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КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

# СБОРНИК ТЕКСТОВ

для самостоятельной аудиторной работы
студентов специальности
**1-33 01 07 Природоохранная деятельность**
**«ИНОСТРАННЫЙ ЯЗЫК**
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Сборник текстов предназначен для обучения студентов факультета инженерных систем и экологии чтению и переводу профессиональной литературы на английском языке.

Сборник составлен в соответствии с требованиями учебной программы «Иностранный язык (профессиональная лексика)» для студентов специальности 1-33 01 07 Природоохранная деятельность дневной формы получения образования.

Целью сборника является совершенствование навыков и умений чтения и перевода англоязычной литературы по указанной специальности. Текстовый материал заимствован из зарубежных источников, его тематика определена программой подготовки специалистов технического профиля.

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# UNIT 1. ENVIRONMENTAL ENGINEERING

## Text 1. Environmental Science

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Environmentalism is a different way of thinking in which people try to care more about the planet and the long-term survival of life on Earth. It means recognizing the planet's environmental problems and coming up with solutions (individually and collectively) that try to put them right.

What problems does our planet face?

Earth can seem an enormous place—it's a giant ball almost 13,000 km (8,000 miles) in diameter. There are over 7.5 billion people living on planet Earth, consuming resources, making pollution, and using so much energy in such an inefficient way that they are fundamentally changing how the climate works, risking life in the future. Here are just a few of the problems the environment is now facing:

Resources

We live by consuming—buying things and throwing them away, sometimes without even using them. Elsewhere on the planet, millions of people live in dire poverty with too little food, no proper water supply or sanitation, and horrible health problems. Earth is a finite place with limited resources, yet we live as though our supply of raw materials will never end. Modern humans have successfully lived on planet Earth for something like 200,000 years, but some of the materials we now critically depend on—metals, minerals, and so on—will last only a few more decades and many more will be gone in a few hundred years, at best.

Energy supply

A basic law of physics (the conservation of energy) tells us it's impossible to do anything on earth without using energy—even something as simple and effortless as thinking needs us to consume food, which is simply energy we feed in through our mouths. Our homes need energy too, for cooking, heating, making hot water, and running all the appliances and gadgets that make our lives comfortable.

Though a small amount of our energy is renewable (things like solar power, wind power, and tidal power will theoretically never run out), most comes from burning fossil fuels such as coal, oil, and natural gas.

The planetary "fossil-fuel tank" inside Earth took hundreds of millions of years to fill up, but humans have emptied the vast majority of it in just a couple of hundred years or so since the beginning of the Industrial Revolution. How are we going to meet our energy needs in future when most of the fossil fuels have gone, especially with more people living on the planet (and in greater affluence) than ever before?

Waste and pollution

There's almost nothing we do that doesn't create some form of waste as a byproduct. Before the 20th century, that wasn't really a problem: people were pretty good at turning things like food or animal waste into compost—they certainly didn't have things like landfill sites and incinerators. These days things are very different because we use a far greater variety of materials, including plastics, which are harder to recycle or dispose of. Even though most plastics are made from petroleum (a finite and relatively scarce material), still we tend to throw them away rather than recycle them. Waste is one thing: if we can contain it and collect it, at least we can recycle it or dispose of it responsibly.

Sometimes waste becomes pollution: solids, liquids, or gases we throw out into the environment without caring where they end up or what damage they do.

Habitats and species

Humans have become dominant on Earth through the evolution, but we tend to regard ourselves as though we are the only species on the planet—and certainly the only one that matters. With the exception of the pets we keep for amusement, we give little or no thought to other species—plants or animals—or their habitats (the places where they're most suited to living). We build homes, factories, and highways for ourselves by obliterating the homes of other species. Mostly we consider animals have no rights at all, though contrary views don't trouble us much: we abhor cruelty and sometimes oppose things like laboratory experimentation on animals, but we turn a blind eye to the billions of creatures raised in appalling conditions and slaughtered in food factories to put cheap, convenient meals.

Social justice

Some environmental problems are caused not just by the way humans relate to the natural world, and to animals, but to the way we treat one another. People in rich countries of Europe and North America often frown on people in developing countries who burn rainforests, have large numbers of children, or live in grossly polluted cities. We ignore the fact that poorer people are often condemned to live that way by the unfair rules of international trade. If we pay people in developing countries a pittance for products like coffee, cotton, or rubber, is it any surprise that they have larger families to try to generate more income to help themselves survive? If we don't share our medicines with them so their children die, isn't it natural that they should have more children to compensate? Politicians like to applaud themselves on how much waste people are now recycling and how much fuss is being made about cutting the greenhouse gases that cause global warming—but we're doing those things partly by exporting our problems to developing countries: we quietly ship our toxic waste to Africa and much of the stuff we buy is manufactured in countries such as China, so we effectively export our greenhouse emissions and pollution overseas. We're very good at brushing environmental problems under someone else's carpet.

## Text 2. Environmental Engineering

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Environmental engineering is the application of science and engineering principles to improve the environment (air, water, and/or land resources), to provide healthy water, air, and land for human habitation and for other organisms, and to remediate polluted sites.

Environmental engineering is a diverse field, which emphasizes several areas: process engineering, environmental chemistry, water and sewage treatment (sanitary engineering), waste reduction or management, and pollution prevention or cleanup.

Environmental engineering is a synthesis of various disciplines, incorporating elements from the following: Agricultural engineering; Biology; Chemical engineering;

Chemistry; Civil engineering; Ecology; Geography; Geology; Hydrogeology; Public health; Solid waste; Water treatment; Wastewater treatment; Statistics.

There are several divisions of the field of environmental engineering: Environmental impact assessment and mitigation; Wastewater treatment; Air quality management; Environmental policy; Contaminated land management and site remediation; Environmental health and safety; Hazardous waste management; Natural resource management; Noise pollution; Risk assessment; Solid waste management.

Development of environmental engineering

Ever since people first recognized that their health and wellbeing were related to the quality of their environment, they have applied thoughtful principles in attempt to improve the quality of their environment. The ancient Harappan civilization utilized early sewers in some cities. The Romans constructed aqueducts to prevent drought and to create a clean water supply for the metropolis of Rome. In the 15th century, Bavaria created laws restricting the development and degradation of alpine country that constituted the region's water supply. Modem environmental engineering began in London in the mid-19th century when Joseph Bazalgette designed the first major sewerage system that reduced the percentage of waterbome diseases such as cholera. The introduction of drinking water treatment and sewage treatment in industrialized countries reduced waterbome diseases leading causes of death. In many cases, as societies grew, actions that were intended to achieve benefits for those societies had longer-term impacts which reduced some environmental qualities.

One example is the widespread application of DDT to control agricultural pests after World War II. While the agricultural benefits were outstanding and crop yields increased dramatically, numerous species were brought to the border of extinction due to the impact of the DDT on their reproductive cycles. The story of DDT vividly told in Rachel Carson's "Silent Spring" is considered to be the birth of the modem environmental movement and the development of the modem field of "environmental engineering." Conservation movements and laws restricting actions that would harm the environment have been developed by various societies. Notabic examples are the laws decreeing the construction of sewers in London and Paris in the 19th century and the creation of the U.S. national park system in the early 20th century.

Briefly speaking, the main task of environmental engineers is to protect public health by protecting from further degradation, preserving the present condition of, and enhancing the environment. Also they try to come up with new forms of energy and find ways to make it more efficient. They try to get people to convert to environmental friendly energy and products.

## Text 3. Environmentalism. Solutions

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Recognizing a problem is always the first step in finding a solution. The solutions we actually come up with are a mixture of different approaches involving conservation, law, economics, technology, education, social justice, personal change, and activism. Let's look at these in turn.

## Conservation

Long before it was fashionable to discuss the environment, people talked about "conservation": direct preservation of birds, wilderness areas, national parks, open spaces, and so on. Most of the older environmental groups came into being as conservation bodies. Newer groups have tended to take a broader view of a whole range of environmental issues. All the same, preserving wilderness for its own sake remains an important part of environmental protection, informed by concepts such as the ecosystem (the idea that many species depend on one another for survival) and biodiversity (Earth's dazzling range of different species, and the habitats that support them).

## Laws

If something people do harms the environment, why not simply make it illegal? Laws and other regulations have become an important means of solving environmental problems over the last few decades. We now have laws to protect species, prevent pollution, mandate recycling, ban the use of harmful chemicals, and much more besides. Since environmental problems are often international or global, international laws and agreements have a large part to play as well. In Europe, for example, the member states of the European Union are bound by collective environmental laws (known as directives) as well as their own national laws—and the international laws take precedence. But attempts to reach global agreements on climate change have so far been disappointing and ineffective.

## Economics

One reason the environment is often degraded or destroyed is that parts of it have little or no financial value. If a new highway is planned, it's usually cheaper to route it through a park or wilderness area (which has no value, because noone could build homes there) than through urban wasteland (because that has a market value); in other words, there's often an economic incentive to destroy rather than preserve the natural world. In much the same way, it can make sense for a farmer in a developing country to burn down rainforest to grow a cash crop such as coffee, even though the forest may be home to a dazzling diversity of important species. One solution is to put prices on harmful activities. In the UK, for example, local governments that want to bury waste in the ground have to pay so much landfill tax per tonne and that gives them an incentive to recycle more. Making people pay if they harm the environment is sometimes called *the polluter pays* principle.

## Technology

History suggests we can often find innovative, scientific solutions to the problems we encounter as civilization progresses. For example, agricultural machinery, pesticides, and fertilizers have made it possible to produce vastly more food from the same amount of land with a much smaller workforce. People with great faith in technology believe we will be able to pull off similar miracles in future — perhaps stopping global warming by fundamentally altering Earth's climate through technological fixes known as geoengineering.

## Education

One reason people harm the environment is that they simply know no better. How would you ever know that polar bears in the Arctic are being polluted with PCBs unless you read about it in something like National Geographic or seen it on TV? Thankfully, our scientific understanding of the environment is improving all the time. Environmental topics are taught much more widely than they were 20 or 30 years ago, so future generations will hopefully have a much better awareness of the need to protect the planet.

Social justice

Understanding the links between poverty, trade, people, and the planet that supports them is a hugely important and often neglected part of environmentalism. Initiatives such as fair trade (which means paying producers more money for commodity goods like coffee and cotton) can be a start in helping to reduce poverty. And when people aren't struggling to survive, they can devote more attention to healthcare, education, and protecting their environment. There's little chance of protecting the planet unless we understand how and why people feel they need to destroy it.

Personal change

A central part of environmentalism is recognizing the damage you inflict on the planet yourself and doing what you can to minimize it. That means buying things more wisely (choosing organic food that doesn't pollute the soil, for example); reducing, reusing, and recycling things before you buy new ones; using public transportation instead of cars and taking trains instead of planes; insulating your home; and opting for renewable energy over fossil fuels. Generally, though, "going green"—making fundamental personal changes to reduce your impact on the planet-- is what environmentalism is all about. An organically grown cabbage.

Activism

Even if you could revolutionize your life to the point where you had zero impact on the planet, you'd make absolutely no difference to problems such as pollution and climate change unless you could persuade lots more people to do the same. That's why many environmentalists ultimately become activists: people who campaign for wider change in society. Eco-activists come in many different types — and strengths. Some are content to pay a subscription to green groups and let them do the campaigning on their behalf, while others form green parties to put environmental issues on the political agenda. Some activists reject conventional politics altogether, preferring to confront environmental threats head-on with direct action (for example, locking themselves to bulldozers or chaining themselves to railroad tracks to stop nuclear waste shipments). Others connect environmentalism to broader social and political ideas.

## UNIT 2. BIOSPHERE. ECOSYSTEM

### Text 4. Life on the Planet Earth. Biosphere

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The Earth is about 4.6 billion years old. The first living cells emerged between 4 billion and 3.8 billion years ago. It is only for the last 50,000 years or so that man has been around on the scene.

For most of that time man made no more impact on the world than the birds building their nests, beavers their dams or rabbits their warrens.

What really set man apart from the other creatures was his invention of farming about 10,000 years ago when large, permanent settlements began to be established and man began to alter his surroundings, his environment, by his own deliberate efforts to make his life more secure and comfortable.

This was followed by the development of the use of metals, the invention of writing, the beginnings of science, the growth of cities and towns and eventually, about 250 years ago, the start of industrialisation and the acceleration in population growth.

Although man is the most intelligent form of life on the planet and can change his surroundings in all sorts of ways, he is just as dependent upon the natural world as every other species, animal and plant, with whom he shares our planet. Man is not somone special who can ignore and exist without nature because he is part of nature and if he fails to realise this the results could be disastrous – and not just for man.

Life on this planet exists in what is called the biosphere a thin layer which is the meeting place of land, air and water. Life only exists for a very short distance below the earth's surface and although life is to be found in the great ocean depths, this still takes us only 6 miles down. In the other direction only the hardiest of creatures can live at great heights in mountainous areas and virtually no life at all exists in the highest mountains, 5 to 5.5 miles above sea level.

At present biosphere includes vast numbers of plants, animals, and other life-forms of our planet, many of them are yet to be discovered. Biosphere is a relatively thin life-supporting layer around the Earth containing living organisms, which is strongly influenced in composition, structure and energetics by the living organisms. Part of the biosphere containing the highest concentration of living matter – the Earth's thin and fragile "film of life" – varies from a few meters in deserts and tundra to a hundred meters in tropical, forest regions and oceans.

The biosphere is a complex system of energy use and material cycling. This system runs on energy flowing into it from the Sun and it gives off energy (primarily as heat) to space.

We can divide the biosphere into two parts, living and nonliving, or biotic and abiotic.

The biotic part of the biosphere consisting of fauna and flora is known to be called biota. We can further divide the abiotic portion into three parts: the solid Earth or lithosphere, liquid water or hydrosphere, and the atmosphere.

The idea of biosphere originated rather casually more than a century ago. The concept played little part in scientific thought, however, until it was developed by the Russian scientist V. I. Vernadsky. It is essentially his concept of the biosphere that we accept today.

## Text 5. Natural Resources

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Natural resources are substances that exist naturally within environments and form our eco-system. Natural resources can be derived from the environment. Many of them are essential for our survival while others are used for satisfying our wants. Some examples of natural resources include the following: Air, wind and atmosphere; Plants, forestry; Animals; Coal, fossil fuels, rock and mineral resources; Soil, pasture;

Water, oceans, lakes, rivers and groundwater. Natural resources may be classified in different ways. On the basis of origin, resources may be divided into biotic and abiotic.

Biotic resources are obtained from the biosphere, such as forests and their products, animals, birds and their products, fish and other marine organisms. Mineral fuels such as coal and oil are also included in this category because they are formed from organic matter.

Abiotic resources include non-living things. Examples include land, water, air and ores such as gold, iron, copper, silver etc.

Considering their stage of development, natural resources may be referred to potential and actual resources.

Potential resources are those that exist in a region and may be used in the future.

Actual resources are those that have been surveyed, their quantity and quality determined and are being used in present times. On the basis of status of development, they can be classified into potential resources, developed resources, stock and reserves.

With respect to renewability, natural resources can be categorized as renewable and non-renewable.

A natural resource is renewable if it is replaced by natural processes. Many renewable resources can be depleted by human use. Some of these, like agricultural crops, take a short time for renewal; others, like water or forests, take a comparatively longer time. Some of them, like sunlight, air, wind, etc., are continuously available and their quantity is not affected by human consumption.

Renewable resources are endangered by industrial developments and growth. They must be carefully managed to avoid exceeding the natural world's capacity to replenish them.

A non-renewable resource is a natural resource which cannot be produced, grown, generated, or used on a scale which can sustain its consumption rate. These resources often exist in a fixed amount, or are consumed much faster than nature can create them. Fossil fuels (such as coal, oil and natural gas) and radioactive elements (uranium) are examples. Since their rate of formation is extremely slow, they cannot be reproduced once they get depleted. Of these, the metallic minerals can be re-used by recycling them, but coal and oil cannot be recycled.

## Text 6. Ecosystem

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

An ecosystem is a biological environment consisting of all the organisms living in a particular area, as well as all the nonliving, physical components of the environment with which the organisms interact, such as air, soil, water, and sunlight. It is all the organisms in a given area, along with the nonliving (abiotic) factors with which they interact; a biological community and its physical environment.

There are 6 major components in an ecosystem:

1. inorganic substances;
2. organic compounds;
3. climate, temperature, wind, light and rain which affect all the processes in an ecosystem;

4. producer - an autotrophic organism of the ecosystem, usually any of the green plants which are able to manufacture food from simple inorganic substance in the process known as photosynthesis;

5. consumer -- an organism, especially an animal, within an ecosystem that feeds upon plants or other animals; Primary consumers obtain energy from plants. But secondary consumers feed on other animals.

6. decomposers, such as bacteria and fungi. Bacteria destroy the flesh of dead animals, fungi break down plant material. They enable chemical substances to return to the physical environment.

Ecosystems can be permanent or temporary.

Ecosystems usually form a number of food chains. The main processes in ecosystems include food chains, materials cycles, development, evolution.

Food chains

The Sun's energy travels through an ecosystem. The proper transfer of energy through an ecosystem by (he producers, the consumers and the decomposers is called a food chain.

Materials cycles

Materials cycles include cycles of nitrogen, carbon, oxygen, water and mineral salts. Chemical substances move from the non-living environment to living things. They are then returned to the environment.

An ecosystem exists in a state of equilibrium. It can support a certain number of plants and animals of different species. If the population of one animal increased, there would not be enough food and water for all the animals. Consequently, some would die. In this way the ecosystem regulates itself and returns to its state of equilibrium. Ecosystems are not static, they change all the time. Plants and animals are able to adapt to changes in the physical environment.

Evolution

During long periods of time ecosystems evolve. The evolution of an ecosystem is caused by factors inside and outside it. Consider the evolution of the atmosphere: when life began there was no oxygen in the atmosphere. Consequently, the Sun's rays prevented life from developing on land. The first living organisms developed under the sea. After the evolution of photosynthesis, the oxygen in the atmosphere increased and life expanded, complex living organisms developed. As the oxygen in the atmosphere increased, a layer of ozone was formed; life would be impossible without it on the surface of the Earth. Today life on the Earth is in danger: man himself might destroy the equilibrium of ecosystem by pollution, extinction of wildlife and unreasonable utilization of the globe's natural resources.

## Text 7. How Does Biodiversity Help an Ecosystem?

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Putting the Bio in Diversity

Earth teems with life. Plants, animals and microbes thrive in the mountains, in the oceans, even in the hot springs of Yosemite National Park. We can see some species, such as Yosemite's extremophiles, only with a microscope. Others are as big as a whale or as tall as a redwood. Without such variety, the planet would cease to exist.

Why is that? Earth is a large ecosystem, a community of living, breathing, reproducing organisms in a particular environment. The term also covers the nonliving components within a specific ecological unit, like soil, water and light. Of course, smaller ecosystems exist, such as the one in our backyards or on the city streets of Paris. Every organism within an ecosystem has a specific function, and all work as a team to keep Earth's ecology balanced.

Without all of these different habitats, species and vast gene pools, our very existence would be in jeopardy. Biodiversity provides us with different types of food and materials. Biodiversity generates income for families, businesses and governments. Without bees and other pollinators, there would be no citrus trees, no flowers, no fruits and no vegetables. Where would fishermen find their catch? Most of our synthetic drugs come from various plants. Cures for a variety of diseases can disappear when a native plant dies. Moreover, a well-functioning ecosystem cleanses our air and water. It helps the planet weather extreme floods and violent forest fires. A healthy ecosystem absorbs dangerous chemicals and sustains life.

Rain forests, for example, contain half of the world's plant and animal species and play a major role in regulating Earth's weather patterns. They act as a firewall against erosion and drought. The rain forests are also the world's lungs, inhaling carbon dioxide and exhaling oxygen. Biodiversity also regulates the chemistry of our atmosphere and soil while determining the growth cycle of plants and mating seasons of animals. Yet, removing any one species can upset an ecosystem's delicate equilibrium.

When one species goes extinct, it changes the way other species interact with one another. Unfortunately, that's happening every day. Habitat loss, the introduction of alien species, pollution, climate change and overexploitation of Earth's natural resources are the main reasons why the planet is losing much of its biodiversity.

Living Life

Scientists say there are between 3 and 30 million species of plants and animals on the planet, although some researchers suggest that number might be as large as 100 million.

Biodiversity in Danger

Animal and plant species die off all the time. It's how the biological world rolls. However, things have changed dramatically in recent decades. According to some scientists, Earth is currently in the midst of its sixth mass extinction. The last major extinction occurred some 65 million years ago, when a large asteroid slammed off the coast of Mexico, killing off the dinosaurs and most everything else. Today, scientists say the extinction rate is as much as 1,000 times faster than what should be natural.

Who's to blame? Look in the mirror. There are more than 7 billion of us in the world, all competing for limited natural resources. In 40 years, there could be another 2 billion people, each relying on the planet for food, energy, land and water. Whether we like it or not, Earth can only sustain so many people. The building of new roads, dams, bridges, farms and ranches all destroy habitat. When there's construction, even on a small scale, animals move away or are killed outright. The loss of biodiversity has gotten so bad that The World Resources Institute says more than 80 percent of the planet's forests have already been destroyed. In West Africa, humans have ruined 90 percent of the coastal rain forests since 1900. The Amazon rain forest, which is spread across nine South American countries, was once bustling with plants and animals, all untouched by civilization. Yet, several decades of clear-cutting and farming have devastated the region. And it's not just clear-cutting that's driving the loss of biodiversity.

Land and water pollution is killing off many species. If you drive a gasoline-powered car, turn on a light that uses electricity generated by a coal-burning power plant or burn fuel oil to heat your home, you're contributing to this mass extinction. Overfishing, over-farming and a ton of other human activities are also driving the loss of biodiversity.

Although it might seem that alleviating the problem is beyond the average person, think again. We can all do something to help stem the tide of biodiversity loss. We can build birdhouses and bat boxes to attract these high-flying animals. We can plant native flowers and trees in our gardens. Bumblebees are dying off at a terrific rate. We can plant flowers that attract them, giving them a place to pollinate and to rest. Governments can enact legislation keeping bio-sensitive areas off limits or putting caps on greenhouse gas emissions, which fuel global.

## Unit 3. BIODIVERSITY

### Text 8. What is Biodiversity?

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Biodiversity is the foundation of ecosystem services to which human well-being is intimately linked. No feature of Earth is more complex, dynamic, and varied than the layer of living organisms that occupy its surfaces and its seas, and no feature is experiencing more dramatic change at the hands of humans than this extraordinary, singularly unique feature of Earth. This layer of living organisms—the biosphere—through the collective metabolic activities of its innumerable plants, animals, and microbes physically and chemically unites the atmosphere, geosphere, and hydrosphere into one environmental system within which millions of species, including humans, have thrived. Breathable air, potable water, fertile soils, productive lands, bountiful seas, the equitable climate of Earth's recent history, and other ecosystem services are manifestations of the workings of life. It follows that large-scale human influences over this biota have tremendous impacts on human well-being. It also follows that the nature of these impacts, good or bad, is within the power of humans to influence.

Defining Biodiversity

Biodiversity is defined as "the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." The importance of this definition is that it draws attention to the many dimensions of biodiversity. It explicitly recognizes that every biota can be characterized by its taxonomic, ecological, and genetic diversity and that the way these dimensions of diversity vary over space and time is a key feature of biodiversity. Thus only a multidimensional assessment of biodiversity can provide insights into the relationship between changes in biodiversity and changes in ecosystem functioning and ecosystem services.

Biodiversity includes all ecosystems—managed or unmanaged. Sometimes biodiversity is presumed to be a relevant feature of only unmanaged ecosystems, such as wildlands, nature preserves, or national parks. This is incorrect.

Managed systems—be they plantations, farms, croplands, aquaculture sites, rangelands, or even urban parks and urban ecosystems—have their own biodiversity. It is estimated that cultivated systems alone now account for more than 24% of Earth's terrestrial surface. It is critical that any decision concerning biodiversity or ecosystem services address the maintenance of biodiversity in these largely anthropogenic systems. In spite of many tools and data sources, biodiversity remains difficult to quantify precisely. But precise answers are seldom needed to devise an effective understanding of where biodiversity is, how it is changing over space and time, the drivers responsible for such change, the consequences of such change for ecosystem services and human well-being, and the response options available. Ideally, to assess the conditions and trends of biodiversity either globally or sub-globally, it is necessary to measure the abundance of all organisms over space and time, using taxonomy (such as the number of species), functional traits (for example, the ecological type such as nitrogen-fixing plants like legumes versus non-nitrogen-fixing plants), and the interactions among species that affect their dynamics and function (predation, parasitism, competition, and facilitation such as pollination, for instance, and how strongly such interactions affect ecosystems). Even more important would be to estimate turnover of biodiversity, not just point estimates in space or time.

Currently, it is not possible to do this with much accuracy because the data are lacking. Even for the taxonomic component of biodiversity, where information is the best, considerable uncertainty remains about the true extent and changes in taxonomic diversity. There are many measures of biodiversity; species richness (the number of species in a given area) represents a single but important metric that is valuable as the common currency of the diversity of life—but it must be integrated with other metrics to fully capture biodiversity. Because the multidimensionality of biodiversity poses formidable challenges to its measurement, a variety of surrogate or proxy measures are often used. These include the species richness of specific taxa, the number of distinct plant functional types (such as grasses, forbs, bushes, or trees), or the diversity of distinct gene sequences in a sample of microbial DNA taken from the soil. Species- or other taxon-based measures of biodiversity, however, rarely capture key attributes such as variability, function, quantity, and distribution—all of which provide insight into the roles of biodiversity

## Text 9. Close to Extinction

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

A Siberian tiger (now endangered animal) scans a snow-covered clearing The last known Tasmanian tiger died in captivity in 1936. Gone, too, are the zebra like quagga, passenger pigeon and golden toad, each of them, like the tiger, photographed before extinction. These lingering images serve as windows into the past, reminders of what our recklessness has subtracted from the Earth. Since the demise of these four species, humans have made an effort to preserve more of the planet's endangered species through zoos and improved wildlife management.

Yet a number of animals currently hang in the balance due to habitat loss, pollution, overhunting, invasive species and environmental change.

Since May 2010, the United Nations-recognized International Union for Conservation of Nature (IUCN) listed 75 species as extinct in the wild. Like a hospital patient on life support, they only live on due to human intervention. They simply don't exist naturally in the ecosystem any longer. Of course, some of these species breed exceedingly well in captivity.

Thailand's red-tailed black sharks, for instance, may have lost their natural habitat, but are exported annually in the tens of thousands to aquariums. The black soft-shell turtle, on the other hand, is only known to survive in a single artificial pond on the grounds of a Buddhist temple in Bangladesh. While the turtles have long thrived in this environment, such a centralized population leaves them particularly vulnerable to extinction and susceptible to overpopulation deaths. Even if captive populations of a threatened species increase enough to permit reintroduction into the wild, the lack of genetic diversity also poses a problem. Still other species find themselves in an even worse predicament: their numbers sufficiently reduced to make them, in the words of some conservationists, functionally extinct. In other words, there may be survivors out there, but the population is so reduced that extinction is inevitable.

According to recent surveys of the Yangtze River, the population of China's freshwater baiji dolphin has likely dipped so low that any remaining mated pairs will be unable to repopulate the species. Similarly, wildlife surveyors predict the West African black rhino as probably extinct. If any of these animals still walk the Earth today, they are likely the last.

Still other endangered species remain in severe decline, despite human efforts to conserve them. In November 2009, the Siberian Tiger Monitoring Program reported just 56 animals, down from 500 just four years prior. Fortunately, experts believe that this rare species can still bounce back from possible extinction.

Endangered plants, unlike turtles and deer, generally don't inspire conservation efforts. But large numerous plant species are dangerously close to disappearing due to loss of habitat, overexploitation, invasive species, pollution and climate change.

In 2006, the IUCN listed 8,000 plant species as threatened, including such species as the Phillip Island Hibiscus. By the 1980s, feral pigs, goats and rabbits had grazed this plant to the brink of vanishing forever on its Phillip Island, Australia habitat. A mere two clumps of the flower remained. Subsequent removal of feral animals has allowed the plant's population to rebound, but it still remains one of the most endangered plants on Earth. The plight of the saiga antelope shows that a combination of factors can drive an animal to the brink of extinction. Extinctions crop up over the millennia with disturbing frequency; even mass extinction events pepper the history of the planet every 65 million years or so. But when it comes to the causes of these phenomena (whether it's a sea-level shift, an asteroid strike, a volcano eruption or a nearby supernova), scientists have a hard time settling on just one cause for one event. Take the extinction of many species of megafauna near the onset of the

Holocene (the geologic period that we still live in today). Scientists have different theories for why it happened. Some experts believe a wild climate shift caused radical habitat alterations. Others pin the problem on human intervention.

Maybe human advancements led to overhunting and habitat destruction. Or perhaps the problem was that the bipedal interlopers (and any animals they carted around the world with them) unwittingly acted as pathogen vectors, carrying new diseases to animals without pre-existing immunities.

But as we try to take in the scope of how badly we've treated the planet, let's avoid the usual buzzwords like "unsustainable agriculture," "overharvesting" and "pollution," and really step into the shoes of the planet's plant and animal population. They're forced to maneuver a veritable minefield of threats in order to survive, dancing around (or more aptly, struggling to adapt to) deadly hazards every step of the way.

## Text 10. The Earth's Biggest Threat to Biodiversity

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Slash and burn deforestation in the Amazon Basin circa June 2001. A decade later, Brazilian rates of deforestation have dropped sharply.

Earth is a planet of unfathomable biodiversity. Scientists have already identified nearly 2 million individual species, and even conservative estimates state that more than 9 million more remain undiscovered. The planet's amazing variety of life is more than just an academic curiosity; humans depend on it. For instance, farmers rely on worms, bacteria and other organisms to break down organic waste and keep soil rich in nitrogen, processes vital to modern agriculture. Pharmaceutical companies use a wide array of plants and animals to synthesize medications, and we can only guess how many medicinal breakthroughs reside in Earth's undiscovered species. A stable food supply and a source for pharmaceuticals are only a couple of the benefits Earth's biodiversity provides.

Earth's plant life mitigates the effect of global warming by absorbing carbon dioxide, yet 90 percent of those plants (and nearly two-thirds of all food crops) depend on the nearly 190,000 species of pollinating insects. Scientists from Cornell even went so far as toad up the value of the different services Earth's plants and animals provide. After factoring everything from ecotourism to biological pest control, they arrived at a grand total of $2.9 trillion and that was back in 1997. Clearly, the planet would be a much different place without its rich and diverse ecosystems, and we must protect the planet from the looming threats to biodiversity.

Climate change is increasingly forcing species away from their habitats in search of more favorable temperatures, and scientists fear not all species will survive the change.

Overhunting, which famously led to the extinction of the passenger pigeon, continues to endanger animals like the rhino. Invasive species like kudzu and the brown tree snake, introduced by humans to non-native environments, can rapidly drive native species to extinction. In the United States, invasive species cause between $125 and $140 billion in damage every year, and they are thought to have played a part in nearly half of all extinctions worldwide since the 1600s.

The greatest of all threats to Earth's biodiversity, however, is deforestation. While deforestation threatens ecosystems across the globe, it's particularly destructive to tropical rainforests. In terms of Earth's biodiversity, rainforests are hugely important; though they cover only 7 percent of the Earth, they house more than half the world's species. Through logging, mining and farming, humans destroy approximately 2 percent of the Earth's rainforests every year, often damaging the soil so badly in the process that the forest has a difficult time recovering. As their habitats disappear, plants and animals are forced to compete with one another for the remaining space, and those that can't go extinct. In recent history, deforestation has led to approximately 36 percent of all extinctions, and as the habitat loss accelerates, that number is bound to increase. Deforestation is particularly difficult to stop because it has so many causes. While it's easy to blame irresponsible logging and mining companies are to be blamed for the devastation. Their reckless practices are in some ways a symptom of lager problems. For instance, many rainforests are located in developing countries that lack the resources to enforce environmental regulations. These countries benefit greatly from the economic activity that the companies generate., giving them even less incentive to discourage deforestation.

What's more, the indigenous people who make their homes in the rainforests regularly clear the land to make room for plantations and cattle pastures, and efforts to stop this activity directly impair the livelihoods of those people. Fortunately, hope remains for the Earth's rainforests. In Brazil, satellite imagery revealed that the rate of deforestation fell by 49 percent compared to the previous year. Thanks in part to stricter environmental regulations and increased enforcement. Recent studies have also shown that as a country's economic conditions improve, its deforestation rate slows considerably as the indigenous populations rely less on the rainforest's resources for survival. Finally, nonprofit groups like the World Wildlife Fund and the Sierra Club continue to raise awareness about the importance of Earth's rainforests. The collective efforts of governments, nonprofits and the indigenous peoples may be enough to stop he destruction before it's too late.

## UNIT 4. POLLUTION

### Text 11. Pollution

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Air pollution, as we know it today, started with the Industrial Revolution in Europe in the $19^{th}$ century. In the last few decades, it has become the major problem for our environment. Clean air is normally made up of nitrogen (76 %), oxygen (22%), carbon dioxide and a few other gases. When harmful elements get into the air they may cause health problems and can also damage the environment, buildings and soil. They make the ozone layer thinner and thinner and lead to the warming of the earth's atmosphere and climate changes. Our modern lifestyle has led to dirtier air over the years. Factories, vehicles of all kinds, the growing number of people are some things that are responsible for air pollution today. But not all pollution in the air is caused by people.

Forest fires, dust storms and volcano eruptions can lead to the pollution of the atmosphere. Carbon monoxide is a colourless gas that is set free when wood, petrol or coal are not completely burned. It is also in products like cigarettes. Because of it, less oxygen enters our blood and it makes us confused and sleepy. Carbon dioxide is a greenhouse gas that gets into the atmosphere when we burn coal, oil or wood Chlorofluorocarbons (CFCs) are gases that come from air-conditioning systems or refrigerators. When they get into the air they rise high into the atmosphere (about 20—50 km above the earth's surface). There, they get into contact with other gases and destroy the ozone layer. We need the ozone layer because it protects us from the sun's ultraviolet rays. Lead is in petrol, paint, batteries and other products. It is very dangerous if it gets into our bodies. In some cases, it can even cause cancer.

There are two types of ozone that we know of: Natural ozone is in the upper part of our atmosphere, but on the ground, people produce ozone too. Traffic and factories cause ground ozone. It is especially dangerous to children and older people. It makes them tired and doctors suggest not to go outdoors when there is too much ozone in the air.

Nitrogen oxide causes smog and acid rain. It is produced when you burn fuels like coal and oil. It can lead to breathing problems especially when children go outside in the wintertime.

Sulphur dioxide is a gas that gets into the air when coal is burned in power plants. Paper factories and other chemical industries also produce sulphur dioxide. This pollutant can lead to lung diseases. Another result of air pollution is acid rain. It happens when sulphur dioxide and nitrogen oxide get into the air. When it rains the water that comes down on us has these dangerous substances in it.

Acid rain can also be caused by volcanic eruptions. Volcanoes send poisonous gases high up into the atmosphere. Acid rain leads to the destruction of forests, lakes and soil. Many lakes and rivers have been poisoned over the decades and even some types of fish have disappeared. Buildings also corrode because of acid rain. The pollutants can travel in the air for a long time before they come down to earth. That's why it's sometimes hard to tell where dangerous pollutants originate. Acid rain that destroys forests and lakes in Austria and Germany may come from power stations in Eastern European countries. The job of cleaning up our air is difficult but not impossible. Choosing other forms of energy, like solar energy, wind energy or tidal energy could be used for controlling pollution. Cities like London have shown that better air quality can be achieved in a short time.

Individuals can also help make the air around us cleaner:

- Walk or ride a bike to school or to your friend's home.
- Take a bus or a train to work Organize carpools.
- Don't use spray cans.
- Make sure that you get a pollution check on the car every year.
- Trees give us oxygen and take in carbon dioxide. They clean the air around us.
- Switch off the lights when you leave the room. Only use the number of lights that you really need.

Don't overheat your room during the winter months. It's better to wear a pullover than to be in a room that is too warm. Smog is a combination of smoke and fog. It occurs when gases from burnt fuel get together with fog on the ground. When heat and sunlight get together with these gases, they form fine, dangerous particles in the air. Smog occurs in big cities with a lot of traffic. Especially in the summertime, when it is very hot, smog stays near the ground. It is dangerous to our breathing and in smog areas we can't see very well. Smog was first discovered in Great Britain in the 19th century, during the beginning of the Industrial Revolution. At that time people used coal for heating and cooking. Factories also used coal to produce iron and steel. The smog often stayed over cities for many days. It caused lung diseases and breathing problems. Thousands of people died in London every year. A lot has been done to prevent smog recently. Factories use coal that doesn't have that much sulphur in it. And cars are much cleaner today. In some cities, cars aren't even allowed to drive on smog days.

## Text 12. Current Environmental Problems

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Environmental problems have become one of the most urgent problems of modern society. More and more people suffer from air and water pollution. Nature also suffers from land and nuclear pollution. The reasons for such environmental problems are numerous.

Among them increasing number of cars in the streets, factory waste, millions of cut down trees, destroyed habitats of animals, contaminated rivers and seas. All these problems mainly arise due to human careless activities and gradually destroy our planet. If we look closely, we'll notice that not only one city is under danger, but the majority of world population. Fortunately, there are many ways to suspend these problems. If everybody starts caring about the planet we live on, many environmental problems can be solved. For example, if we start recycling paper and cardboard, we can save lots of trees. If we start using public transport more than private cars, we can have less air pollution.

Our planet Earth is only a tiny part of the universe, and it is so far the only place where human beings can live. We always polluted our surroundings. But until now pollution was not such a huge problem. People lived in the countryside and couldn't produce such amount of pollution that would lead to a dangerous situation on a global scale. With the development of industrial cities, which create huge amounts of pollutants, the problem has become real. Nowadays our planet is in serious danger. Global warming, acid rains, air and water pollution, overpopulation are the problems that threaten human lives on the Earth. Every year world industry pollutes the air that we breathe with. A great number of cities suffer from smog.

Rainforests are cut down. Their disappearance upsets the oxygen balance. As a result, some rare species of animals, birds, fish and plants are extinct. A lot of seas, rivers and lakes are filled with poison like industrial and nuclear wastes, chemical fertilizers and pesticides. The pollution of air and the world's ocean, destruction of the ozone layer is the result of man's careless interaction with nature, a sign of the ecological crisis.

A human being is able not only to create but also to destroy. Especially our earth suffers badly from pernicious actions of man. This applies to both people's neglectful attitude to the nature – dropping of cigarette ends, rubbish on the earth – and industrial factories and natural appearances (e.g. acid rains).Factories regularly emit harmful chemicals into the air. Petrol and gas, that are used by our drivers, also leave much to be desired. Apart from air pollution, water and soil are subjected to pollution as well. When such fuels as coal and oil burn, they emit very dangerous smoke. A person destroys not only environment, plants, animals, but also himself. Faster and faster man's health starts worsening; children of weak immune system are being given birth. Forests are being cut down, and animals from the Red Book are gradually dying out. What will be next in our world of progressive technology remains undecided. Let's protect the nature.

People should consider their attitude to the environment. Some progress has already been made in this direction. Numerous conferences have been held by a lot of agencies to discuss problems facing ecologically poor regions including the Aral Sea, the South Urals, Kuzbass, Donbass and Chernobyl. Greenpeace is also doing much to preserve the environment. What can we do to save our planet? First of all, people should switch to alternative forms of power, such as solar power or wind power. Secondly, the use of atomic power must be banned. Thirdly, we need to recycle. It's the art of turning waste into new products. What will be next in our world of progressive technology remains undecided. Let's protect the nature, Nature is our friend.

## Text 13. Land Pollution

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Land pollution is the degradation of Earth's land surfaces often caused by human activities and their misuse of land resources. The causes of land pollution are health hazard disposal of urban and industrial wastes, exploitation of minerals, and improper use of soil by inadequate agricultural practices.

Urbanization and industrialization also result in land pollution. The Industrial Revolution set a series of events which destroyed natural habitats and polluted the environment, causing diseases in both humans and other species of animals.

Increased mechanization

The concentration of population in cities, along with the internal combustion engine, led to the increased number of roads and infrastructure that goes with them. Roads cause visual, noise, light, air and water pollution, in addition to land pollution.

As the demand for food has grown very high, there is an increase in field size and mechanization.. The increase in field size makes it economically viable for the farmer but results in loss of shelter for wildlife, as hedgerows and copses disappear. When crops are harvested, the naked soil is left open to wind after the heavy machinery has compacted it. Another consequence of more intensive agriculture is the move to monoculture. This is unnatural, it depletes the soil of nutrients, allows diseases and pests to spread and makes farmers use chemical substances foreign to the environment. A pesticide is a substance or mixture of substances used to kill a pest.

A pesticide may be a chemical substance, biological agent (such as a virus or bacteria), antimicrobial, disinfectant or device used against any pest. Although there are benefits to the use of pesticides, there are also drawbacks, such as potential toxicity to humans and other organisms.

Herbicides are used to kill weeds, especially on pavements and railways. They are similar to auxins and most are biodegradable by soil bacteria. However one group derived from trinitrotoluene have the impurity dioxin, which is very toxic and causes fatality even in low concentrations.

Insecticides are used to rid farms of pests which damage crops. First insecticides used in the nineteenth century were inorganic. Now there are two main groups of synthetic insecticides. Organochlorines include DDT, Aldrin, Dieldrin and BHC. They are cheap to produce, potent and persistent. DDT was used on a massive scale from the 1930s, and then usage fell as the harmful environmental effects were realized. It affects the nervous and endocrine systems. Organophosphates, e.g. parathion, methyl parathion and about other insecticides are available nationally.

Parathion is highly toxic, methyl-parathion is less so and Malathion is generally considered safe as it has low toxicity and is rapidly broken down in the liver. Mining Modern mining projects leave behind disrupted communities, damaged landscapes, and polluted water. Mining also affects ground and surface waters, the aquatic life, vegetation, soils, animals, and the human health. Acid mine drainage can cause damage to streams which in return can kill aquatic life. The vast variety of toxic chemicals released by mining activities can harm animals and aquatic life as well as their habitat. The average mine disturbs over a thousand acres of land. Increased waste disposal There are various methods of waste disposal, they differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers, but most of them are harmful for the environment in some degree. Poorly managed landfills can create a number of adverse environmental impacts such as wind-blown litter, attraction of vermin, and generation of liquid leachate.

## Text 14. Soil as a Resource in the US

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Soil Composition

Soil is a mixture of rock particles and organic matter, such as animal manure, leaves and other plant waste. It also contains air, water and tiny animals, including earthworms. Some soils are moist and crumbly while others are hard and dry. There are 20,000 different kinds of soil in the U.S. alone, according to the U.S. Department of Agriculture's Natural Resources Conservation Service. Each is a recipe of different physical and chemical characteristics. Over time, local climate, topography, plants, animals and people all affect the soil's composition.

Agricultural and Urban Use

Land covers 2.3 billion acres of the United States. The Economic Research Service (ERS) of the U.S. Department of Agriculture reports the following land use: forests, 30 percent; pasture and rangeland, 27 percent; cropland,18 percent; special uses that primarily encompass national park lands,14 percent; miscellaneous lands including swamps and tundra, 9 percent; and urban areas, 3 percent.

Soil is often called the "living skin" of the earth. In rural areas, it's easily visible, but in large cities, it's hidden beneath buildings and roads. Two important ways that people use soil are for agriculture and the support of buildings and roads. According to ERS, urban areas are defined as having at least 432,500 people. Land used for agriculture declined from 63 percent of total U.S. land in 1949 to 51 percent in 2007. Although urban growth didn't account for much of this decrease. So, it's been noted that rural land now is converted to urban use yearly.

Soil Surveys and Tests

In order to identify soil strengths and problems there are a lot of tests: soil surveys of large areas, geotechnical tests of soils at construction and farm sites and simpler home garden soil tests. They are used to guide the usage choices. Soil surveys which detail large areas of varying soils help determine whether planned land uses are okay, inappropriate or doable with some remediation. Surveys map boundaries of different soils and include photos and data concerning their characteristics. For example, the state of Ohio reports 400 different soils within its boundaries. Nationwide surveying of U.S. soils began more than 100 years ago. According to NCRS, surveys of varying sophistication exist for more than 92 percent of U.S. lands. It adds that the contemporary process details 300 soil characteristics, including problems with expansion and contraction, saturation and stability that can cause buildings to fail. Farmers purchasing agricultural land look to surveys for information about water absorption and drainage as well as what plants will grow.

Geotechnical Reports and Garden Tests

Geotechnical soil reports are based on lab analysis of core samples taken from building sites. Municipalities may require them, based on local difficulties identified by area soil surveys, for any building project involving construction or repairs. One example is Woodside, California, which mandates geotechnical reports due to expansive soils and earthquake faults. Although not mandated, simpler garden soil tests can provide homeowners with important environmental information, such as lead content and nutrient analysis. Obtaining a garden soil test from the local agricultural cooperative extension office is an eco-friendly thing to do, because it helps you avoid overuse of fertilizers.

## Text 15. The World Beneath Our Feet

*"We know more about the movement of celestial bodies than about the soil underfoot".*

*Leonardo Da Vinci*

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

When we hike through the woods, we enjoy the calm serenity. What we fail to notice is that beneath our feet the ground is teeming with diverse life forms – the engine behind our own existence. It is accredited to these most tiny organisms in the soil that life on Earth's surface exists at all. Soil as a habitat, without seeming so, is a lively habitat filled with many living organisms. Even though the ground appears to be simply a compact layer, between its components there are countless minute margins where an army of organisms are maintaining the under-ground "factory of life". In fact, approximately half of the space that soil consumes consists of microscopically small hollow spaces.

The solid part of the soil forms a filigree structure composed primarily of clay particles, humus particles and sand. The spaces in between – known as soil pores – are filled with water or air and house countless animals, plants and fungi. This is a habitat of gigantic dimensions: the entire habitable area of a handful of clay soil is greater than a square kilometer. It is home to billions of microorganisms and to these organisms, every clump of soil is practically an infinite landscape. Only a small fraction of the organisms living within the soil is known to science. We, however, know that one handful of soil contains more organisms than there are humans on the planet. In only one gram of soil, close to 50,000 types of bacteria and up to 200 metres of fungus threads can be found. The weight of all living organisms in the soil layers of one hectare of land can be as much as 15 tons, equivalent to the weight of 20 cows. In comparison, the grass on one hectare of land in the lowlands feeds only about two cows. For researchers, with all of its organisms, soil can be viewed as a gigantic yet minimally studied "pharmacy".

In 1928, Alexander Fleming discovered the first antibiotic, penicillin, and its antibacterial characteristics. Penicillin is a natural substance released by Penicillium soil fungi. In light of this knowledge, researchers worldwide have continued to collect a myriad of soil organisms and tested whether the unicellular organisms, bacteria, fungi, algae, lichens and plants can also produce antibiotics. In doing so, the researchers have discovered numerous new substances which have almost all since become important medications. The potential for furthering medication knowledge and production is vast but has not yet even begun to be utilized. Teeming with life pictures of soil organisms, once zoomed in, show an impressive diversity of how fascinating and beautiful they can be. The soil thrives with life and not in a motley jumble similar to the many species living above ground, but in a complex network of relationships; including carnivores, herbivores, scavengers and omnivores. In soil, teamwork is essential and omnipresent. One particular plant group, the leguminous plants, which clover and beans belong to, has a symbiotic relationship with the bacteria that live in the soil.

## Text 16. Soil Management (I)

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Soil management involves six essential practices: proper tillage; maintenance of a proper supply of organic matter in the soil; maintenance of a proper nutrient supply; control of soil pollution; maintenance of the correct soil acidity; and control of erosion.

*Tillage*

The purpose of tillage is to prepare the soil for growing crops. This preparation is traditionally accomplished by using a plough that cuts into the ground and turns over the soil. This removes or kills any weeds growing in the area, loosens and breaks up the surface layers of the soil, and provides a bed of soil that holds sufficient moisture to permit the planted seeds to germinate. Traditional tillage may harm the soil if used continuously over many years, especially if the fertile topsoil layer is thin. Today, many farmers use a program of minimum or reduced tillage to conserve the soil.

Among the secondary but important benefits of tillage is the aeration resulting from pulverization. This aeration not only provides a freer circulation of oxygen and water but also results in increased biological activity in the soil, including that of organisms that fix atmospheric nitrogen.

Tillage contributes to the health of plants by inhibiting plant diseases and by discouraging the development of various types of insects that harm plants.

*Supply of organic matter*

An acre of living topsoil contains approximately 900 pounds of earthworms, 2,400 pounds of fungi, 1,500 pounds of bacteria, 133 pounds of protozoa, 890 pounds of arthropods and algae, and even small mammals in some cases. Soil also contains dead organisms, plant matter, and other organic materials in various phases of decomposition. Humus, the dark-coloured organic material in the final stages of decomposition, is relatively stable. Both organic matter and humus serve as reservoirs of plant nutrients; they also help to build soil structure and provide other benefits.

Organic matter and humus are terms that describe different but related things. Organic matter refers to the fraction of the soil that is composed of both living organisms and once-living residues in various stages of decomposition. Humus is only a small portion of the organic matter. It is the end product of organic matter decomposition and is relatively stable. Humus contributes tc well-structured soil that, in turn, produces high-quality plants.

Practically all the soil organisms depend on organic matter as their food source. Therefore, to maintain their populations, organic matter must be renewed from plants growing on the soil, or from compost. When soil livestock are fed, fertility is built up in the soil, and the soil will feed the plants. Rich organic matter and humus levels help to maintain favourable conditions of moisture, temperature, nutrients, pH, and aeration.

*Nutrient supply*

The nutrients most necessary for proper plant growth are nitrogen, potassium, phosphorus, iron, calcium, sulphur, and magnesium, all of which usually exist in most soils in varying quantities. In addition, most plants require minute amounts of substances known as trace elements, which are present in the soil in very small quantities and include manganese, zinc, copper, and boron. Nutrients often occur in the soil in compounds that cannot be readily utilized by plants.

## Text 17. Soil Management (II)

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The increasing amounts of fertilizers and other agricultural chemicals applied to soils since World War II ended in 1945, plus industrial and domestic waste-disposal practices, led by the mid-1960s to increasing concern over soil pollution. Soil pollution is the build-up in soils of persistent toxic compounds, chemicals, salts, radioactive materials, or disease-causing agents, which have adverse effects on plant growth and animal health.

The effectiveness of a pesticide as well as the hazards of harmful residues depends largely on how long the pesticide remains in the soil. For example, DDT, a chlorinated hydrocarbon, has a half-life of three years in cultivated soils, while organophosphorus insecticides persist for only days or months. Insecticides persist longer if worked into the soil than if left on the surface. Herbicides applied to soils may not persist at all or may persist up to two years or longer, depending on the compound. Eventually, all pesticides disappear because of evaporation and vaporization, leaching, plant uptake, chemical and microbial decomposition, and photodecomposition.

Maintenance of specific soil acidities is important in soil management because it controls the adaptation of various crops and native vegetation to different soils. The ordinary procedure for correcting excess soil acidity is the application of lime in the form of limestone, dolomitic limestone, or burnt lime. About 18.14 million metric tons of limestone is used annually on United States farms. When lime is added, the hydrogen of the complex soil colloid is exchanged for the calcium of lime.

The mechanical loss of fertile topsoil is one of the greatest problems of agriculture. Such loss is almost always caused by erosion resulting from the action of water or wind. According to the U.S. Department of Agriculture, more than half of all fertile U.S. topsoil has been damaged to some extent by erosion. Commonly implemented practices to slow soil transport include terraces and diversions. Terraces, diversions, and many other erosion "control" practices are largely unnecessary if the ground stays covered year-round.

Irrigation may be defined as the science of artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growing in grain fields and helping in preventing soil consolidation.

Various types of irrigation techniques differ in how the water obtained from the source is distributed within the field. In general, the goal is to supply the entire field uniformly with water, so that each plant has the amount of water it needs, neither too much nor too little. The modern methods are surface irrigation, localized irrigation, drip irrigation, sprinkler irrigation, center pivot irrigation, sub-irrigation.

## UNIT 5. WATER POLLUTION

### Text 18. Water Pollution

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, groundwater). Water pollution affects plants and organisms living in water. Water pollution occurs when pollutants are released directly or indirectly into water without adequate treatment to remove harmful compounds. Water pollution is one of the major problems in the global context. Some 90% of China's cities suffer from some degree of water pollution, and nearly 500 million people lack access to safe drinking water.

Source of water pollution are divided into point and non-point. Point source pollution refers to contaminants that enter a waterway through a discrete conveyance, such as a pipe or ditch. Examples of sources in this category include discharges from plants or a city storm drain. Non-point source pollution refers to diffuse contamination that does not originate from a single discrete source.

Non-point source pollution is often the cumulative effect of small amounts of contaminants gathered from a large area. The leaching out of nitrogen compounds from agricultural land which has been fertilized is a typical example.

*Causes of water pollution*

The specific contaminants leading to pollution in water include a wide spectrum of chemicals, pathogens, and physical changes such as elevated temperature and discoloration. While many of the chemicals and substances that are regulated may be naturally occurring (calcium, natrium, iron, manganese, etc.), the concentration is often the key in determining what a natural component of water is, and what a contaminant is.

Many of the chemical substances are toxic. Pathogens can produce waterborne diseases in either human or animal hosts. Alteration of water's physical chemistry includes acidity (change in pH), electrical conductivity, temperature, and eutrophication.

*Chemical and other contaminants*

Contaminants may include organic and inorganic substances. Organic water pollutants include:

Disinfection by-products found in chemically disinfected drinking water, such as chloroform; Food processing waste, which can include oxygen-demanding substances; Insecticides and herbicides; Petroleum hydrocarbons, including fuels (gasoline, diesel fuel), motor oil, and fuel combustion byproducts; Tree and bush debris; Volatile organic compounds (VOCs), such as industrial solvents; Various chemical compounds found in personal hygiene and cosmetic products;

Inorganic water pollutants include:

Acids from industrial discharges (especially sulfur dioxide from power plants); Ammonia from food processing waste; Chemical waste as industrial by-products; Fertilizers containing nutrients – nitrates and phosphates; Heavy metals from motor vehicles; Acid mine drainage; Trash (e.g. paper, plastic, or food waste);

*Thermal pollution*

Thermal pollution is the rise or fall in the temperature of a natural body of water caused by human influence. A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacturers. Elevated water temperatures decreases oxygen levels (which can kill fish) and affects ecosystem composition, such as invasion by new thermophilic species.

*Measurement of water pollution*

Water pollution may be analyzed through several broad categories of methods: physical, chemical and biological. Most involve collection of samples, followed by specialized analytical tests. Some methods may be conducted in situ, without sampling, such as temperature measurement.

Common physical tests of water include temperature, solids concentration like total suspended solids (TSS) and turbidity.

Water samples may be examined using the principles of analytical chemistry. Frequently used methods include pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD), nutrients (nitrate and phosphorus compounds), metals (including copper, zinc, cadmium, lead and mercury), oil and grease, total petroleum hydrocarbons (TPH), and pesticides.

Biological testing involves the use of plant, animal, and/or microbial indicators to monitor the health of an aquatic ecosystem.

## Text 19. Sewage Treatment

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Sewage treatment, or domestic wastewater treatment, is the process of removing contaminants from wastewater and household sewage, both runoff and domestic.

Water treatment describes the processes used to make water more acceptable for a desirable end-use. The goal of all water treatment process is to remove existing contaminants in the water, or reduce the concentration of such contaminants.

The combination of following processes are used for municipal drinking water treatment worldwide: pre-chlorination – for algae control and arresting any biological growth; aeration – along with prechlorination for removal of dissolved iron and manganese; coagulation – for flocculation; coagulant aids, also known as polyelectrolytes – to improve coagulation and for thicker floc formation; sedimentation – for solids separation, that is, removal of suspended solids trapped in the floc; filtration – removing particles from water; desalination – process of removing salt from the water; disinfection – for killing bacteria.

Biological processes are also employed in the treatment of wastewater and these processes may include, for example, aerated lagoons, activated sludge or slow sand filters.

Origins of sewage

Sewage is created by residential, institutional, and commercial and industrial establishments and include household waste liquid from baths, kitchens, and so on that is disposed via sewers. In many areas, sewage also includes liquid waste from industry and commerce.

The separation and draining of household waste into greywater and blackwater becomes now more common in the developing world, with greywater being permitted to be used for watering plants or recycled for flushing toilets.

Most sewage also includes some surface water from roofs and may include water from stormwater runoff.

Process of treatment

Sewage can be treated close to where it is created (in septic tanks, biofilters or aerobic treatment systems), or collected and transported via a network of pipes and pump stations to a municipal treatment plant. Sewage collection and treatment is typically subject to local, state and federal regulations and standards. Industrial sources of wastewater often require specialized treatment processes. Conventional sewage treatment may involve four stages, called pre-treatment, primary, secondary and tertiary treatment.

## Text 20. Stages of Sewage Treatment

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

*Pre-treatment*

Pre-treatment removes materials such as trash, tree limbs, leaves, that can be easily collected from the raw wastewater before they damage or clog the pumps and skimmers of primary treatment clarifiers.

*Primary treatment*

In the primary sedimentation stage, sewage flows through large tanks, commonly called primary clarifiers or primary sedimentation tanks.

Primary settling tanks are usually equipped with mechanically driven scrapers that continually drive the collected sludge towards a hopper in the base of the tank where it is pumped to sludge treatment facilities.

The dimensions of the tank should be designed to effect removal of a high percentage of the floatables and sludge. A typical sedimentation tank may remove from 60% to 65% of suspended solids, and from 30% to 35% of BOD from the sewage.

*Secondary treatment*

Secondary treatment is designed to substantially degrade the biological content of the sewage which is derived from human waste, food waste, soaps and detergent. The majority of municipal plants treat the settled sewage liquor using aerobic biological processes. The bacteria and protozoa consume biodegradable soluble organic contaminants (e.g. sugars, fats, organic short-chain carbon molecules, etc.) and bind much of the less soluble fractions into floc.

Secondary treatment systems are classified as fixed-film or suspended-growth systems.

Fixed-film or attached growth systems include trickling filters and rotating biological contactors, where the biomass grows on media and the sewage passes over its surface.

Suspended-growth systems include activated sludge, where the biomass is mixed with the sewage and can be operated in a smaller space than fixed-film systems. However, fixed-film systems can provide higher removal rates for organic material and suspended solids.

*Tertiary treatment*

The purpose of tertiary treatment is to provide a final treatment stage to raise the effluent quality before it is discharged to the environment (sea, river, lake, ground, etc.).

More than one tertiary treatment process may be used at any treatment plant. The main processes are removal of nutrients, nitrogen, phosphorus, sand filtration and sometimes disinfection.

*Disinfection*

The purpose of disinfection in the treatment of wastewater is to substantially reduce the number of microorganisms in the water to be discharged back into the environment. The effectiveness of disinfection depends on the quality of the water being treated (e.g., cloudiness, pH, etc.), the type of disinfection being used, the disinfectant dosage (concentration and time), and other environmental variables. Generally, short contact times, low doses and high flows all militate against effective disinfection. Common methods of disinfection include ozone, chlorine and ultraviolet light.

Chlorination remains the most common form of wastewater disinfection due to its low cost and long-term history of effectiveness. One disadvantage is that chlorination of residual organic material can generate chlorinated-organic compounds that may be carcinogenic or harmful to the environment.

Ozone is considered to be safer than chlorine because, it is generated onsite as needed and shouldn't be stored. Ozonation also produces fewer disinfection by-products than chlorination. A disadvantage of ozone disinfection is the high cost of the ozone generation equipment and the requirements for special operators.

Ultraviolet (UV) light can be used instead of chlorine, iodine, or other chemicals. UV radiation causes damage to the genetic structure of bacteria, viruses, and other pathogens, making them incapable of reproduction. The key disadvantages of UV disinfection are the need for frequent lamp maintenance and replacement.

## UNIT 6. AIR POLLUTION

### Text 21. The Atmosphere

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

What is the atmosphere? It is only the thing that keeps you from being burned to death every day, helps to bring the rain that our plants need to survive, not to mention it holds the oxygen that you need to breath. Essentially, the atmosphere is a collection of gases that makes the Earth habitable.

The atmosphere consists of 78% nitrogen, 21% oxygen, 1% water vapor, and a minute amount of other trace gases like argon, and carbon monoxide. All of these gases combine to absorb ultraviolet radiation from the Sun and warm the planet's surface through heat retention.

The mass of the atmosphere is around 5×1018 kg. 75% of the atmospheric mass is within 11 km of the surface. While the atmosphere becomes thinner the higher you go, there is no clear line demarcating the atmosphere from space; however, the Karman line, at 100 km, is often regarded as the boundary between atmosphere and outer space. The effects of reentry can be felt at 120 km. Over the vast history of the Earth there have been three different atmospheres or one that has evolved in three major stages. The first atmosphere came into being as a result of a major rainfall over the entire planet that caused the buildup of a major ocean. The second atmosphere began to develop around 2.7 billion years ago. The presence oxygen began to appear apparently from being released by photosynthesizing algae. The third atmosphere came into play when the planet began to stretch its legs, so to speak. Plate tectonics began constantly rearranging the continents about 3.5 billion years ago and helped to shape long-term climate evolution by allowing the transfer of carbon dioxide to large land-based carbonate stores. Free oxygen did not exist until about 1.7 billion years ago and this can be seen with the development of the red beds and the end of the banded iron formations. This signifies a shift from a reducing atmosphere to an oxidizing atmosphere. Oxygen showed major ups and downs until reaching a steady state of more than 15%. The Earth's atmosphere performs a couple of cool optical tricks. The blue color of the sky is due to Rayleigh scattering which means as light moves through the atmosphere, most of the longer wavelengths pass straight through. Very little of the red, orange and yellow light is affected by the air; however, much of the shorter wavelength light blue is absorbed by the gas molecules. The absorbed blue light is then radiated in every direction. So, no matter where you look, you see the scattered blue light. The atmosphere is also responsible for the aurora borealis.

Auroras are caused by the bombardment of solar electrons on oxygen and nitrogen atoms in the atmosphere. The electrons literally excite the oxygen and nitrogen atoms high in the atmosphere to create the beautiful light show we know as an aurora. The atmosphere is divided into 5 major zones. The troposphere begins at the surface and extends to between 7 km at the poles and 17 km at the equator, with some variation due to weather. The stratosphere extends to about 51 km. The mesosphere extends to about 85 km. Most meteors burn up in this zone of the atmosphere. The thermosphere extends up to between 320 and 380 km. This is where the International Space Station orbits. The temperature here can rise to 1,500 °C. The exosphere is the last bastion of the atmosphere. Here the particles are so far apart that they can travel hundreds of km without colliding with one another. The exosphere is mainly composed of hydrogen and helium.

## Text 22. Terrestrial and Extraterrestrial Atmospheres

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

We live at the bottom of an invisible ocean called the atmosphere, a layer of gases surrounding our planet. Nitrogen and oxygen account for 99 percent of the gases in dry air, with argon, carbon dioxide, helium, neon, and other gases making up minute portions. Water vapor and dust are also part of the Earth's atmosphere. Other planets and moons have very different atmospheres, and some have no atmospheres at all. The atmosphere is so spread out that we barely notice it, yet its weight is equal to a layer of water more than 10 meters (34 feet) deep covering the entire planet. The bottom 30 kilometers (19 miles) of the atmosphere contains about 98 percent of its mass. The atmosphere air is much thinner at high altitudes. There is no atmosphere in space. Scientists say many of the gases in our atmosphere were ejected into the air by early volcanoes. At that time, there would have been little or no free oxygen surrounding the Earth. Free oxygen consists of oxygen molecules not attached to another element, like carbon (to form carbon dioxide) or hydrogen (to form water). Free oxygen may have been added to the atmosphere by primitive organisms, probably bacteria, during photosynthesis. The oxygen in today's atmosphere probably took millions of years to accumulate.

The atmosphere acts as a gigantic filter, keeping out most ultraviolet radiation while letting in the Sun's warming rays. Ultraviolet radiation is harmful to living things, and is what causes sunburns. Solar heat, on the other hand, is necessary for all life on Earth. The Earth's atmosphere has a layered structure. From the ground toward the sky, the layers are the troposphere, stratosphere, mesosphere, thermosphere, and exosphere. Another layer, called the ionosphere, extends from the mesosphere to the exosphere. Beyond the exosphere is outer space. The boundaries between atmospheric layers are not clearly defined, and change depending on latitude and season. All the planets in our Solar system have atmospheres. Most of these atmospheres are radically different from the Earth's, although they contain many of the same elements.

The Solar system has two major types of planets: terrestrial planets (Mercury, Venus, Earth, and Mars) and gas giants (Jupiter, Saturn, Uranus, and Neptune) and accordingly there are terrestrial and extraterrestrial atmospheres.

The atmospheres of the terrestrial planets are somewhat similar to the Earth's. Mercury's atmosphere contains only a thin exosphere dominated by hydrogen, helium, and oxygen. Venus' atmosphere is much thicker than the Earth's, preventing a clear view of the planet. Its atmosphere is dominated by carbon dioxide, and features swirling clouds of sulfuric acid. The atmosphere on Mars is also dominated by carbon dioxide, although unlike Venus, it is quite thin. Gas giants are composed of gases. Their extraterrestrial atmospheres are almost entirely hydrogen and helium. The presence of methane in the atmospheres of Uranus and Neptune give the planets their bright blue colour.

In the lower atmospheres of Jupiter and Saturn, clouds of water, ammonia, and hydrogen sulfide form clear bands. Fast winds separate light-coloured bands, called zones, from dark-coloured bands, called belts. Other weather phenomena, such as cyclones and lightning, create patterns in the zones and belts. Jupiter's Great Red Spot is a centuries-old cyclone that is the largest storm in the Solar system.

The moons of some planets have their own atmospheres. Saturn's largest moon, Titan, has a thick atmosphere made mostly of nitrogen and methane. The way sunlight breaks up methane in Titan's ionosphere gives the moon an orange color. Most celestial bodies, including all the asteroids in the asteroid belt and our own moon, do not have atmospheres. The lack of an atmosphere on the Moon means it does not experience weather. With no wind or water to erode them, many craters on the Moon have been there for hundreds and even thousands of years.

The way a celestial body's atmosphere is structured and what it's made of allow astrobiologists to speculate what kind of life the planet or moon may be able to support. Atmospheres, then, are important markers in space exploration. A planet or moon's atmosphere must contain specific chemicals to support life as we know it. These chemicals include hydrogen, oxygen, nitrogen, and carbon. Although Venus, Mars, and Titan have similar atmospheric gases, there is nowhere in the Solar system besides Earth with an atmosphere able to support life. Venus' atmosphere is far too thick, Mars' far too thin, and Titan's far too cold. Our atmosphere – the thin blue line.

Scientists have gathered enough information about other planets in our Solar system to know that none can support life as we know it. Life is not possible without a stable atmosphere containing the right chemical ingredients for living organisms: hydrogen, oxygen, nitrogen, and carbon. These ingredients must be balanced: not too thick or too thin.

Life also depends on the presence of water. Jupiter, Saturn, Uranus, and Neptune all have atmospheres made mostly of hydrogen and helium. These planets are called gas giants, because they are mostly made of gas and do not have a solid outer crust.

Mercury and Mars have some of the right ingredients, but their atmospheres are far too thin to support life. The atmosphere of Venus is too thick: the planet's surface temperature is more than 460 degrees Celsius (860 degrees Fahrenheit). Jupiter's moon Europa has a thin atmosphere rich with oxygen. It is likely covered by a huge ocean of liquid water. Some astrobiologists think that if life will develop elsewhere in the Solar system, it will be near vents at the bottom of Europa's ocean. The Earth's magnetosphere is not considered a part of the atmosphere. The magnetosphere, formed by the Earth's magnetic fields, protects the atmosphere by preventing it from being blown away by powerful Solar wind.

## Text 23. Air Pollution (I)

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Air pollution consists of chemicals or particles in the air that can harm the health of humans, animals, and plants. It also damages buildings. Pollutants in the air take many forms. They can be gases, solid particles, or liquid droplets.

Sources of Air Pollution

Pollution enters the Earth's atmosphere in many different ways. Most air pollution is created by people, taking the form of emissions from factories, cars, planes, or aerosol cans. Second-hand cigarette smoke is also considered air pollution. These man-made sources of pollution are called anthropogenic sources. Some types of air pollution, such as smoke from wildfires or ash from volcanoes, occur naturally. These are called natural sources.

Air pollution is most common in large cities where emissions from many different sources are concentrated. Sometimes, mountains or tall buildings prevent air pollution from spreading out. This air pollution often appears as a cloud making the air murky. It is called smog. The word "smog" comes from combining the words "smoke" and "fog." Large cities in poor and developing nations tend to have more air pollution than cities in developed nations. According to the World Health Organization (WHO), some of the worlds most polluted cities are Karachi, Pakistan; New Delhi, India; Beijing, China; Lima, Peru; and Cairo, Egypt. However, many developed nations also have air pollution problems. Los Angeles, California, is nicknamed Smog City.

Indoor Air Pollution

Air pollution is usually thought of as smoke from large factories or exhaust from vehicles. But there are many types of indoor air pollution as well.

Heating a house by burning substances such as kerosene, wood, and coal can contaminate the air inside the house. Ash and smoke make breathing difficult, and they can stick to walls, food, and clothing. Naturally-occurring radon gas, a cancer-causing material, can also build up in homes. Radon is released through the surface of the Earth. Inexpensive systems installed by professionals can reduce radon levels. Some construction materials, including insulation, are also dangerous to people's health. In addition, ventilation, or air movement, in homes and rooms can lead to the spread of toxic mold. A single colony of mold may exist in a damp, cool place in a house, such as between walls. The mold's spores enter the air and spread throughout the house. People can become sick from breathing in the spores.

Effects on Humans

People experience a wide range of health effects from being exposed to air pollution. Effects can be broken down into short-term effects and long-term effects.

Short-term effects, which are temporary, include illnesses such as pneumonia or bronchitis. They also include discomfort such as irritation to the nose, throat, eyes, or skin. Air pollution can also cause headaches, dizziness, and nausea. Bad smells made by factories, garbage, or sewer systems are considered air pollution, too. These odors are less serious but still unpleasant.

Long-term effects of air pollution can last for years or for an entire lifetime. They can even lead to a person's death. Long-term health effects from air pollution include heart disease, lung cancer, and respiratory diseases such as emphysema. Air pollution can also cause long-term damage to people's nerves, brain, kidneys, liver, and other organs. Some scientists suspect air pollutants cause birth defects. Nearly 2.5 million people die worldwide each year from the effects of outdoor or indoor air pollution.

People react differently to different types of air pollution. Young children and older adults, whose immune systems tend to be weaker, are often more sensitive to pollution. Conditions such as asthma, heart disease, and lung disease can be made worse by exposure to air pollution. The length of exposure and amount and type of pollutants are also factors.

Effects on the Environment

Like people, animals, and plants, entire ecosystems can suffer effects from air pollution. Haze, like smog, is a visible type of air pollution that obscures shapes and colors. Hazy air pollution can even muffle sounds. Air pollution particles eventually fall back to Earth. Air pollution can directly contaminate the surface of bodies of water and soil. This can kill crops or reduce their yield. It can kill young trees and other plants. Sulfur dioxide and nitrogen oxide particles in the air, can create acid rain when they mix with water and oxygen in the atmosphere. These air pollutants come mostly from coal-fired power plants and motor vehicles. When acid rain falls to Earth, it damages plants by changing soil composition; degrades water quality in rivers, lakes and streams; damages crops; and can cause buildings and monuments to decay.

Like humans, animals can suffer health effects from exposure to air pollution. Birth defects, diseases, and lower reproductive rates have all been attributed to air pollution.

## Text 24. Air Pollution (II)

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damages the natural environment into the atmosphere.

*Air pollutants*

Pollutants can be in the form of solid particles, liquid droplets, or gases. Also they may be natural or man-made.

Pollutants can be classified as primary or secondary. Usually, primary pollutants are substances directly emitted from a process, such as ash from a volcanic eruption.

Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone that makes up photochemical smog. Note that some pollutants may be both primary and secondary as they can be emitted directly or formed from other pollutants.

*Major primary pollutants include:*

Sulphur oxides ($SOx$) and sulphur dioxide ($SO2$). $SO2$ is produced by volcanoes and in various industrial processes. Nitrogen oxides ($NOx$) and nitrogen dioxide ($NO2$) are emitted from high temperature combustion.

Carbon monoxide is a colourless, odourless, non-irritating but very poisonous gas. It is a product of incomplete combustion of fuel such as natural gas, coal or wood. Carbon dioxide ($CO2$) is a greenhouse gas, vital to living organisms, emitted from combustion.

Volatile organic compounds are important outdoor air pollutants. They are often divided into categories of methane ($CH4$) and non-methane (NMVOCs). Methane is an extremely efficient greenhouse gas which contributes to global warming.

Particulate matter, also referred to as fine particles, is tiny particles of solid or liquid suspended in a gas. Toxic metals, such as lead, cadmium and copper also can be air pollutants.

Chlorofluorocarbons (CFCs), which are harmful to the ozone layer, are emitted from currently banned products. Ammonia ($NH3$) is emitted from agricultural processes. It is a gas with a characteristic pungent odour, caustic and hazardous. Radioactive pollutants produced by nuclear explosions, war explosives, and natural processes such as the radioactive decay of radon.

*Secondary pollutants include:*

Particulate matter formed from gaseous primary pollutants and compounds in photochemical smog. Ground level ozone ($O3$) formed from $NOx$ and VOCs.

*Minor air pollutants include:*

Persistent organic pollutants (POPs) are resistant to environmental degradation through chemical, biological, and photolytic processes. Because of it, they are capable of long-range transport, bioaccumulate in human and animal tissue, biomagnify in food chains, and have potential significant impacts on human health and the environment.

Sources of air pollution can be classified into anthropogenic and natural.

Anthropogenic sources are mostly related to burning different kinds of fuel.

*Anthropogenic sources include: Stationary* sources as smoke stacks of power plants, factories, waste incinerators, furnaces and other types of fuel-burning heating devices; *Mobile* sources include motor vehicles, marine vessels, aircraft; *Chemical* sources as dust and smoke from controlled burn practices in agriculture and forestry management; *Fumes* from paint, hair and aerosol sprays and other solvents; *Waste* deposition in landfills, which generate methane; *Military*, such as nuclear weapons, toxic gases, germ warfare and rocketry.

*Natural sources include*: Dust from natural sources; Methane, emitted by the digestion of food by animals; Radon gas from radioactive decay within the Earth's crust; Radon can also accumulate in buildings, especially in confined areas. Smoke and carbon monoxide from wildfires; Volcanic activity, which produce sulphur, chlorine, and ash particulates.

## Text 25. Air Pollution in Big Cities

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

It is during the past 30 years or so that the people of the United States have begun to understand that air is a resource. It is the resource that can be managed for health and environmental quality. Management of our air means gaining control over industrial emissions and the emissions from individual sources, such as cars, trucks, and temporary sources such as construction projects.

Pollution of the air by certain industrial processes, particularly by burning of coal, has been a concern for many years. However, it was not until thousands died because of air pollution, in such cities as London in the 1950s, that the first steps were taken to reduce the poisons that were routinely being emitted into the air we breathe.

Two major sources of harmful emissions became the targets for initial action: utilities and industries, and motor vehicles. Steps were first taken to clean up smokestack emissions around power plants and industrial complexes. Attention was then focused on the sulfur oxides emitted from utility, commercial, and industrial stacks. At the same time devices were developed to cut back one missions from motor vehicles.

It took years and money, but progress was made during the 1960s and 1970s. The air is generally cleaner today than it was 20 years ago in much of the Nation.

Air quality management is a complex undertaking. It is complicated by the nature of air, and by the gases that are commonly considered its basic components.

It is further complicated by the continual chemical changes that take place in the air as it moves from one location to another and by atmospheric forces. These changes can be beneficial, harmful, or of little or no consequence to the environment. It is because of the potential health hazards associated with air pollution in large urban centers that special understanding of city air pollution is needed.

This is especially true in the regions where large cities often occupy low-lying areas, and where long periods of air stagnation are common during the summer months. Sources of pollution are more abundant in major cities than in small towns or rural areas.

## Text 26. Air Pollution Control

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The following items are commonly used as pollution control devices by industry or transportation. They can either destroy contaminants or remove them from an exhaust stream before it is emitted into the atmosphere. 60 Particulate and SO2 Emissions

*A. Cyclone Separators*

Cyclonic separation is a method of removing particulates from an air, gas or liquid stream, without the use of filters, through vortex separation. Rotational effects and gravity are used to separate mixtures of solids and fluids. The method can also be used to separate fine droplets of liquid from a gaseous stream.

*B. Scrubbers*

The term describes a variety of devices that use pollutants from a furnace flue gas or from other gas streams. In a wet scrubber, the polluted gas stream is brought into contact with the scrubbing liquid, by spraying it with the liquid, by forcing it through a pool of liquid, or by some other contact method, so as to remove the pollutants. The most common application is flue gas desulfurization using ammonia as the solvent or spray liquid.

*C. Semidry Scrubbers*

The advantage of semidry scrubbers is in that they remove contaminates by way of a solid waste that is easier to dispose of and less expensive. Initially, the scrubbing medium is wet (such as a lime or soda ash slurry), and a spray dryer is used to atomize the slurry into the gas which evaporates the water in the droplets. As this takes place, the acid in the gas neutralizes the alkali material and forms a fine white solid. Most of the white solids are removed at the bottom of the scrubber while some are carried into the gas stream and have to be removed by a filter or electrostatic precipitator. Although semidry systems cost 5-15% more than wet systems, when combined with a fabric filter, they can achieve 90-95% efficiencies.

*D. Electrostatic Precipitators*

An electrostatic precipitator (ESP) or electrostatic air cleaner is a particulate collection device that removes particles from a flowing gas (such as air) using the force of an induced electrostatic charge. Electrostatic precipitators are highly efficient filtration devices that minimally impede the flow of gases through the device, and can easily remove fine particulate matter such as dust and smoke from the air stream. Periodically, the precipitators have to be taken offline and cleaned.

*VOC (Volatile Organic Chemicals) Emissions*

*A. High VOC Concentrations*

Three types of treatment are generally used for streams with high concentrations of VOC: Refrigerated Vapour Condensation, Solvent Vapour Adsorption, and Flaring. The method chosen is dependent on allowable release concentrations and the cost of the solvent. Refrigerated vapour condensation can mean condensation at temperatures as low as −80°C. Due to the high cost of refrigeration, this option is usually reserved for expensive solvents whose recovery can justify the high operating costs. Solvent vapour adsorption is a more common application where the VOC containing gas is bubbled through an organic solvent which "accepts" the VOC in the gas stream. The VOC are then released from the solvent by heat and a partial vacuum.

*B. Moderate VOC*

Concentrations For moderate concentrations of VOC, incineration or regenerative carbon adsorption is utilized. At temperatures between 750-1000°C, VOC are typically destroyed by 99%. Usually, a heat exchanger is used to preheat the gas stream with the flue gas to save on fuel costs for the incinerator. Regenerative carbon adsorption is where a gas stream passes through a bed of activated carbon. The VOC are adsorbed into the carbon. This method can achieve 99% effectiveness for VOC concentrations.

## Text 27. Effects of Air Pollution on Agriculture: an issue of national concern

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The term "air quality" means the relative state of the air around us. Good air quality refers to clean, clear, unpolluted air. On the basis of its location, air quality is defined as ambient or indoor air quality. The air quality in enclosed spaces, such as home, schools or workplaces, is known as indoor air quality.

Both ambient and indoor air quality influence welfare of humans and vegetation. Air quality index (AQI) is a number used by government agencies to communicate to the public how polluted the air is.

Different countries also use different names for their indices such as Air Quality Health Index, Air Pollution Index and Pollutant Standards Index. In India Central Pollution Control Board (CPCB) has a developed threshold level for selected pollutants in ambient air. Agricultural crops are affected by air pollutants. Air pollutants currently considered to be most important in causing direct damage to crops are sulphur dioxide (SO2), nitrogen oxides (NOx), ozone (O3), fluorine (F) and suspended particulate matter (SPM). The urban and peri-urban areas of India have the unfortunate combination of being impacted by both the "traditional" pollutants (i.e. SO2 and particulates), as well as the "new" pollutants in the form of NOx and ozone (O3). Mixtures of both traditional and new pollutants result in combined adverse effects which is often greater than the sum of their individual effects.

Agricultural crops can be injured when exposed to high concentrations of various air pollutants. Injury ranges from visible markings on the foliage, reduced growth and yield and premature death of the plant. Development and severity of the injury depends on pollutant concentration and number of other external factors. These factors include length of exposure to the pollutant, plant species and its stage of development, as well as other environmental factors conducive to a build-up of the pollutant and to the preconditioning of the plant, which make it either susceptible or resistant to injury.

Experimental studies conducted at Varanasi situated in upper Indo-Gangetic Plains (IGP) of India have indicated significant losses of agricultural production at current ambient pollutant levels in urban, suburban and rural areas.

The intensity of losses, however, depends upon the pollutant concentration, duration of exposure, climatic and edaphic factors, plant species and cultivars. Pollutants either affect the plants directly by causing visible injury or indirectly by growth or yield reductions. Reductions in leaf area, biomass, chlorophyll, ascorbic acid and N contents have often been observed for the crop species growing in polluted areas.

Field transect studies have shown significant negative correlations between air pollutant concentrations and net photosynthesis, biomass accumulation as well as yield of crop plants. Monocot plants are found to be more resistant than dicot plants. Leguminous plants and leafy vegetables are most sensitive to air pollutants among the crop plants. Winter crops showed relatively lower magnitude of yield losses at different sites than summer crops.

Quality of seeds also varied between urban, suburban and rural sites. Variations in nutrient, metabolite and energy contents of seeds directly corresponded to the levels of air pollutants at different sites. At urban and suburban sites, the magnitude of response involved all air pollutants, whereas at rural site ozone (O3) had more influence than the others. Ozone seems to play a major role as maximum reductions in yield and seed quality were recorded at sites showing highest O3 concentrations. Simulation experiments conducted in closed top or open top chambers have also confirmed the adverse impacts of individual pollutants on plants.

National ambient air quality standards are mainly based on health impact; hence a revision of the same taking into account climatic conditions, type of vegetation and soil is urgently required to save crops from adverse impacts of air pollution. Economic evaluation of crop loss due to air pollution is an important need of the future to ensure food security for growing population of the country. Long-term studies are required all along the country to identify the high and low risk zones of air pollution in different regions to develop control policy for reducing adversities of air pollution on vegetation.

Ozone pollution and agriculture

Ozone in troposphere act as secondary pollutant. It is formed as a result of chemical reaction between NOx and VOCs which are primary air pollutants. Research studies conducted under research projects, predicted the impact of ozone pollution on wheat, rice, maize and soybean crops grown globally for the year 2030 by global air quality model, and compares the results to estimate losses in crop yields. In the year 2000, the global economic value of crop losses through surface ozone was estimated to be between US $14 and $26 billion, with 40 per cent of this cost occurring in China and India. In comparison, climate change is estimated to cause global crop losses totaling approximately just US $5 billion per year.

The study showed that soybean and wheat are especially sensitive to O3. Greatest losses for wheat were in India and China, with India losing up to 28 % and China up to 19% of crop yields. Europe suffered the greatest relative yield loss for soybean (20 to 27%), followed by China (11 to 21 %). Across all four regions, maize was found to be the least affected crop with yield loss between 2 to 7%. India is very much dependent on agriculture.

Agricultural production determines the livelihood security as well as economic development of the country. Reduction in crop yield and consequently the economic losses caused air pollutants have major social, economic and environmental consequences. Sulphur dioxide, nitrogen oxides, ozone and suspended particulate matter are some of the important air pollutants causing yield loss in crops.

Air pollution risk assessment of Indian crops will bring together experts and specialists on air pollution, to discuss the likely impacts of air pollution on agricultural production. It will help the decision makers to formulate necessary policy options to reduce the vulnerability of crops to air pollution.

## UNIT 7. GLOBAL WARMING. CLIMATE CHANGE

### Text 28. Global Warming

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Global warming is the unusually rapid increase in Earth's average surface temperature over the past century primarily due to the greenhouse gases. The global average surface temperature rose from 0.6 to 0.9°C (1.1 to 1.6°F) between 1906 and 2005, and the rate of temperature increase has nearly doubled in the last 50 years.

*Enhanced greenhouse effect*

Over the past 250 years, humans have been artificially raising the concentration of greenhouse gases in the atmosphere at an increasing rate. Since the Industrial Revolution began in about 1750, carbon dioxide levels have increased nearly 38% and methane levels have increased 48%. The atmosphere today contains more greenhouse gas molecules, so more of the infrared energy emitted by the surface is absorbed by the atmosphere. As some of the extra energy from atmosphere radiates back down to the surface, Earth's surface temperature rises.

*Greenhouse Gases*

*Water vapour* is the most abundant of the greenhouse gases, and is the dominant contributor to the natural greenhouse effect. As temperatures rise, more water evaporates from ground sources – rivers, oceans, etc. Because the air is warmer, the relative humidity can also be higher, also leading to more water vapour. Higher concentrations of water vapour are able to absorb more thermal infrared radiation from the Earth, further warming the atmosphere. The warmer atmosphere can then hold more water vapour, and the cycle continues.

*Carbon dioxide* is released into the atmosphere through both natural and human processes. Natural production and absorption of carbon dioxide is called carbon cycle. Human activities such as fuel burning (coal, oil, natural gas, and wood), cement production, and changes in land use are increasing the concentration of carbon dioxide in the atmosphere.

*Methane*, which comes from both natural and human sources, is an extremely powerful warming agent - even more effective than carbon dioxide - however its lifetime in the atmosphere is brief, only about 12 years. In nature, methane is released through biological processes in low oxygen environments, such as swamps. Human activities, including growing rice, raising cattle, using natural gas and coal mining, are increasingly adding methane in the atmosphere.

*Nitrous oxide*, known as "laughing gas", is a warming gas, persisting in the atmosphere for approximately 120 years. It is produced naturally from many biological sources in both soil and water. Human-related sources of nitrous oxide include agricultural soil management, sewage treatment, combustion of fossil fuel, and the production of a variety of acids.

*Ozone* is a highly reactive molecule composed of three atoms of oxygen. Ozone concentrations vary by both geographic location and altitude. At lower levels in the troposphere, ozone exerts a warming force upon the atmosphere, primarily due to human processes. Automobile emissions, industrial pollution, and the burning of vegetation increase the levels of carbon and nitrogen molecules which – when reacting to sunlight – produce ozone, an important contributor to photochemical smog. Levels of ozone have nearly doubled since the 1800s, and have increased by nearly 30% since the industrial revolution.

*Halocarbons* are compounds of human origins used primarily as cooling agents, propellants, and cleaning solvents. The most familiar type of halocarbons is the chlorofluorocarbons. Another set of synthesized halocarbon compounds - created as substitutes to CFCs - are called HFCs (hydrofluorcarbons). While they are also greenhouse gases, they are less stable in the atmosphere and therefore have a shorter lifetime and less impact as a greenhouse gas.

## Text 29. Effects of Global Warming

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The likely effects of global warming will not be limited to one country or even one continent and will permeate almost every aspect of the environment. Rising sea levels are the most common concern; taking place with a thermal expansion of the oceans, increased precipitation, and the melting of mountain glaciers. In the 20th century alone, sea levels rose 0.17 meters predictions for the next century range anywhere from 0.18 to 0.59 meters. Currently, the Arctic summer sea ice is about half as thick as it was in 1950. The melting Arctic sea ice does not contribute to sea-level rise, except for the expansion of seawater with increasing heat. However, melting Arctic sea ice 72 may lead to global changes in ocean circulation. Water from melted ice forms a layer at the sea surface that is less dense than the underlying water since it is less salty, potentially preventing the pattern of deep ocean currents from rising to the surface. Additionally, melting sea ice speeds up the warming of the Arctic. Increasing ocean temperatures could cause serious ecological damage. Approximately one quarter of the world's coral reefs have died over the last few decades, many of them affected by coral bleaching – a process directly tied to warming waters which weakens the coral animals. An increase in global temperature will likely enhance the ability for severe weather, which could mean stronger and more frequent storms. Warmer temperatures cause more evaporation of water, which, as part of the water cycle eventually leads to increased precipitation and further increasing the potential for flooding. With drought affecting some regions and heat intensifying in the tropics, many areas will become unsuitable for agriculture. In tropical areas that are already dry and hot, the ability to harvest food will likely decrease even with small increases in warming. However, warmer temperatures and increased precipitation can also make previously poor land more suitable for farming. Therefore with a changing climate, a global change in the agricultural pattern will occur. Yet, it is unknown if the increase in the usefulness of poor lands will counterbalance an increase in drought and desertification. Many species are affected by global warming, most often by changes in migration patterns, shorter hibernation times, relocation to new areas, and extinction due to lack of adaptation. For example, many animals accustomed to living in the arctic regions, such as polar bears and penguins, have been forced further out of their native habitat in search of more accommodating habitat closer to the poles. Animals that migrate, such as birds and butterflies, have begun extending their migratory range closer to the poles, arriving sooner and departing later.

## Text 30. Climate Change: obsession with plastic pollution distracts attention from bigger environmental challenges

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Climate change: obsession with plastic pollution distracts attention from bigger environmental challenges. By now, most of us have heard that the use of plastics is a big issue for the environment. Partly fueled by the success of the BBC's Blue Planet II series, people are more aware than ever before about the dangers to wildlife caused by plastic pollution – as well as the impact it can have on human health – with industries promising money to tackle the issue.

Single use plastics are now high on the agenda – with many people trying to do their bit to reduce usage. But what if all of this just provides a convenient distraction from some of the more serious environmental issues? In our new article in the journal Marine Policy we argue plastic pollution – or more accurately the response of governments and industry to addressing plastic pollution – provides a "convenient truth" that distracts from addressing the real environmental threats such as climate change.

We know plastic can entangle birds, fish and marine mammals which can starve after filling their stomachs with plastics, and yet there are no conclusive studies on population level effects of plastic pollution. Studies on the toxicity effects, especially to humans are often overplayed. Research shows that plastic is not as great a threat to oceans as climate change or over-fishing.

Taking a stand against plastic – by carrying reusable coffee cups, or eating in restaurant chains where only paper straws are provided – is the classic neoliberal response. Consumers drive markets, and consumer choices will therefore create change in the industry.

Alternative products can often have different, but equally severe environmental problems. And the benefits of these small-scale consumer driven changes are often minor. Take, for example, energy-efficient light bulbs – in practice, using these has been shown to have very little effect on a person's overall carbon footprint. But by making these small changes, plastic still appears to be an issue we can address. The Ocean Cleanup of plastic pollution – which aims to sieve plastic out of the sea – is a classic example. Despite many scientists' misgivings about the project and its recent failed attempts to collect plastic the project is still attractive to many as it allows us to tackle the issue without having to make any major lifestyle changes. That's not to say plastic pollution isn't a problem, rather there are much bigger problems facing the world we live in – specifically climate change. In October last year the Intergovernmental Panel on Climate Change (IPCC) produced a report detailing drastic action needed to limit global warming to 1.5°C. Much of the news focused on what individuals could do to reduce their carbon footprint – although some articles did also indicate the need for collective action.

Despite the importance of this message, environmental news has been dominated by the issues of plastic pollution. So it's not surprising that so many people think ocean plastics are the most serious environmental threat to the planet. But this is not the case. In 2009 the concept of planetary boundaries was introduced to indicate safe operating limits for the Earth from a number of environmental threats. Three boundaries were shown to be exceeded: biodiversity loss, nitrogen flows and climate change.

Climate change and biodiversity loss are also considered core planetary boundaries meaning if they are exceeded for a prolonged time, they can shift the planet into new, less hospitable, stable states. These "clear and present dangers" of climate change and biodiversity loss could undermine the capacity of our planet to support over seven billion people – with the loss of homes, food sources and livelihoods. It could lead to major disruptions of our ways of life – by making many areas uninhabitable due increased temperatures and rising sea levels. These changes could start to happen within the current century. This is not to distract from the fact that some significant steps have been taken to help the planet environmentally by reducing plastic waste. But it is important not to forget the need for large-scale systemic changes needed internationally to tackle all environmental concerns. This includes longer-term and more effective solutions to the plastic problem. But also extending to more radical large-scale initiatives to reduce consumption, decarbonise economies and move beyond materialism as the basis for our well-being. The focus needs to be on making the way we live more sustainable by questioning our overly consumerist lifestyles that are at the root of major challenges such as climate change, rather than a narrower focus on sustainable consumer choices – such as buying our takeaway coffee in a reusable cup. We must reform the way we live rather than tweak the choices we make. There is a narrow window of opportunity to address the critical challenge of, in particular, climate change. And failure to do so could lead to massive systemic impacts to the Earth's capacity to support life – particularly the human race. Now is not the time to be distracted by the convenient truth of plastic pollution, as the relatively minor threats this poses are eclipsed by the global systemic threats of climate change.

## UNIT 8. ENVIRONMENTAL IMPACT ASSESSMENT. ENVIRONMENTAL REMEDIATION

### Text 31. Environmental Impact Assessment

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

An environmental impact assessment (EIA) is an assessment of the possible positive or negative impact that a proposed project may have on the environment, together consisting of the natural, social and economic aspects. The purpose of the assessment is to ensure that decision makers consider the ensuing environmental impacts when deciding whether to proceed with a project.

EIAs are unique in that they do not require adherence to a predetermined environmental outcome, but rather they require decision makers to account for environmental values in their decisions and to justify those decisions in light of detailed environmental studies and public comments on the potential environmental impacts of the proposal.

EIAs began to be used in the 1960s as part of a rational decision making process. It involved a technical evaluation that would lead to objective decision making.

EIA was made legislation in the US in the National Environmental Policy Act (NEPA) 1969. It has since evolved as it has been used increasingly in many countries around the world.

The International Organization for Standardization (ISO) covers EIA and includes key steps for carrying out the assessment. As well as direct effects, developments cause a multitude of indirect effects through consumption of goods and services, production of building materials and machinery, additional land use for manufacturing and industrial services, mining of resources etc.

The indirect effects of developments are often more serious than the direct effects assessed by EIA. Large proposals such as airports or ship yards cause wide ranging national and international environmental effects, which should be taken into consideration during the decision-making process.

Broadening the scope of EIA can also benefit threatened species conservation. Instead of concentrating on the direct effects of a proposed project on its local environment some EIAs used a landscape approach which focused on much broader relationships between the entire population of species in question.

As a result, an alternative that would cause least amount of negative effects to the population of that species as a whole, rather than the local subpopulation, can be identified and recommended by EIA.

There are various methods available to carry out EIAs, industry specific and general methods.

Product environmental life cycle analysis (LCA) is used for identifying and measuring the impact on the environment of industrial products. These EIAs consider technological activities used for various stages of the product: extraction of raw material for the product and for ancillary materials and equipment, through the production and use of the product, right up to the disposal of the product, the ancillary equipment and material.

Genetically modified plants

There are specific methods available to perform EIAs of genetically modified plants. Some of the methods are GMPRAM, INOVA etc.

Fuzzy Arithmetic EIA methods need specific parameters and variables to be measured to estimate values of impact indicators. However many of the environment impact properties cannot be measured on a scale e.g. landscape quality, lifestyle quality, social acceptance etc. and moreover these indicators are very subjective. Thus to assess the impacts we may need to take the help of information from similar EIAs, expert criteria, sensitivity of affected population etc. To treat this information, which is generally inaccurate, systematically, fuzzy arithmetic and approximate reasoning methods can be utilised. This is called as a fuzzy logic approach.

At the end of the project, an EIA should be followed by an audit. An EIA audit evaluates the performance of an EIA by comparing actual impacts to those that were predicted. The main objective of these audits is to make future EIAs more valid and effective. The two main considerations are: scientific – to check the accuracy of predictions and explain errors; management – to assess the success of mitigation in reducing impacts.

## Text 32. Environmental Remediation

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

1. Generally, remediation means providing a remedy, so environmental remediation deals with the removal of pollution or contaminants from environmental media such as soil, groundwater, sediment, or surface water for the general protection of human health and the environment or from a brownfield site intended for redevelopment. Remediation is generally subject of many regulatory requirements, and also can be based on assessments of human health and ecological risks where no legislated standards exist or where standards are advisory.

2. In the USA the most comprehensive set of Preliminary Remediation Goals (PRGs) is from the Environmental Protection Agency (EPA).

A set of standards used in Europe exists and is often called the Dutch standards.

The European Union (EU) is rapidly moving towards Europe-wide standards, although most of the industrialised nations in Europe have their own standards at present.

3. Once a site is suspected of being contaminated there is a need to assess the contamination. Often the assessment begins with preparation of a Phase I Environmental Site Assessment. The historical use of the site and the materials used and produced on site will guide the assessment strategy and type of sampling and chemical analysis to be done. Often nearby sites owned by the same company and have been reclaimed, levelled or filled, are also contaminated. For example, a car park may have been levelled by using contaminated waste in the fill. Ceiling dust, topsoil, surface and groundwater of nearby properties should also be tested, both before and after any remediation. This is a controversial step as: No one wants to have to pay for the cleanup of the site; If nearby properties are found to be contaminated it may have to be noted on their property title, potentially affecting the value; No one wants to pay for the cost of assessment.

4. In the US there has been a mechanism for taxing polluting industries to form a Superfund to remediate abandoned sites, or to litigate to force corporations to remediate their contaminated sites. Other countries have other mechanisms and commonly sites are rezoned to "higher" uses such as high density housing, to give the land a higher value so that after deducting clean up costs there is still an incentive for a developer to purchase the land, clean it up, redevelop it and sell it on.

5. Standards are set for the levels of dust, noise, odour, emissions to air and groundwater, and discharge to sewers or waterways of all chemicals of concern or

chemicals likely to be produced during the remediation by processing of the contaminants. These are compared against both natural background levels in the area and standards for industrial zones and against standards used in other recent remediations. If the emission is emanating from an industrial area, it does not mean that in a nearby residential area there should be permitted any exceedances of the appropriate residential standards. Monitoring for compliance against standards is necessary to ensure that exceedances are detected and reported both to authorities and the local community. Enforcement is necessary to ensure that continued or significant breeches result in fines or even a jail sentence for the polluter. Penalties must be significant because otherwise fines are treated as a normal expense of running business. Compliance must be cheaper than to have continuous breeches.

6. Remediation technologies are many and varied but can be categorized into ex-situ and in-situ methods. Ex-situ methods involve excavation of effected soils and subsequent treatment at the surface, In-situ methods seek to treat the contamination without removing the soils.

## Text 33. Environmental Remediation Methods

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Excavation

Excavation processes can be as simple as hauling the contaminated soil to a regulated landfill, but can also involve aerating the excavated material in the case of volatile organic compounds. Recent advancements in bioaugmentation and biostimulation of the excavated material have also proven to be able to remediate semi-volatile organic compounds (SVOCs) onsite. If the contamination affects a river or bay bottom, then dredging of bay mud or other silty clays containing contaminants may be conducted. Recently, ExSitu Chemical oxidation has also been utilized in the remediation of contaminated soil. This process involves the excavation of the contaminated area into large bummed areas where they are treated using chemical oxidation methods.

Pump and treat

Pump and treat involves pumping out contaminated groundwater with the use of a submersible or vacuum pump, and allowing the extracted groundwater to be purified by slowly proceeding through a series of vessels that contain materials absorbing the contaminants from the groundwater. For oil-contaminated sites this material is usually activated carbon in granular form. Chemical reagents such as flocculants followed by sand filters may also be used to decrease the contamination of groundwater. Depending on geology and soil type, pump and treat may be a good method to quickly reduce high concentrations of pollutants.

Solidification and Stabilization

Solidification and stabilization work has reasonably good results but also a set of serious deficiencies related to durability of solutions and potential long-term effects. Stabilization and solidification is a remediation technology that relies on the reaction between a binder and soil to prevent or reduce the mobility of contaminants.

Stabilization involves the addition of reagents to a contaminated material (e.g. soil or sludge) to produce more chemically stable constituents.

Solidification involves the addition of reagents to a contaminated material to impart physical stability to contain contaminants in a solid product and reduce access by external agents (e.g. air, rainfall).

Conventional Stabilization and solidification is an established remediation technology for contaminated soils and treatment technology for hazardous wastes in many countries in the world. In situ oxidation New in situ oxidation technologies have become popular, for remediation of a wide range of soil and groundwater contaminants. Remediation by chemical oxidation involves the injection of strong oxidants such as hydrogen peroxide, ozone gas, potassium permanganate or persulfates. Oxygen gas or ambient air can also be injected as a more mild approach. One disadvantage of this approach is the possibility of less contaminant destruction by natural attenuation if the bacteria which normally live in the soil prefer a reducing environment. The injection of gases into the groundwater may also cause contamination to spread faster than normal depending on the site's hydrogeology.

## Text 34. Waste Management: Concepts, Handling, Transport

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text. Complete the text with the most suitable variants given below.***

Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. Waste management can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of expertise for each. Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers.

Waste management concepts

There are a number of concepts about waste management which vary in their usage between countries or regions. Some of general, widely used concepts include:

*Waste hierarchy* refers to the "3 Rs": reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste.

*Extended producer responsibility* is a strategy designed to promote the integration of all costs associated with products throughout their life cycle (including end-of-life disposal costs) into the market price of the product.

*Polluter pays principle* is a principle where the polluting party pays for the impact caused to the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the waste.

Waste handling and transport

Waste collection methods vary widely between different countries and regions. Domestic waste collection services are often provided by local government authorities, or by private industry. Some areas, especially in less developed countries, do not have a formal waste-collection system.

Examples of waste handling systems include:

In Australia, curbside collection is the method of waste disposal. Every urban domestic household is provided with three bins: one for recyclables, one for general waste and one for garden materials – this bin is provided by the municipality if requested. Also, many households have compost bins. To encourage recycling, municipalities provide large recycle bins, which are larger than general waste bins. Municipal, commercial and industrial, construction and demolition waste is dumped at landfills and some is recycled. Household waste is segregated: recyclables sorted and made into new products, and general waste is dumped in landfill areas.

Australians are in favour of the recycling of waste. Of the total waste produced in 2003, 30% of municipal waste, 45% of commercial and industrial waste and 57% of construction and demolition waste was recycled. Energy is produced from waste as well: some landfill gas is captured for fuel or electricity generation. Households and industries are not charged for the volume of waste they produce.

In Europe and a few other places around the world, a few communities use a proprietary collection system known as Envac, which conveys refuse via underground conduits using a vacuum system.

In Canadian urban centres curbside collection is the most common method of disposal, whereby the city collects waste, recyclables and organics on a scheduled basis. In rural areas people often dispose of their waste by hauling it to a transfer station. Waste collected is then transported to a regional landfill.

In Israel, the Arrow Ecology company has developed the ArrowBio system, which takes trash directly from collection trucks and separates organic and inorganic materials through gravitational settling, screening, and hydro-mechanical shredding. The system is capable of sorting huge volumes of solid waste, salvaging recyclables, and turning the rest into biogas and rich agricultural compost.

## Text 35. Methods of Solid Waste Disposal

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Integrated waste management Integrated waste management uses LCA attempts to offer the most benign options for waste management. A number of broad studies have indicated that waste administration, and then source separation and collection followed by reuse and recycling of the non-organic fraction, energy and fertilizer production of the organic waste fraction via anaerobic digestion is the favourable method for mixed Municipal Solid Waste (MSW). Non-metallic waste resources are not destroyed with incineration, can be reused or recycled in a future resource depleted society.

Plasma gasification

A gasifier vessel utilizes proprietary plasma torches in order to create a gasification zone of up to 3,000 °F (1,650 °C) to convert solid or liquid wastes into a syngas. When municipal solid waste is subjected to this intense heat within the vessel, the waste's molecular bonds break down into elemental components. The process results in elemental destruction of waste and hazardous materials.

Landfill

Disposal of waste in a landfill involves burying the waste, and this remains a common practice in most countries. Landfills were often established in abandoned or unused quarries, mining voids or borrow pits. A properly designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing of waste materials. Older, poorly designed or poorly managed landfills can create a number of adverse environmental impacts such as wind-blown litter, attraction of vermin, and generation of liquid leachate. Another common by-product of landfills is gas (mostly composed of methane and carbon dioxide), which is produced as organic waste. This is a greenhouse gas, it also can create odour problems and kill surface vegetation.

Many landfills also have landfill gas extraction systems installed to extract the landfill gas. Gas is pumped out of the landfill using perforated pipes and burnt in a gas engine to generate electricity.

Incineration

Incineration and other high temperature waste treatment systems are sometimes described as "thermal treatment". Incinerators convert waste materials into heat, gas, steam, and ash. It is used to dispose solid, liquid and gaseous waste. It is recognized as a practical method of disposing of certain hazardous waste materials. Incineration is common in countries such as Japan as these countries generally do not require any area for landfills. Waste-to-energy (WtE) or energy-from-waste (EfW) are terms for facilities that burn waste in a furnace or boiler to generate heat, steam or electricity. Combustion in an incinerator is not always perfect and there have been concerns about micro-pollutants in gaseous emissions from incinerator.

Recycling

The popular meaning of ‘recycling’ in most developed countries refers to the widespread collection and reuse of everyday waste materials such as empty beverage containers. Material for recycling may be collected separately from general waste using dedicated bins and collection vehicles, or sorted directly from mixed waste streams.

The most common recycled products include steel food and aerosol cans, HDPE and PET bottles, glass bottles and jars, paperboard cartons, newspapers, magazines, and corrugated fibreboard boxes.

PVC, LDPE and PP are also recycled, although they are not commonly collected. These items are usually composed of a single type of material, making them relatively easy to recycle into new products.

## Text 36. The Ways to Recycle Old Electronics

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Most of us are surrounded by electronics in our homes - computers, peripherals, MP3 players, game consoles and countless other digital gadgets. Each time we upgrade to the latest model, we've got an electronic device on our hands that, as far as our own needs are concerned, is obsolete. So let see where it may go, if not to the growing pile of logoed plastic and metal in the basement. Why not just throw it out?

There are lots of reasons why something like your old computer shouldn't go out with the trash. First, it may not be trash at all. Sure, if it's pre-1995, it's not going to do anyone much good. But if you bought it in the last 10 years or so, it can possibly be upgraded or refurbished and be of great use to someone who doesn't have the money to buy a new one. And if you do have a relic on your hands, tossing it is still not the best way to go. If you throw out your old electronics, not only are you taking up increasingly scarce landfill space with valuable resources like plastic, metal and glass that could be made into new devices using less energy than it takes with virgin resources, but you're also putting potentially toxic materials in the ground. Lead, mercury and other substances can leech from old monitors and circuit boards into the air and ground water and possibly affect people's health. In some countries and many U.S. states, particular electronic components are regulated as hazardous waste.

So, if you're not going to put your old computer in the dumpster, you're down to two choices: reuse or recycle. If the device is in good working order, reuse is the better option. Refurbishing is easier on the environment than recycling. Recycling uses energy, and the longer you can keep the non-recyclable parts out of a landfill, the better.

You can donate a working electronic device for reuse in any number of ways. Cell phones are easy -- the store where you buy your new one will usually donate your old one for you at little or no cost. And if you want to choose which charity gets to have your old phone, a simple Web search will point you to a selection of charities in your area that want it. For example, many cities have women's shelters that accept unwanted, working cell phones and give them to women in domestic-abuse situations so they can dial 9-1-1 anywhere, any time. If your unwanted device is a fairly modern, working computer, many school districts will gladly take it. And if you've got an old computer, scanner, Webcam or other device that's not in working order, you can post it to an online message board like Craig's List or a listserv like Freecycle, and you'll likely find some who at least wants it for parts.

Of course, that last option requires that you deal with other human beings and multiple e-mail exchanges in order to get your non-working electronic device into new hands. If you want to get rid of a broken or extremely old piece of electronics with minimal effort, recycling may be the way to go. Many computers are built to be easily disassambled into their component parts for easy recycling. Some devices may require more energy to recycle, but it's still better than tossing them into a landfill.

Electronics recycling is a fairly new industry, and it's far from centralized at this point. Many people end up throwing their old electronics in the trash out of frustration alone. It can take a good deal of research to figure out how to properly recycle this stuff. Going to the manufacturer's Web site or to the store where you bought the device is often a good bet. Many electronics manufacturers and retailers have instituted collection programs that make recycling your old gadgets pretty easy.

## Text 37. Energy Resources

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The search for accessible, renewable energy has reached a fevered pitch, and one of the leading candidates to potentially replace fossil fuels is also one of the oldest -- wind. It's been harnessed for centuries to mill grains and power ships, and as far back as the 1930s it's been used to generate electricity. But over the past years, as demand for and the price of energy has steadily increased, so too have the efforts to turn wind into a viable option for producing electricity on a large scale. The potential of wind turbines, which convert kinetic energy into electrical energy, has been promoted at every turn. But there are some risks. After all, these wind turbines can be colossal, measuring more than 400 feet (122 meters) tall, weighing in at close to 400 tons, and equipped with rotating blades that may span 300 feet (91 meters) or more. And even the most ambitious plans from the U.S Department of Energy aim to supply just 6 percent of the nation's electricity from wind by the year 2020. So, one should see whether it is worth the risks.

First, let's look at some of the financial risks of wind energy. Subsidies and incentives offered by the government are creating a sense of urgency for utility providers to install wind farms. But even with the financial breaks, wind energy is a cost-intensive operation. According to the American Wind Energy Association, constructing a 50 megawatt wind farm (around 25 wind turbines) carries an up-front cost of around $65 million, and that's before a single kilowatt of electricity is generated.

That's a pretty steep price for a venture that rests completely on something as unpredictable as the wind. Another risk associated with wind farming is blighting the landscape with massive turbines. The same hypothetical 50 megawatt wind farm, for example, would require nearly 4,000 acres (16 square kilometers), or around 150 acres (0.6 square kilometers) per turbine. So even in areas that are relatively isolated, these installations can turn an otherwise pristine desert mesa into an industrial eyesore. And because sweeping mountain ranges and breezy coastlines are ideal locations for both wind farms and tourists communities are resisting wind farm development out of fear that visitors will opt for other destinations.

Wind farming also poses some physical risks to the environment as well as to people. Indeed, wind turbines can also cause actual bodily harm, both to humans and wildlife, in areas around installation sites. From a distance, the blades seem to move slowly but the tip speed on these turbines can approach 200 miles per hour, creating deadly obstacles for birds. Birds of prey are particularly vulnerable since they hunt in open plains where visibility is high. One particularly highly publicized wind farm, Altamont Pass in California, has been a lightning rod of controversy because of the impact poor planning has had on the bird population. According to the Center for Biological Diversity, as many as 1,300 eagles, falcons, hawks and other predatory species are killed each year because the wind turbines were constructed along a critical migration route.

People are also at risk. As with any developing technology, progress and understanding usually happen simultaneously. Blade throw, although it's rare these days thanks to design improvements, is a malfunction that occurs when a blade breaks free of the turbine and becomes a very large, very dangerous projectile. Similarly, wind farms that operate in cold climates are also susceptible to ice formation. Accumulating ice can fall or be thrown from turbines, potentially endangering surrounding people and property.

There are also more subtle health risks of wind farming. In her book, "Wind Turbine Syndrome: A Report on a Natural Experiment," Dr. Nina Pierpont describes a condition called "wind turbine syndrome" in which wind farms pose actual health risks to nearby residents. The sub-sonic noise generated by turbines is believed to cause maladies ranging from headaches and sleeplessness to dizziness and even depression. And visually, the flicker effect of spinning turbines can cause vertigo and even seizures. For all its promise, wind energy is not without its own set of risks that should be weighed against the benefits. After all, it wasn't that long ago that petroleum was hailed as a cleaner, more efficient alternative to coal and helped power the world through the industrial revolution.

## Text 38. Three Big Mistakes We Make With Recycling

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Recycling is a civic and moral duty, but it also can be a pain in the neck. Consider the humble plastic coffee cup. Many of us dutifully toss our coffee shop cups and lids in the recycle bin, assuming that the discarded cups will be refashioned into some kind of eco-friendly baby toy for needy children. Truth is, it's probably going to the landfill. Plastic coffee cups have a waterproof lining that's difficult to recycle, so most recycling facilities toss them in the trash. We all want to be good recyclers; we want to do the right thing. But if you rush to recycle — without understanding how recycling actually works — you'll end up sending even more stuff to the garbage heap.

Every week, fleets of green Waste Management trucks, the largest residential recycler in North America, pick up millions of curbside recycling bins filled with bowling balls, curling irons, electronic kids' toys with lights and bells, rubber hoses and what not. Consumers most often make a mistake when they think, 'I don't know what this material is. It could be plastic or some type of glass. I really want this to be recycled, so I'm going to put this in my container and hopefully my recycling team will be able to find a reuse for it.' They're 'wishing' that an item can be recycled. Unfortunately, when those unrecoverable items come into the recycling facility, they are pulled out as contamination." "Contamination" is recycling industry lingo for anything that can't be recycled in a conventional single-stream recycling facility. In a single-stream facility, truckloads of material arrive all mixed together — plastics, paper, metals, glass — and a sequence of smart machines and quick-handed workers sort out the salvageable from the trash. So when you drop a bowling ball into the recycling bin in an act of wishful recycling, all you're doing is temporarily delaying its trip to the landfill.

Not-quite-clean Containers

Here's a "dirty little secret" about the recycling industry. They're not doing this as a public service out of the goodness of their corporate hearts. Recycling is a business. Waste Management and every other residential recycler make money by selling giant crushed cubes of recycled material — commodities like plastic, paper, metal, glass — to companies that turn that material into new products. Waste Management's "product" is the stuff in your recycling bin. And if the product is dirty, greasy, wet or otherwise weird, no one will want to buy it. One bad apple can spoil the whole bunch. If you have one bad item in your load of material, it can contaminate everything else around it. Liquid and food debris are the worst culprits. If a full bottle of water or detergent spills onto a stack of cardboard, the soggy cardboard will become a useless mush in the sorting machines. Leftover yogurt in your container will get smeared on everything around it, and the company buying that bale of plastic will reject it.

To save time and money, workers in the Waste Management recycling facility will search out and throw away anything contaminated with food or liquid. So if you don't empty and wash out your recyclables, your best intentions are going straight to the landfill.

Wrapping Stuff Up in Plastic Bags

Perhaps the biggest mistake made by well-meaning recyclers is to wrap items up in plastic grocery bags. We're so accustomed to bagging our trash that it's only natural to neatly wrap up a stack of cat food cans in a grocery bag before dropping it in the recycling bin. In truth, all you're really doing is sending those bagged cans straight to the garbage heap. Plastic bags can get jammed in the large sorting machines at a single-stream recycling facility. When that happens, managers have to shut down the plant and have employees go in and manually remove that film plastic. Not only is it a problem for our efficiency, but it's a safety issue for the employees that have to remove the material. Plastic bags are 100 percent recyclable, just not in your curbside recycling bin. Just remember, anything you try to recycle in a bag will end up getting tossed in the trash.

More Recycling Do's and Don'ts

- Plastic bottle caps are recyclable now, but only if they're attached to the bottle.
- Cardboard boxes need to be flattened at home or else they trap other items in the sorting machines.
- Broken glass isn't recyclable, because the machines can't sort the small pieces by color (plus it's a danger to recycling facility workers).
- Plastic utensils, clamshell containers (like the ones that hold berries from the grocery store), chip bags and candy wrappers can't be recycled for various reasons.
- Clean pizza boxes (without food or the paper liner) can be recycled.
- If you're not sure if something is recyclable, don't put it in the recycling bin.

## UNIT 9. BELARUS AND ITS NATURE-CONSERVATIVE AREAS

### Text 39. Belarus and Its Nature-Conservative Areas Parks and Wildlife Sanctuaries

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

**Belovezhskaya Pushcha National Park (BPNP) and a Biosphere Reserve** is located in the western part of the country in Brest Region's Kamenets and Pruzhany districts and Grodno Region's Svisloch District, 380 km from Minsk. It forms a single nature reserve with Poland's Belovezhski National Park. The area of the Belarusian part of the reserve is 163,505 hectares, while the Polish part is 10,501 hectares. BPNP was set up in 1991 and it is one of the oldest nature reserves in the world. The intact wood of BPNP was first mentioned in chronicles in the 10th century, and in the 14th century Lithuanian Prince Yagailo proclaimed these lands a reserve. BPNP is an Europe's last surviving primeval forest which has preserved its prehistoric nature with relic plants and animals, the European bison in the first place. In 1992 UNESCO gave the Pushcha the status of biosphere reserve and placed on the United Nations World's Heritage list. Thus Pushcha entered a world system for surveying changes in the environment. The flora and fauna is remarkable because of the great number of various types of plants and animals. The flora is represented by 958 vegetative plants, around 260 moss species, over 290 lichens, 570 kinds of mushrooms. The reserve's flora contains 65 endangered species. Experts registered here more than 1000 oaks aged 300–700 years, 450-year-old ash-trees, 220-year-old pine-trees, 150-year-old junipers. You can also find here white firs, various types of spruce, pines, hornbeams. The fauna of the reserve counts 59 mammals (including 6 rare species), 253 bird species, 11 amphibians, 7 reptiles, 24 fish species and over 11,000 invertebrates. Eleven mammals, 52 fowl species, 2 reptiles, 1 amphibian, 8 fish species and 38 insects were included in Belarus Red Book. Other large animals found in BPNP include the deer, the boar, the elk, the wolf, the fox. About one-third of the territory of the reserve is occupied by swamps. One of the largest swamps in Europe – Dikoye – is located here.

The reserve is crossed by a number of rivers (the Narev, the Lesnaya Pravaya, etc.). In addition, there are two reservoirs (Bolshoye Lyadskoye and Maloye Lyadskoye). The national park contains lots of landmarks of ancient culture, such as settlements of the Stone Age, burial places and shrines. One of the most prominent monuments of architecture situated here is Belaya Vezha (the White Tower Citadel), and the famous royal road. Another important site is Viskuli Residence, the former mansion of Duke Tyshkevich. Belovezhskaya Puscha has been known as a place of royal hunting since the 15th century.

**National Park "Pripyatsky"** is situated in the very centre of the Belarusian Polesie, 250 km to the south from Minsk, on the banks of the river Prypyats in Gomel Region's Zhitkovichi, Lelchitsy and Petrikov districts. The protected territory in the Pripyat area – the State Landscape Hydrological Reserve – was set up in 1969, and the National Park was established here in 1996 to preserve the unique natural landscape of Belarus Polesse area and study climate changes that resulted from the drainage of Polesse lowlands.

The total area of the park is more than 83,000 hectares. Its territory stretches for 64 km from west to east and is a vast plain in the south of the Pripyat Polesie consisting of the area at the river Pripyat and terraces, which turned into a glacial plain at the very south. In the postglacial period the area used to be occupied with a huge water reservoir that was known as the Polesse Sea or the Herodotus Sea (since the ancient Greek historian mentioned these lands in his books). Today much of the area is occupied by turf swamps. Meadows here are mixed with shrubs, and multiple lakes are mixed with sand dunes. The park's major waterway is the River Prypyats – the longest tributary of the River Dnieper. The borders of the park are formed by the tributaries of the Prypyats – the creeks of Stviga and Ubort. The number of lakes here is about 300 and may cover up to 70 % of the park during the flood period. Local flora is represented by 943 vascular plants including 38 rare species, 196 kinds of moss. The fauna park includes 45 types of animals, 250 fowl species, 51 mammals, 265 types of birds, 7 types of reptiles, 11 types of amphibians, 37 fish species, including four mammals and 65 birds that were included in Belarus Red Book. Local forests have large populations of elks, boars and roes. Other dwellers here are also European bison, badgers, lynxes, black storks, grey cranes, snake-birds, eagle-owls, big sub-eagles, marsh turtles, reed toads, grass-snakes, starlets. The most frequently found trees are birch, aspen, black adler, ash and hornbeam, 184 lichen species and 321 waterweed types. The park serves as a vital transit corridor for birds migrating from Western Europe to Russia and hosts a unique population of globally endangered fowl species, such as the Schrenk's warbler and the crake. Pike, bream, sabre fish, roach and ide spawn right on the park's flood plains during snowmelt floods.

**Srednyaya Prypyats landscape reserve** and a wildlife sanctuary, located in Brest Region's Pinsk, Stolin, Luninets districts and Gomel Region's Zhitkovichi District is 90,447 hectares. The reserve's landscape is formed by oak woods, swamplands, meadows, rivers and lakes. Among numerous representatives of fauna there are five globally endangered fowl species and 52 bird species that were included in Belarus Red Book. The flora of the reserve counts 725 plant species, and the fauna includes 36 mammals (the elk, the boar, the roe, the fox, the wolf, the raccoon dog, the beaver), 182 fowl species, 6 reptiles, 10 amphibians and 37 fish species. The River Prypyats plays a key role in the conservation of some endangered fowl species, such as the gray duck, the swamp owl, the corncrake, the eagle-owl, etc.

**Volma River Biological Reserve (Volmyanski)**, a Landscape protection area, situated in Smolevichi District, Minsk Region is 637,7 hectares. The western border of the reserve is formed by the river Volma. The reserve was established to preserve valuable woods populated with endangered animal and plant species. The reserve's landscape that was formed by the glacier is characterized by a great number of hills and barrows. The northern part of the reserve contains 5-10-metre-high kames. Another peculiar feature of the local landscape in the natural floodland of the River Volma. The reserve contains eleven valuable plant communities, including aspen woods, pinewoods and spruce woods with small inclusions of oaks and maples. Nine of locally available plants have been included in Belarus Red Book (list of endangered species), such as the bugle-weed, the club moss, the wolf's bane, the crisped lily, the bitter vetchling, the sword lily, etc. The waters of the Volma are populated by such species as trout, minnow, perch, char, roach. The local fauna is represented by the beaver, the elk, the roe, the pine marten, the otter, the hare, the squirrel. Camping and burning fire in the reserve is prohibited.

**Naroch region. National Park "Narochanski"**, 170 km from Minsk, is famous for lake Naroch, a pearl of the Belarusian nature, and the most picturesque Blue Lakes in the northwest of Belarus. The park was formed in 1999 to preserve the unique local environment and ensure the efficient use of natural resources. It occupies the territory of Minsk Region's Myadel and Vileika districts, Vitebsk Region's Postavy District and Grodno Region's Smorgon District that is 94 thousand hectares, 37.9 thousand of which are covered with forests. There are 42 lakes covering 18.3 thousand hectares here. The area is famous for its mineral waters, too. This land also means quiet rustle of pine forests and the largest recreational and resort complex in the country. The beauty of the Naroch, wonderful woods and soft climate were the main reasons for establishing of a great recreational centre at the lake's shores. Nowadays there are 18 sanatoriums and rest-homes here. The park's fauna counts around 900 plant species including over 30 endangered ones. Part of the park called

Golubye Ozera (blue lakes) is a botanical area of international importance. The fauna is represented by 243 species, including 10 amphibians, 5 reptiles, over two hundred bird species and 49 mammals. The park takes particular pride in a herd of 50 royal stags that has been recently added to its animal population. Rare fowl species found at Lake Naroch National Park include the snow grouse and the goosander. Local rivers and lakes are populated with 32 fish species, including trout, chub, minnow, char, tiddler, vendace, orfe, etc. In addition, the park has many other historical sites, such as Mesolithic settlements near the villages of Kusevschina, Strugolapy, Laposi, Krasyany and Neolithic items by the villages of Nikoltsy and Kochergi, ancient ceramic facilities near Nikoltsy, Rybki, Rassokhi and Iron Age barrows and ruins near Oleshki, Guski, Shklyanikovo and Zasvir.

**Ruzhanskaya Puscha Biological Reserve** and a wildlife sanctuary, situated in Pruzhany District, Brest Region, was set up to preserve the unique piece of nature with valuable trees and herbs. Beautiful oaks, hornbeams, limes, pines, spruces, larches attract lots of tourists. Rare plant species found in the reserve include the lady's slipper, the butterfly orchid, the salmonberry, the ramson, the lily of the valley, the thyme and the holy grass. The most recent additions on the list of the reserve's flora are the aspen, the alder, the birch and the silver fir. The reserve also contains rare kinds of mushrooms. The most typical representatives of the local fauna are the deer, the roe, the elk, the boar, the lynx, the hare, the beaver, the otter, the raccoon dog, the squirrel, the wolf. The fowl family is represented by the black stork, the black cock, the owl. Local rivers abound in roach, pike, perch, bream and ide. However, hunting and fishing in the reserve is banned.

## Text 40. Dokudovskoye Peatland

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Dokudovskoe peatland is located in Grodno region, Lida district. It is partly extracted – the extracted part is located southwest of the village Sterkovo and 2 km west of the village Dokudovo. The overall peatland area is 7,811 ha, the area of the depleted site area 3,583 ha. The peatland consist of 13 % bogs, 3 % transitional peatland, and 84 % fen. The main present land users are 'Lidsky Forestry' (2,744 ha) and peat factory 'Lidskoe' (384 ha). It is planned to rewet the extracted parts of the peatland by the peat factory successively. The current water level in the degraded peatland is 1.2–1.5 m below soil surface. Peat fires occur frequently. The peat factory near Lida was constructed in 1974. It is more or less constructed in the same way and has the same capacity as another 26 peat factories in Belarus. 300–500 t of briquettes are produced per day. Excavated peat has a water content of 38–48 %. Within the process the peat is dried with steam at a temperature of 120–140°C. The fuel for this is chipped wood and briquettes breakage. Heat from the factory is delivered to other consumers. The temperature whilst compaction is up to 150 dc. There is no norm for the density of briquettes but there is one for the humidity (about 16 %) and the ash content of the briquettes. Transport is done by trucks. Products from the peat factory are exported to Sweden, Lithuania, and Poland. Dokudovskoe peatland is interesting as a model site as it is closely located to Lida peat factory, which is interested in manufacturing biomass briquettes. As the site is partly already rewetted, chronosequential investigations could be carried out at different vegetation stages after rewetting. Currently biomass is no alternative for the peat factory for the total replacement of peat because only basic experiences exist on that until now. On the long run such a development is conceivable. In this regard, the mixture of peat either with straw of rape (0.4 %) or shives from flax production (5 %) and wood chips is noteworthy. The biomass raw materials (flax and rape) are transported to the factory by railway goods trucks.

By law, currently the biomass content in peat cannot be higher than 5 %. According to the deputy director of the factory 30–50 % of the peat could be replaced by biomass, depending on size of the biomass material (not bigger than 8 mm): The smaller the material, the higher the biomass content in briquettes could be. The price for flax shives is about 22 $ / ton. The peat stock at the Lida site will last approx. another 30 years; investigations on remaining peat are planned. The material is highly decomposed (35–40 %) fen peat. The ash content is about 10–18 %. The heating value is 3.600–3.800 kcal/kg (15– 17 MJkg). Rape straw would have a heating value of about 3.900 kcallkg. Flax shives are normally directly burned at the flax factory and accordingly difficult to get. Rape straw is more easily available. It would be possible to harvest reeds in fen and transition mires rewetted excavated sites near Lida that are available for biomass harvesting (in the short run 264 ha). Since the year 2000 about 3.000–4.000 ha of extracted parts of Dokudovskoe have already been rewetted by the factory and have been given to the forestry fund. Currently they are in different stages of succession. The biomass could be used in the regional heating facility, in private houses or in public buildings. In the near future it is planned to construct a block heat and power plant in Lida that could also use biomass from re-wetted sites as fuel for co-firing. (Thematic Programme for Environment and sustainable management of natural resources, including energy).

## Text 41. Sporava Peatland

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The Sporava peatland is located in the floodplain of the Yaselda river. It is one of the largest, least modified floodplain mires in Belarus and Europe. The seasonally flooded site comprises a large flat alluvial plain and peatlands extend along a 35 km stretch of the Yaselda river. The vegetation is dominated by sedge communities and wet meadows, with associated reedbeds, willow thickets and agricultural grasslands. The area is partly used for haymaking and cattle grazing. The current water management seems to be beneficial for the site. The peatland can be divided into two parts. The first part, located between Peschanka and Mlynok villages is a narrow, very wet floodplain strip of the Yaselda (25 km). The highly meandered river bed occupies the centre of the mire, and is partially overgrown by vegetation. A reedbed of 10–100 m wide is situated along both banks. Strongly waterlogged eutrophic peatlands occupy a 50–100 m wide strip adjacent to the reedbed, whilst the rest of the floodplain is represented by a 500–2000 m wide mesotrophic lowland mire. The outer edges of the floodplain are surrounded by open or forested elevations. The second part is the significantly extended Yaselda floodplain, and is more diverse. It includes fens of different trophic levels, with shrubs and scattered elevated islands which are open or covered with low woodland stands. The Yaselda river has a well formed river bed here, crossing the large, natural, highly productive Sporovskoe Lake. The site comprises an extensive area of suitable breeding habitat for the globally threatened aquatic warbler Acrocephalus paludicola. The site holds approx. 9 % of the European breeding population of the species (2006: 2373–2531 singing males). It supports 112 species of breeding birds, including 17 Red Data bird species for Belarus and internationally important populations of corncrakes, great snipes and bittern. The site supports also a rich non-avian biodiversity with 18 Red Data plant species for Belarus, including many globally threatened orchids, one Red Data reptile for Belarus, two European Red Data book invertebrates, and at least 10 Red Data invertebrate species for Belarus. The site supports an internationally significant proportion of the Caricetum elatae vegetation community, and nationally important stands of the Molinetum caeruleae and Corynephoretum canescentis communities. Today, the site is in dire need of vegetation management. Overgrowing with bushes is enormous and fast with an estimated annual rate of 5 % loss of open mire habitat, presumably rather accelerating.

## UNIT 10. ECOLOGY

### Text 42. Sustainability

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Compared to the rest of the Universe, the Earth is very small. Our planet and eight (or maybe nine) others orbit the Sun, which is only one of about 200 billion stars in our galaxy. Our galaxy, the Milky Way are the part of our Universe, which includes millions of other galaxies and their stars and planets. By comparison, the Earth is microscopic. Compared to a person, on the other hand, the Earth is enormous. It has a diameter of 7,926 miles (12,756 kilometers) at the equator, and it has a mass of about 6 x 1024 kilograms. The Earth orbits the Sun at a speed of about 66,638 miles per hour (29.79 kilometers per second). To a lot of people, the Earth is inconceivably,mind-bogglingly big. And it's just a fraction of the size of the Sun.

From the Earth the Sun looks very small. This is because it's about 93 million miles away from us. The Sun's diameter at its equator is about 100 times bigger than the Earth's, and about a million Earths could fit inside the Sun. The Sun is inconceivably, mind-bogglingly bigger. But without the Sun, the Earth could not exist. In a sense, the Earth is a giant machine, full of moving parts and complex systems. All those systems need power, and that power comes from the Sun. The Earth and the Moon are tiny compared to the Sun, but the Moon's shadow can completely cover the Sun during an eclipse. The Sun is an enormous nuclear power source: through complex reactions, it transforms hydrogen into helium, releasing light and heat. Because of these reactions, every square meter of our planet's surface gets about 342 Watts of energy from the Sun every year. This is about 1.7 x 1017 Watts total, or as much as 1.7 billion large power plants could generate. When this energy reaches the Earth, it provides power for a variety of reactions, cycles and systems.

It drives the circulation of the atmosphere and the oceans. It makes food for plants, which many people and animals eat. Life on the Earth could not exist without the Sun, and the planet itself would not have developed without it. To a casual observer, the Sun's most visible contributions to life are light, heat and weather. But the Sun has a relationship with the Moon too. The light we see when the Moon shines at night is really reflected light from the Sun. The relative positions of the Sun and Moon also create solar and lunar eclipses. This might make it seem like the Moon is nothing without the Sun, but it does some important jobs for the Earth. The Moon regulates the Earth's orbit, and it causes the ocean tides. People generally think of the Earth as a "Blue Marble" or a "Sphere", although it's really shaped more like a pumpkin. But scientists classify the Earth as several spheres:

- Atmosphere: the air we breathe;
- Biosphere or ecosphere: the life on the Earth;
- Geosphere: the layers of the planet itself;
- Hydrosphere: all of the water, including oceans, rivers, and lakes;
- Cryosphere: the ice at the poles;
- Anthrosphere: the people who live on the Earth.

## Text 43.Sustainable Development

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

The state of the environment today has reached a crisis point, which stems largely from humankind's attempts at development – to make our lives more comfortable and more satisfying. Development includes technological changes (such as the industrial revolution in the 19th century and today's electronic revolution), social changes (such as an increase in the division of labor and the separation of the home from the workplace) and economic changes (such as the change from subsistence farming to cash crops, the increase in taxation by central governments, etc.) All these changes are sometimes called progress. Most realistic environmentalists today aim for sustainable development – that is, development that does not damage the environment and which, theoretically, could continue indefinitely. Sustainable development requires action on four levels: by individuals, local authorities, national governments and the international community. What is the most important contribution an individual can make? We can adopt lifestyles that emit less pollution, use less energy and create less waste. We should walk or bicycle rather than travel by car. We should insulate our houses and become less dependent on electrical labor-saving devices. We should avoid "disposable" paper and plastic products such as tableware handkerchiefs, etc. and we should recycle all our metal, glass and paper waste. As consumers, we should become less dependent on manufactured goods in general, since a high proportion of industrial pollution comes from the manufacture of short-lived consumer goods. We should buy "environmentally friendly" products such as unbleached toilet paper, organically-grown vegetables and unleaded gasoline.

Local authorities can promote sustainable development through better planning of towns and cities. Local authorities should discourage the use of motor vehicles in towns by prohibiting cars in shopping districts, building public amenities within walking distance of residential areas, and creating bicycle paths instead of more roads. Trees and flowers in public parks make a town more pleasant and also help to counteract the greenhouse effect. Local authorities should provide recycling centers and other collection points for recyclable waste. They should also invest in the technology for disposing of human waste responsibly, rather than simply pouring raw sewage into the sea.

National governments can promote sustainable development through legislation, and through policies in agriculture, energy, transportation and trade. National governments could impose the carbon tax, which makes individuals and industries pay for the carbon dioxide they produce, a tropical hardwood tax, a "polluter pays" tax.

National agricultural policies should encourage organic farming and discourage the use of fertilizers and pesticides. Central governments should fund more research into renewable energy sources, and stop subsidizing the nuclear power industry. Governments in developed countries should prohibit the export of toxic chemicals, obsolete technology and military weapons to developing countries, and discourage the import of cheap, useless consumer goods.

Many of the most complex problems of the environment today, demand collaboration between countries. The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992, produced a document known as Agenda 21, which is an international agreement for working toward sustainable development. It covers issues such as population control, food and agricultural policy, waste disposal and financial aid for conservation projects in developing countries.

## Text 44. What Is Ecology? (I)

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Ecology is an intricate biological subject that deals chiefly with the relations between organisms, including humans, and the environmental elements that affect them. For instance, ecology helps the world understand how microscopic bacteria grow in water, how animals and plants interact and survive in the seas, deserts, forests or land and the list goes on.

Ecology simply attempts to understand the fundamental relation between plants and animals and their physical environment. It includes the study of different habitat sizes, study of plant and animal communities and their ecosystems, and the study of biodiversity with an aim of improving the environment, protecting public health, and managing natural resources.

According to ESA (The Ecological Society of America): "Ecology - is the study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them. Ecology also provides information about the benefits of ecosystems and how we can use Earth's resources in ways that leave the environment healthy for future generations."

The ecological concepts are built around the successional development of ecosystems, adaptation processes, distribution of organisms, energy transfer through the organisms, the distribution of biodiversity, wildlife and nature, and environmental conservation.

Ecologist is the one who study many kinds of environments. For example, ecologists may study microbes living in the soil under your feet or animals and plants in a rainforest or the ocean. Levels of Organizations in Ecology Levels of organization in ecology are the smaller categories by which ecosystems can be studied. The main levels of organization in the ecology are six and are categorized from the smallest to the largest. Let's look at the stages as described below: Species, Individuals, Organism.

Any living thing, individuals or organisms that are genetically related and can interbreed to produce young ones are part of this level of ecological organization. These organisms have to be of the same species because if they cannot breed to produce, then they don't qualify as members of this group. Organisms and individuals in this level act mutually with the environmental abiotic factors and will only crossbreed or interbreed with similar organisms, which limit their distribution.

Population. Population is the second level of organization in ecology. It pertains to a group of organisms or individuals belonging to the same species that live in the same geographical area and interacts with one another. An example is an eagle bird and its family together with other birds of the same species. In this sense, population includes individuals or organisms only of the same species, but they may vary in the genital makeup such as skin, eye or hair colour and size.

Community. Community is the third level of organization in ecology and includes all the populations in a given area at any particular time. Community includes all the organisms or individuals of different species living within the same geographical area that are actively interacting with each other. It is made up of all the biotic factors of the area and often includes biodiversity. An example is how populations of birds, zebras, antelopes, leopards, and lions coexist in a specific location.

Ecosystem. Ecosystem is the fourth level of organization in ecology and includes all the communities in a given area together with the non-living aspects of the environment. In precise, it accounts for the entire living community (biotic) and their interaction with the abiotic factors (physical environment) such as light, water, heat, atmosphere, and rocks. At this level, emphasis is how the biotic communities depend on the abiotic factors.

Biome. Biomes refer to a group of ecosystems sharing the same characteristics and are well adapted to the prevailing abiotic factors. An example is a desert biome. Biosphere. Biosphere is the highest level of organization in ecology. It is the entire planet with the all the living things combined, including humans. The biosphere includes the oceans, atmosphere and Earth. In simple terms, it is the combination of all the ecosystems and their defined habitats present on the Earth.

## Text 45. Ecology (II)

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Ecology is the study of the relationships between organisms and their environment.

Ecology emerged in the late 20th century as one of the most popular and most important aspects of biology. The word ecology was coined by a German zoologist Ernst Haeckel, who applied the term oekologie to the "relation of the animal both to its organic as well as its inorganic environment". The word comes from the Greek oikos, meaning "household, home, or place to live". Thus ecology deals with the organism and its environment. The word environment includes both other organisms and physical surroundings. It involves relationships between individuals within a population and between individuals of different populations. These interactions between individuals, between populations, and between organisms and their environment form ecological systems, or ecosystems. Modern ecology, however, is now focused on the concept of the ecosystem, a functional unit consisting of interacting organisms and all aspects of the environment in any specific area. It contains both the nonliving (abiotic) and living (biotic) components through which nutrients are cycled and energy flows.

Constant interactions between living organisms and their physical environment bind these components into a stable system. The state of balance in any ecosystem is self-sustainable so that even slight imbalances are corrected before they become severe, irreparable and fatal. Particular concern of the ecologists is with "higher" levels of life organization: from populations to biosphere. Ecology is a multidisciplinary science. Facts about ecological systems are drawn from biology, geology, chemistry, physics, history, physiology, anthropology, including various branches of geography: hydrology, soil science, geomorphology, biogeography, etc. Originally ecology was treated as environmental biology. Modern ecology has to deal with environmental problems caused by human activities.

The science of ecology has the following areas of study. They are plant and animal ecology, population ecology, community ecology, paleoecology. A new term "social ecology" was introduced to show interaction of man, society and nature, close interdependence of social and natural factors. Other ecological approaches concern specialized areas. Systems ecology, concentrating on input and output analysis, has stimulated the rapid development of applied ecology, concerned with the application of ecological principles to the management of natural resources, agricultural production, and problems of environmental pollution. In applied ecology, basic ecological principles are applied to the management of populations of crops and animals, so that yields can be increased and the impact of pests reduced. Applied ecologists also study the effect of humans on their environment and on the survival of other species. Theoretical ecologists provide simulations of particular practical problems (e.g., the effects of fishing on fish populations) and develop models of general ecological relevance. Nowadays it is evident that some of the most pressing problems in the affairs of men-expanding populations, food scarcities, environmental pollution, and all the attendant sociological – and political problems – are to a great degree ecological.

## Text 46. Areas of Study

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Ecology developed along two lines: the study of plants and the study of animals. Plant ecology concerns the relationships of plants to other plants and their environment. Animal ecology concerns the study of population dynamics, distribution, behaviour, and the interrelationships of animals and their environment. Because animals depend upon plants for food and shelter, animal ecology cannot be fully understood without a considerable background of plant ecology. This is particularly true in applied areas of ecology – wildlife and range management. Both plant and animal ecology may be approached as the study of the interrelations of an individual organism with its environment, called autecology, or as the study of groups of organisms, called synecology. Autecology, is usually concerned with the relationship of an organism to one or more variables such as humidity, light, salinity, or nutrient levels, it is easily quantified and lends itself to experimental design both in the field and the laboratory. Important concepts developed by synecology are those concerned with nutrient cycling, energy budgets, and ecosystem development. Synecology may be subdivided according to environmental types, as terrestrial or aquatic. Terrestrial ecology, which may be further subdivided into forest, grassland, arctic, and desert ecology, concerns such aspects of terrestrial ecosystems as microclimate, soil chemistry, soil fauna, hydrologic cycles, ecogenetics, and productivity. Aquatic ecology, called limnology, is limited to freshwater stream ecology and lake ecology. The former concerns life in flowing waters; the latter, life in relatively still water. Marine ecology deals with life in the open sea and in estuaries. The study of the geographic distribution of plants and animals is ecological plant and animal geography. The study of population growth, mortality, natality, competition, and predator-prey relations is population ecology. The study of the genetics and ecology of local races and distinct species is ecological genetics.

The study of the behavioral responses of animals to their environment, and of social interactions as they affect population dynamics, is behavioral ecology. Investigations of interactions between the physical environment and the organism fall under ecoclimatology and physiological ecology. The study of groups of organisms is community ecology (though it is difficult to separate it from studies of bioenergetics, biogeochemical cycles, and trophic-dynamic aspects of the community or ecosystem ecology). That part of ecosystem ecology concerned with the analysis and understanding of the structure and function of ecosystems by the use of applied mathematics, mathematical models, and computer programs is systems ecology.

## Text 47. The State of the Global Environment

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Man can only live in comfort on a very small part of the earth's surface, about 70 per cent of which is water, and much of the land is too hot, too cold, too barren, too swampy or too high for human beings. In that small part where he can live comfortably, man has been very careless in looking after his heritage.

Our modern lifestyle is destroying the fragile environment. At last, however, man has begun to wake up to the consequences of his actions and started to take steps to prevent things getting out of hand. There are many examples of what has happened already to make people realize that something must be done.

Water Pollution

Because of poisonous waste from industry and untreated sewage being allowed to enter rivers, many rivers in different parts of the world are now dead through lack of oxygen in the water and no longer have any fish life. A third of all British rivers are in this condition. Lakes have been similarly affected: in Switzerland Lake Zurich is dead and so are many other Swiss lakes. In northern Italy nearly all the lakes are dead and in the USA Lake Erie is dying.

A growing pollution menace is that from oil escaping from damaged oil tankers. It is alarming to think that there are about 3500 oil tankers on the world's seas. The importance of our oceans in the life process should never be forgotten:

70 per cent of our oxygen comes from the seas through the actions of tiny onecelled plants called diatoms and they cannot function in polluted water. Contaminating the oceans and seas is endangering the world's oxygen supplies.

Sewage and agricultural nitrate fertilizers are responsible for the blooms of algae, called red tides, now becoming more common. These deplete the water of oxygen, producing what are known as `dead zones`; one such zone, of 4000km², has been found in the Gulf of Mexico, near the mouth of the Mississippi.

Many countries have joined together to improve the management of the 214 river basins that are shared by more than one country. These schemes are already improving water quality and management of the North American Great Lakes and of the European Rhine. The UN Global Environment Monitoring System (GEMS), which is coordinated by UNEP, now includes 344 water-monitoring stations in 59 countries.

Air Pollution

Air pollution comes in many forms, but four pollutants are particularly important: the sulphur oxides, emitted mainly by power stations and industry; nitrogen oxides, emitted mainly by vehicles; and soot and dust, known technically as suspended particulate matter (SPM), found everywhere where fuels are burnt. Some 60 per cent of the pollution is blamed on the exhausts of motor vehicles and a further 30 per cent is caused by industry. The car is an ecological disaster. It is now the world's number one polluter. From the beginning to the end of its life, one car produces an enormous quantity of pollution. The production of one car results in 1,500 kilos of waste, and 75 million metres of polluted air. Cars are partly responsible for the ever-increasing amount of poisonous lead being found in human beings. In addition to being a health hazard (lung diseases, mentally retarded children and problems with the digestive system) air pollution causes millions of pounds worth of damage through the corrosion of metal and the decay of stone and brick-work.

## Text 48. Ways to Protect the Ecology

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Environmental protection is the practice of protecting the natural environment by individuals, organizations and governments. Its objectives are to conserve natural resources and the existing natural environment and, where possible, to repair damage and reverse trends.

Due to the pressures of overconsumption, population growth and technology, the biophysical environment is being degraded, sometimes permanently. This has been recognized, and governments have begun placing restraints on activities that cause environmental degradation. Since the 1960s, environmental movements have created more awareness of the various environmental problems. There is disagreement on the extent of the environmental impact of human activity and even scientific dishonesty occurs, so protection measures are occasionally debated.

Approaches with Regards to Environmental Protection Times are ever changing. It is crucial for societies, countries and organizations to avoid resistance and adapt to the needs of all living species and resources. Key concepts of conservation pertain to sustainability of resources and species, the longevity of individual product usage and the concerned domino effects that reckless usage of resources is creating. Sustainable developments, ecological restorations alongside animal welfare are not only all-important aspects when discussing conservation and change but it also provides a valid reason as a topic of concern and awareness. By educating current and upcoming generations, and equipping them with the necessary knowledge and tools, change to help replenish the environment and a healthier living style as a society is bound to reap great results.

Conserving and Improving Our Surrounding Environment

Human beings are the domineering organisms in the ecological system. For this reason, we can protect ecology by improving water quality, reducing environmental pollution, protecting biodiversity, and limiting the destruction of natural resources. Humans have all the capabilities and resources needed for the necessary steps to help improve the ecological communities so as to regenerate the natural systems and to encourage ecological stability. Acts such as pollution reduction, environmental conservation, wildlife protection, and reducing exhaustive natural resource exploitation can significantly protect the world's ecology.

Recovery, Replacement and Control Measures

Natural and less toxic recovery, replacement and control measures can be instituted to avoid the damages of the environment's delicate nature that host the various intricate processes existent among living and non-living things. This can include acts such as exploiting renewable energy sources, afforestation, establishing pollution regulation policies, allowing for natural breeding, and restoration of destroyed natural resources as well as habitats.

Restoration of wetlands and controlling invasive species are perfect examples of restoration and control measures respectively, which can help protect ecology. A good example of replacement is the use of wetlands and marshes to filter water impurities and other toxins instead of solely depending on water treatment plants.

Management of Natural Resources

Natural resource management encompasses protection of endangered species, forestation, protection of aquatic habitats, the practice of organic farming, and controlled exploitation of natural resources. Bringing back species that are on the verge of extinction is a wonderful way of protecting ecology because they can be used in future ecological studies. On the other hand, forest management practices play an important role in sustaining healthy forest ecosystems and preserve certain species of trees. Organic or natural approaches that use natural predators and enemies for pest control protects the ecology of pests, limits the problems associated with pesticide, and relieve crop damage by pests. Additionally, properly managing aquatic habitats ensures that nursery grounds for fish and other aquatic life forms are protected, and controlled exploitation of natural resources limits the destruction of the ecosystem.

Creating Awareness, Education and Advocacy

Educative campaigns and advocacy create awareness that can help people understand the value of ecology. It is a simple way of establishing a workable solution towards conserving and protecting both abiotic and biotic elements. It enables people to make conscious efforts of not only thinking about the past and present but also the future so that we can use resources sustainably while at the same time conserving them for the future generations. This can be done through environmental campaigns, education, and discussions.

## Text 49. International Cooperation in the Field of Environmental Protection

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

Harmonization of international environmental relations is one of the main ways out of the global community of ecological crisis. High priority to the environmental factor in international relations is increasing and is associated with progressive deterioration of the biosphere. They become environmental imperatives and define new norms and rules of interaction between states. Therefore, the problem of harmonizing relations of society and nature, protection of the environment has assumed global importance. The development of effective international mechanisms would ensure judicious use of the planet's resources and their protection would help preserve the ecological balance.

It is a recognized fact that it is necessary to implement the joint efforts of the environmental action of all countries. Currently no country is able to solve their environmental problems alone or by cooperating with several countries. We need a clear concerted action by all countries and their coordination on the basis of international law. The solution to all these problems is possible only on the basis of international cooperation undertaken on a multilateral basis. Forms of such cooperation are the organization of scientific and practical meetings; the establishment of international organizations; the conclusion of official contracts and agreements, coordinating joint efforts for the protection of nature and the work of the public international parties and organizations (the "green" and "environmentalists"). In the world there are a significant number of international environmental organizations that conduct a variety of scientific studies of the impacts of human activities on climate, atmosphere, hydrosphere, soil, flora and fauna, predictions of earthquakes and tsunamis, biological and genetic consequences of environmental pollution. Implementing these projects by such organizations as UNEP (UN Environment Programme), established in 1973, which coordinates all activities in the field of environmental protection, is developing a program for further joint action in this area, WMO (World Meteorological Organization), UNESCO (United Nations Educational, Scientific and Cultural Organization), WHO (World Health Organization), ECE (European Economic Commission), IMO (International Maritime Organization), IORP (International Organization on Radiological Protection), the IUCN (International Union for Conservation of Nature, Natural resources), founded in 1948, MODM (International Council for the Exploration of the Sea), IOC (International Organization for Climate Change), WWF (World Wildlife Fund), founded in 1961, the Club of Rome, founded in 1968, Greenpeace, founded by the Canadian conservationists in 1971, WCE (World Commission on the Environment), founded in 1983. International cooperation in the field of environmental protection is one of the important places in the foreign policy of any country. At the present stage of human development, the ultra-high level of impact on the environment doesn't always have predictable effects. Environmental education, training and culture of citizens are determined not only by the nature of the state, but the welfare and health of the nation. Discussion concerning environmental protection often focuses on the role of government, legislation and law enforcement. However, in its broadest sense, environmental protection may be seen to be the responsibility of all the people and not simply that of government. Decisions that impact the environment will ideally involve a broad range of stakeholders including industry, indigenous groups, environmental group and community representatives. Gradually, environmental decision-making processes are evolving to reflect this broad base of stakeholders and are becoming more collaborative in many countries. Many constitutions acknowledge the fundamental right to environmental protection and many international treaties acknowledge the right to live in a healthy environment. Also, many countries have organizations and agencies devoted to environmental protection. There are international environmental protection organizations, such as the United Nations Environment Programme.

Although environmental protection is not simply the responsibility of government protection acts, most people view these agencies as being of prime importance in establishing and maintaining basic standards that protect both the environment and the people interacting with it.

## Text 50. What Environmental Scientists Do

***Write out unknown words and word expressions from the text, look up their meaning in a dictionary. Read and translate the text.***

In a world where global warming, air pollution, and plastic waste are major topical issues, environmental science is becoming an increasingly valued and relevant degree. Although it is a relatively new field, it combines elements of the key traditional fields of chemistry and biology, and is widely recognized as a rigorous and academic degree. However, due to its newness, many people have questions about what studying environmental science is like and where it can lead.

What is studying environmental science like?

Environmental science is an interdisciplinary subject, so it will involve studying elements of biology, chemistry, physics, geography and social sciences; this can be a challenge as each of these fields requires different skills and knowledge. However, by combining an understanding of all of these areas, students are better able to study the environment from an integrated perspective.

Fieldwork is a key part of studying environmental science. How far you travel for fieldwork is related to your areas of interest – it could involve travelling to different countries to experience a range of habitats and climates or it could be focusing on a particular ecosystem and involve a significant amount of work in a single location. Laboratory work is also a core element of studying environmental science – as part of the degree, you will learn how to test analyze different samples and interpret the results. It is also common to do work placements or voluntary work as part of the degree; the environmental sector is extremely competitive, and work experience develops valuable skills which are invaluable when job hunting.

What do you study in environmental science?

Core elements of most courses include atmospheric sciences, ecology, environmental chemistry and geosciences.

Atmospheric sciences involves studying the atmosphere, typically covering the chemistry and physics of the atmosphere, and the impact changes can have on ecosystems all over the world. You may also study meteorology. Ecology focuses on how organisms interact with the environment and each other. This can connect to social sciences as well as biology. Environmental chemistry centres around the impact humans have on the environment and how contamination happens, what its effects are and how it can be prevented.

Geoscience is a very broad field, but focuses on the earth's natural processes; in environmental science, this will involve learning more about the earth to ensure you have a good scientific basis for understanding environmental changes.

Should I study biology instead of environmental science?

If your main interest is in biology, a pure biology degree may be a better choice. There will still be the opportunity to choose modules that are related to environmental science, and it will reduce the number of different sciences you are learning about. However, if you are happy with interdisciplinary study and you are committed to working in the environmental sector then environmental science might be a better option. It is also important to consider that a pure biology degree will enable you to access some biologyrelated careers that an environmental science degree wouldn't qualify you for. This is because studying a single science will result in a much greater understanding of that specific field than a multi-disciplinary approach.

Where can it take you?

Environmental science is a degree with excellent career prospects, as well as opportunities for further study – around a fifth of students go on to postgraduate study or research. This may also be necessary if you wish to pursue a career in law or graduate education. Working as an environmental scientist or in a career directly related to the field may require further study, as their person specifications often require a high degree of specialisation. However, due to the interdisciplinary nature of the degree, and the range of transferable skills you develop, there is a wide range of career opportunities outside the environmental science field. Common routes for environmental science graduates include resource management, environmental advocacy, teaching and planning and development. These careers allow you to utilize the skills you have developed, but definitely allow you to engage with immediate real-world problems, rather than researching in a laboratory.

What is the job market like?

Jobs in the environmental sector are typically very competitive and can require specialised study and significant work experience. However, the sector is growing rapidly, and there are a number of careers, such as environmental engineer or scientist where demand is extremely high. Moreover, as the impact of environmental issues such as plastic waste are studied further, the demand for graduates who are able to support sustainability targets is likely to increase. Moreover, many countries are likely to need to undergo major infrastructure upgrades in the next decade, and environmental considerations will be a major concern. New graduates are likely to have good career opportunities but will likely join companies in more junior roles in order to be trained up, as many careers have very specific knowledge and skill requirements. This means that starting salaries may be relatively low, but there will be good opportunities to progress and earn more in the future.

Do I need a degree in environmental science to work in the green sector?

An environmental science degree is only advantageous if you want to work in a scientific role. There are many jobs in the green sector which do not require a science background and are accessible to any graduate, with the right volunteer work and enthusiasm.

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