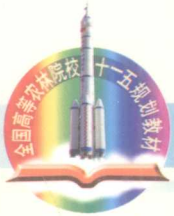

全国高等农林院校“十一五”规划教材

环境科学与工程专业英语

English Course for Environmental Science and Engineering

张　颖　主编

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前　言

环境科学是一门新兴的边缘学科，是针对当前世界面临的重大环境问题而发展起来的。其发展速度很快，许多新概念、新思维、新方法又不断改进，进一步推动了本学科的发展。

为了反映国际环境科学与工程领域的发展动态，同时也为了提高本专业学生阅读专业文献和获取信息的能力，我们编写了《环境科学与工程专业英语》，旨在使学生具备一定的环境科学与工程的相关基础知识，提高学生独立阅读英文原版教材和国外科学文献的能力，使学生掌握国外环境科学与工程领域先进的科学文化知识。

在内容选材上，本教材充分注重专业领域的覆盖面，不仅涉及了环境科学与工程的基本原理与方法，包括大气、水体、土壤、固体废弃物、噪声、能源以及相关的污染防治技术，同时还涵盖了生态学、可持续发展理论、环境影响评价和环境管理的相关知识。力求能体现出系统性、先进性、代表性、新颖性和实用性的特点，突出最新进展，便于读者更好地掌握。注重学科交叉，力求深入浅出，除可满足课堂教学所需外，兼有提供课外阅读材料的功能。书中对课文的一些较难的句子和段落予以注释，同时对一些专业词汇和术语进行总结，使读者能更快扩展专业词汇。书后的单词表对本书中的专业词汇进行了总体编排，便于检索与记忆。

全书共分十章（Part），由东北农业大学张颖担任主编，哈尔滨工业大学孙爽和东北农业大学单德鑫担任副主编。主要编写人员有：张颖（Part 1、Part 3 和 Unit 16—19），孙爽（Part 2 和 Part 10），单德鑫（Part 6），山东农业大学王玉军（Part 8），上海师范大学王晓辉（Part 7）、东北农业大学孟庆娟（Unit 20—21），山西农业大学崔旭（Part 5 和 Part 9）。张颖、孙爽和单德鑫对全书进行统稿。

此外，东北农业大学在读研究生范春晖、周宁、张林、康爽、韩雪、

胡淼等对本书的编写、校对也做出了贡献。

限于作者水平和经验，疏漏和错误之处在所难免，恳请广大读者提出宝贵的意见。

编　者

2008 年 11 月

郑 重 声 明

Contents

Part 1

Environmental Science

Unit 1 Introduction of Environmental Science

Environmental science is an interdisciplinary area of study that includes both applied and theoretical aspects of human impact on the world. Since humans are generally organized into groups, environmental science must deal with politics, social organization, economics, ethics, and philosophy. Thus, environmental science is a mixture of traditional science, individual and societal values, and political awareness.

Although environmental science as a field of study is evolving, it is rooted in the early history of civilization. Many ancient cultures expressed a reverence for the plants, animals and geographic features that provided them with food, water, and transportation. These features are still appreciated by many modern people.

The current interest in the state of the environment began with philosophers like Thoreau and scientists like Rachel Carson and received emphasis from the organization of the first Earth Day on April 22, 1970. Subsequent Earth Days reaffirmed this commitment. As a result of this continuing interest in the state of the world and how people both affect it and are affected by it, environmental science is now a standard course or program at many colleges. It is also included in the curriculum of high schools. Most of the concepts covered by environmental science courses had previously been taught

in ecology, conservation, biology, or geography courses. Environmental science incorporates the scientific aspects of these courses with input from the social sciences, such as economics, sociology, and political science, creating a new interdisciplinary field.

Environmental science in its broadest sense is the science of the complex interactions that occur among the terrestrial, atmospheric, aquatic, living, and anthropological environments. It includes all the disciplines, such as chemistry, biology, ecology, sociology, and government, which affect or describe these interactions. To a significant degree, environmental science has evolved from investigations of the ways by which, and places in which, living organisms carry out their life cycles. This is the discipline of natural history, which in recent times has evolved into ecology, the study of environmental factors that affect organisms and how organisms interact with these factors and with each other.

Traditionally, environmental science has been divided among the study of the atmosphere, the hydrosphere, the geosphere, and the biosphere (see Fig. 1-1). The atmosphere is the thin layer of gases that cover Earth's surface. In addition to its role as a reservoir of gases, the atmosphere moderates Earth's temperature, absorbs energy and damages ultraviolet radiation from the sun, transports energy away from equatorial regions, and serves as a pathway for vapor-phase movement of water in the hydrologic cycle. The hydrosphere contains Earth's water. Over 97% of Earth's water is in oceans, and most of the remaining fresh water is in the form of ice. Therefore, only a relatively small percentage of the total water on Earth is actually involved with terrestrial, atmospheric, and biological processes. Exclusive of seawater, the water that circulates through environmental processes and cycles occurs in the atmosphere, underground as groundwater, and as surface water in streams, rivers, lakes, ponds, and reservoirs. The geosphere consists of the solid earth, including soil, which supports most plant life. The part of the geosphere that is directly involved with environmental processes through contact with the atmosphere, the hydrosphere, and living things is the solid geosphere. The lithosphere varies from 50 to 100 km in thickness. The most important part of it insofar as interactions with the other spheres of the environment are concerned is its thin outer skin composed largely of lighter

silicate-based minerals and called the crust. All living entities on Earth compose the biosphere. Living organisms and the aspects of the environment pertaining directly to them are called biotic, and other portions of the environment are abiotic.

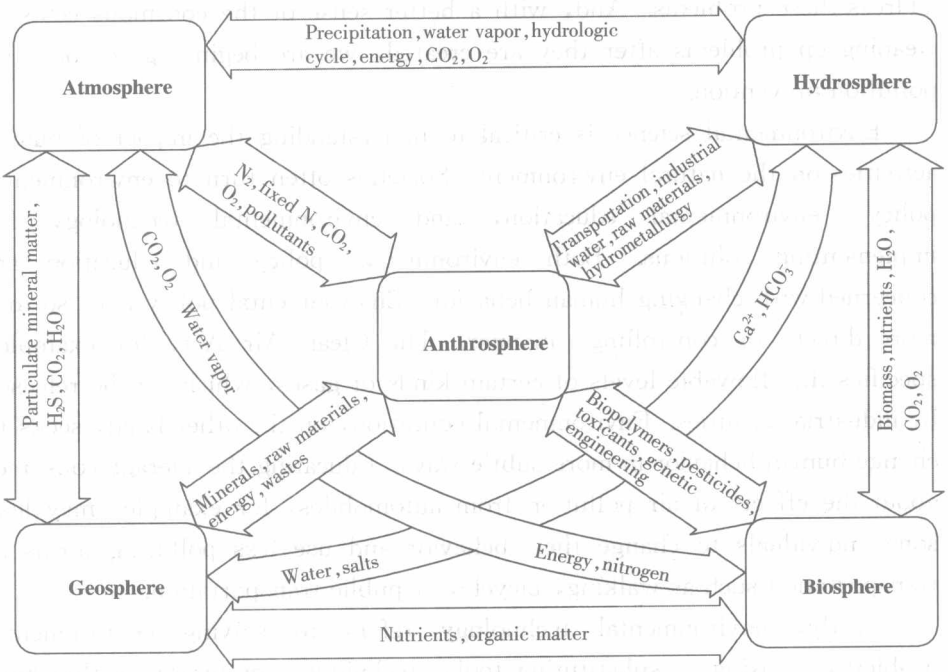

Fig. 1 - 1 Illustration of the close relationships among the air, water, and earth environments with each other and with living systems, as well as the tie-in with technology (the anthrosphere)

To a large extent, the strong interactions among living organisms and the various spheres of the abiotic environment are best described by cycles of matter that involve biological, chemical, and geological processes and phenomena. Such cycles are called biogeochemical cycles.

The scope of environmental science continues to expand both in terms of the number of cities and countries of the world where water and air quality problems are in urgent need of attention, and in terms of the pollutants themselves, which now so often seen to have international and global impacts.

Due to diligent efforts of environmental scientists, great progress has been made in our understanding of the fate and transport of substances that

contaminate our air, surface water, soil, and subsurface water systems. That progress has led to better technologies for controlling emissions and for cleaning up contaminated sites. With increased understanding and better technologies, it has been possible to craft more sophisticated legislation to address these problems. And, with a better sense of the enormous costs of cleaning up problems after they are created, we are beginning to focus on pollution prevention.

Environmental science is critical to understanding the impact of human activities on the natural environment. Societies often turn to environmental policy, environmental education, and environmental technology for implementing solutions. Both environmental policy and education are concerned with changing human behavior. Environmental policy does so in a more direct, or controlling, manner. The Clean Air Act, for example, specifies the allowable levels of certain kinds of gases, which can be released by industrial facilities. Environmental education, on the other hand, seeks to change human behavior in more subtle ways. Educating the average consumer about the effects of air pollution from automobiles, for example, may lead some individuals to change their behavior and use less polluting forms of transportation such as walking, bicycle, or public transportation.

Lastly, environmental technology refers to solving environmental problems by using or substituting tools, techniques, or processes that have less environmental impact. For example, probably the most well known type of environmental technology is the catalytic converter, which is attached to the exhaust system and neutralizes the gases that are emitted by the engine when gasoline is burned or combusted. To solve a specific environmental problem, societies often turn to environmental policy, education or technology, or combination of any or all of the three.

Adapted from "*Eldon D. Enger, Environmental Science*, 1995" & "*Stanley E. Manahan, Environmental Chemistry, Seventh Edition*, 2000"

New words and expressions

interdisciplinary [ˌintəˈdisiplinəri] *adj.* 跨学科的

theoretical [ˌθiəˈretikl] *adj.* 理论上的
geographic [ˌdʒiəˈgræfik] *adj.* 地理的
ecology [iːˈkɔlədʒi] *n.* 生态学
atmosphere [ˈætməsfiə] *n.* 大气，空气
hydrosphere [ˈhaidrəsfiə] *n.* 水圈
terrestrial [təˈrestriəl] *adj.* 陆地的
geosphere [ˈdʒiːəusfiə] *n.* 岩石圈
crust [krʌst] *n.* 地壳
biosphere [ˈbaiəsfiə] *n.* 生物圈
biotic [baiˈɔtik] *adj.* 生物的
gasoline [ˈgæsəliːn] *n.* 汽油
combust [kəmˈbʌst] *v.* 消耗，燃烧

Notes to the texts

1. Environmental science is an interdisciplinary area of study that includes both applied and theoretical aspects of human impact on the world.
   环境科学是一门研究人类对世界影响的理论和应用方面知识的交叉学科。
2. Environmental science in its broadest sense is the science of the complex interactions that occur among the terrestrial, atmospheric, aquatic, living, and anthropological environments.
   广义上的环境科学是指陆地、大气、水、生物和生存环境之间相互作用的一门科学。
3. Environmental science is critical to understanding the impact of human activities on the natural environment. Societies often turn to environmental policy, environmental education, and environmental technology for implementing solutions.
   环境科学用来解释人类活动对自然环境产生的影响是至关重要的。人们在寻求解决环境问题的办法时常常从环境政策、环境教育和环境技术方面着手。
4. The scope of environmental science continues to expand both in terms of the number of cities and countries of the world where water and air quality problems are in urgent need of attention, and in terms of the pollutants themselves, which now so often seem to have international and global impacts.

环境科学研究范围继续延伸，既深入到世界上那些水和空气质量问题急需关注的城市和国家，又涉及当今产生全球国际化影响的污染物本身。

Questions

1. Define "environmental science".
2. Why is environmental science important to understanding the impact of human activities on the natural environment?