大专院校专业英语读物

Readings in English for Junior College Students

环境科学专业英语

Environmental Science English

王素凤　主编

中国环境科学出版社

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前　言

当前，环境问题日益严重，环境科学专业已经成为大中专院校的热门学科之一。为了使环境科学专业的学生掌握专业英语词汇，熟悉科技交流的英语表达方式，以便能顺利阅读英文版环境科技读物，更大程度地丰富专业知识，多层次多角度了解全球科学信息，把握国内外科技进展，我们编写了这本书，力求给读者提供一本体系完整、知识全面的环境科学专业英语阅读材料。本书适合环境生态专业、环境管理专业、环境监理专业、环境法学专业、食品安全专业以及环境工程专业的学生使用。

全书共分为 4 部分。第一部分介绍了生态环境的基本内容，由王素凤老师编写。第二部分介绍了全球的环境问题，由冯雨峰老师编写。第三部分着重介绍了环境问题给人类带来的影响，其中第一节的 5 及第四节内容由冯雨峰老师编写，其余部分由刘军老师编写。第四部分介绍了政府针对环境问题实施的政策、措施、法律、经济等管理手段，以及环境污染的控制技术，其中第一节的 1 及第二节内容由王素凤老师编写，冯雨峰老师编写了第一节的 2，官金华老师编写了第一节的 3，其中第一节的 4、5、6、7 内容由张雪花老师编写。最后由王素凤老师统稿。由于编者水平有限，且编写时间仓促，难免存在错误和疏漏之处，恳请广大读者批评指正。

本书的编写宗旨是力求让读者学到纯正的专业英语，所有的文章的编写均参考原版外文书刊及国外英文网站，并在每篇文章后对文章的参考网站及文献已作了注释，在此谨向原作者、出版社及有关网站致谢。

在本书的编写过程中，中国环境管理干部学院院长王立新博士，环境科学系主任张明顺博士，环境科学系副主任朱庚申教授，及教务处副主任耿世刚教授等专家学者给予了大力支持和帮助，在此深表感谢。

编　者

2003 年 12 月

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Unit 1 Ecological Environment

Part 1 Ecosystem Biomes

Most people tend to think of the earth and its plants and animals' populations in patterns that conform to the distribution of the continental land masses: elephants in Africa, bisons in North America, sloths in South America, kangaroos and platypuses in Australia, and so on. But ecologists also see the patterns of life on our planet in term of biomes.

A biome is a major ecological unit, classed according to its key plant and animal life. A savanna grassland is a biome, as is a tropical rain forest and a desert. This type of floral and faunal community may appear on more than one continent because it is created by climate: average annual temperatures and rainfall, as well as latitude and altitude. Biomes exist and change over time within the complex worldwide pattern of air currents.

Climate then determines the kind of plants that grow in any region. A plant fitted for life in the harsh, stony soil of a blazing hot desert will not be found growing in the cold, wet lowlands along a northern coast. The plant community, in turn, determines the makeup of resident animal populations. A bird fitted for opening seed cones in a northern spruce forest will not be at home among the large, fleshy fruits produced by trees in a tropical rain forest.

Although the species inhabiting distinct biomes may differ from one part of the world to another, they share many characteristics. The cacti of the North American desert, for instance, are unrelated to the euphorbia of dry African regions. But their reduced leaves, swollen stems, and spherical structure often make them look-alikes and help both groups conserve precious water. Again, the large, hoofed mammals of

temperature grasslands on the steppes of Asia, the prairies of the North America, and the pampas of South America share many physical characteristics, and all tap the same kinds of resources.

The marvelous diversity of life, everywhere evolving and adapting through time, nevertheless displays unexpected kinships in the space represented by the earth's biomes and their inhabitants.

Reference: *Valerie Harms. Almanac of the Environment (Body Ecology). Published by G.P Putnam's Sons, New York.1994.*

Vocabulary

distribution[ˌdistri'bju:ʃən] *n.* 分布状态，区分，分类
bison['baisn] *n.* 美洲或欧洲的野牛
sloth[sləuθ] *n.* [动]树懒
kangaroo[ˌkæŋgə'ru:] *n.* [动]袋鼠
biome['baiəum] *n.*（生态）生物群系
platypus['plætipəs] *n.* [动]鸭嘴兽
savanna[sə'vænə] *n.* 热带（或亚热带）稀树大草原
tropical['trɔpikl] *a.* 热带的
floral['flɔ:rəl] *a.* 植物群的，花似的，花的，植物的
faunal ['fɔ:nəl] *a.* 动物志的，动物区系上的
harsh[hɑ:ʃ] *a.* 粗糙的，荒芜的
fleshy ['fleʃi] *a.* 多肉的，[植] 肉质的
cacti ['kæktai] *n.* [植] 仙人掌，仙人球
euphorbia[ju'fɔ:biə] *n.* 大戟属植物
prairie['prɛəri] *n.* 大草原，牧场，[美方] 林间小空地
pampas['pæmpəz] *n.* 南美大草原（彭巴斯草原）
inhabitant[in'hæbitənt] *n.* 居民，居住者，栖居的动物

Part 2 Ecosystem Pathways

Everything starts with the sun, that great ball of hot gases (mostly hydrogen), about

864.000 miles in diameter and 93 million miles away from Earth. The sun gives off tremendous amounts of light and ultraviolet energy. The earth receives only about one-billionth of the sun's total energy output. Much of it is either reflected back into space or absorbed by chemicals in the atmosphere, so that most of the harmful ultraviolet radiation does not reach our planet's surface. Its radiant light is experienced as heat on Earth, and as such it powers the major cycling of carbon, nitrogen, oxygen, water, and minerals.

A tiny fraction of the sun's energy is captured by green plants and bacterium on land and by algae in water, and is used in the process of photosynthesis to make sugar, starch, and the organic compounds that many organisms must eat to live. From the sugar and starch animals produce other substances, such as proteins, oils, fats, and vitamins that we and other creatures need to thrive. All this happens on the relatively thin, twelve-mile zone that extends from the deepest ocean floor to the top of higher mountains. This layer, called the biosphere, caused the astronauts to marvel at its fluid and fragile beauty.

The term "ecosphere" — emerged as an attempt to combine the concepts of biosphere and ecosystem. As the earth obits annually around the sun, creating seasonal cycles, it also spins completely around on its own axis, creating a cycle from light to dark.

The earth's atmosphere is the thin, gaseous envelope that surrounds the planet. Most of our air is found within eleven miles above sea level. Air has been cycling for billions of years and is a precious necessity for all of us. We participate in its circulation by breathing it in and out. Weather cycles are creatures by air movements (winds) which start when warm air from the earth expands and becomes lighter than cold air. The pressure and pull of gravity on colder heavier air causes it to flow under the warm air, pushing it upward. Such winds keep air circulating from place to place. Since the earth's axis is titled at an angle of 23.5 degrees, as the planet rotates it is heated unevenly. Because many vertical and horizontal winds are thus set in motion, weather differs greatly from place to place. Variations in climate lead to a wide range in the distribution of animal and plant communities across the biosphere.

Large areas with vegetable, birds, animals, insects, and microorganisms are called biomes. Most familiar to us are tundra in arctic regions, coniferous forests with evergreen trees such as spruce and fir, deciduous forests with trees such as oak and maple where the leaves fall off annually, grassland, desert, chaparral, and tropical

jungles. Each of these large communities has species that have adapted to its conditions of soil, water, and temperature. Polar bears thrive in the arctic. Cactus plants have thick "skins" for storing water; Birds' bills, feet, legs, tails, and wings are shaped to enable them to survive where they live. Biomes may be seen as large ecosystems, but ecosystems are also found in places as small as a puddle.

Ecosystems are a dynamic complex of plant, animal, and microorganism communities and their nonliving environment interacting as a functional, largely self-sustaining unit but also in conjunction with the larger cycles of nature. What comes in and goes out of ecosystems is important as well. This is true for forests as well as cities. Their future depends as much on the external life-support environment as on internal activities.

Ecosystems have to stay in balance or else they fail. No community has the capacity to carry more organisms than it has food, water, or shelter to accommodate. The balance of food and territory is often maintained by fire, disease, and the predator-prey ratio. Each creature has a niche or role to play.

The food cycle is actually a complex web, but briefly it consists of (1) the sun as energy source. (2) Producers—green plants and trees. (3) Consumers—herbivores, carnivores, parasites, and scavengers. (4) Decomposers—mostly bacterial and fungi that convert dead maters and gases such as carbon and nitrogen back into the air, soil, or water. Without decomposers, such as molds and worms, most of which are deemed horrible by humans, the world would be buried in litter. Decomposers are invaluable for recycling the nutrients that can be used by the producers.

Thus, when we spray pesticides around, we imperil the food chain. Also, our habit of packaging food in throwaway containers has generated more trash than our decomposers can handle. Since food provides the energy that all living things must have in order to carry out their purpose, we need to be cautious about the food chains, which are the orderly processes of nature by which essential energy is passed from one organism to another. These connections are as intricate as a spider's web.

Carbon is the basic building block of the DNA, RNA, and proteins essential for life. Carbon is cycled by green plants during photosynthesis and into the food web. Animals release carbon dioxide back into the air or water as one of their waste products. Decomposers also release carbon dioxide into the atmosphere. If it were not for decomposers, all carbon would eventually become locked up in organic matter that could not decay. Carbon is tied up deep in the earth in fossil fuels—coal, petroleum,

and natural gas—for long periods of time. When these are extracted and burned, carbon dioxide is released into the air. Volcanoes also release carbon dioxide. Carbon dioxide is soluble in water. Some of this gas is taken in by the oceans and returned to the atmosphere; some is taken to form calcium carbonate to build shells and rocks and skeletons of tiny protozoan and corals.

We humans have interfered with the carbon cycle by removing forests and other vegetation without replanting. For instance, the world has lost 40% of its tropical forests to meet our demand for coffee, chocolate, sugar, and hamburger. By 2000 there could be no such forests left. In this way we rob nature of its ability to absorb carbon dioxide (CO_2) and leave all of us vulnerable to the dangers of global warming.

Nitrogen is an essential part of all the amino acids, proteins, and DNA in living cells. Nitrogen in the atmosphere is made available to plants by the nitrogen-fixing bacterium and algae of the soil. These microscopic plants use nitrogen and convert it into nitrogen-containing salts called nitrates. The nitrates are released into the soil and then may be taken up, dissolved in soil water, by the roots of plants. Once plants have used nitrogen in the manufacture of their proteins, it can circulate through the rest of the living world by the way of food chains. The cycle also occurs when organisms excrete waste products or die, and the decomposers break them down and release nitrogen in the form of ammonia. The nitrifying bacteria use the ammonia and convert it into nitrites and then nitrates, which are available to plants through their roots. In water nitrogen is found mostly in the bottom sediments, which is why shallow estuaries are so rich in nutrients.

But when human cause nitrogen overload, ecosystems are threatened. We disrupt the nitrogen cycle by emitting large quantities of nitric oxide into the atmosphere when wood or fuel is burned. Nitric oxide combines with oxygen gas to form nitrogen dioxide, which can react with water vapor to form nitric acid. This acid has been damaging trees and killing fish. Other disturbances occur when we use certain inorganic fertilizers, over harvest nitrogen-rich crops, mine mineral deposits, and allow industrial, agricultural, and urban runoff and untreated sewage into our waters. Plant communities saturated with nitrogen become too acidified. In lakes, rivers, and oceans excess nitrogen depletes oxygen, causing the algae blooms and red tides that destroy fish and other vital organisms.

Minerals, such as potassium, phosphorus, calcium, sulfur, and magnesium, also circulate between organisms and their surroundings—from producers to consumers to

decomposers to producers again, most of these processes aided by climate and winds, take a great deal of time.

Mining phosphates to produce fertilizers and detergents and permitting runoff of animal waste and fertilizers from farms into our waters have severely disturbed aquatic life. Excess sulfur dioxide gets into the atmosphere from our burning coal and oil for electricity, petroleum refining, and the smelting of metallic minerals into copper, lead, and zinc.

The water cycle is so universal that it is likely to be taken for granted as the aforementioned. Fluids, such as blood in animals and sap in plants, are carried mostly by water in which food and other materials needed by the cells are dissolved. The chemical reactions of life take place in water. Water also supplies the hydrogen and oxygen which make up living things. Water falls upon the earth in the form of rain, hail, or snow. It either sinks into the soil or runs into marshes, swamps, rivers, lakes, and eventually the sea. Much of it is taken from the soil by the roots of plants to make carbohydrates. Most of the water, carrying dissolved nutrients such as nitrates and minerals, moves up through the stems to the leaves and is evaporated into the atmosphere through small pores. A mature tree may transpire as much as 1500 gallons of water a year. Water is also evaporated from the surface of the land and bodies of water. It circulates in the atmosphere as water vapor until it condenses and falls again as rain, snow, or hail.

We interfere with the water cycle by withdrawing huge quantities of freshwater and depleting our supplies. Also, by clearing vegetation from land for the sake of roads, parking lots, etc., we reduce seepage of water into the ground for storing and thus increase the likelihood of flash-flooding and surface runoff, which causes soil erosion.

Reference: *Valerie Harms. Almanac of the Environment (Body Ecology). Published by G.P Putnam's Sons, New York.1994.*

Vocabulary

hydrogen['haidrəudʒən] *n.* [化] 氢
ultraviolet ['ʌltrə'vaiəlit] *a.* 紫外线的，紫外的　*n.* 紫外线辐射
radiant ['reidjənt] *a.* 发光的，辐射的
mineral['minərəl] *n.* 矿物，矿石，无机物
algae['ældʒi:] *n.* 藻类，海藻
photosynthesis[ˌfəutəu'sinθəsis] *n.* 光合作用　*a.* [植] 光合的

starch[stɑ:tʃ] *n.* 淀粉
protein['prəuti:n] *n.* [生化]蛋白质　*a.* 蛋白质的
fragile['frædʒail] *a.* 易碎的，脆的
ecosphere['i:kəu,sfiə] *n.* [生]生物圈，生态层
envelope['enviləup] *n.* [天]包层
tundra['tʌndrə] *n.* 苔原，冻土地带，（北极及北极附近地区的）冻原
coniferous[kəu'nifərəs] *a.* 松类的，结球果的
spruce[spru:s] *n.* 云杉，云杉属植物
fir[fə:] *n.* [植]冷杉，枞树，杉木
deciduous[di'sidʒjuəs] *a.* 每年落叶的，非永久性的
oak[əuk] *n.* [植]橡树
maple['meipl] *n.* [植]枫
chaparral[tʃæpə'ræl] *n.* 丛林，茂密的树丛
cactus ['kæktəs]（*pl.* cacti）*n.* 仙人掌
dynamic[dai'næmik] *a.* 动力的，动力学的
territory['teritəri] *n.* 领土，版图，地域
predator['predətə] *n.* 掠夺者，食肉动物
prey[prei] *n.* 被掠食者，牺牲者
niche[nitʃ] *n.* 小生境
herbivore['hə:bivɔ:] *n.* 草食动物
carnivore['kɑ:nivɔ:] *n.*（动物或植物）食肉类，食肉动物，食虫植物
parasite['pærəsait] *n.* 寄生虫
scavenger['skævindʒə] *n.* 清道夫，食腐动物
fungi['fʌndʒai, 'fʌŋgai]（fungus 的 *pl.*）*n.* 真菌
mold[məuld] *n.* 霉（菌）
spray[sprei] *n.* 浪花，喷雾　*vt.* 喷，喷涂；向……喷射
pesticide['pestisaid] *n.* 杀虫剂，农药
imperil[im'peril] *vt.* 使处于危险，危害
intricate['intrikit] *a.* 复杂的，错综的，难以理解的
volcano [vɔl'keinəu] *n.* 火山
skeleton['skelitən] *n.*（动物之）骨架，骨骼
protozoan[,prəutəu'zəuən] *n.* [动]原生动物
nitrogen['naitrədʒən] *n.* [化]氮
amino['æminəu] *a.*　[化]氨基的

microscopic[maikrə'skɔpik] *a*. ①显微镜的，（像）显微镜的 ②用显微镜可见的，微观的 ③微小的，细微的
nitrate['naitreit] *n.* [化]硝酸盐，硝酸钾
excrete[eks'kri:t] *vt.* 排泄，分泌
ammonia['æməunjə] *n.* [化]氨，氨水
estuary['estjuəri] *n.* 港湾，河口湾，三角湾，江口湾
deplete[di'pli:t] *vt.*（部分及全部地）弄空，使空虚，耗尽精力（及资源等）
potassium[pə'tæsjəm] *n.* [化]钾
phosphorus['fɔsfərəs] *n.* [化]磷
calcium['kælsiəm] *n.* [化]钙
sulfur['sʌlfə] *n.* [化] 硫磺，硫黄
magnesium[mæg'ni:zjəm] *n.* [化]镁
detergent[di'tə:dʒənt] *n.* 清洁剂，去垢剂
copper['kɔpə] *n.* 铜
lead[li:d] *n.* 铅
zinc[ziŋk] *n.* 锌
sap[sæp] *n.* 树液
marsh[mɑ:ʃ] *n.* 湿地，沼泽，沼泽地
swamp[swɔmp] *n.* 沼泽，湿地；煤层聚水
carbohydrate['kɑ:bəu'haidreit] *n.* [化]碳水化合物，醣类
transpire[træns'paiə] *vt.* 发生，得知；使蒸发，使排出 *vi.* 蒸发，发散，泄露
condense[kən'dens] *v.*（使）浓缩
vegetation[ˌvedʒi'teiʃən] *n.* [植]植被，（总称）植物、草木，（植物的）生长
seepage['si:pidʒ] *n.* 渗流，渗出的量

Part 3 Ecosystem Producers, Consumers, Decomposers

Organisms that make up an ecosystem are usually classified as producers, consumers, or decomposers, depending on how they get the food they need to survive. Producers can manufacture the organic compounds they need. In most terrestrial

ecosystems, green plants are the producers. In the water, most producers are phytoplankton. Only producers make their own food. All other organisms are consumers, and live directly or indirectly on the food provided by producers.

Decomposers, which feed on the dead, are paradoxically the life-givers of the planet. Microorganisms sheltered in roots not only break down and make ammonia, nitrogen, and phosphorus, but also can break down some forms of industrial chemical and pesticides into simple compounds that plants can absorb. Without decomposers, litter, wastes, and garbage would not be made available for new uses. Ecosystems are dependent on this cycling between death and life. Barren lands can be restored at nature's own pace of production, consumption, and decomposition.

An amazing example of regeneration is the story pf an island in the East Indies, which in 1883 was sterilized and reduced to ash by a volcano equal to a 10,000-megaton H-bomb. Nine months after the eruption the only sign of life was a single spider spinning a web. The island was twenty-five miles from the nearest source of life, but after three years eleven species of ferns and fifteen flowering plants had arrived. After ten years a carpet of green covered the scarred land. Twenty-five years later 263 species of animals—mostly insects, birds, and reptiles—had made their way to the island. Fifty years later a dense forest covered the island. Yet even then, the species populations were fluctuating wildly. In some years rats overran the vegetation, then disappeared.

As with ecosystems, our economic growth experiences wide fluctuations, is a mixture of competition and symbiosis, and depends on the trinity of consumers, producers, and decomposers working in concert.

Reference: *Valerie Harms. Almanac of the Environment (Body Ecology). Published by G.P Putnam's Sons, New York.1994.*

Vocabulary

phytoplankton[ˌfaitəu'plæŋktən] *n.* 浮游植物
barren['bærən] *a.* 不孕的，贫瘠的，没有结果的 *n.* 荒地
decomposition[ˌdi:kɔmpə'ziʃən] *n.* [化学]分解（作用）；腐败；解体
megaton['megəˌtʌn] *n.* 百万吨级
overrun[ˌəuvə'rʌn] *vt.* 泛滥
symbiosis[simbai'əusis] *n.* [生]共生（现象），合作（或互利、互依）关系

Part 4 Ecosystem-Rock Cycles

Sedimentary rock forms from erosion, the remains of organisms, and the impact of wind, water, and ice. Gravel, sand, silt, and clay are examples. Some sedimentary rocks, such as limestone, are precipitated from solution. Bituminous coal is derived from plant remains.

Igneous rock forms when molten rock (magma) wells up from beneath the earth's crust, as during a volcanic eruption, and hardens into rock. Granite is an example. Rapid cooling produces a fine-grained or glossy texture, such as in basalt and pumice. The most popular gemstones—rubies, diamonds, sapphires—are found within igneous rocks.

Metamorphic rock is produced when rock is subject to high temperature, or pressure, or active fluids. Marble, anthracite, slate, and talc are examples.

As rocks are exposed to varied temperatures and conditions, they can change from one type to another. The ones near the surface are gradually crumbled by the weathering action of heat, cold, rain, snow, and ice. The extremely slow cycling of rocks is responsible for concentrating the mineral resources we have used. Because they take so long to be made, they are considered nonrenewable.

Reference: *Valerie Harms. Almanac of the Environment (Body Ecology). Published by G.P Putnam's Sons, New York.1994.*

Vocabulary

igneous['igniəs] *a.* [地]火成的
glossy['glɔsi] *a.* 平滑的，有光泽的
basalt['bæsɔ:lt] *n.* 玄武岩，黑陶器（似玄武岩的制品）
pumice['pʌmis] *n.* 轻石，浮石
gemstone['dʒem,stəun] *n.* 经雕琢的宝石
ruby['ru:bi] *n.* 红宝石
sapphire['sæfaiə] *n.* 蓝宝石
metamorphic[,metə'mɔ:fik] *a.* 变形的，变质的，改变结构的
slate[sleit] *n.* 石板
talc[tælk] *n.* [矿]滑石，云母