环境保护

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前　言

对于只学了基础英语的人，刚开始接触英文专业书刊资料时，往往感到生词太多，阅读速度太慢。本书就是为帮助读者越过这一难关而编写的。

书中包括课文37篇，补充阅读材料15篇，内容涉及环境工程、环境医学、生态学、大气和废水治理、资源回收利用、固体废物和放射性污染等环境科学各专业，以及给排水工程等多方面的问题。每一课课文之后附有英汉对照的生词，多数课文之后尚附有难句注释和思考练习，据编者教学经验，用70（课内）学时可以授完。

本书主要用作环境工程专业学生专业英语课程的教材，同时也可供给水排水及环境科学各分科的大专学生及有关工程技术人员学习参考。

编　者

1995年1月

CONTENTS

Lesson（课文）

Lesson

1. The Environment and Environmental Engineering

Text

Simply stated, the environment can be defined as one' s surroundings. In terms of the environmental engineer's involvement, however, a more specific definition is needed. To the environmental engineer, the word enviromnent may take on global dimensions, may refer to a very localized area in which a specific problem must be addressed, or may, in the case of contained environments, refer to a small volume of liquid, gaseous, or solid materials within a treatment plant reactor①.

The global environment consists of the atmosphere, the hydrosphere, and the lithosphere in which the life-sustaining resources of the earth are contained. The atmosphere, a mixture of gases extending outward from the surface of the earth, evolved from elements of the earth that were gasified during its formation and metamorphosis. The hydrosphere consists of the oceans, the lakes and streams and the shallow ground water bodies that interflow with the surface water. The lithosphere is the soil mantle that wraps the core of the earth.

The biosphere, a thin shell that encapsulates the earth, is made up of the atmosphere and lithosphere adjacent to the surface of the earth, together with the hydrosphere. It is within the biosphere that the life forms of earth, including humans, live. Life-sustaining materials in gaseous, liquid, and solid forms are cycled through the biosphere, providing sustenance to all living organisms.

Life-sustaining resources——air, food, and water——are withdrawn from the biosphere. It is also into the biosphere that waste products in gaseous, liquid, and solid forms are discharged. Form the beginning of time, the biosphere has received and assimilated the wastes generated by plant and animal life. Natural systems have been ever active, dispersing smoke from forest fires, diluting animal wastes washed into streams and rivers, and converting debris of past generations of plant and animal life into soil rich enough to support future populations.

For every natural act of pollution, for every undesirable alteration in the physical, chemical, or biological characteristics of the environment, for every incident that eroded

the quality of the immediate, or local environment, there were natural actions that restored that quality. Only in recent years has it become aparent that the sustaining and assimilative capacity of the biosphere, though tremendous, is not, after all, infinite. Though the system has operated for millions of years, it has begun to show signs of stress, primarily because of the impact of humans upon the environment.

Environmental engineering has been defined as the branch of engineering that is concerned with protecting the environment from the potential, deleterious effects of human activity, protecting human populations from the effects of adverse environmental factors, and improving environmental quality for human health and well-being.

As the above definition implies, humans interact with their environment——sometimes adversely impacting the environment and sometimes being adversely impacted by pollutants in the environment. An understanding of the nature of the environment and of human interaction with it is a necessary prerequisite to understanding the work of the environmental engineer. ②

New Words and Expressions

environmental *a*. 环境的，环境产生的
engineering *n*. 工程，工程学
defined (define 的过去式) *vt*. 解释，给……下定义，明确说明，限定
protect *vt*. 保护
potential *adj*. ① 可能的，潜在的② (物理) 势的，位的
deleterious *a*. 有害的，有害杂质的
adverse *adj*. 不利的；反对的
well-being *n*. 幸福；福利；健康
imply *vt*. 意指；含……的意思，应用，提交
interact *vt*. 相互作用，互相反应
impact *n*. ①碰撞，冲击②效果；影响
prerequisite *n*. *adj*. 必须具备的 (事物)；先决条件
engineer *n*. ①工程师②轮机员 *vt*. 督造；指导
involvement *n*. 包含，卷入，连累，牵连，困境
dimensions *n*. 面积；容积；大小；尺寸；维
localize *vt*. 局部化，地方化
treatment-plant 处理厂
reactor *n*. 电抗器；反应堆；反应器
hydrosphere *n*. 水圈
lithosphere *n*. 岩石圈
life-sustaining 维持生命，支撑，维持，供养，使生存下去
metamorphosis *n*. (复数-es) 变化 (形、性、质、态)

groundwater *n*. 地下水
interflow *vi*. *vi*.，*n*. 补给；流通
mantle *n*. ①披风 ②覆盖物 *vt*. 覆盖，罩上
core *n*. 核心
biosphere *n*. 生物圈
encapsulate 密封，包胶囊；加浓
adjacent *adj*. 接近的，临近的
gaseous *adj*. 气的，似气体的
organisms *n*. 生物，有机体
withdrawn *vt*. ①回收，缩回，撤回，退回，取消 ②抽出，提取
waste *adv*. 荒芜的，无用的 *vt*. 浪费；消耗，荒芜 *n*. 浪费；废物
discharge *vt*. 放出 *n*. 流出，放出，排泄物，排放
assimilate *vt*. 同化；吸收；消化
disperse *vt*. 驱散，传播，消散，扩散
dilute *vt*. 扩大，膨胀；评述；稀释
debris *n*. 残骸
alteration *n*. 改变，变更
biological *adj*. 生物学的
incident *n*. 事件，小事，事变，
erode *vt*. 侵蚀，腐蚀
immediate *adj*. 立刻的，直接的
apparent *adj*. 显然的，表面上的，外表的，明显的
stress *n*. 压力；重点，强调 *vt*. 着重，强调；应力，受力状态
contained *a*. 封闭的，包含的
address *vt*. 向……致词，和……交谈，写信给，（在讲演中）谈到
evolve *vt*. 向进，发展，演变，推论，引伸，（使）发展
shell *n*. 壳

Notes

① may take on global dimension, may refer to very localized area, …or may… refer to a small volume of …a treatment plant reactor.
…可能包含全球范围，也可能专指非常局限的区域，或者……也可能指处理厂反应器内的一小块液体、气体或固体。

② An understanding of the nature…engineer. 其中 it 系指 environment，意即了解环境的本质以及人类与环境的相互作用，是了解……的先决条件。

Exercises

(1) 利用下列词组造句

1. in terms of　在……所指的范畴；用……术语
2. take on　采取，呈现，承受
3. refer to　指……
4. in the case of　在……情况下
5. interflow with　与……互相流通
6. (be) made up of　由……组成
7. it has become apparent that　……显然变得……
8. the impact of M upon N，M 对 N 的影响
9. simply stated　简单地说
10. be defined as　被定义为……
11. evolved from　从……演变而来
12. (be) withdraw from　从……取来
13. (be) discharged into　排入……
14. protect…from…　保护……免于……
15. (be) concerned with　与……有关，对……关切

(2) 回答下列各问（填空或回答对错）

☐1. In environmental engineering's specific definition, the environment can be defined as one's surroundings.

2. The life sustaining resources of the earth are contained in _____.

3. The elements in atmophere came from _____.

☐4. Some surface water may come from ground water and v. v. (vice-versa).

☐5. The biosphere consists of atmosphere and lithosphere.

6. Life-sustaining resources are _____ from the biosphere, into where waste products are also _____

☐7. Natural environment has a capability of selfpurification.

☐8. The environmental capability is not infinite.

9. The environmental engineers' task is to protect _____, protect _____ and improve _____.

☐10. Man and his environment are interacting each other.

(3) 问答

1. What is the topic of each paragraph of this text?
2. Give a definition of environment.
3. Give a definition of environmental engineering.
4. It is said that natural systems have been ever active, why?

2. Ecology

Text

The recognition that all life forms are inextricably dependent on one another and on the physical environment is a fairly recent phenomenon. The word "ecology" was not even invented until the mid-1800s, and the study of ecology as a branch of natural sciences was not widespread until a few decades ago.

The science of ecology defines "ecosystems" as groups of organisms which interact with each other and the physical environment, and which affect the population of the various species in the environment. For example, the simplest type of ecosystem consists of two animals such as the hare and the lynx. If the hare population in a specific locality is high, the lynx have an abundant food supply, procreate, and increase in population until they outstrip the availability of hares. As the lynx population decreases due to the unavailability of food, the hares increase since the number of predators is fewer, and the cycle repeats (Figure2-1). Such a system is dynamic in that the numbers of each population are continuously changing, but over a long time span is at a steady state condition, kown as "homeostasis".

A slightly more complex example includes three species: the sea otter, the sea urchin and kelp. The kelp forests along the Pacific coast consist of 60m(200ft)streamers fastened to the ocean floor. Kelp is an economically valuable plant since it is the source of algin (used in foods, paints, cosmetics, etc.) and its harvesting is regulated to preserve the forests.

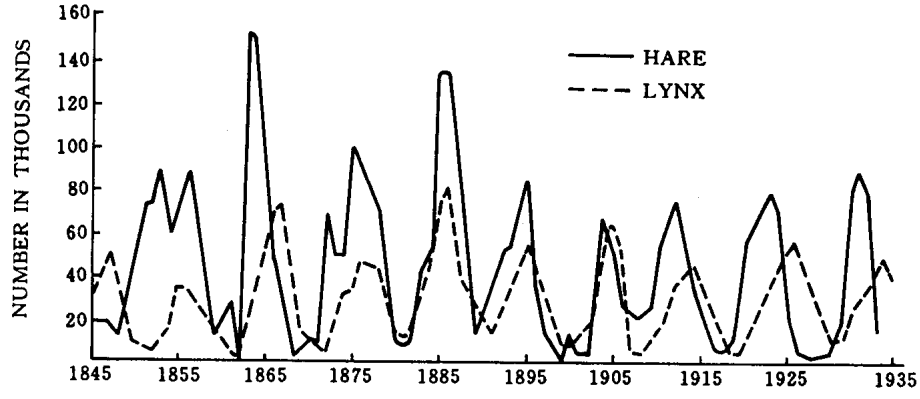

Figure 2-1 The hare and lynx homeostasis.

A few years ago, kelp started to mysteriously disappear, leaving barren ocean

floors. The puzzle was solved when it was recognized that sea urchins feed on the kelp, weaken the stems, and cause them to detach and float away. The sea urchins population had increased because the population of their predators, the sea otters, had been reduced drastically. The solution to the problem was to protect the sea otter and allow its populaiton to increase, thus reducing the number of sea urchins, and save the kelp forests.

Some ecosystems are fragile, while others are resilient and able to withstand even serious perturbations. One characteristic of a resilient ecosystem is that more than one species fills a "niche" within that system①. That is , many species perform the same function. For example, in the hare/lynx system, if the hare were the only source of food for the lynx (a niche), the destruction of the hares would result in the eventual eradication of the lynxes as well. If, however, the lynx used other small animals for food, the system might survive the loss of the hares.

Engineers must appreciate the fundamental principles of ecology, and design with the environment, so as not to impact adversely on especially fragile ecosystems. For example, one of the most fragile of all ecosystems is the deep oceans, yet ocean disposal of hazardous waste is seriously advocated by some engineers, The inclusion of ecological principles in engineering decisions is a major component of the environmental engineering profession.

New Words and Expressions

recognition *n.* 认出，承认
inextricably *adv.* 不能解脱(决)地，不能避免地，解不开地
widespread *adj.* 广布的，流传广远的，普通的
hare *n.* 野兔
lynx *n.* 山猫，猞猁
abundant *adj.* 丰富的
procreate *vt.* 生殖，产新种，繁殖
outstrip *vt.* 超过 胜过
predator *n.* 捕食者，掠夺者
dynamic *adj.* 动力的，动力学的；有力的
span *n.* 一段时间；跨度
homeostasis *n.* 均态，自动（调节），动态平态
otter *n.* 水獭，獭皮
urchin *n.* 海胆
kelp *n.* 海藻，海草（灰）
fasten *vt.* 使牢固，变为坚固
algin *n.* 藻朊（酸）

paint *n*. 油漆，颜料 *vt*. 油漆；画画，描绘
cosmetic *n*. 化妆品
mysteriously *adv*. 神秘地
puzzle *n*. 难题，迷惑 *vt*. 迷惑，难住
stem *vt*. 挡住，逆行 *n*. 茎
detach *vt*. 分开，分离，分遣，派遣
fragile *adj*. 脆弱的，易受伤害的，虚弱的
resilient *adj*. 有弹性的，跳（弹）回的，能恢复原状的
perturbation *n*. 不安，骚扰，动摇，混乱，狼狈，焦虑
eradication *n*. 根除，扑灭
appreciate *vt*. 评价，珍惜；涨价
advocate *vt*. 提倡，主张
niche *n*.，*v*. 放在壁龛；位置，食物链中之一环
drastically *adv*. 激烈地，猛烈地，果断地
locality *n*. 地点，现场，场所，产地，所在地，位置
streamer *n*. 飘烟（风、尘）带；射束，光柱，电子流，北极光；浮筒；横幅
inclusion *n*. 包（括）含，参加（杂），孕有；加速；包（裹）体
be regulated to 被限制于
preserve *v*. 保护，保藏，贮藏，维护
withstand *v*. 抵挡，反抗，经受住，耐
fundamental *a*. 基本的，根本的，主要的
hazardous *a*. 有害的，危险的，冒险的
barren *a*. 光滑的，光秃秃的，贫瘠的（土地）

Notes

① One characteristic of a resilient…with that system.
其中“niche”可理解为食物链中的一环或位置。
全句意为：有弹性的生态系统所具有的一个特征是该系统中的一个位置可由不只一个生物种来占据。（意即许多生物可相互替代起相同作用）

Exercises

（1）用下列词组造句

1. dependent on…　　取决于……，依赖于……
2. define…as…　　把……定义为……
3. consist of …　　由……组成
4. due to …　　由于……
5. a…time span　　一段时间

6. feed on (upon) …　　以……为食，吃……

7. result in …　　导致……结果

8. the solution to the problem is to…　解决该问题的办法是

9. one characteristic of…is that…　……的一个特征是……

10. …was not…until…　直到…才…

11. …so as to (not) …　以便（不）

12. …is continuously changing　不断变化

(2) 问题

□1. For a long time, people have known that all life forms are dependent on one another and on their enviroment.

□2. Ecology is a new branch of natural sciences and its study field is ecosystems.

□3. The hare and the lynx make up a ecosystem.

4. When we say a system is in dynamic balance state, that means _____.

□5. Kelp is a kind of plant that can become a forest.

6. What is the use of kelp?

7. Why did kelp begin disappearing a few years ago?

□8. The kelp stems were eaten by the sea urchins that caused the sea urchins to death.

9. Why the resilient ecosystem is not so fragile?

□10. The auther of this text advocates that hazardous waste should be disposed into the sea.

(3) 运用下列副词造句：

1. continuously
2. mysteriously
3. especially
4. drastically
5. seriously
6. inextricably
7. fairly
8. adversely
9. slightly
10. economically
11. eventually

3. Environmental Problems

Text

1 Our Fragile World

Anyone who has had an opportunity to observe even a small fraction of the natural wonders of our planet would agree that we live in a marvelous world. The majesty of the Rocky Mountains, the beauty of the Maine coast on a clear summer day, and the colors of a desert sunset are all impressive sights. On a more mundane level, we are reminded of the Earth's bounties by the smell and feel of freshly plowed Iowa farmland, by a breath of fresh air on a brisk fall day, or the taste of fresh, clean water on a hot summer day. ①

It goes without saying that all of these things are threatened by a broad range of human activities. In an effort to increase short-term agricultural production, farmland in many areas is cultivated improperly, resulting in extreme erosion that threatens its very existence. Many urban dwellers would agree that a breath of fresh air is a rare commodity in the city. In many industrialized areas, ground water sources of drinking water are being threatened by the insidious movement of hazardous waste chemical leachates through ground water aquifers. ② The protection of our environment must be given the highest priority because on it depends the preservation of human kind, itself.

In order to combat threats to our environment, it is necessary to understand the nature and magnitude of the problems involved. Before discussing these problems further, it is essential to recognize the fact that science and technology must play key roles in solving environmental problems. Only through the proper application of science and technology, under the direction of people with a strong environmental consciousness and a basic knowledge of the environmental sciences, can humankind survive on the limited resources of this planet.

2 Classifying Environmental Problems

Environmental problems are always interrelated. Sometimes a solution to one problem actually creates another problem. For example, when people are sick and dying from disease, it is natural to want to improve human health. When health is improved and infant mortality is reduced, a population explosion may result. To feed this growing population, natural habitats are often destroyed by turning them into farmland. As natural habitats are destroyed, the wild plants, predatory animals, and parasites that once lived there are killed as well. Because of the lack of predators and parasites, outbreakes of insect pests become more common. Farmers use pesticides to control the pests and

protect the crops, but in the process the environment becomes polluted. The development of this entire cycle in itself consumes fossil fuel supplies that are becoming scare. ③In addition, when fuels are burned, air pollutants are generated.

New Words and Expressions

fragile *adj.* 脆弱的
Rocky Mountains 岩石山脉
Maine *n.* 美国缅因州
mundane *adj.* 世俗的
bounty *n.* 慷慨，施舍；赠物
Iowa *n.* 美国爱荷华州
insidious *adj.* 暗藏的，阴险的
leachate *n.* 雨水渗沥过固体废物所产生的沥滤液
aquifer *n.* 地下含水层
infant *n.* 婴儿
mortality *n.* 死亡率
outbreak *n.* 暴发
pesticide *n.* 农药
environmental consciousness 环境意识

Notes

① On a more mundane level, we are reminded of the Earth's bounties by smell and feel of freshly plowed Iowa farmland, by a breath of fresh air on a brisk fall day, or the taste of fresh, clean water on a hot summer day. 在更为世俗的层次，我们会想起地球的赏赐——感受爱荷华州新耕土地的泥土清香，呼吸秋季凉爽的新鲜空气，在炎热夏季品尝甘甜 洁净的饮水。

② In many industralized areas, ground water sources of drinking water are being threatented by the insidious movement of hazardous waste chemical leachates through ground water aquifers. 在许多工业区，有害废物的化学沥滤液通过地下水潜移扩散，威胁着地下水饮用水源。

③ The development of this entire cycle in itself consumes fossil fuel supplies that are becoming scare. 经历这一完整循环（指从虫害泛滥到得以治理），本身要消耗日渐不足的化石燃料供应（指从农药制造到农药机械喷洒都要消耗石油资源）。

Exercises

1. How many types of environmental disruptions are there?
2. Why war can be said as a type of environmental problem?

4. The Impact of Humans upon the Environment

Text

In a natural state, earth's life forms live in equilibrium with their environment. The numbers and activities of each species are governed by the resources available to them. Species interaction is common, with the waste product of one species often forming the food supply of another. Humans alone have the ability to gather resources from beyond their immediate surroundings and process those resources into different, more versatile forms. These abilities have made it possible for human population to thrive and flourish beyond natural constraints. But the natural and manufactured wastes generated and released into the biosphere by these increased numbers of human beings have upset the natural equilibrium.

Anthropogenic, or human-induced, pollutants have overloaded the system. The overloading came relatively late in the course of human interaction with the environment, perhaps because early societies were primarily concerned with meeting natural needs, needs humans share in common with most of the higher mammals①. These peoples had not yet begun to be concerned with meeting the acquired needs associated with more advanced civilizations. ②

Satisfying Natural Needs

Early humans used natural resources to satisfy their needs for air, water, food, and shelter. These natural, unprocessed resources were readily available in the biosphere, and the residues generated by the use of such resources were generally compatible with, or readily assimilated by, the environment. Primitive humans ate plant and animal foods without even disturbing the atmosphere with the smoke from a campfire. Even when use of fire became common, the relatively small amounts of smoke generated were easily and rapidly dispersed and assimilated by the atmosphere.

Early civilizations often drank from the same rivers in which they bathed and deposited their wastes, yet the impact of such use was relatively slight, as natural cleansing mechanisms easily restored water quality. These early humans used caves and other natural shelters or else fashioned their homes from wood, dirt, or animal skins. Often nomadic, early populations left behind few items that were not readily broken down and absorbed by the atmosphere, hydrosphere, or lithosphere. ③ And those items that were

not broken down with time were so few in number and so innocuous as to present no significant solidwaste problems.

Only as early peoples began to gather together in larger. more or less stable groupings did their impact upon their local environments begin to be significant. ④ In 61 A. D.. cooking and heating fires caused air pollution problems so severe that the Roman philosopher Seneca complained of "the stink of the smoky chimneys". By the late eighteenth century. the waters of the Rhine and the Thames had become too polluted to support game fish. From the Middle Ages the areas where food and human waste were dumped harbored rats. flies. and other pests.

Satisfying Acquired Needs

But these early evidences of pollution overload were merely the prelude to greater overloads to come. With the dawn of the industrial revolution. humans were better able than ever to satisfy their age-old needs of air. water. food. and shelter. Increasingly they turned their attention to other needs beyond those associated with survival. By the late nineteenth centuries. automobiles. appliances. and processed foods and beverages had become so popular as to seem necessities. and meeting these acquired needs had become a major thrust of modern industrial society.

Unlike the natural needs discussed earlier. acquired needs are usually met by items that must be processed or manufactured or refined. and the production. distribution. and use of such items usually results in more complex residuals. many of which are not compatible with or readily assimilated by the environment.

Take. for example. a familiar modern appliance——the toaster. The shell and the heating elements are likely to be made of steel. the handle of the lift lever of plastic. Copper wires and synthetic insulation may be used in the connecting cord. and rubber may be used on the plug. In assessing the pollutants generated by the manufacture and sale of this simple appliance. it would be necessary to include all the resources expended in the mining of the metals. the extracting and refining of the petroleum. the shipping of the various materials. then the manufacturing. shipping. and selling of the finished product. The potential impact of all of these activities upon air and water quality is significant. Furthermore. if the pollution potential involving the manufacture and use of the heavy equipment needed for the extraction and processing of the raw materials used in the various toaster components is considered. the list could go on ad nauseam. And the solid-waste disposal problems that arise when it is time to get rid of the toaster become a further factor.

As a rule. meeting the acquired needs of modern societies generates more residuals than meeting natural needs. and these residuals are likely to be less compatible with the environment and less likely to be readily assimilated into the biosphere. As societies as-