water treatment plant built in Bloomington?
2. What placed a heavy burden on the water treatment plant?
3. How much potable water did the plant provide to the city of Bloomington in 1929?
4. What about 1985?
5. What commitments were made by the State of Illinois and the City of Bloomington relating the capacity of water treatment plant?
6. What technology does the facility reveal?
7. What kind of instrumentation system is there?
8. Where does the facility draw water from?

XI. Find information concerning the following statements:

1. the sources of water to the treatment facility;
2. chemicals are mixed and sent to the settling basins;
3. the sludge is withdrawn from the bottom;
4. water passes through filters;
5. the water runs into the clear wells;
6. finished potable water is sent into three transmission mains.

XII. Say which of the following statements are true to the text:

1. Over fifty years agriculture made room for industry and business flourished in the city of Bloomington.

2. The Diamond Star Auto Assembly Plant promised 5.000 new jobs the community.
3. The opportunity to diversify and invigorate the region’s economy placed a heavy burden on the water treatment plant.
4. The Bloomington plant did not display the largest use of conical clarifiers.
5. The facility received praise from the professional community.
6. In the future the plant will allow to furnish water to other areas.

UNIT X

SOIL POLLUTION

I. Remember the following words and word combinations from the text:

1. nitric oxides - оксиды азота
2. sulphur oxides - оксиды серы
3. widespread - распространенный
4. soil acidity - кислотность почвы
5. fertility - плодородие
6. to deplete - истощать
   depletion - истощение
7. to release wastes - выбрасывать отходы
8. fertilizers - удобрения
9. pesticides - пестициды (средство от паразитов)
10. nutrients - питательные вещества
11. relatively low cost - сравнительно низкая стоимость
12. ease of handling - легкость в обращении
13. ease of storing - легкость в хранении
14. response - реакция (ответ)
15. capacity - способность
16. to break down - разрушать
17. land disposal - захоронение (отходов) в землю
18. domestic wastewaters - бытовые сточные воды
19. a sound practice - правильная практика
20. terrestrial plants - земные растения
21. environmental degradation - ухудшение качества окружающей среды
22. to raise - повышать
23. to lower - понижать

II. Translate the following word combinations into Russian:

widespread substances, to raise soil acidity, to release wastes, commercial fertilizers, soil pollutants, to deplete the local flora, relatively low cost, to restore the fertility of the soil, the response of microorganisms to break down the complex waste materials, terrestrial plants, environmental degradation.

III. Find the English equivalents for the following Russian words and word combinations in the right column:

1. экологически правильная практика	1. to restore the fertility of soil
2. бытовые сточные воды	2. a cardinal solution to the problem
3. понижать плодородие почвы	3. to introduce chemical substances into the soil
4. улучшать технологию	4. land disposal of wastes
5. удобрения	5. to neutralize the effect of soil pollutant
6. легкость в обращении	6. ease of handling
7. нейтрализовать действие загрязнителей почвы	7. fertilizers
8. захоронение отходов в землю	8. to improve technology
9. вводить химические вещества в почву	9. to lower fertility of soil
10. кардинальное решение проблемы	10. domestic wastewaters
11. восстанавливать плодородие почвы	11. ecologically a sound practice

IV. Match each word in A with its synonym in B:

A. to release, pollutants, to vary, reaction, to determine, capability, possibility, to break down, to utilize, to restore, effect, to store, cost

B. value, to keep, to liberate, contaminants, to change, to destroy, to use, to renew, influence, response, to define, ability, opportunity.

V. Answer the questions using the words suggested; (use the Present Perfect Tense).

Model: Why has the problem to restore the fertility of soil become a difficult one (because of industrial enterprises). It has become a difficult problem because the industrial enterprises deplete the flora.

1. What widespread substances from the atmosphere have polluted the soil? (nitric and sulphur oxides)
2. What substances have become the preferred source of nutrients? (commercial fertilizers)
3. Why has land disposal become ecologically a sound practice? (because of the possibility to create nutrients in soil)
4. What problems have resulted in environmental degradation? (those ones associated with land disposal of domestic wastewaters)
5. What properties have determined the capacity of the soil to break down the complex waste materials? (the soil chemical properties)

VI. Read the text below carefully to find out the composition and properties of soil.

Text 10A

PROTECTION OF SOIL AGAINST POLLUTION

The most widespread substances polluting the soil from the atmosphere are nitric and sulphur oxides. They enter the soil together with precipitation, raise soil acidity and significantly lower fertility.

Higher concentration of heavy metals in the soil around industrial enterprises deplete the local flora, with more sensitive species disappearing.

It is a difficult problem to restore the fertility of soil polluted by heavy metals. The main measure and a cardinal solution to the problem is to improve technology so that waste is not released into the environment.

Sometimes various chemical substances are introduced into the soil to neutralize the effect of soil pollutants and so on.

The soil may be polluted when fertilizers and pesticides are incorrectly used, and also by the waste of livestock breeding complexes.

Until recent times, animal wastes were utilized as a valuable economic source of nutrients for crop production. Commercial fertilizers have become the preferred source for supplementing nutrients in the soil because of their relatively low cost, ease of handling, ease of storing and ready availability. That is why agricultural wastes are utilized to improve soils and provide added fertility for plant growth.

Soils vary greatly in their physical and chemical properties and are classified according to these properties. The chemical conditions existing in soils determine the reaction of soil, which may be acid, neutral or alkaline. This reaction in turn determines the availability or solubility of certain elements as well as the response of microorganisms and higher plants.

The soil chemical properties determine the capacity of the soil to break down the complex waste materials added in varying amounts. Therefore, land disposal of domestic wastewaters has become ecologically a sound practice because it creates the possibility for the nutrients present in domestic wastewaters to be recycled to the land where they could then serve as fertilizer for terrestrial plants. However, a number of potential problems associated with such a practice could result in environmental degradation.

Notes:

1. livestock breeding complexes - животноводческие комплексы
2. until recent times - до недавнего времени
3. that is why - вот почему
4. because of - из-за, вследствие чего-либо
5. in turn - в свою очередь

VII. Answer the following questions about the text.

1. What are the most widespread substances polluting the soil from the atmosphere?
2. What depletes the local flora?
3. What is the main measure to restore the fertility of the soil?
4. Some chemical substances are introduced into the soil to neutralize the effect of soil pollution, aren't they?
5. When may the soil be polluted?
6. What is a valuable economic source for crop production?
7. Why have commercial fertilizes become the preferred source for nutrients in the soil?
8. What do soil vary in?
9. What determines the solubility of certain elements in soil?
10. What has become ecologically a sound practice?

VIII. Fill in the blanks with information taken from the text:

1. ….. raise soil acidity and significantly lower fertility.
2. It is a difficult problem to restore the fertility of soil polluted by …..
3. The soil may be polluted when ….. are incorrectly used.
4. Soils vary greatly in their …..
5. This reaction in turn determines ….. of certain elements as well.
6. ….. has become ecologically a sound practice.

IX. Read the text, try to get it as a whole:

Text 10 B

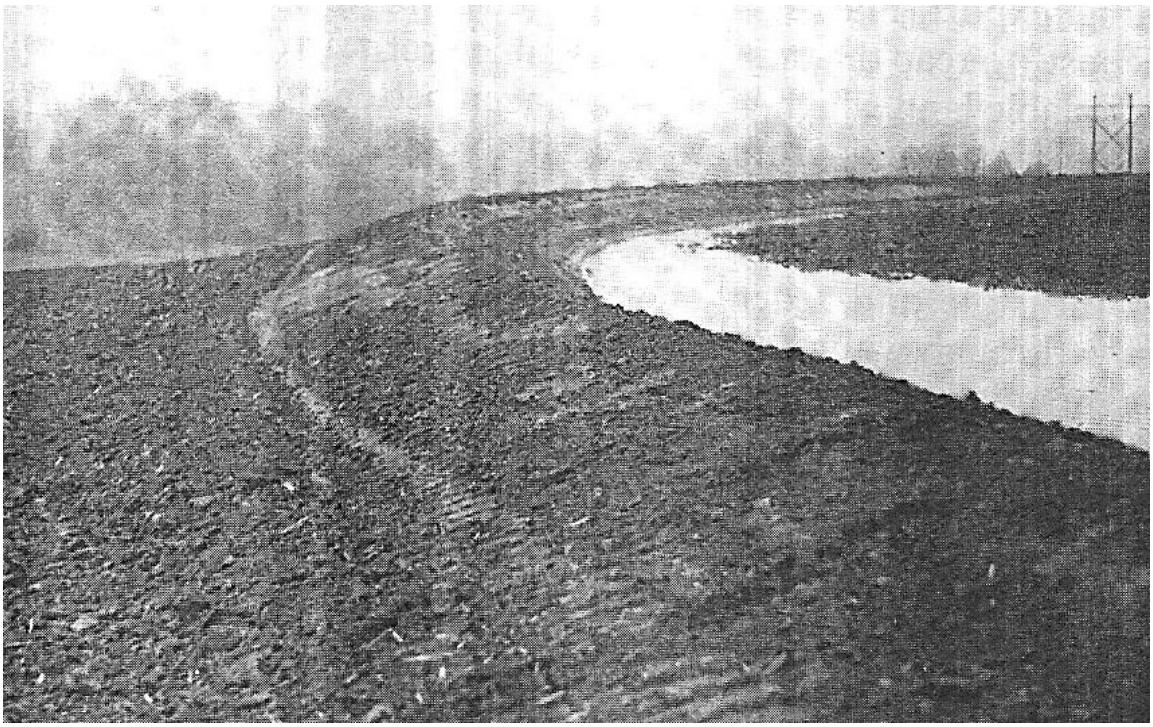
SOIL, PLANTS AND WATER

Plants take up from the soil not only water but dissolved mineral material which is necessary for the building of the plant cells. The dissolved materials which are used by the plants are called mineral nutrients. They are, in a way, the food for the plants.

With sunlight and water the green leaves of the plant make sugars which, in turn, are changed to the starches and other plant materials we eat in the form of potatoes, beans, rice and other foods. These nutrients are provided by the soil. How much of a plant, such as a tree, is made up of the mineral nutrients from the soil?

When you burn a log in the fireplace, the remaining ash is only a small bit compared with the original log. The ash contains nearly all the mineral nutrients. By far the greater part of the log which went up the chimney as a smoke consisted of water and of the organic material manufactured in the leaves. Thus, the soil provides only a small part of the plant, but a most essential part. It also provides the medium in which the plant can extend its roots and gather up its water.

Soil water is absorbed and transported by plants. This use of water by plants results in soil becoming drier to much greater depths that if the soil were bare and water merely evaporated from the surface. Roots extract most of the available water from the soil in which they are growing. In some places, plants roots grow to depths of several feet and some in arid parts of Western United States grow as deep as 50 feet. Evaporation from a bare soil surface will dry the soil to depths of only 1 or 2 feet.



All who have tried to grow shrubbery round the house or a few tomato plants and lettuce in the backyard know that in the spring the soil, is so wet that digging in it is a most unpleasant chore. In late summer, however, this soil is so dry and hard that digging in it is almost impossible. Again, in autumn after plants shed their leaves and become dormant, the soil becomes wet. This conspicuous seasonal change in soil moisture is partly the result of use of water by plants. They use large quantities in summer and almost none in winter.

Besides the seasonal cycle, there is a daily cycle in the use of water, that is between day and night of a summer day. Plants transpire, or lose, most water during a hot, dry, sunny day. At night, little water is lost by plants. This daily variation in water loss is reflected in the flow of water in small streams draining areas of a few hundred acres in size. If no rain has fallen for several days, streamflow is highest from the late morning hours until about noon. Flow then decreases to a minimum from shortly after sunset until about midnight from which time it again increases to an early morning peak.

X. Find answers to the following questions in the text:

1. What do plants take up from the soil?
2. What materials are called mineral nutrients?
3. What do the green leaves of the plant make?
4. What does ash contain after burning a log in the fireplace?
5. What does the soil provide?
6. What does the use of water by plants result in?
7. What extracts most of the available water from the soil?
8. What do you know about the seasonal change in soil moisture?
9. What is a daily cycle in the use of water?
10. How is this daily variation in water loss reflected?

XI. Find sentences characterizing the following:

1. substances necessary for the building of the plant cells;
2. nutrients provided by the soil;
3. the medium in which the plant can extend its roots and gather up its water;
4. the role of plant roots;
5. seasonal cycle of the soil;
6. a daily cycle of soil in the use of water.

XII. Think and find arguments to prove that:

1. soil is a food for the plants;
2. soil provides a most essential part of the plant;
3. seasonal change in soil moisture is the result of use of water by plants;
4. digging is better in wet soil than in the dry one;
5. the reflection of water flow in small streams due to daily variation in water loss.

UNIT XI

WASTE MANAGEMENT

I. Remember the following words and word combinations from the text:

1. waste management - управление отведением и очисткой сточных вод
2. to carry off - уносить, удалять
3. to account for - принимать в расчет, объяснять
4. to derive from - происходить от
5. detergents - моющие средства, детергенты
6. to infect - заражать
7. offensive - неприятный
8. sewer system - система коллектора сточных вод
9. sewer network - сеть канализационных труб
10. to resemble=to be similar - походить, иметь сходство
11. storm water - ливневая канализация
12. bulk - большое количество
13. to bypass - обходить
14. to dump - сбрасывать в отвал (без засыпки)
15. swift stream - быстрый поток
16. screen - сито
17. grit chamber - песколовка
18. silt - ил
19. to drain off - фильтровать
20. pollution load - нагрузка загрязнений (в сточных водах)
21. inoculation - инокуляция (биологический засев)
22. to decompose, decomposition - разлагать, разложение

II. Match each word in A with its systems in B:

A. treatment, to dispose, living, directly, to resemble, silt, reduction, matter, to remove, offensive, smell.

B. purification, substance, straight, to release, biotic, to be similar, sludge, to discharge, decrease, unpleasant, odor.

III. Match adjectives in A with nouns in B and translate the phrases into Russian:

A. living, harmful, sanitary, satisfactory, clean, aquatic, fine, organic, secondary, great, large, domestic, primary.

B. matter, bacteria, sewage, decomposition, stream, plants, solids, materials, treatment, reduction, objects, wastes, amount.

IV. Find the English equivalents for the following Russian words and word combinations in the right column:

1. происходить из живой материи	1. finer suspended solids
2. инфицировать систему водоснабжения	2. grit chamber
3. система коллектора сточных вод	3. secondary treatment
4. очистные сооружения	4. inoculation of sewage
5. находиться под давлением	5. settling tank
6. течь прямо в речку без очистки	6. industrial wastes
7. быть похожим	7. to resemble
8. промышленные отходы	8. to flow directly to a river without treatment
9. отстойник	9. to be under pressure
10. инокуляция сточных вод	10. treatment plants
11. вторичная очистка	11. sewer system
12. песколовка	12. to infect water supplies
13. мелкие взвешенные твердые вещества	13. to derive from living matter

V. Each sentence is the answer to a question. Make the question with the interrogative word suggested.

Model: Factories use water to dispose industrial wastes (what for).

What do factories use water for?

1. Wastes are offensive to sight and smell and also dangerous to health because they provide food for harmful bacteria (why).

2. The waste water from homes and factories is carried in the sewer system under the streets (where).
3. The sewer system carries not only the sanitary sewage but also the storm water from streets (what).
4. Oxygen is the key element in the satisfactory decomposition of sewage (what element).
5. In primary treatment sewage first passes through a screen that removes large objects (where).

VI. Read the text below carefully to find out types of wastes and their treatment.

Text 11A

WASTEWATER AND SEWAGE TREATMENT

"Nowhere in the world is there such
a waste of material as in this century.
In our eagerness to get the most results
from our resources, and we get them quickly,
we destroy, perhaps as much as we use.
Americans have not earned to save and their
wastefulness imperils their future. Our resources
are fast "giving out", and the next problem will
be to make them last"

- Austin Bierbower "American Wastefulness" Overland
Monthly 49, April 1907.

Most of the water we use in our homes is for carrying off wastes. Drinking, cooking, or even watering lawns account for less water than we use for washing our clothes, bathing, flushing the toilet. Factories use water to dispose industrial wastes such as chemicals or grease. They also

use water to carry away excess heat. The cooling of steel and condensing of steam are examples.

Wastes are animal, vegetable or mineral. Nearly all domestic or home wastes are animal or vegetable because they are derived from living matter. Detergents and many industrial wastes are mineral in origin. Wastes are offensive to sight and smell, as well as dangerous to health, because they provide food for harmful bacteria which can infect our water supplies.

The waste water from homes and factories is carried in the sewer system under the streets. Water is sewer system flows in pipes that, unlike the water supply system, are not under pressure. The sewer network resembles a network of stream channels. The sewer system carried not only the sanitary sewage – that is, the wastes from homes and factories – but also the storm water from the streets. Treatment plants thus have to handle a large amount of water during storm periods. In such circumstances, the bulk of the water is usually diverted so that it bypasses the treatment plant and flows directly to a river without treatment.

Oxygen is the key element in the satisfactory decomposition and eventual purification of sewage. The work of oxygen in water is similar to its work in the body.

If raw sewage is dumped into a clean swift stream, the oxygen in the water which was absorbed from the air and given off by aquatic plants will begin to decompose the sewage.

There are various degrees of sewage treatment. In primary treatment the sewage first passes through a screen that removes large objects such as sticks and rags. Next water flows slowly through a grit chamber where sand and silt settle out. Then the water flows into a large settling tank where finer

suspended solids settle to the bottom or rise to the top. The water between the two is drained off and chlorinated to kill bacteria and then discharged to the stream.

Primary treatment reduces the pollution load of sewage by about 35 per cent. If greater reduction is required so as not to overload the stream, then the sewage matter must be oxidized. It may be accomplished by inoculation of sewage with microbes which can oxidize organic material. This is called secondary treatment.

VII. Answer the following questions about the text:

1. What do factories use water for?
2. What origin are all domestic wastes of?
3. Where is the wastewater from homes and factories carried in?
4. What does the sewer system carry?
5. What do treatment plants handle?
6. What is the key element in the satisfactory decomposition of sewage?
7. What does the primary treatment consist of?
8. What is the secondary treatment of sewage?

VIII. Think and say about:

1. general use of water;
2. the function of water in sewer system;
3. ways of wastewater treatment.

IX. Read the text, try to get it as a whole.

Text 11B

METHODS OF HAZARDOUS WASTE DISPOSAL

Historically, the largest percentage of hazardous wastes have been disposed of on land because land disposal was by far the cheapest disposal option.

Although many citizens are convinced that no methods exist for the safe disposal of hazardous wastes, a number of new technologies have been developed which avoid most of the shortcomings inherent to past hazardous waste management practices. All such methods are considerably more expensive than simply dumping wastes in a pit or a municipal landfill.

A listing of legal hazardous waste disposal options would include:

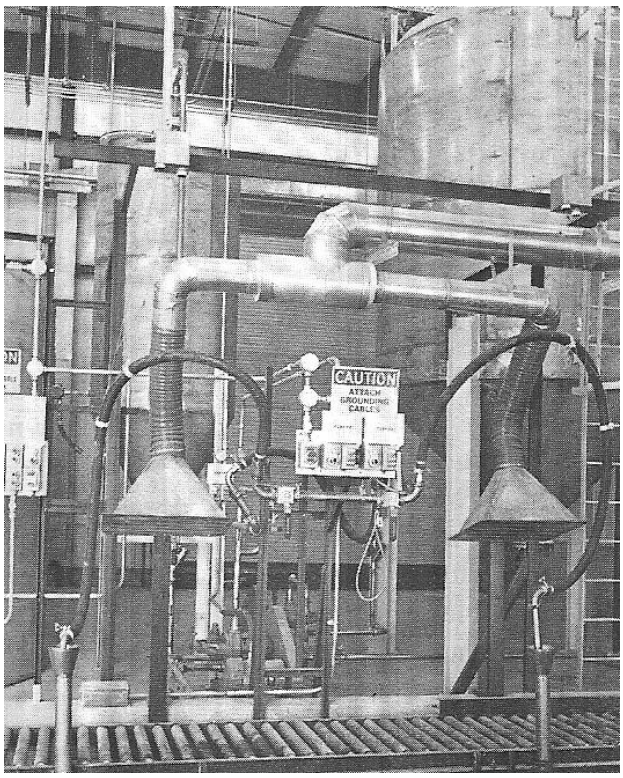
Secure Chemical Landfill – generally the cheapest method of hazardous waste disposal is the so – called “secure chemical landfill”, a specially designed earthen excavation constructed in such a way as to contain dangerous chemicals and prevent them from escaping into environment through leaching or vaporization.

However, many experts agree that there is no way to guarantee that sometime in the future contaminants will not migrate from the landfill site. Liners eventually crack, soil can shift or settle. Since many chemical wastes remain hazardous more or less indefinitely, serious pollution problems can occur many years after a secure chemical landfill has been closed or forgotten. Many authorities feel that although chemical landfills are legal, they are the least acceptable method of managing hazardous wastes.

Chemical techniques involve processes such as neutralization to render wastes harmless, sulfide precipitation to extract certain toxic metals, oxidation – reduction processes to convert some metals from a hazardous to a non-hazardous state, and solidification, in which the waste material is combined with a cement – like material, encapsulated in plastic blended with organic polymers, or combined with silica to form a solid, inert substance which can be disposed of safely in a landfill.

Biological treatment based on the ability of microbes to decompose toxic organic compounds focuses on the use of activated sludge for soluble organic wastes and a process called "land spreading", in which non-chlorinated organic wastes such as oil residues and oil – based solvents are mechanically mixed into the upper layers of soil where they are quickly broken down by ordinary soil bacteria, generally within one season.

Deep Well Injection – the use of deep wells for waste disposal dates back to the late 19th century when the petroleum industry employed this method to get rid of salt brine, but its use for liquid hazardous waste disposal began only during 1940s. A number of industries most notably petroleum refineries and petrochemical plants, now utilize this disposal method.



Controlled Incineration. Because burning at very high temperature actually destroys hazardous wastes, most hazardous waste management experts regard controlled incineration as the best and, in some cases, the only environmentally acceptable means of disposal. A controlled incinerator burns at temperatures ranging from 750-3000 F, with wastes, air and fuel being thoroughly mixed to ensure

complete combustion. Several different types of incinerators are currently being used, each having its own advantages and disadvantages for combustion of special waste categories. One of the more interesting of these is the incinerator ship which burns toxic wastes in sea, thereby having maximum environmental impact – and avoiding public protests. The incinerator ship Vulcanus was commissioned by the US Air. Force in 1977 to destroy large quantities of the dioxin – tainted herbicide Agen Orange and in 1981 successfully burned large US stockpiles of PCBs and other toxic chemicals in the Gulf of Mexico.

Waste Exchangers – the ideal way to manage hazardous materials would be to recycle them, thus preventing their entry into the waste stream and eliminating the disposal problem.

X. Find the answers to the following questions in the text:

1. In what way have hazardous wastes been disposed historically?
2. New technologies are more expensive than simple dumping, aren't they?
3. What is the cheapest method of hazardous waste disposal?
4. Is there any guarantee that sometime in the future contaminants will not migrate from landfill site?
5. Why do authorities feel that chemical landfills are the least acceptable method of managing hazardous wastes?
6. What processes do chemical techniques involve?
7. What is biological treatment based on?
8. What does deep well injection date back?
9. Which is the best method of hazardous waste disposal according to experts?
10. What types of incinerators are currently being used?

XI. Find sentences characterizing the following:

1. the cheapest disposal option;
2. the least acceptable method of managing hazardous wastes;
3. a process called "land spreading";

4. industries utilizing deep well injection method;
5. the procedure carried out in controlled incinerator;
6. the work of the incinerator ship;
7. the ideal way to manage hazardous materials.

XII. Choose the terms relating hazardous waste disposal means of:
1. secure chemical landfill;
2. chemical techniques;
3. biological treatment;
4. deep well injection;
5. controlled incineration;
6. waste exchangers.

UNIT XII

ENVIRONMENT AND HEALTH

I. Remember the following words and work combinations from the text:

1. environmental disease - экологическое заболевание
2. toxic waste dumps - сброс токсичных отходов
3. unsafe working conditions - небезопасные условия труда
4. medical x-rays - медицинские рентгеновские снимки
5. adverse impact on human health - неблагоприятное воздействие на здоровье человека
6. causative agents - возбудители заболеваний
7. public concern - озабоченность общественности
8. to influence disease rate - влиять на уровень заболеваемости
9. ailments - недуги, нездоровье, недомогание
10. environmentally-induced diseases - экологические заболевания
11. to cure a disease - вылечить болезнь
12. discharge of poisons - сброс ядов
13. to avoid exposure to radiation - избегать воздействия радиации
14. synthetic food colorings - синтетические пищевые красители
15. to search for non-existent - искать несуществующее лечение
16. to initiate changes - инициировать изменения
17. contaminants - загрязняющие вещества (искусственного происхождения)
18. cell damage - повреждение клеток
19. to have implications - иметь последствия

II. Match each word in A with its synonym in B:

A: ailment, exposure, to initiate, adverse, excessive rate, to search, action, substance, to evolve;

B: to begin, extreme, matter, to look for, impact, to develop, disease, harmful, act, speed.

III. Match adjectives in A with nouns in B and translate the phrases into Russian:

A: toxic, adverse, synthetic, public, effective, unsafe, cellular, complex, theoretical, natural, environmental;

B: health world studies, structure, level, conditions, method, concern, health, food, wastes, products.

IV. Find the English equivalents for the following Russian words and word combinations in the right column:

1. экологическое заболевание	1. to have implications
2. лечить болезнь	2. cell damage
3. иметь последствия	3. natural selection
4. избыточные уровни шума	4. to avoid exposure to radiation
5. естественный отбор	5. environmental disease
6. вредное воздействие на здоровье людей	6. to cure a disease
7. избегать влияния радиации	7. discharge of poisons
8. выброс ядов	8. excessive levels of noise
9. токсичные вещества	9. adverse effect on human health
10. разрушение клетки	10. toxic substances

V. Translate the following sentences with the Modal verbs into Russian:

1. We can protect out health without searching for non-existent cure.
2. Rising levels of pollution and environmental degradation may influence disease rates.

3. Toxic pollutants initiate changes that can kill the cell.
4. Prevention must be the best cure.
5. Polluted air and water can be regarded as causative agents of environmental disease.

VI. Read the text below carefully and find out the relationships between environment and health.

Text 12 A

ENVIRONMENTAL DISEASE

"The most important pathological effects of pollution are extremely delayed and indirect"
- Rene Dubos

Polluted air and water, excessive levels of noise, sunshine, nuclear weapons, toxic waste dumps, inadequate diet, medical x-rays, drugs, cigarettes, unsafe working through their adverse impact on human health can be regarded as causative agents of environmental disease.

In recent years public concern about rising levels of pollution and environmental degradation has focused on the question of whether such trends may be influencing disease rates, particularly such ailments as heart attack, cancer, stroke and other ills. If such a connection exists, most people agree it does most environmentally – induced diseases are difficult to cure but theoretically simple to prevent – remove all the adverse environmental influence and ailment will disappear. In other words by preventing the discharge of poisons into our air, water and food, by avoiding exposure to radiation, by refusing to fill our lungs with cigarette smoke or our stomachs with synthetic food colorings we can

protect our health more effectively and cheaply without searching for non-existent cure. The old adage – “Prevention is the best cure” has become true when applied to environmentally – induced diseases.

In spite of the fact that environmental factors can effect human health, the focus of most environmental health concern today in this age of toxic pollutants is on those substances which act at the cellular level to initiate changes which can kill or damage the cell. Research has shown that the action of such contaminants occurs at the level of individual cell or cells. The cell is a complex structure, the end product of billions of years of evolution and natural selection in response to existing environmental conditions. Cell damage has many implications. It can be manifested in one of three ways: mutation, birth defects, or cancer.

Notes:

1. adage – изречение;
2. in recent years – совсем недавно;
3. in other words – другими словами;
4. in response to – в ответ на.

VII. Answer the following question about the text:

1. What environmental factors have adverse impact on human health?
2. What the main public concern about rising levels of pollution?
3. Is it difficult to cure environmentally – induced diseases?

4. What is the possible way to protect our health?
5. What is the most environmental health concern today?
6. What is the cell?
7. What are the implications of cell damage?

VIII. Read the sentences which follow and decide whether they are true or false. Use the following phrases to express your agreement or disagreement:

I think so	I don't think so
I believe so	I'm afraid not
I agree on this point	I don't agree on this point
That's right	That's wrong

1. We can protect our health by avoiding exposure to radiation.
2. Excessive levels of noise do not have any adverse impact on human health.
3. Environmentally – induces diseases are difficult to cure.
4. Prevention is the best cure.
5. Toxic pollutants are the most environmental health concern today.

IX. Read the text try to get it as a whole.

Text 12B

CANCER
WHAT IS CANCER?

Cancer is a collective term used to describe a number of diseases which may differ in origin, prognosis, and treatment. In addition to normal cells, cancer cells continue to divide and spread, invading other tissues where they interfere with vital bodily functions and eventually lead to death. Although the precise manner in which certain cells become cancerous is not

yet known, evidence suggests that the basic problem involves an alteration in the DNA, the latter leads to a loss of control over growth.

Causes of Cancer

The search for agents responsible for initiating cancer involves a wide variety of factors for example viruses, hereditary characteristics and environmental agents such as chemicals and radiation, the latter group is responsible for about 85 % of all cases. Viruses are known

to cause some forms of cancer in animals (e. g. viral leukemia in cats, rous sarcoma in chickens). Similarly, there is a suspicion that a herpes – type virus may play a part in the development of some cases of cervical cancer since this disease is not common in women who have had intercourse with various partners. However, evidence is only circumstantial.

Heredity as a major factor

It is known that a few types of cancer are hereditary, one of the best known hereditary cancers is retinoblastoma. This is a cancer of the eye resulting from a single dominant gene which is passed on from parents to children according to well – understood genetic principles. If diagnosed early, this disease can be cured by surgically removing the eyes. In some cases a genetic predisposition to cancer exists but will not result in development of the disease unless exposure to carcinogenic agent occurs.

A great many environmental agents such as chemicals, sunlight, air pollutants, heavy metals, x-rays, high-fat diet, chemical pesticides and cigarette smoking are responsible for majority of human cancers. The

exact mechanism by which such agents induce cancer is not completely understood.

Smoking

The smoking of cigarettes is now recognized as leading contributor to cancer mortality in the US. Rates of lung cancer are most reflective of the impact of smoking on health. Today about one third of all cancer deaths are due to lung cancer and of the 130,000 new lung cancer victims diagnosed each year, 80 % of them are cigarette smokers.

X. Find answers to the following questions in the text:

1. What does the term cancer describe?
2. What do cancer cells do?
3. What does the main problem relating to emergence of cancerous cells involve?
4. What does the search for agents responsible for initiating cancer involve?
5. What causes some forms of cancer?
6. What is one of the best known hereditary cancers?
7. Does a genetic predisposition to cancer exist?
8. What factors are responsible for majority of human cancers?
9. What factor is the leading contributor to cancer mortality in the US?

XI. Find sentences characterizing the following:

1. cancer as a collective term used to describe a number of diseases;
2. causes of cancer;
3. agents responsible for cancer;
4. types of hereditary cancer;
5. environmental agents responsible for cancer;
6. impact of smoking on health.

XII. Think and find arguments to prove that:

1. cancer cells eventually lead to death;
2. there is a variety of factors responsible for about 85 % of all cases of cancer;
3. viruses cause some forms of cancer;
4. a few types of cancer are hereditary;
5. smoking of cigarettes in the leading contributor to cancer mortality in the US.

UNIT XIII

TOXIC MATERIALS AND HUMAN HEALTH

I. Remember the following words and word combinations from the text:

1. contact with toxic materials - взаимодействие с токсичными материалами
2. lead poisoning - отравление свинцом
3. Hippocrates - Гиппократ
4. mercury fumes - пары ртути
5. death sentence - приговор к смертной казни
6. asbestos-containing volcanic rock - асбестосодержащая вулканическая порода
7. to confine - ограничивать
8. occupational group - профессиональная группа
9. to pose threat - представлять угрозу
10. to be a major concern to workers - быть серьезной проблемой у работников
11. to result in - приводить к чему-либо
12. hazardous substance - опасное вещество
13. to reinforce clay - усилить (уплотнить) глину
14. invulnerability to fire - неуязвимость к огню
15. to acquire great economic value - приобрести экономическое значение
16. to represent an occupational hazard - представлять профессиональную опасность
17. retired workers - пенсионеры
18. current workers - работники
19. to be exposed to large asbestos amounts - подвергать воздействию большого количества асбеста

II. Match each word in A with an antonym in B:

A. seldom, toxic, to increase, significant, man-made, invulnerability, current workers, direct, compound insulation;

B. indirect, natural, element, often, retired workers, conductivity, to decrease, non-toxic, slight, vulnerability.

III. Translate the following word combinations into Russian:

death sentence, occupational hazard, volcanic rock, occupational groups, poisonous substances, large amounts of asbestos, human illness, mercury fumes, modern age, economic value, to be very useful, to reinforce clay.

IV. Find Russian equivalents for the following English words and word combinations is the right column:

1. industrial production	1. умереть от заболевания легких
2. widespread use	2. получить задание
3. to die of lung disease	3. взаимодействие с токсичными веществами
4. contacts with toxic substances	4. приобрести большое экономическое значение
5. high concentration	5. широко распространенное применение
6. poisonous substances	6. промышленное производство
7. to receive an assignment	7. высокая концентрация
8. asbestos-containing rock	8. обладать волшебными свойствами
9. to acquire great economic value	9. горные породы, содержащие асбест
10. to have magical properties	10. ядовитые вещества

V. Translate the following sentences into Russian. Define the tenses.

1. Hippocrates described the symptoms of lead poisoning as early as 370 BC.
2. Some examples of disease caused by direct contact with toxic substances have been confined to occupational groups.
3. In modern times asbestos has acquired great economic value.
4. Asbestos represents an occupational hazard.
5. During Greek and Roman times asbestos was regarded as having magical properties because its vulnerability to fire.

VI. Read the text below carefully and learn about the impact of toxic substances on human health.

Text 13A

TOXIC SUBSTANCES

"Being born a human being, but not been able to live as a human being is the most painful thing to me"
Tsuginori Hamamoto
Minamata Disease Victim

Human illness or death due to contacts with toxic materials in the environment is certainly not unique to the modern age. Hippocrates described the symptoms of lead poisoning as early as 370 BC; mercury fumes in Roman miners in Spain made work there as the equivalent of a death sentence to the unfortunate slaves receiving such an assignment. For centuries Turkish peasants living in homes built of asbestos-containing volcanic rock have been dying of lung disease. Such examples

of disease caused by direct contact with toxic substances have been confined to certain occupational groups or to people who, by chance, happened to be living in an area where there was high concentration of some toxic materials.

Large populations seldom were exposed to significant amounts of poisonous substances. Today however that situation is changing thanks in part to the tremendous increase in industrial production as well as to the

"chemical revolution" which has witnessed the introduction of thousands of new man-made compounds into widespread use. Some of these substances are confined to an occupational setting and pose little threat to the general public, although, of course, they are a major concern to workers and their families.

One of the toxic substances is asbestos. Probably no other hazardous substance has resulted in so many deaths as has asbestos. Asbestos was utilized by humans ever since Stone Age. Potters employed the substance to reinforce their clay. During Greek and Roman times asbestos was regarded as having magical properties because of its vulnerability to fire.

In modern times asbestos has acquired great economic value in thousands of commercial products and processes. It is employed in building materials, textiles insulation, etc.

Unfortunately in addition to being very useful, asbestos also represents an occupational hazard in major proportions. It is now estimated that of the 8-11 million of current and retired workers

exposed to large amounts of asbestos on the job, 30-40% can be expected to die of cancer.

Notes:

1. by chance - случайно
2. thanks to = because of - вследствие чего-либо
3. unfortunately- к сожалению
4. probably- вероятно

VII. Answer the following questions about the text:

1. Who described the symptoms of lead poisoning?
2. Why have Turkish peasants been dying of lung disease for centuries?
3. Were large populations often exposed to the impact of poisonous substances?
4. Why is this situation changing now?
5. What are new man-made compounds confined to?
6. When was asbestos utilized by humans?
7. What was it used for?
8. Where is asbestos used today?

VIII. Think and say about:

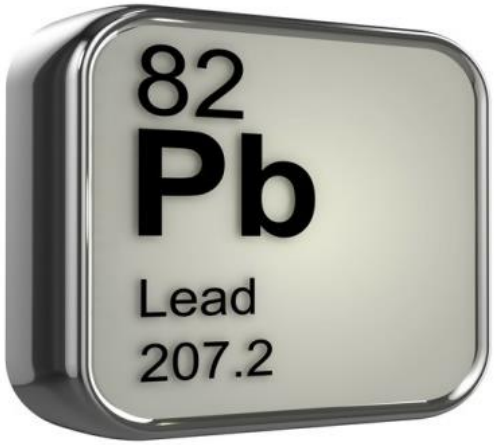
1. some facts from history of human contacts with toxic substances;
2. toxic substances posing threat to general public;
3. role of asbestos in modern times.

IX. Read the text, try to get it as a whole.

Text 13B

LEAD

Human contact with lead, a naturally – occurring mineral element widespread throughout the environment dates back thousands of years. The metal was first smelted about 4000 B.C. as a by-product of a silver processing and soon found use as an ingredient in paints, glazes and as an alloy.



Today lead is used in a wide range of industrial products, mostly for storage batteries and as an anti-knock additive in gasoline. It is produced in larger quantities than any other toxic heavy metal (world lead production is now estimated at 3 million tones per year). It is found in greater or lesser concentration throughout the environment in soils, water, air and food.

Lead levels in general environment have increased sharply, primarily due to lead-containing auto emissions. It is also known that the major source of lead intake is through drinking water due to the presence of lead pipes in household. Food, especially leafy vegetables may be another significant source of lead exposure. Plants absorb lead largely through their leaves form the soil.

As for biological effects of lead, it can affect human health in a number of ways. It interferes with blood cell formation, often resulting in anemia, it can cause kidney damage, sterility, miscarriage and birth defects. Because lead has a strong affinity for nerve disease, injury to the central nervous system is perhaps the most serious manifestation of lead poisoning. Depending on the degree of exposure lead poisoning can be reflected by hyper irritability, poor memory, mental retardation, coma and death at high levels. A recent report to congress from the agency for Toxic Substances and

Disease Registry stated that between 3-4 million American children, most of them living in inner city areas are exposed to health-threatening levels of lead.

The public is most aware of lead poisoning menace in relation to cases among young children who had consumed chops of lead-based paints. This condition frequently is fatal among small children; those receiving treatment in time generally survive but commonly suffer from mental retardation, careful palsy or atrophy of the optic nerve, leading to blindness.

Fortunately, a very successful public education effort aimed at warming parents about lead hazards, plus the sharp reduction in exterior paint lead levels has greatly reduced cases of lead poisoning in recent years.

X. Find answers the following questions in the text:

1. When does human contact with lead date back?
2. Where is lead used today?
3. How is lead produced?
4. What is the major source of lead today?
5. How does lead affect human health?
6. What is the most serious manifestation of lead poisoning?
7. How can lead poisoning be reflected?
8. What does public education about lead hazards include?

XI. Find information concerning the following statements in the text:

1. human contact with lead;
2. lead abundance in soils water, air and food;
3. biological effects of lead;
4. awareness of public to lead poisoning menace;
5. situation with lead poisoning among small children;
6. a very successful public education effort relating to lead poisoning in recent years.

XII. Say which of the following statements are true to the text:

1. Lead found its use as an ingredient in paints, glazes and alloys.
2. Lead levels have not increased in recent years.
3. The major source of lead intake is through drinking water.
4. Food especially leafy vegetables may not be another significant source of lead exposure.
5. The most serious manifestation of lead poisoning is the central nervous system.
6. Young children consume chips of lead-based paints, that is why they are subjected to lead poisoning menace.

UNIT XIV

PROBLEM OF PESTS AND THEIR IMPACT ON HUMAN HEALTH

I. Remember the following words and word combinations from the text:

1. infestation of locusts - заражение саранчи
2. disastrous impact on human health and well-being - катастрофическое воздействие на здоровье и благосостояние человека
3. to refer to - ссылаться на что-либо, называться
4. epidemic disease - эпидемическая болезнь
5. invertebrates - беспозвоночные животные
6. bird species - виды птиц
7. starling - скворец
8. disease causing bacteria - болезнетворные бактерии
9. fungi - грибы
10. weeds - сорняки
11. immemorial times - незапамятные времена
12. to cause discomfort - вызывать дискомфорт
13. vectors of disease - переносчики болезней
14. justification - обоснование, подтверждение
15. chemical pesticides - химические пестициды
16. plant pathogens - растительные патогены, фитопатогены
17. to be responsible for - быть ответственным за
18. non-chemical means of control - нехимические средства контроля
19. to lose harvest - потерять урожай
20. increase in crop loss - увеличение потерь урожая
21. worry about feeding a hungry world - беспокоится как накормить голодный мир
22. to estimate - оценивать, давать оценку

II. Match each word in A with its synonym in B:

A. disastrous, to refer to, broadly, species, to generate, to same, justification, to limit, to review, to estimate;

B. widely, to restrict, catastrophic, to evaluate, grounding, to name, types, to consider, to create, identical.

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

human health, to protect human interests, to lose harvest, bird species, deadly epidemic disease, agricultural crops, to cause distress, plant pathogens, non-chemical means of control, widespread utilization of pesticides.

IV. Find the Russian equivalents for the following English words and word combinations in the right column:

1. to cause discomfort	1. сельскохозяйственное производство
2. increase in crop loss	2. переносчики болезней
3. pest degradation	3. цены на продукты питания
4. chemical pesticides	4. вызывать неудобство
5. agricultural production	5. виды птиц
6. food prices	6. причина беспокойства
7. problems caused by pests	7. проблемы вызванные возбудителями болезней
8. bird species	8. химические пестициды
9. a cause of concern	9. вырождение паразитов
10. vectors of disease	10. увеличение потерь урожая

V. Translate the following sentences into Russian with the Passive Voice:

1. Bird species can be considered as pests.
2. Weeds are plants that can be growing where they're not wanted.
3. Conflict between people and pests is generated when they compete for the same resources.
4. About 6% of our annual harvest is lost to pests while in storage or transit.
5. Pests can be found among such invertebrates such as insects, mites, ticks, etc.

VI. Read the text below carefully and learn about diseases caused by pests and pesticides.

Text 14 A

PESTS AND PESTICIDES

"And the locusts came up over all the land of Egypt, and settled on the whole country of Egypt… they covered the face of the whole land, so that the land was darkened, and they ate all the plants in the land and all the fruit of the trees… not a green thing remained, neither tree not plant of the field, through all the land of Egypt."
Exodus 10:14 – 15 RSV

The infestation of locusts which caused Pharaoh and his people such distress was sometimes disastrous impact of certain insects, fungi, rodents, etc, can have on human health and well-being. Such organisms are typically referred to as "pests" – a term derived from the Latin word pests ("plague"), which periodically swept through the ancient world. The term "pest" then is

a purely human concept and refers broadly to any organism – animal, plant or microbe – which adversely affects human interests.

Representative species can be found among such invertebrates as the insects, mites, ticks and nematodes. Several bird species such as starlings, pigeons and English sparrows can be considered pests, as can mammals, rats, mice, moles, rabbits and in some situations, deer, coyotes, and even elephants! Many types of microorganisms, such as disease – causing bacteria, viruses and fungi: are pests, as are weeds – plants which can be growing where they're not wanted.

Conflict between people and pests has existed since time immemorial and is generated primarily when such organisms complete with humans for the same resources, cause us discomfort or are vectors of disease. The need to protect human interests by limiting pest damage as much as possible has created justification for the development and use of chemical pesticides. Although the use of such toxic compounds has come under criticism in recent years it is important to review types of problems caused by pests.

Insects, weeds and plant pathogens (fungi nematodes) are responsible for the loss of an estimated 33% of all agricultural crops in the US every year in spite of the use of about 1 billion pounds of pesticides annually and the widespread utilization of other non-chemical means of control. Insect problems are particularly severe on corn and cotton (60% of all insecticides in the US are used on these two crops) soybeans rice, wheat, fruits and vegetables. In addition to such losses in the field, about 6% of our annual harvest is lost to pests while in storage or transit.

A further increase in crop loss due to pest degradation is a cause of concern both to farmers and humanitarians worried about feeling a hungry world. The US Department of Agriculture estimates that without pesticides, American agricultural production would drop by at least 25% and food prices would rise by 50%.

Notes:
1. in spite of - несмотря на
2. in addition to - кроме
3. at least - по крайней мере

VII. Answer the following questions about the text:
1. Can impact of certain insects, fungi, etc, have a disastrous effect on human health?
2. What does the term pest refer to?
3. When does conflict between people and pests exist?
4. What has the need to protect human interests by limiting pest damage created?
5. What crops are insect problems very severe on?
6. How many per cent of annual harvest is lost due to pests?
7. What is a cause of concern for farmers and humanitarians today?
8. What does the US Department of agriculture estimate?

VIII. Fill in the blanks with information taken from the text:
1. Such … viruses and fungi are pests.
2. The need to protect human interests by limiting pest damage has created … for the development and use of chemical …
3. Insects weeds and plant pathogens … for the loss of agricultural crops.
4. … are particularly severe on corn and cotton.
5. A term pests was applied to a number of deadly…

IX. Read the text, try to get it as a whole.

Text 14 B

VECTORS OF DISEASE

Public health practitioners along with farmers were among the first to greet the introduction of synthetic chemical pesticides with great enthusiasm. Compounds such as DDT were viewed as perhaps the ultimate weapon in freeing humanity from the threat of a number of insect or rodent form diseases responsible for millions of deaths and illnesses each year although the medical community hope to eradicate carriers of these diseases completely, pesticide use has played a significant role in lowering death rates and improving public health in many parts of the world. Some pests of particular public importance include:

Mosquitoes have probably been responsible for more human deaths that any other insect, though their role as disease – carriers was not recognized until late in the 19th century. Worldwide, even today millions of people become ill each year due to such mosquito – form ailments as malaria, yellow fever ,encephalitis, etc. In the past, there have been major outbreaks of all these diseases particularly malaria and yellow fever in the parts of the US.

In recent years, entry of large numbers of infected immigrants from tropical regions where malaria is still epidemic has been primarily responsible for the several hundred new cases of malaria being reported in the US each year.

In addition some cases of so – called “airport malaria” have been diagnosed among Americans returning from trips abroad as a result of visiting countries of Africa and Southern Africa where malaria is still a problem.

Flies – many species of flies, particularly the common housefly, are important carriers of serious gastrointestinal diseases such as typhoid fever, cholera, dysentery and parasitic worm infections due to their habit of feeding on human and animal wastes. If such wastes contain pathogenic organisms the fly can pick these up either on the sticky pads of its feet, on its body hairs or mouth – parts and mechanically transmit them to humans when it alights on food materials.

Body lice can be a source of intense discomfort but they are of special public health concern because of several serious epidemic diseases. Typhus fever characterized by high temperature, severe headache, rash has been a major killer in past centuries, particularly during wartime. When a person infested with lice scratches himself, major abrasions on the skin permit entry to the rickettsia. Other lice subsequently feeding on a person infected with typhus ingest the pathogen and spread it as they move from person to person.

Although the above is by no means a complete listing of the human health problems caused by various pest species, it should convey some realization of the need for pest control.

X. Find answers to the following sentences in the text:

1. Who greeted the introduction of synthetic chemical pesticides?
2. What compound is the weapon in freeing humanity from the threat of insect – borne diseases?
3. Has pesticide use played a significant role in lowering death rates?
4. What ailments are mosquitoes responsible for?
5. What was the reason of new cases of malaria in the US each year?
6. What are important carriers of gastrointestinal diseases?
7. Why are body lice a special public health concern?

8. Is it necessary to convey some realization of the need for pest control?

XI. Find sentences characterizing the following:

1. attitude of public health practitioners to the introduction of synthetic chemical pesticides;
2. role of pesticide use in improving public health ;
3. mosquitoes as disease – carriers;
4. outbreaks of malaria and yellow fever in the US;
5. reasons of epidemic of new cases of malaria each year;
6. carriers of typhoid fever, cholera and dysentery;
7. body lice as a special public health concern.

XII. Fill in the blanks with information taken from the text:

1. Many species of flies are important carries of …
2. In recent years entry of large numbers of … from tropical regions has been responsible for new cases of malaria in the US.
3. New cases of so – called … have been diagnosed among Americans returning from abroad.
4. Body lice are a source of … for people.
5. … is characterized by high temperature and severe headache.
6. A number of … responsible for millions of deaths and illnesses each year.

UNIT XV

MEASURES TAKEN TO PROTECT THE ENVIRONMENT

I. Remember the following words and word combinations from the text:

1. a review - обзор
2. to be liable to - нести ответственность
3. reference to - ссылка на
4. fall-out of land - выпадение земли
5. smelting - выплавка (плавильный завод)
6. refining of metals - переработка металлов
7. to pose threat - представлять угрозу
8. bacillary infection - бактериальная инфекция
9. treated sewage sludge - очищенный осадок сточных вод
10. valuable content - ценное содержимое
11. plant nutrients - питательные вещества растений
12. to treat soil - обрабатывать почву
13. long-term monitoring - долгосрочный мониторинг
14. elimination of disease producing organisms - устранение болезней, вызывающих заболевание организма
15. food chain - пищевая цепочка
16. run-off - стоки
17. residential and commercial occupation - занятость в коммунальных службах и на предприятии
18. gas works sites - завод по производству газа
19. coal tar derivatives - производные каменноугольной смолы
20. tipped asbestos wastes - наваленные асбестовые отходы
21. careful core-sampling - тщательная выборка ядра (каротаж)

22. removal operation - операция по удалению
23. to be practicable - быть практически осуществимым
24. upward migration - миграция вверх
25. extra casts - дополнительные расходы

II. Match each word in A with its antonym in B:

A: suitable, elimination, practicable, long-term monitoring, to include, valuable content, complete, upward migration, indirect contacts, analysis;

B: downward migration synthesis, introduction, direct contact, unsuitable, impracticable, short-term monitoring, incomplete, to exclude.

III. Match adjectives in A with nouns in B and translate the phrases into Russian:

A: agricultural, valuable, practical, economic, parasitic, bacillary, careful, direct, major, extra;

B: land, infection, contract, production, work, conditions, purposes, problems, monitoring, content, infection.

IV. Find the Russian equivalents for the following English words and word combinations in the right column:

1. to pose threat	1. пищевая цепочка
2. removal operation	2. газовый завод
3. long-term monitoring	3. питательные вещества растений
4. gas works sites	4. переработка металлов
5. upward migration	5. операция по удалению
6. refining of metals	6. представлять угрозу
7. plant nutrients	7. долгосрочный мониторинг
8. asbestos wastes	8. очищенный осадок сточных вод
9. food chain	9. миграция вверх
10. treated sewage sludge	10. отходы асбеста

V. Each sentence is the answer to a question. Make the question with the interrogative word suggested.

Model: In the Far East agricultural work poses threats to the crops from bacillary infection. (What from)

What does agricultural work pose threats to the crops from?

1. The treated sewage sludge in Great Britain in deposited on land for agricultural purposes. (What for)
2. Complete elimination of disease producing organisms is not guaranteed by sewage treatment. (What)
3. The assessment of contaminated sites must be based on analysis. (What)
4. Extra costs in building foundation construction are usual in either case. (What)
5. The metal content of solids requires careful long-term monitoring because of their phytotoxicity. (Why)

VI. Read the text below and learn about the effect of environmental problems on people's health.

Text 15 A

RELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS AND HEALTH

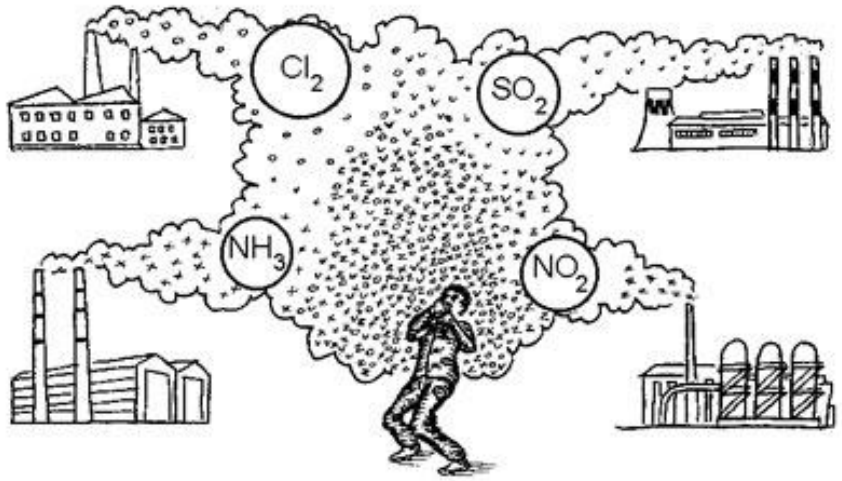
Rachel Carson (in Silent Spring) was altering the world to what has been called the fundamental principle of ecology, namely: we can never do merely one thing because the world is a system of fantastic complexity. Nothing stands alone. No intervention in nature can be focused exclusively on but one element of the system.
- Garett Hardin. Bulletin of the atomic Scientists (January, 1970)

A review of the hazards liable to the present air, food and water would be incomplete without reference to the relationships which exist between them, often invading the medium of land. Air pollution for instance, can lead

to fall-out on land making it unsuitable for crop or livestock production. The effect has been noted in connection with the smelting and refining of metals.

In the Far East, agricultural work poses threats not only to the workers employed in rice fields blooded with sewage contaminated water, from parasitic conditions but to the crops themselves from bacillary infection which may survive through to the point of consumption.

Over 40% of the treated sewage sludge produced in Britain is deposited on land for agricultural purposes, because of its valuable content of the plant nutrients nitrogen and phosphorus and role as a soil conditioner. The metal content of solids treated in this may requires careful long-term monitoring because of their phytotoxicity and the need to prevent undue accumulation (particularly cadmium) and introduction into the food chain. As complete elimination of disease producing agents is not guaranteed by sewage treatment the risks of direct contact and the contamination of water sources by run-off from the land stiff exist.



The redevelopment of land used formely for industry or waste disposal and now increasingly in demand for residential and commercial occupation poses many practical, environmental and economic problems. Particular difficulties arise with gas works sites, where coal tar derivatives, cyanide, hydrogen sulphide and arsenic are some of the hazards which may be encounted on disturbance on the ground. Sites made up with tipped asbestos waste or furnace residues containing toxic materials are also a major problem. The assessment of contaminated sites must be based on analysis

following careful core-sampling at representative points which may need to be large in number if the waste is mixed or has been deposited in layers. In some cases a whole site may have to be excavated and new soil imported involving a tremendous removal operation. In others, it may be more practicable to cover the contaminated material to a depth of up to 2 m with layered material designed to prevent the upward migration of toxic chemicals. Extra costs in building foundation construction are usual in either case.

Notes:
1. in connection with – в связи с
2. undue - чрезмерный
3. in this way – таким образом
4. in either case – в любом случае

VII. Answer the following questions about the text:
1. What do the relationships present in air, food and water involve?
2. What can air pollution lead to?
3. Why does agricultural work pose threats to the crops themselves?
4. Why does the metal content require long-term monitoring?
5. What poses many practical, environmental and economic problems?
6. Where do particular difficulties arise?
7. What must the assessment of contaminated sites be based on?
8. What does the removal operation of soil include?

VIII. Think and say about:
1. relationships present between air, food and water;
2. reasons of using treated sewage sludge on land for agricultural purposes;
3. the procedure of the contaminated sites assessment.

IX. Read the text, try to get in as a whole.

Text 15 B

POLLUTION CONTROL

Pollution control itself may be a polluting activity where air pollution has been abated by wet-scrubbing methods. A liquid waste product requires disposal. This may not be an easy problem to deal with if particulates with a toxic content have been collected in this way and secondary pollution of water or land is to be prevented. Attempts to control sulphur dioxide emissions by scrubbing with chalk-bearing water have been effective but only at the cost of oxygen depletion from the water and the production of another waste product, calcium sulphate. The process has been found to produce a net overall benefit to the environment in only a few special situations.

Direct contamination of water and food may arise from air pollution. The increase in total emissions of sulphur dioxide to the air over the period of twentieth century is estimated to be almost thirtyfold. Perhaps the effects of international transport of this gas are exaggerated; those on the acidity of lakes through dissolution of SO_2 in rainwater cannot be dismissed. Food production in the polluted areas may require special care to be taken over the ventilation of premises to prevent the introduction of airborne contaminants into manufacturing areas.

If the environment is regarded as a unified system, no form of pollution can be viewed in isolation. The Royal Commission on

Environmental Protection (Fifth Report, Air Pollution Control: An Integrated approach) recommended the target adverse impact of industrial processes on our surroundings. Sewage treatment is abundant source of methane, useful as a pollution-free fuel. The needs of industry for water can be met by juxtaposition of the consumers and sewage treatment works the effluent from which, though not treated to portable standards is an economic alternative to public supplies for cooling purposes. Refuse incineration presents useful opportunities for energy production as well as reducing the bulk and putrescible nature of waste.

In the long run a comprehensive study of various components which make up the practice of environmental health is necessary to an understanding of its relevance to everyday life now. It once again demonstrates that humans themselves hold the key to health and prosperity. They can change their environment for the better or the worse, depending upon the action taken. First must come understanding and acceptance of relationships between environmental factors and health which demonstrate clearly that our future health is largely in our own hands. The view that the total environment must be understood and treated in a comprehensive way finds increasing acceptance and may provide grounds for cautions optimism for the future.

X. Find answers to the following questions in the text:

1. What does a liquid waste product require?
2. What method of control sulphur dioxide emissions has been effective?
3. What problems may arise from direct contamination of water and food?
4. What may food production in polluted areas require?
5. Must all forms of pollution be viewed all together?
6. Sewage treatment is an abundant source of methane, isn't it?
7. What presents useful opportunities for energy production?
8. How can humans change their environment?

XI. Find information concerning the following statements in the text:

1. pollution control is a polluting activity;
2. control of sulphur dioxide emissions is possible at the cost of oxygen depletion from water;
3. the Royal Commission on Environmental Protection recommended the target adverse impact on our surroundings;
4. methane is a pollution – free fuel;
5. refuse incineration presents useful opportunities for energy production;
6. humans hold the key to health and prosperity.

XII. Think and find arguments to prove that:

1. pollution control is not as easy problem to deal with;
2. food production requires special measures to be taken;
3. the needs of industry for water can be met by juxtaposition of the consumers and sewage treatment works;
4. understanding of relationships between environmental factors and health is very important.

SUPPLEMENTARY READING

Ecosystems: What They Are

1. Photographs of the earth taken from the moon made it clear as never before that the Earth is a sphere in the void of space like a space - ship on an everlasting journey. "Spaceship Earth" became a popular term and concept. Spaceship Earth is unique among all the planets we know. In addition to its rock base, it has an oxygen-rich atmosphere, an abundance of liquid water, and, most conspicuous, millions of kinds of living things of which we, Homo sapiens, are but one. The layer around the Earth where air (atmosphere), water (hydrosphere), and minerals (lithosphere) interact with living things is called the biosphere.

2. No living organism exists or can exist as an entity unto itself. Each organism is but one member of a particular species. The word "species" refers to the total population of a specific kind of plant, animal, or microbe. But no species is an entity unto itself either. All species depend on air, water, and nutritive elements from the earth's minerals. But plants, animals, and microbes also play important roles in removing pollutants from air and replenishing its oxygen and carbon dioxide, in purifying water, and in recycling mineral elements. Therefore, we can say that plants support animals; animal activities support plants; and all organisms help to support and maintain air, water, and soil quality.

3. Thus, the biosphere consists of a virtually infinite number of mutually dependent and mutually supportive interrelationships among all living organisms, air, water, and minerals. Humans are no less a part of and no less dependent on these interrelationships than any other species, although we frequently delude ourselves into thinking that we are. Our very term "natural resources" implies that all these things air, water, soil minerals, grasslands, forests, wildlife-are there simply for our taking with no prices to be paid for their use, misuse, or pollution, and no need to put anything back in return. However, there are prices to be

paid, and some of the prices, such as potential global warming, depletion of the ozone shield, and loss of tropical forests, may be steeper than we can afford.

4. It should be clear that sustainability of human society as well as sustainability of other species will depend on maintaining the integrity of the biosphere. To do this, we need to know how the biosphere works how the biosphere functions to support all life. Thus, it is important to examine ecosystems. An ecosystem may be defined as a grouping of various species of plants, animals, and microbes interacting with each other and with their environment. The environment includes temperature, precipitation, amount of moisture, and all other chemical and physical factors which organisms are exposed. Furthermore, the interrelationships are such that the entire grouping may perpetuate itself, perhaps indefinitely. This definition is a very condensed description of what is observed in nature and can be best understood by considering some examples of ecosystems with which you are probably already familiar.

5. A quick tour across the United States shows deciduous (leaf-shedding) forests in the East, which turn brilliant colors in the fall before the leaves drop; prairies or grasslands in the Central States; deserts with distinctive cacti in the South-west; and coniferous (evergreen) forests in c the northern and western Mountain States. Across northern Canada and on the upper slopes of mountains, there are treeless expanses called tundra, and in equatorial regions we find tropical rainforests. These different ecosystems are the result of different climates, that is, different environmental conditions of temperature and rainfall.

6. Looking at these examples more closely, we note that each ecosystem is characterized by a distinctive plant community, which is defined as grouping of particular plants. Each plant community supports a particular array of animals. An array of microbes will be found in each ecosystem, feeding on dead plant and animal material. Each of these examples represents a distinctive grouping of plants, animals, and microbes interacting with one another and with the environment. Thus, each grouping

in association with the environment that supports it is an ecosystem. Furthermore, we know that these groupings existed long before humans came on the scene and, if not disturbed by humans, would continue to exist for a very long time and perhaps even indefinitely. That is, ecosystems perpetuate themselves.

7. Major terrestrial ecosystems, such as forest or prairie, are not entirely uniform; each consists of a number of more or less distinct but related ecosystems. Thus, each is also called a biome, a term that refers to a number of closely related ecosystems. Within a biome, an ecosystem may include any more or less distinctive grouping of organisms interacting with each other in a particular environment. For instance, a patch of woods, an open field, a pond, a stream, each may be considered and studied as an ecosystem. While it is convenient to divide the biosphere into biomes and ecosystems for study and discussion, it is important to recognize that they seldom have distinct boundaries, and they are definitely not independent of one another. Rather, one ecosystem tends to blend into next through a transitional region called an ecotone, which is a region that contains many of the species and characteristics of the two adjacent systems.

8. The ecotone between adjacent systems may include unique environments that support distinctive plants and animals as well as those that are common to the adjoining ecosystems. Consider a marshy area, which often occurs between the open water of a lake and dry land. Whether they contain distinctive species or not, ecotones may be studied as ecosystems in their own right. Furthermore, some animal species- migratory birds, for instance,- may inhabit different ecosystems at different times of the year, and what happens in one ecosystem used by the migrators will definitely affect any other ecosystems used during other seasons. For example, losses and fragmentation of forests have disrupted migration lanes and resulted in drastic declines in the populations of certain North American songbirds. How the loss of all these birds will affect various ecosystems is a question we just cannot answer at this time.

9. Oceans include a variety of environments depending on temperature, water depth, nature of the bottom, and concentrations of nutrients and sediments. Each of these environments, called marine environments, supports a more or less distinctive array of seaweeds, plankton, fish, shellfish, and other marine organisms. Thus, different areas of oceans-reefs, continental shelves, deep oceans – may be studied as separate ecosystems, even though their interconnections and, interdependencies are obvious. There are conspicuous ecotones between ocean and freshwater systems in the form of estuaries, and between oceans and the land in the form of beaches, wetlands, and rocky coastlines.

10. All ecosystems and biomes are interconnected through the movements of air (wind) and water. Thus, the entire biosphere is really one mammoth ecosystem. It is only for the convenience of study and understanding that we divide it into biomes and smaller ecosystems.

Ecosystems: What They Are

1. There are two "sides" in every ecosystem, the organisms on the one hand and the environmental factors on the other. All the organisms – plants, animals, and microbes – in the ecosystem are referred to as the biota (bio, "life"). The way the categories of organisms fit together is referred to as the biotic structure. The nonliving chemical and physical factors of the environment (climate, soil quality and so forth) are referred to as abiotic (a, "non") factors.

2. As it was noted before, the environment involves the interplay of many physical and chemical, or abiotic factors, the major ones being rainfall (amount and distribution over the year), temperature (extremes of heat and cold as well as average), light, water, wind, chemical nutrients, pH (acidity), salinity (saltness) and fire. The degree to which each is present or absent, high or low, profoundly affects the ability of organisms to survive. However, different species may be affected differently by each factor. We shall find that this difference in response to environmental factors determines which species may or may not occupy a given region. In turn, which organisms do or don't survive determines the nature of a given ecosystem.

3. In any study of the abiotic side of ecology, the key observation is that different species thrive under different conditions. This principle applies to all living things, both plants and animals. Some like it very wet; others like it relatively dry. Some like it very warm; others do best in cooler situations. Some tolerate freezing, others don't. Some require bright sun; others do best in shade. Laboratory experiments clearly bear this fact out. Plants may be grown in a series of chambers in which all abiotic factors are controlled. Thus, a single factor – temperature, say – can be varied in a

systematic way, while all other factors are kept constant. Experiments show that, as temperature is raised from a low point that fails to support growth, plants grow increasingly well until they reach some maximum. Then, as temperature is raised still further, the plants become increasingly stressed; they do less well, suffer injury and die.

4. The point that supports the maximum growth is called the optimum. Actually, since maximum growth usually occurs over a range of several degrees, we speak of an optimal range. The entire span that allows any growth at all is called the range of tolerance. The points at the high and low ends of the range of tolerance are called the limits of tolerance. Between the optimal range and the high or low limit of tolerance, there are zones of stress. That is, as temperature is raised or lowered from the optimal range, the plants experience increasing stress until, at either limit of tolerance, they cannot survive. Similar experiments have been run to test other factors, and the results invariably follow the same general pattern. Of course, not every species has been tested for every factor; however, the consistency of such observations leads us to conclude that this is a fundamental biological principle: Every species (both plant and animal) has an optimum range, tones of stress, and limits of tolerance with respect to every abiotic factor.

5. This line of experimentation also demonstrates that different species differ markedly with respect to the values at which the optimum and limits of tolerance occur. For instance, what may be an optimal amount of water for one species may stress a second and result in the death of a third. Some plants cannot tolerate any freezing temperatures, others can tolerate slight but not intense freezing, and some actually require several weeks of freezing temperatures in order to complete their life cycles. While optimums and limits of tolerance may differ from one species, however, there may be great

overlap in the ranges of tolerance for various species. Thus many plants may grow under the same conditions, although these conditions may not be optimal for all of the plants.

6. Since the results just described apply to any and all abiotic factors, we observe what is known as the Law of Limiting Factors: Any one factor being outside its optimal range at any given time will cause stress and limit the growth of an organism. The factor that is limiting the growth is called the limiting factor. It may be any factor that affects the organism. The Law of Limiting Factors includes the problem of "too much" as well as the problem of "too little". For example, plants may be stressed or killed by overwatering or over fertilizing as well as by under watering or under fertilizing, a common pitfall for amateur gardeners. The factor that is limiting may change from one time to another. For example, in a single growing season, temperature may be limiting in the early spring, nutrients may be limiting later, and then water may be limiting if a drought occurs. Also, if one limiting factor is corrected, growth will increase only until another factor comes into play.

7. The Law of Limiting' Factors was first presented by Justus von Liebig in 1840 in connection with his observations regarding the effects of chemical nutrients on plant growth. He observed that restricting any one of the many different nutrients at any given time had the same effect: it limited growth. Thus, this law is also called Liebig's Law of Minimums. Observations since Liebig's time, however, show that his law has much broader application. Beyond its application to all abiotic factors, it may be applied to biotic factors as well. Thus the limiting factor for one species may be competition or predation from another. This is certainly the case with our agricultural crops, where it is a

constant struggle to keep them from being limited or even eliminated by weeds and "pests".

8. In summary, the biosphere consists of a great variety of environments, both aquatic and terrestrial. In each environment we find plants, animal, and microbial species that are adapted to all the abiotic factors and also to each other in various feeding and nonfeeding relationships. Such environment supports a more or less unique grouping of organisms interacting with each other and with the environment in a way that perpetuates or sustains the entire group. That is, each environment with the species it supports is an ecosystem. Every ecosystem is interconnected with others through ecotones and through some species that cross from one system to another. At the same time, each species and, as a result, each ecosystem, is kept within certain bounds by limiting factors. That is, the spread of each species is at some point limited by its not being able to tolerate particular conditions, compete with other species, or cross some physical barrier. Significantly, nowhere in nature do we find a species restraining its own spread and influence in and of its own volition; restraint is always due to one or more limiting factors.

9. A major concern of many environmentalists is how altering any factor, abiotic or biotic, may upset these limits and have far-reaching consequences through a ripple effect. Recognizing that everything in the biosphere is interconnected leads to the conclusion that nothing can be changed without affecting everything else to a greater or lesser degree. Obviously, humans have changed and are continuing to change things on a very large scale. What will these changes bring? Many environmentalists, including a number of scientists, promote the idea that we may be on the verge of a sudden and catastrophic "collapse of the

biosphere" in which most if not all life may perish. On the other hand, cornucopians, also including a number of scientists, point out that there is no solid evidence to support such a "doomsday scenario", much less that it is imminent. Indeed, they argue that all our experience to date should lead to the quite opposite conclusion: Humans have already caused the extinction of thousands of species and made manifold changes over most of the earth, but we and the biosphere are still doing well. Therefore, they maintain that continuing development as we have been does not pose an environmental threat.

1. **Nutrient Cycling.** When you look at the various inputs and outputs of producers, consumers, detritus feeders and decomposers, how they fit together should be conspicuous. The waste, or byproducts, of each is the food or essential nutrients for the other. Specifically, the organic material and oxygen produced by green plants are the food and oxygen required by consumers and other heterotrophs. In turn, the carbon dioxide and other wastes generated when heterotrophs break down their food are exactly the nutrients needed by green plants. Herein is the first basic principle of ecosystem sustainability: for sustainability, ecosystems dispose of wastes and replenish nutrients by recycling all elements. This principle is in harmony with the Law of Conservation of Matter. Since atoms are neither created nor destroyed, nor converted one into another, they can be reused indefinitely. This is exactly what natural ecosystems do; they recycle the same atoms over and over again. We can see this even more clearly by focusing on the pathways of three key elements: carbon, phosphorus, and nitrogen. Since these pathways do lead in a circle, they are known as the carbon cycle, the phosphorus cycle, and the nitrogen cycle.

2. **The Carbon Cycle.** For descriptive purposes, it is convenient to start the carbon cycle with the "reservoir" of carbon dioxide molecules present in the air and dissolved in water. Through photosynthesis and further metabolism, carbon atoms from carbon dioxide become the carbon atoms of all the organic molecules making up the plant's body. Through food chains, the carbon atoms then move into and become part of the tissues of all the other organisms in the eco-system. However, it is unlikely that a particular carbon atom will be passed through many organisms on any on cycle because at each step there is a considerable chance that the consumer will break down the organic molecule in cell respiration. As this occurs, the carbon atoms are released back to the environment in molecules of carbon dioxide, thus completing one cycle, but of course ready to start another.

Likewise, burning organic material returns the carbon atoms locked up in the material to the air in carbon dioxide molecules. No two successive cycles of a particular carbon atom are likely to be the same. Nor are the two cycles likely to be within the same ecosystem because in the atmosphere wind will carry them around the globe.

3. **The Phosphorus Cycle.** Phosphorus exists in various rock and soil minerals as inorganic phosphate ion ($PO4^{3-}$). As rock gradually breaks down, phosphate and other nutrient ions are released. Phosphate dissolves in water but does not enter air. Plants absorb phosphate from the soil or water solution, and as it is bonded into organic compounds by the plant it is frequently referred to as organic phosphate. Through food chains, organic phosphate is transferred from producers to the rest of the ecosystem. As with carbon, at each step there is a high likelihood that the organic phosphate will be broken down in cell respiration, releasing inorganic phosphate in urine or other waste. The phosphate may then be reabsorbed by plants to start another cycle.

4. There is an important difference between the carbon cycle and the phosphorus cycle. No matter where carbon dioxide is released, it will mix and maintain the concentration of carbon dioxide in the air. Mineral nutrients, however, which do not have a gas phase, are recycled only insofar as the wastes that contain them are deposited on the soil from which the nutrients originally came. This is basically what happens in a natural ecosystem. However, humans are prone to upset this cycle. A very serious case of humans interfering with the phosphorus cycle is seen in the cutting of tropical rainforests. This type of ecosystem is supported by a virtually 100 percent efficient recycling of nutrients. In other words, there are little or no reserves in the soil. When the forest is cut and burned, the nutrients that were locked up in the trees are really washed away, and the land is rendered unproductive: Also, in the human system, phosphate from agricultural crop-lands makes its way, in large part, into waterways – either directly by way of runoff from croplands or indirectly by way of

discharge of sewage effluents. Since there is essentially no return of phosphate from water, this addition results in over fertilization of bodies of water. Meanwhile, phosphorus is replaced on croplands by mining phosphate rock – a process that will ultimately result in depletion.

5. **The Nitrogen Cycle**. It is more complex than the carbon and phosphorus cycles because it has both a gas phase and a mineral phase. The main reservoir of nitrogen is the air, which is about 78 percent nitrogen gas (N_2). Plants cannot utilize nitrogen gas directly from the air; instead the nitrogen must be in a mineral form, such as ammonium ion (NH_4^+) or nitrate ion (NO_3). A number of bacteria and also certain blue-green algae, which are actually bacteria, can convert nitrogen gas to the ammonium form, a process called biological nitrogen fixation. Most important among these nitrogen-fixing organisms is a bacterium called Rhizobium, which lives in nodules on roots of legumes, members of the pea-bean family of plants. This is another example of symbiosis. The legume provides the bacteria with a place to live and with food (sugar) and gains a source of nitrogen in return. Fixed organic nitrogen is passed from the legumes to other organisms in the ecosystem through food chains.

6. As animals break down proteins and other organic compounds containing nitrogen for energy in cell respiration, the nitrogen is excreted, generally in the ammonium ion form. Bacteria in the soil may convert the ammonium ion to the, nitrate form but either form may be reabsorbed by any plants, thus creating an ongoing cycle. However, another kind of bacterium in the soil gradually changes the nitrate ion back to nitrogen gas. Consequently, nitrogen will not accumulate in the soil. Some nitrogen gas is also converted to the ammonium form by discharges of lightning in the process known as atmospheric nitrogen fixation and comes down with rainfall, but this is estimated to be only about 10 percent of the amount of biological nitrogen fixation.

7. All natural ecosystems, then, depend on nitrogen-fixing organisms; legumes with their symbiotic bacteria are, by far, the most important. The

legume family includes a huge diversity of plants, ranging from clovers (common in grasslands) through desert shrubs to many trees. Every major terrestrial ecosystem, from tropical rainforest to desert and tundra, has its representative legume species, and legumes are generally the first plants to recolonize a burned-over area. Without them, all production would be sharply impaired because of lack of available nitrogen. The nitrogen cycle in aquatic ecosystems is similar, but there blue-green algae are the most significant nitrogen fixers.

8. Only humans have been able to bypass the necessity for legumes when nonlegume crops such as corn, wheat, and other grains are being grown. We do this by fixing nitrogen in chemical factories (industrial nitrogen fixing). Synthetically produced ammonium and nitrate com-pounds are major constituents of fertilizer. However, the high cost of industrially fixed nitrogen and other soil factors are causing many farmers to readapt the natural process of enriching the soil by alternating legumes with nonlegume crops, that is, by crop rotation.

Ecosystems: What Keeps Them The Same?

1. The most important point to recognize is that no forces or rigid structures exist that prevent ecosystems from changing. In fact, eco-systems can and do change, even drastically, as conditions are altered. The one thing that enables ecosystems to sustain a given composition of species over long periods of time is that all the relationships in the system are in a dynamic balance.

2. Each species in an ecosystem exists as a population – that is to say, an interbreeding, reproducing group. An ecosystem's remaining stable (sustaining itself) over a long period of time implies that the population of each species in the ecosystem remains more or less constant in size and geographic distribution. Any continuing increase or decrease in population would be observed as a change in the ecosystem. In turn, a population's remaining constant over a long time means that reproductive rate is equaled by death rate. Thus, the problem of ecosystem balance boils down to a problem of how birth rate and death rate are balanced for each species in the ecosystem.

3. Maintaining or increasing a population depends on more than reproductive rate (number of live births, eggs laid, or seeds or spores set in plants) by itself. Recruitment, which is defined as making it through the early growth stages to become part of breeding, reproducing population, is equally important. For example, many fish lay thousands, even millions of eggs, and plants typically set thousands of seed. Yet population increase may be nil because recruitment is so low; in other words, most of the young fish and plants perish in the early stages of growth. (Note that "low recruitment" is a polite way of saying high mortality of the young.) Conversely, even a relatively low reproductive rate may result in a substantial population increase when recruitment is high. Primates are an outstanding example of this latter strategy.

4. Additional factors that influence population growth and geographic distribution are the ability of animals to migrate or of seeds to disperse to

similar habitats in other regions, the ability to adapt to and invade new habitats in addition to the one originally occupied, defense mechanisms, and resistance to adverse conditions and disease. All these factors taken together are referred to as the biotic potential of the species. Despite different strategies regarding biotic potential, there is one point in common: Every species has sufficient reproductive capacity to rapidly increase its population if factors are favorable for a high recruitment. Indeed, each new generation will be multiplied by the number of female produced. For example, rabbits producing 20 offspring, 10 of which are female, may grow by a factor of 10 each generation: 10, 100, 1000, 10 000... Such a multiplying series is called an exponential increase. In populations it is commonly called a population explosion.

5. Populations in natural ecosystems do not explode because all conditions are seldom favorable for any extended period of time. One or more abiotic factors, such as unfavorable temperature, amount of available water, pH, or salinity, and/or one or more biotic factors, such as predators, parasites, disease organisms, or lack of sufficient food, become limiting. The combination of all these abiotic and biotic factors that may limit population increase is referred to as environmental resistance.

6. One may already foresee the result of the interplay between biotic potential and environmental resistance. Sooner or later, any population increase will be curtailed by one or more factors of environmental resistance. It is important to observe how this curtailment works, however. In general, the reproductive rate for a species remains fairly constant, because that rate is part of the genetic endowment of the species. What varies tremendously is recruitment. It is in the early stages of growth that individuals (plants and animals) are most vulnerable to precaution, disease, lack of food (or nutrients) or water, or other adverse conditions. Consequently, environmental resistance effectively reduces recruitment. Of course, some adults also perish, particularly the old and weak. If recruitment is at the replacement level, just enough to replace these adults, then the population size will remain constant. If recruitment is not

sufficient to replace losses in the breeding population, of course, the population size will decline.

7. In certain situations, environmental resistance may effect reproduction as well as causing mortality (death) directly. For example, loss of suitable habitat often prevents animals from breeding. Also, certain pollutants adversely affect reproduction. However, we can still view these situations as environmental resistance either blocking a population's growth or causing its decline.

8. In conclusion, whether a population grows, remains stable, or decreases is the result of a dynamic balance between its biotic potential and environmental resistance. In general, biotic potential remains constant; it is shifts in environmental resistance that allow populations to increase or cause them to decrease For example, a number of favorable years (low environmental resistance) will allow a population to increase; then a drought may cause it to die back, and the cycle may be repeated. It should be noted that balance is a relative phenomenon. Some balances fluctuate very little, others fluctuate widely, but as long as decreased populations restore their numbers, the system may be said to be balanced. Still, the questions remain: What maintains the balance within a certain range? What prevents a population from going into an explosion or into extinction? Indeed, in nature, neither possibility is ruled out.

9. In general, populations remain within a certain size range because most factors of environmental resistance are density-dependent. That is, as population density (the number of individuals per unit area) increases, environmental resistance becomes more intense and causes an increase in mortality such that population growth ceases or declines. Conversely, as population density decreases, environmental resistance is generally mitigated, allowing the population to recover. This balancing act will become clearer if we discuss specific mechanisms of population balance.

10. Human impacts, on the other hand, readily result in extinction because they are not density-dependent. Impacts such as ecosystem

destruction, habitat alteration, pollution, and exploitation can be just as intense at low population densities as at high. Furthermore, the biotic potential of many species depends on a minimum population base – a herd of deer, a pack of wolves, a flock of birds, or a school of fish, for example. If a population is pushed below a certain critical number necessary to support a breeding population, biotic potential fails, and extinction is virtually assured. Species whose populations are declining because of human impacts are defined as threatened. If the population is approaching or is at what scientists believe to be critical number, the species may be defined as endangered.

Ecosystems: Mechanisms of Population Balance

1. There are some specific mechanisms that provide population balance in nature. It is necessary to focus on one mechanism at a time, but keep in mind that in natural ecosystems all of the mechanisms are working in concert to create the overall balance. Knowledge of these mechanisms will make us aware of how ecosystems may be upset and the consequences that may result.

2. A classic example of population balance is that between the lynx, a member of the cat family, and hares, a member of the rabbit family, as observed in Canada from 1850 to 1930. When the hare population is low, each hare can find abundant food and plenty of places, to hide and raise offspring. In other words, the hares' environmental resistance is relatively low, and their population increases despite the presence of the lynx predator. As the hare population increases, however, each hare has relatively less food and fewer hiding places. More hares provide easier hunting for the lynx so that, with plenty of hares to feed lynx young, the lynx population begins to fall. As the hare population falls the food and shelter available to each hare again increase. Also, surviving hares are those that are healthiest and best able to escape from the lynx. Hunting becomes harder for the lynx; many of them starve, and their population begins to fall. These factors sum up to lower environmental resistance for the hares, and their population increases again, repeating the cycle. These events explain the fluctuating but continuing balance found between the hare and lynx populations.

3. Much more abundant and ecologically important in population control are a huge diversity of parasitic organisms. These organisms range from tapeworms, which may be a foot or more in length to microscopic disease-causing protozoans, fungi, bacteria, and viruses. All species of plants, animals, and even microbes may be infected by parasites. In terms of population balance, parasitic organisms act in the same way as large

predators. As the population density of the host organism increases, parasites and their vectors (agents that carry the parasites from one host to another), such as disease-carrying insects, have little trouble finding new hosts, and infection rates increase, causing dieback. Conversely, when the population density of the host is low, transfer of infection is impeded, and there is a great reduction in levels of infection, a condition that allows the population to recover.

4. Parasites may not kill their host, but they generally weaken it and make it more vulnerable to adverse conditions and to attack by larger predators. It is commonly observed that the animals killed by large predators are infected with parasites, whereas animals killed by hunters are generally healthy. In a food web, a population of any given organism is affected by a number of predators and parasites simultaneously. Consequently, the balance can be thought as a balance between the population of an organism and its natural enemies. The wide swings in populations noted in the hare-lynx case are generally typical of very simple ecosystems involving relatively few species. Balances between an organism and several natural enemies are generally more stable and less prone to wide fluctuations because different natural enemies come into play at different population densities. Also, when the preferred prey is at a low density, the population of the natural enemy may be supported by its feeding on something else. Thus, the lag time between increase of the prey population and that of the natural enemy is diminished. These factors have a great damping effect on the rise and fall of the prey population.

5. In all such balances, however, whether simple or complex, it is extremely important to recognize that a high degree of adaptation is involved on the part of both the prey or host and the natural enemy. This adaptation is such that a given natural enemy is incapable of completely eliminating its prey or host but yet is capable of limiting the prey or host population to a certain density. Putting any predator and prey or host

and parasite together does not lead to an automatic balance. Such lack of balance is shown all too clearly by what may occur when a species from one region is introduced into another. Such introductions may lead to what are commonly called ecological disasters as balances fail.

6. In discussing predator-prey balances, it was said that in lean times the excess carnivore population – the lynx, for instance, – simply starved. Actually, another factor is often involved in the control of carnivore and some herbivore populations: territoriality, which refers to individuals or groups claiming a territory and defending it against others of the same species. For example, the males of many species of songbirds stake out a territory at the time of nesting. Their song has the function of warning other males to keep away. Male wolves and other carnivores, including dogs, stake out a territory by spotting it with urine, the smell of which warnes other males to stay away. The territory defended is large enough to assure the "owners" of being able to gather enough food to successfully rear a brood. The size of the territory defended varies with resources available. In lean times territories are larger; in good times they are smaller.

7. The obvious advantage of territoriality is that individuals that are able to successfully claim and defend a territory will have enough re-sources to rear a well-fed, healthy next generation. Those individuals unable to claim a territory generally meet an unhappy end. Continually chased out of one territory after another, they fall victim to any of the factors of environmental resistance, or at the very least they are unable to breed and raise young. Territoriality does not change the basic principle of population being a dynamic balance between biotic potential and environmental resistance. In the face of limited resources, however, territoriality creates a mechanism of selecting the strongest and fittest to survive and breed, while eliminating the genes of the weaker individuals.

8. Territoriality is an instinctive behavioral trait in many species. By keeping populations in check, territoriality helps to maintain the balance

of the ecosystem and thus to ensure survival of the species. Many people have observed that humans are also a territorial animal, even to an extent that greatly exceeds any other species. Almost all of us aspire to owning a piece of land that we can put a fence around and call ours, and the bigger the piece of land, the better. Throughout history, virtually all wars between nations have involved territorial disputes, and nations continue to arm themselves to the teeth with the most sophisticated weaponry available – always, they say, to defend themselves against the threat of territorial encroachment by their neighbors.

CONCLUSION

В пособии рассмотрены наиболее актуальные проблемы охраны окружающей среды: охрана атмосферы, земли и воды, проблема шума, радиации, загрязнение продуктов питания, переработка промышленных и бытовых отходов, взаимоотношения человека и окружающей среды и др.

Основное назначение пособия заключается в обеспечение планомерного руководства аудиторной работой студентов, направленной на основательное изучение текстов и их обсуждение с применением смыслового анализа.

Пособие включает целевые задания к текстам, состоящие из трёх частей: вокабуляра, упражнений языковых и речевых для обсуждения в аудитории. Цель упражнений – активизация вокабуляра и восприятие смыслового содержания текста. Тексты по проблемам экологии взяты из оригинальных современных научных и научно-популярных изданий (монографий, журналов и газет).

Структура модулей и последовательность изложения учебной информации однотипны, что облегчает усвоение матери ала и пони мани е задач, поставленных в упражнениях.

Пособие заканчивается текстами для дополнительного чтения, которые тематически и лексически являются продолжением уроков основной части пособия и предназначены для самостоятельной работы студентов.

Итак, в заключение можно сделать вывод, что такое структурированное пособие, в котором предложены новые пути отбора и организации учебного материала, построения последовательной системы упражнений, может помочь преподавателям по-новому взглянуть на проблем ы обучения чтению оригинальной литературы и извлечению необходимой когнитивной информации.

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