

石油化工专业英语系列丛书

环境科学与工程

专业英语

石油化工专业英语教材编委会 编

中国石化出版社

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图书在版编目 (CIP) 数据

环境科学与工程专业英语/石油化工专业英语教材编
委会编. —北京: 中国石化出版社, 2009
(石油化工专业英语系列丛书)
ISBN 978-7-5114-0134-2

I. 环… II. 石… III. ①环境科学—英语—教材②环境
工程—英语—教材 IV. H31

中国版本图书馆 CIP 数据核字 (2009) 第 197889 号

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式或任何方式传播。版权所有, 侵权必究。

中国石化出版社出版发行

地址: 北京市东城区安定门外大街 58 号

邮编: 100011 电话: (010) 84271850

读者服务部电话: (010) 84289974

<http://www.sinopec-press.com>

E-mail: press@sinopec.com.cn

北京金明盛印刷有限公司印刷

全国各地新华书店经销

*

787×1092 毫米 16 开本 86.25 印张 3250 千字
2009 年 11 月第 1 版 2009 年 11 月第 1 次印刷
定价: 150.00 元(全套)

前 言

在经济全球化和高等教育国际化的 21 世纪,中国高等教育正在与国际接轨,从教育理念、培养目标、育人环境到教材更新和教学方法等方面更加注重学生基本素质、知识结构及实际操作能力的培养,旨在使学生具备较强竞争力和发展潜质,能够在未来的专业领域和职业生涯中迅速适应环境,胜任所从事的工作,成为有所作为的人。专业外语水平是衡量大学生基本素质和综合能力的重要指标之一,在一定程度上决定着学生未来的学术潜力和工作能力。在实际教学过程中,我们发现目前适合工科大学专业外语教学需求的教材比较匮乏。我们应邀编写本系列专业外语教程,就是为了满足工科大学学生和相应读者群的迫切需求。

本套专业外语系列教程包括《环境科学与工程专业英语》《仪表自动化专业英语》《石油加工专业英语》《过程装备与控制工程专业英语》《材料科学与工程专业英语》五部教材。每部教材由 30 个单元组成,每单元包括课文、词汇表、注释、阅读材料及其注释。课文与阅读材料均选自原版外语教科书、学术报告、专业著作及学术期刊等,语言标准,文体规范,学术性强,难易适度,具有较高的可读性和实用性。

大学本科生在经历基础阶段外语学习之后,通过阅读本教材,能够初步接触本专业领域的基础外语词汇、专业术语和表达方式,领略专业外语的文体和风格,提高专业外语阅读理解能力,为将来直接阅读专业外语文献、进行专业外语写作和学术交流打下良好基础,从而使自己的专业外语水平取得实质性跃进。我们希望本系列教程会对有志于相关专业领域学术研究与发展的学生和读者提供有益的帮助和参考。

为了使这套系列专业外语教程取得理想的教学效果,编者建议选用本教程的学生课前务必认真预习,课堂上教师可组织学生采用介绍、讲述、问答、讨论、归纳等方式,创造积极活跃的课堂气氛,使学生能够得到充分的实践机会,以期达到熟练掌握之目的,尽量避免把专业外语课上成枯燥乏味的翻译课。

《环境科学与工程专业英语》是根据国家教委颁布的《大学英语专业阅读阶段教学基本要求》编写的专业英语教材,内容包括环境问题,污染监测,污染处理技术和环境管理。旨在让学生掌握环境科学与工程方面的专业英语词汇,熟悉科技英语的表达方式,丰富环境科学与工程专业知识,切实提高阅读环境科学与工程专业英语的能力。适用于作为环境科学、环境工程专业的本科专业英语教材,也可用于研究生和有关专业技术人员及英语爱好者作为英文环境科学、环境工程英文阅读材料使用。

本系列教程由辽宁石油化工大学外国语学院英语教师和相关专业英语教师共同编撰。由于时间仓促、水平有限,编写过程中难免出现纰漏,欢迎广大读者在使用过程中不吝赐教,在此深表谢意。由于课文选材比较广泛,故未能一一注明出处,在此一并向原作者表示感谢。

本书编写人员

李 萍 孙秀丽 商丽艳 郭文森 王 丹

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Environment and Environmental Problem

Environment

Humans have always inhabited two worlds. One is the natural world of plants, animals, soils, air, and water that preceded us by billions of years and of which we are a part. The other is the world of social institutions and artifacts that we create for ourselves using science, technology, and political organization. ^① Both worlds are essential to our lives, but integrating them successfully causes enduring tensions.

Where earlier people limited ability to alter their surroundings, we now have power to extract and consume resources, produce wastes, and modify our world in ways that threaten both our continued existence and that of many organisms with which we share the planet. To ensure a sustainable future for ourselves and future generations, we need to understand something about how our world works, what we are doing to it, and what we can do to protect and improve it. ^②

Environment and Environmental Science

Environment (from the French *environment*: to encircle or surround) can be defined as the circumstance or conditions that surround an organism or group of organisms, or the complex of social or cultural conditions that affect an individual or community. ^③ Since humans inhabit the natural as well as the “built” or technological, social, and cultural world, all constitute important parts of our environment.

Environmental science, then, is the systematic study of our environment and our proper place in it. A relatively new field, environmental science is highly interdisciplinary, integrating natural of the world around us. In contrast to more theoretical disciplines, environmental science is mission-oriented. That is, it seeks new, valid, generalizable knowledge about the natural world and our impacts on it, but obtaining this information creates a responsibility to get involved in trying to do something about the problems we have created. Environmental Science applies the findings and principles from multiple disciplines to environmental questions and problems. Environmental Science, by nature, is multidisciplinary and interdisciplinary.

Most environmental scientists develop expertise in a particular discipline, and work cooperatively with specialists in other disciplines to solve environmental problems. They work in a variety of institutions in both the public and private sectors: municipal, provincial and federal government departments, consulting and engineering companies, development aid organizations in the non-governmental sector and activist community organizations. ^④ In all of these institutions they must integrate their scientific knowledge into the prevailing political, eco-

conomic and legal systems.

As distinguished economist Barbara Ward points out, for an increasing number of environmental issues, the difficulty is not to identify remedies. Remedies are now well understood. The problem is to make them socially, economically, and politically acceptable. Foresters know how to plant trees, but not to establish conditions under which villagers in developing countries can manage plantations for themselves. Engineers know how to control pollution, but not how to persuade factories to install the necessary equipment. City planners know how to build housing and design safe drinking water systems, but not how to make them affordable for the poorest members of society. The solutions to these problems increasingly involve human social systems as well as natural science.

Environmental Dilemmas

Imagine that you are an astronaut returning to earth after a long trip to the moon or Mars. What a relief it would be to come back to this beautiful, bountiful planet after experiencing the hostile, desolate environment of outer space. Although there are dangers and difficulties here, we live in a remarkable prolific and hospitable world that is, as far as we know, unique in the universe. Compared to the conditions on other planets in our solar system, temperatures on the earth are mild and relatively constant. Plentiful supplies of clean air, fresh water, and fertile soil are regenerated endlessly and spontaneously by geological and biological cycles. ⁶

Perhaps the most amazing feature of our planet is the rich diversity of life that exists here. Millions of beautiful and intriguing species populate the earth and help sustain a habitable environment. This vast multitude of life creates complex, interrelated communities where towering trees and huge animals live together with, and depend upon, tiny life-forms such as viruses and fungi. Together, all these organisms make up delightfully diverse, self-sustaining communities, including dense, moist forests, vast sunny savannas, and richly colorful coral reefs.

Before humans came on the scene, the world changed only slowly. The climate warmed and cooled, new plants and animals evolved and became extinct in their turn, and sea levels rose and fell over periods of thousands, if not millions, of years. But during the last two thousand years there have been very great changes. There are many things to appreciate and celebrate about the world in which we live, many pressing environmental problems cry out for our attention—forests have disappeared, river courses have been changed, and large areas of natural vegetation have turned into farmland and cities. Human populations have grown at alarming rates in this century. Nearly 6000 million people now occupy the earth and we are adding 100 million more each year. In the next decade, our numbers will increase by nearly as many as are now alive in China. Most of the growth will be in the poorer countries where resources and services are already strained by present populations.

Some demographers believe that this unprecedented growth rate will slow down in the century and that the population might eventually drop back below its present size. Others warn that the number of humans a century from now could be four or five times more than

that of our present population if we don't act quickly to balance birth rate with death rate. Whether there are sufficient resources to support 6 billion humans—let alone 25 billion—on a sustainable basis is one of the most important questions we face. How we might stabilize population and what level of resource consumption future generations we can afford are equally difficult parts of this challenging equation. ⑥

Food shortages and famines already are too familiar in many places and may increase in frequency and severity if population growth, soil erosion, and nutrient depletion continue at the same rate in the future as they have in the past. We are coming to realize, however, that food security often has more to do with poverty, democracy, and equitable distribution than it does with the amount of food available. Water deficits and contamination of existing water supplies threaten to be critical environmental issues in the future for agricultural production as well as for domestic and industrial use. Many countries already have serious water shortages and more than one billion people lack access to clean water or adequate sanitation. Violent conflicts over control of natural resources may flare up in many places if we don't learn to live within nature's budget.

How we obtain and use energy is likely to play a crucial role in our environmental future. Fossil fuels (oil, coal, and natural gas) presently supply about 80% of the energy used in industrialized countries. Supplies of these fuels are diminishing at an alarming rate and problems associated with their acquisition and use—air and water pollution, mining damage, shipping accidents, and political insecurity—may limit where and how we use remaining reserves. Cleaner renewable energy resources—solar power, wind, and biomass—together with conservation, may replace environmentally destructive energy sources if we invest in appropriate technology in the next few years.

As we burn fossil fuels, we release carbon dioxide and other heat-absorbing gases that cause global warming and may bring about sea-level rises and catastrophic climate changes. Acids formed in the extensive damage to the building materials and sensitive ecosystems in many places. Continued fossil fuel use without pollution control measures could cause even more extensive damage. Chlorinated compounds, such as the chlorofluorocarbons used in refrigeration and air conditioning, also contribute to global warming, as well as damaging the stratospheric ozone which protects us from cancer-causing ultraviolet radiation in sunlight. ⑦

Destruction of tropical forests, coral reefs, wetlands, and other biologically rich landscapes is causing an alarming loss of species and a reduction of biological variety and abundance that could severely limit our future options. Many rare and endangered species are threatened directly or indirectly by human activities. In addition to practical values, aesthetic and ethical considerations suggest that we should protect these species and the habitat necessary for their survival.

Toxic air and water pollutants, along with mountains of solid and hazardous wastes, are becoming overwhelming problems in industrialized countries. We produce hundred of millions tons of these dangerous materials annually, and much of it is disposed of in dangerous and

irresponsible ways. No one wants this noxious stuff dumped in his or her own backyard, but too often the solution is to export it to someone else's. We may come to a political impasse where our failure to decide where to put our wastes or how to dispose of them safely will close down industries and result in wastes being spread everywhere. The health effects of pollution, toxic wastes, stress, and the other environmental ills of modern society have become a greater threat than infectious diseases for many of us in industrialized countries.

Assuming that population growth, mineral usage, and energy consumption are stabilized during the remainder of the century, the problem of air and water pollution and solid waste disposal should be manageable. The technology for removing most contamination from air and water is available and there is every reason to believe that solutions to outstanding problems will be found. The recycling of materials, the conversion of wastes into useful products, and various methods of volume reduction, like incineration and biological oxidation, should enable us to handle the increased volume of solid wastes. ⑥

Summarizing, it appears that progress on our planet depends on a leveling-off in population growth and in mineral and energy consumption. Continued rapid rates of growth in these areas could result in a very low standard of living for millions of people. On the other hand, intelligent management of our resources and population stability would enable the nations of the world to employ their science skills and technology for the betterment of all mankind. ⑥ The twenty-first century may prove to be one of scientific progress comparable with that of our present century, present-day visions and small-scale operations can become practical useful processes. Those who live in the next century may find the following situations to be commonplace, or at least operational on a small scale.

Illustrate the importance of environmental science and environmental education for everyone. What we are doing to our world, and what that may mean for our future and that of our children is paramount concern as we enter the twenty-first century.

New Words and Expressions

- | | |
|---|---|
| <p>1. institutions /ɪnstɪ'tju:ʃənz/ <i>n.</i> 公共机构, 协会, 制度</p> <p>2. modify /'mɒdɪfaɪ/ <i>vt.</i> 更改, 修改; <i>v.</i> 修改</p> <p>3. sustainable /sə'steɪnəbl/ <i>adj.</i> 可以忍受的, 足可支撑的, 养得起的</p> <p>4. systematic /sɪstɪ'mætɪk/ <i>adj.</i> 系统的, 体系的</p> <p>5. interdisciplinary /ɪntə(:)'dɪsɪplɪnəri/ <i>adj.</i> 各学科间的</p> <p>6. theoretical /θiə'retɪkəl/ <i>adj.</i> 理论的</p> <p>7. oriented /'ɔ:riəntɪd,'əʊ-/ <i>adj.</i> 导向的</p> | <p>8. generalizable /'dʒenərəlaɪzəbl/ <i>adj.</i> 可概括的, 可归纳的</p> <p>9. multidisciplinary /ˌmʌltɪ'dɪsɪplɪnəri/ <i>adj.</i> 包括各种学科的</p> <p>10. provincial /prə'vɪnʃəl/ <i>adj.</i> 省的</p> <p>11. prevailing /pri'veɪlɪŋ/ <i>adj.</i> 占优势的, 主要的, 流行的</p> <p>12. plantation /plæn'teɪʃən/ <i>n.</i> 耕地, 种植园, 大农场, 森林, 人造林</p> <p>13. affordable /ə'fɔ: d/ <i>vt.</i> 提供, 给予, 供应得起</p> |
|---|---|

14. **astronaut**/'æstrɒnɔ:t/n. 太空人,宇航员
15. **Mars**/mɑ:z/n. 火星,战神
16. **bountiful**/'bauntiful/adj. 慷慨的,宽大的
17. **prolific**/prə'lifɪk/adj. 多产的,丰富的,大量繁殖的
18. **spontaneously**/spɒn'teɪnjəsli/adv. 自然地,本能地
19. **intriguing**/ɪn'tri:ɡɪŋ/adj. 迷人的,有迷惑力的,引起兴趣
20. **habitable**/'hæbitəbl/adj. 可居住的
21. **demographer**/di:'mɒɡrəfə/n. 人口统计学家
22. **democracy**/di'mɒkrəsi/n. 民主政治,民主主义
23. **deficits**/'defɪsɪt/n. 赤字,不足额
24. **sanitation**/sæni'teɪʃən/n. 卫生,卫生设施
25. **acquisition**/ækwi'zɪʃən/n. 获得,获得物
26. **catastrophic**/'kætə'strɒfɪk/adj. 悲惨的,灾难的
27. **noxious**/'nɒkʃəs/adj. 有害的
28. **usage**/'ju:zɪdʒ/n. 使用,用法
29. **betterment**/'betəmənt/n. 改良
30. **commonplace**/'kɒmənpleɪs/n. 平凡的事,平常话;adj. 平凡的
31. **paramount**/'pærəmaʊnt/adj. 极为重要的

Notes

- Humans have always inhabited two worlds. One is the natural world of plants, animals, soils, air, and water that preceded us by billions of years and of which we are a part. The other is the world of social institutions and artifacts that we create for ourselves using science, technology, and political organization.
人类一直居住于两个世界。一个是由早于我们数十亿年就存在的植物、动物、土壤、空气和水组成的自然世界,并且我们也是其中的一部分。另一个世界是我们用科学、技术和行政机构为自己创造的社会机构和人造产物。
- To ensure a sustainable future for ourselves and future generations, we need to understand something about how our world works, what we are doing to it, and what we can do to protect and improve it.
为了我们自己 and 后代有一个可持续的未来,我们需要懂得我们的世界如何运转,我们要为它做什么,并且应该如何做来保护和改进它。
- Environment (from the French *environ*: to encircle or surround) can be defined as the circumstance or conditions that surround an organism or group of organisms, or the complex of social or cultural conditions that affect an individual or community.
环境可以定义为:环绕在一个有机生命或有机群体的环境或条件,或者影响个体或社会的复杂社会和文化条件(来自于法国环境保护论者:包围和环绕)。
- They work in a variety of institutions in both the public and private sectors: municipal, provincial and federal government departments, consulting and engineering companies, development aid organizations in the non-governmental sector and activist community organizations.
他们工作在各种各样的公共的和私人部门中:市政的、省的 and 联邦政府部门,咨询和工程公司,非政府部门的开发援助组织和活跃的社会组织。
- Compared to the conditions on other planets in our solar system, temperatures on the earth are mild and relatively constant. Plentiful supplies of clean air, fresh water, and fertile soil

are regenerated endlessly and spontaneously by geological and biological cycles.

与太阳系的其他星球环境相比,地球上的温度是温和的,而且是相对稳定的。充足的清洁空气、新鲜淡水和肥沃的土壤可以自然地通过地理和生物循环不断再生。

6. How we might stabilize population and what level of resource consumption future generations we can afford are equally difficult parts of this challenging equation.

如何稳定人口以及我们能够为后代提供的资源消费水平,是这个具有挑战性平衡问题中同样困难的部分。

7. Chlorinated compounds, such as the chlorofluorocarbons used in refrigeration and air conditioning, also contribute to global warming, as well as damaging the stratospheric ozone which protects us from cancer-causing ultraviolet radiation in sunlight.

氯化合物,例如用于冰箱和空调中的氟氯烃,同样导致地球变暖,并且会破坏可以保护我们远离太阳光中致癌的紫外线辐射的同温层。

8. The recycling of materials, the conversion of wastes into useful products, and various methods of volume reduction, like incineration and biological oxidation, should enable nations to handle the increased volume of solid wastes.

物质循环、将废弃物转换成有用的产品以及各种减少体积的方法,例如焚烧和生物氧化,可以帮助国家控制固体废弃物的体积增长。

9. On the other hand, intelligent management of our resources and population stability would enable the nations of the world to employ their science skills and technology for the betterment of all mankind.

另一方面,资源智能管理和人口稳定能够使世界上的国家用它们的科学技能和技术为人类造福。



Environment Protection in China

China's modernization drive has been launched in the following conditions: The country has a large population base, its per-capita average of natural resources is low, and its economic development as well as scientific and technological level remains quite backward. Along with the growth of China's population, the development of the economy and the continuous improvement of the people's consumption level since the 1970s, the pressure on resources, which were already in rather short supply and on the fragile environment, has become greater and greater. Which road of development to choose has turned out, historically, to be an issue of paramount importance to the survival of the Chinese people as well as their posterity.

The Chinese government has paid great attention to the environmental issues arising from the country's population growth and economic development, and has made protecting the environment an important aspect of the improvement of the people's living standards and quality of life. In order to promote coordinated development between the economy, the society

and the environment, China enacted and implemented a series of principles, policies, laws and measures for environmental protection in the 1980s.

The prevention and control of environmental pollution and ecological destruction and the rational exploitation and utilization of natural resources are of vital importance to the country's overall interests and long-term development. The Chinese government is unswervingly carrying out the basic national policy of environmental protection.

Formulating the guiding principles of simultaneous planning, simultaneous implementation and simultaneous development for economic construction, urban and rural construction and environmental construction, and combining the economic returns with social effects and environmental benefits; and carrying out the three major policies of prevention first and combining prevention with control, making the causer of pollution responsible for treating it and intensifying environmental management.

Promulgating and putting into effect laws and regulations regarding environmental protection and placing environmental protection on a legal footing, continuously improving the statutes concerning the environment, formulating strict law-enforcement procedures and increasing the intensity of law enforcement so as to ensure the effective implementation of the environmental laws and regulations. Persisting in incorporating environmental protection into the plans for national economic and social development, introducing to it macro regulation and management under state guidance, and gradually increasing environmental protection input so as to give simultaneous consideration to environmental protection and other undertakings and ensure their coordinated development.

Establishing and improving environmental protection organizations under governments at all levels, forming a rather complete environmental control system, and bringing into full play the governments' role in environmental supervision and administration accelerating progress in environmental science and technology.

Since the beginning of the 1990s the international community and various countries have made an important step forward in exploring solutions to problems of the environment and development. The United Nations Conference on Environment and Development, held in June 1992, made sustainable development in the strategy for common development in the future, and this won wide acclaim from the governments of all countries represented at the conference.

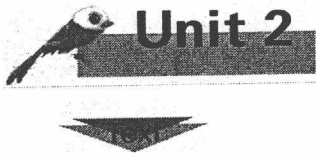
In August 1992, shortly after that conference, the Chinese government put forward ten major measures China was to adopt to enhance its environment and development, clearly pointing out that the road of sustainable development was a logical choice for China now and in the future.

In March 1994 the Chinese government approved and promulgated China's Agenda 21- White Paper on China's Population, Environment, and Development in the 21st Century. This document, proceeding from the country's specific national conditions in these three respects, put forward China's overall strategy, measures and program of action for sustainable development. The various departments and localities also worked out their respective plans of action to implement the strategy for sustainable development.

At its Fourth Session in March 1996 China's Eighth National People's Congress examined and adopted the Ninth Five-Year Plan of the People's Republic of China for National Economic and Social Development and the Outline of the Long-Term Target for the Year 2010. Both the Plan and Outline take sustainable development as an important strategy for modernization, thus making it possible for the implementation of the strategy of sustainable development in the course of China's economic construction and social development.

Notes

1. launch 发动, 开展
2. supervision 监督, 管理
3. promulgate 宣布, 颁布
4. vocational 职业(上)的, 行业的
5. Which road of development to choose has turned out, historically, to be an issue of paramount importance to the survival of the Chinese people as well as their posterity.
历史已经证明, 选择什么样的发展道路对于中国人民以及子孙后代的生存是最首要的问题。
6. The prevention and control of environmental pollution and ecological destruction and the rational exploitation and utilization of natural resources are of vital importance to the country's overall interests and long-term development.
环境污染和生态破坏的防控以及自然资源的合理开发利用对国家的整体利益和长远发展是至关重要的。
7. Formulating the guiding principles of simultaneous planning, simultaneous implementation and simultaneous development for economic construction, urban and rural construction and environmental construction, and combining the economic returns with social effects and environmental benefits; and carrying out the three major policies of prevention first and combining prevention with control, making the causer of pollution responsible for treating it and intensifying environmental management.
制定关于经济建设, 城市、农村及环境建设的同时计划、同时实施、同时发展的指导原则, 并与社会效益和环境效益带来的经济转型相结合; 并且实施三个主要政策: 首先预防, 并通过预防与控制相结合, 其次制造污染者负责处理污染, 最后加强环境管理。
8. Since the beginning of the 1990s the international community and various countries have made an important step forward in exploring solutions to problems of the environment and development.
自 20 世纪 90 年代初, 国际社会和各个国家在探索环境和发展问题的解决方法上已经迈出了重要的一步。
9. The various departments and localities also worked out their respective plans of action to implement the strategy for sustainable development.
各部门和地方也制订了各自的行动计划, 以实施可持续发展战略。



Dissolved Oxygen in Water

Natural Water

Pure water H_2O absolutely free from any substances dissolved in it does not exist outside the laboratory, as natural water contains dissolved gases and salts. These substances make the water suitable for particular beneficial uses. ^① Water must have an adequate level of dissolved oxygen if fish are to thrive-without it they will die. (As explained later, the great majority of pollution instances on our rivers are attributable to the depletion of the dissolved oxygen, leading to various highly undesirable effects.) Again, drinking water without dissolved oxygen and with only a very low level of dissolved salts is not very palatable; it is the level of salts in solution-as natural "hardness", for example, which gives many waters their palatability.

The Importance of Dissolved Oxygen

The importance of an adequate supply of dissolved oxygen for fish has been mentioned. However, the actual amount of dissolved oxygen present in even the cleanest water is extremely small. The solubility of oxygen in water at a temperature of 20 degrees Celsius is 9.2 milligrams oxygen per liter of water, i. e., little more than nine parts per million at the level of water temperature one might find in a typical Irish summer. ^② There is an inverse temperature oxygen solubility relationship, i. e., the solubility of oxygen increases as the temperature drops, so that the net amount of oxygen present in a river may be some 50% greater in the winter than in the summer.

However, it is essential to base pollution control measures on the lowest natural (i. e. summer) levels which occur. Around 9 ppm is, as stated, the maximum solubility of oxygen in water in summer. This level is more usually referred to as the 100% saturation value at the actual temperature (which must be specified if saturation values are used).

Saturation levels above 80% are desirable if game fish are to thrive; for coarse fish the corresponding value is 55% saturation (at summer temperature). Expressed in terms of oxygen concentrations (as ppm), the respective values are 7 and 5. Thus, quite small amounts of pollution will reduce the natural oxygen levels to the minimum desirable figures, and small increases in pollution will seriously disrupt fish life.

Water pollution is the contamination of water bodies such as lakes, rivers, oceans, and groundwater caused by human activities, which can be harmful to organisms and plants which live in these water bodies.

Although natural phenomena such as volcanoes, algae blooms, storms, and earthquakes