

水利工程 专业英语

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全国高等院校水利水电类精品规划教材

水利工程专业英语

Technical English for Water Engineering

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内容提要

本书是高等院校水利水电工程、农业水土工程、水文与水资源等专业本科生和研究生的专业英语教材。内容分为7个单元,涉及水利工程领域的各个专业,包括水文与水资源、水环境、灌溉排水、水工建筑物、水电站、工程施工、水土保持、水利经济以及科技论文写作等相关内容。每个单元后附有科技英语翻译技巧,第七单元讲解科技论文的英语写作方法,提高科技英语阅读、翻译与写作的水平。

本书也可作为从事相关专业的工程技术人员、管理人员和教师了解专业知识、提高英语水平的辅助阅读材料。

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出版者的话

近年来,随着我国对基础设施建设投入的加大,水利水电工程建设也迎来了前所未有的黄金时间。截至2006年,全国已建成堤防28.08万公里,各类水库85849座,2006年水利工程在建项目4614个,在建项目投资总规模达6121亿元(《2006年全国水利发展统计公报》)。据《可再生能源发展"十一五"规划》,到2010年,我国水电总装机容量将达到1.9亿千瓦。水利水电工程的大规模建设对设计、施工、运行管理等水利水电专业人才的需求也更为迫切,如何更好地培养适应现今水利水电事业发展的优秀人才,成为水利水电专业院校共同面临的课题。作为水利水电行业的专业性科技出版社,我社长期关注水利水电学科的建设与发展,并积极组织水利水电类专著与教材的出版。

在对水利水电类本科层次教材的深入了解中,我们发现,以应用型本科教学为主的众多水利水电类专业院校普遍缺乏一套完整构建在校本科生专业知识体系又兼顾实践工作能力的教材。在广泛调研与充分征求各课程主讲老师意见的基础上,按照高等学校水利学科专业教学指导委员会对教材建设的指导精神与要求,并结合教育部实施的多层次建设、打造精品教材的出版战略,我社组织编写了本系列"全国高等院校水利水电类精品规划教材"。

此次规划教材的特点是:

- (1)以培养水利水电类应用型人才为目标,充分重视实践教学环节。
- (2)在依据现有的专业规范和课程教学大纲的前提下,突出特色,力求创新。
- (3)紧扣现行的行业规范与标准。
- (4)基本理论与工程实例相结合,易于学生接受与理解。

本系列教材除了涵盖传统专业基础课及专业课外,还补充了多个新开课程的教材,以便于学生扩充知识与技能,填补课堂无合适教材可用的空缺。同时,部分教材由工程技术人员或有工程设计施工从业经历的老师参与编写,也是此次规划教材的创新。

本系列教材的编写与出版得到了全国 21 所高等院校的鼎力支持,特别是三峡大学 党委书记刘德富教授和华北水利水电学院副院长刘汉东教授对系列教材的编写与出版给 予了精心指导,有效保证了教材出版的整体水平与质量。在此对推进此次规划教材编写与出版的各院校领导和参编老师致以最诚挚的谢意,是他们在编审过程中的无私奉献与 辛勤工作,才使得教材能够按计划出版。

"十年树木,百年树人",人才的培养需要教育者长期坚持不懈的努力,同样,好的教材也需要经过千锤百炼才能流传百世。本系列教材的出版只是我们打造精品专业教材的开始,希望各院校在对这些教材的使用过程中,提出改进意见与建议,以便日后再版时不断改正与完善。

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前言

根据大学英语教学大纲的要求,专业英语属于大学英语应用提高阶段,安排在第五至第七学期,教学时数应不少于100学时,课内外学习时数的比例应不低于1:2。通过专业英语课学习,使学生掌握以英语为工具获取专业知识的能力,在专业英语的听、说、读、写、译等方面具有较高水平。根据大学英语教学大纲要求和水利工程类专业指导性教学计划,编写了《水利工程专业英语》教材,以满足高等院校水利水电工程、农业水利工程、水文与水资源及相关专业的本科专业英语教学需要。

作为全国高等院校水利水电类精品规划教材系列之一,本书按照水利工程类进行选材,内容按专业方向分为7个单元,共31篇课文及阅读材料,涉及水利工程领域的各个专业,包括水文与水资源、水环境、灌溉排水、水工建筑物、水电站、工程施工、水土保持、水利经济以及科技写作等相关内容。书中的英文原文多选自国外相关的经典著作、近期发表的高水平科技论文,还参考了其他兄弟院校编写的专业英语教材,力求做到选题广泛,语言流畅,难易适中。每个单元后附有科技英语翻译技巧。第七单元讲解科技论文的英语写作要求与方法,为专业英语课学习提供理论知识,提高科技英语阅读、翻译与写作水平。

本书由河北农业大学杨路华任主编,内蒙古农业大学冀鸿兰、重庆交通大学童思陈任副主编。全书由杨路华统稿,华北水利水电学院赵中极教授主审。教材编写大纲由编写人员集体讨论确定,各章节编写分工如下:内蒙古农业大学冀鸿兰编写第一单元和第七单元,重庆交通大学童思陈编写第二单元和附录,河北农业大学高惠嫣编写第三单元,河北农业大学夏辉编写第四单元,河北工程大学杜新艳、河北农业大学杨路华编写第五单元,河北农业大学绳莉丽、云南农业大学林志祥编写第六单元。

本教材在编写过程中得到了华北水利水电学院、黄河水利出版社以及各位编者所在 单位的大力支持,河北农业大学柴春岭博士协助主编、副主编进行了书稿编辑与校对工 作。本教材在编写过程中参阅了书后所列文献的有关内容,编写者在此一并表示衷心 感谢。

对于书中不妥之处,恳请读者批评指正,提出改进意见。

编 者 2008年11月

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UNIT I HYDROLOGY AND WATER RESOURCES

Lesson 1 The Hydrologic Cycle

Water on the earth is always changing. Its repeating changes make a cycle. As water goes through its cycle, it can be a solid (ice), a liquid (water), or a gas (water vapor). Ice can change to become water or water vapor. Water can change to become ice or water vapor. Water vapor can change to become ice or water.

How do these changes happen? Adding or subtracting heat makes the cycle work. If heat is added to ice, it melts or vapors. If heat is added to water, it evaporates.

If heat is taken away from water vapor, it condenses. Condensation turns water vapor into a liquid. If heat is taken away from liquid water, it freezes to become ice.

In the hydrologic cycle, water from oceans, lakes, swamps, rivers, plants, and even you, can turn into water vapor. Water vapor condenses into millions of tiny droplets that form clouds. Clouds lose their water as rain or snow, which is called precipitation. Precipitation is either absorbed into the ground or runs off into rivers. Water absorbed into the ground is taken up by plants. Plants lose water from their surfaces as vapor back into the atmosphere. Water that runs off into rivers flows into ponds, lakes, or oceans where it evaporates back into the atmosphere. The cycle continues.

There are six important processes that make up the water cycle. These are:

1 Evaporation

Evaporation is the process where a liquid, in this case water, changes from its liquid state to a gaseous state. Liquid water becomes water vapor. Although lower air pressure helps promote evaporation, temperature is the primary factor. For example, all of the water in a pot left on a table will eventually evaporate. It may take several weeks. But, if that same pot of water is put on a stove and brought to a boiling temperature, the water will evaporate more quickly.

During the water cycle some of the water in the oceans and freshwater bodies, such as lakes and rivers, is warmed by the sun and evaporates. During the process of evaporation, impurities in the water are left behind. As a result, the water that goes into the atmosphere is cleaner than it was on earth.

2 Condensation

Condensation is the opposite of evaporation. Condensation occurs when a gas is changed into a liquid. Condensation occurs when the temperature of the vapor decreases.

When the water droplets formed from condensation are very small, they remain suspended in the atmosphere. These millions of droplets of suspended water form clouds in the sky or fog at ground level. Water condenses into droplets only when there are small dust particles present around which the droplet can form.

3 Precipitation

When the temperature and atmospheric pressure are right, the small droplets of water in clouds form larger droplets and precipitation occurs. The raindrops fall to earth.

As a result of evaporation, condensation and precipitation, water travels from the surface of the earth goes into the atmosphere, and returns to the earth again.

4 Surface Runoff

Much of the water that returns to the earth as precipitation runs off the surface of the land, and flows down hill into streams, rivers, ponds and lakes. Small streams flow into larger streams, then into rivers, and eventually the water flows into the ocean.

Surface runoff is an important part of the water cycle, because through surface runoff much of the water returns again to the oceans, where a great deal of evaporation occurs.

5 Infiltration

Infiltration is an important process where rainwater soaks into the ground, through the soil and underlying rock layers. Some of this water ultimately returns to the surface at springs or in low spots downhill. Some of the water remains underground and is called groundwater.

As the water infiltrates through the soil and rock layers, many of the impurities in the water are filtered out. This filtering process helps clean the water.

6 Transpiration

One final process is important in the water cycle. As plants absorb water from soil, the water moves from the roots through the stems to the leaves. Once the water reaches the leaves, some of it evaporates from the leaves, adding to the amount of water vapor in the air. This process of evaporation through plant leaves is called transpiration. In large forests, an enormous amount of water will transpire through leaves.

New Words and Phrases

- 1. hydrologic a. 水文的
- 2. subtract v. 减去,减 ~ from
- 3. evaporation n. 蒸发(作用) evaporate (v.)
- 4. condensation n. 凝结,浓缩 condense (v.)
- 5. swamp n. 沼泽,湿地,煤层聚水洼
- 6. droplet n. 小滴
- 7. absorb vt. 吸收,吸引
- 8. gaseous a. 气体的,气态的

- 9. promote vt. 促进,发扬,提拔,晋升
- 10. freshwater n. 淡水,湖水
- 11. impurity n. 杂质,混杂物
- 12. suspend vt. 悬挂, 悬浮
- 13. particle *n*. 微粒,质点
- 14. surface runoff 地表径流
- 15. underlie *vt*. 位于……之下,成为…… 的基础
- 16. transpiration n. 蒸发(物),散发,蒸腾作用 transpire (v.)

Notes

1. Water absorbed into the ground is taken up by plants.

被地面吸收的水分又被植物吸收。

take up 吸收,溶解;占据(时间,空间,精力等);对……有兴趣,从事;担任(职务等)

How much water is needed to take up the salt? 这盐需要多少水才能溶解?

Nearly the whole meeting was taken up with the discussion of that single problem. 几乎整个会议的时间都用来讨论那个简单问题。

He has taken up photography as a hobby. 他把摄影当做自己的一种爱好。

The new president took up office yesterday. 新总统昨天就职。

2. Water that runs off into rivers flows into ponds, lakes, or oceans where it evaporates back into the atmosphere.

流入河流的水又进入池塘、湖泊或海洋,并在此通过蒸发返回到大气中。

句中 that runs off into rivers 是修饰 Water 的定语从句, where it evaporates back into the atmosphere 是修饰 ponds, lakes, or oceans 的定语从句, it 指代 water。

3. As a result, the water that goes into the atmosphere is cleaner than it was on the earth. 因此,蒸发到大气中的水比在地球上的更清洁。

as a result 结果

as a result of 作为……的结果

The flight was delayed as a result of fog. 航班因大雾晚点。

result in 结果,导致

What this will result in, only the future can tell. 这件事的结果如何,只有将来才知道。 result from 由于……造成的后果

The damage resulted from his careless. 由于他的粗心,导致了损坏。

4. Surface runoff is an important part of the water cycle, because through surface runoff much of the water returns again to the oceans, where a great deal of evaporation occurs.

地表径流是水文循环中重要的一环,因为通过地表径流,大部分水又返回到海洋,在 海洋上空会形成大量的蒸发。

Reading Material World Water Balance

1 General Problems

World water balance should be considered as a quantitative expression of a great process called the water cycle which takes place on the earth. The two terms characterize different sides of the same process. That is why the differentiation in the two concepts which some investigators resort to cannot be considered well grounded. In the past, the hydrological science was limited by qualitative notions of water cycle but when, due to the progress in water resources use, the hydrometric and atmospheric precipitation data became available, it became possible to comprehend this process qualitatively.

Water cycle, as it is known, connects together all parts of the hydrosphere: ocean and water on land, i. e. surface, soil and ground waters; as well as water in other components of nature, e. g. climate, soils, geological structure and biosphere. In the process of water cycle erosion occurs; relief is formed; dissolved matters change place; large quantities of heat are transferred and a most important biological process—transpiration—occurs.

One of the links in the water cycle is the important economic link wherein water is used to meet man's needs.

The term 'water balance' cannot be considered literally as 'balancing', i. e. equality between income and output elements of water balance. It is obvious that in the studying of water balance, it is indispensable to observe the law of matter conservation. The water cycle for the whole world is not watertight and, therefore, a perfect balance is not possible, either on a global basis or on a regional basis.

The study of world water balance, as a whole as well as separate continents and oceans, depends on the state of knowledge of two major water balance elements—precipitation and river runoff. It cannot be said that present knowledge of these elements is quite perfect, nevertheless, available data, even if insufficient, together with scientific theory make it possible to solve a whole set of water balance problems as well as to estimate world water balance, provided suitable methods for investigating are applied.

The importance of studying world water balance lies in the fact that the development of knowledge of any processes occurring on the earth, including the water cycle, is a contribution to general scientific and economic progress. It plays an important part in estimating the world water resources, which are continuously being used within the process of water cycle. The level

of our knowledge on the water cycle and world water balance also indicated the level of our understanding of world water resources and, in this way, partly suggests the right ways of their use.

2 Development of the Comprehension of World Water Balance

Already in ancient times, a certain notion of water cycle existed in a very crude form which was far from reality. A better qualitative picture of water cycle appeared during the renaissance period. Significant contributions to promote such knowledge were made in the 17 ~ 18 th centuries by persons like P. Perrault, M. V. Lomonosov, Lh. Buffon, P. I. Ritchkov, J. Dalton and others. But a lack of information on the form of discerned data made their contributions less effective.

The present estimations of world water balance were initiated by E. Ya. Brikner of USSR (1905). The method of estimating world water balance suggested by him has probably a greater importance than the actual estimate of balance. The essence of the method lies in the following equations $_{\circ}$

- (1) For the peripheral part of the land feeding the ocean with stream water: $E_p = P_p R_p$
- (2) For closed areas without runoff to the ocean: $E_a = P_a$
- (3) For the Ocean: $E_{\rm m} = P_{\rm m} + R_{\rm p}$
- (4) For the Earth: $E = E_t + E_m$

Where: $E_{\rm p}$, evaporation from the peripheral part of the land; $P_{\rm p}$, precipitation on the peripheral part of the land; $R_{\rm p}$, river runoff to the ocean; $E_{\rm a}$ and $P_{\rm a}$, evaporation and precipitation of closed areas; $E_{\rm m}$ and $P_{\rm m}$, evaporation and precipitation of the ocean; $E_{\rm s}$, evaporation from the surface of the land; $E_{\rm s}$, evaporation from the whole of the land.

The next step was made by R. Fritzsche (1906), who was the first to obtain values of river runoff close to the present ones. G. Wüst (1920), improved upon it by adding runoff from Polar glaciers to river runoff. Both results of G. Wüst's estimation (1920 and 1936) of the world water balance are characterized by low values of precipitation and evaporation of the ocean. Attention was drawn to this by W. Meinardus (1934) who probably prepared the first reliable map of atmospheric precipitation for the ocean.

A principal distinction of our world water balance investigations lies in the fact that they are based on the first map of world river runoff (Lvovitch, 1954) and on the fairly detailed map of precipitation on the land, prepared by O. A. Drosdov in 1939. My subsequent world water balance estimations are based on making river runoff maps and data for the runoff of Polar glaciers more accurate.

M. I. Budiko (1965) and later F. Albrecht (1961) in their research estimated evaporation from heat balance, and river runoff from the difference between precipitation and evaporation.

Attention is drawn to the fact that world water balance elements have not substantially

changed throughout the history of research in this field. This shows a great insight of our predecessors in solving the problem on the basis of very poor information.

The results of the various estimations of separate water balance elements are basically dependent on the accuracy of estimation for precipitation, especially in the ocean. Thus, beginning from W. Meinardus (1934) precipitation on the ocean area (excluding G. Wüst's estimation) is assumed to be more than 100 cm. Precipitation on the surface of the ocean should be assumed not less than 114 cm provided corrections for gage records are applied. The methods of correction have been developed by the Hydrometeorological Service of USSR (M. I. Budiko's paper for the present Symposium).

River-runoff value, as indicated above, has remained almost unchanged for the past fifty years. This does not imply the lack of progress in the study of this world water balance element. For instance, runoff data obtained from the first map of world river-runoff (1945) differ from the results of Fritzsche Wüst's calculations (1906, 1920) for selected 10°—latitude zones by 90% to 116%. For the world, as a whole, the results of both calculations have agreed. Here the law of great numbers reveals itself, i. e. compensation for errors for large areas. However, the understanding of river-runoff distribution over the area has substantially improved.

The same is true of the runoff from Polar glaciers into the ocean. According to the data of different authors an annual runoff from Antarctica and Greenland is estimated.

The splendid results of international research of Antarctica for the past one and a half decades are obtained. Without claiming a full survey of world water balance estimations we must mention the investigations of A. A. Kaminskiy (1925), W. Halbfass (1934), A. B. Voznesenskiy (1938) and others on this problem.

In the last estimation a series of questions remains still unsolved. The inflow of ground-water directly into the ocean by passing rivers is not yet known. R. Nace estimates this value at 5% of the runoff of world rivers, i. e. at 1 600 km³. I believe that this value does not appear to be overestimated, and R. Nace himself considers it to be fairly approximate. The necessity of searching for ways of determining the inflow of groundwater into the ocean is, therefore, a mutual desire.

In terms of depth of runoff South America has a world lead, Europe occupies the second place and next are Asia, Africa and Australia in descending order.

Lesson 2 Floods

A flood is an overflow of water, an expanse of water submerging land, a deluge. The basic cause is excessive runoff from catchments into river systems incapable of carrying this extra volume. Most of the world's population and property are located on lands subject to the overflow of rivers or seas. For example, flood-prone lands comprise about 5% of the area of the United States, more than 10% of the Yellow River basin in China, and almost all of the Netherlands.

1 Types of Flood

1.1 River Flood

One major type of flood is river flood. Many cities, including Paris, Rome, and Washington, occupy land subject to river floods.

The flow of a river usually is confined to a well-defined channel that meanders in the course of time from one side of its valley to the other. However, when there is a heavy rainfall or rapid snowmelt, the river overflows into a wide flat area adjacent to the channel. This area, the natural floodway of the river, is called a floodplain, which is composed of sediments deposited by the river. Typically, a river uses some portion of its floodplain about once in two or three years. Once in a century a river may inundate its entire floodplain to a considerable depth.

1.2 Coastal Flood

A second major type of flood is coastal flood. Coastal lands, such as offshore bars formed by sediments carried by coastal currents occupy a position relative to the sea that floodplains do to rivers. Like floodplains, offshore bars and barrier beaches are the sites of many cities, for example, Atlantic City, Lagos and Nigeria. All are subject to coastal floods.

1.3 Ice Jam Flood

In northeast, north and northwest China, some rivers or river sections flow from lower latitude to higher latitude, therefore, ice jam and ice dam often occur due to time difference of freeze-up and melting between upstream and downstream in winter and spring, which causes sudden rise of water level of rivers and flooding. The Ningxia – Inner Mongolia part and Shandong part of Yellow River and Yilan part of Songhuajiang River are where ice jams happen most seriously. The characteristics of ice jam flood are lower flow but higher water level.

2 Consequences of Flood

2.1 Human Beings

Floods will cause death and injuries. Floods often result in a loss of life especially in lowlying areas and along river banks.

A torrential flood can sink and wash away homes as well as damage various other properties such as electrical goods, vehicles and the like. This is a loss for residents.

The worst effect of floods is on one's health. Floods can cause the accumulation of human waste in the flood water. These flood water can spread to other areas, resulting in diseases such as cholera and malaria. Floods usually bring infectious diseases, e. g. military fever, pneumonic, plague, dermatopathia, dysentery, common cold (type A), breakbone fever, etc.

2.2 Environment

Floods will lead to the damages of roads, collapse of bridges or traffic congestion, which may affect the daily operation.

Floods disrupt normal drainage systems in cities and typically overwhelm sewer systems. Thus, raw or partially raw sewage spills are common in flooded area. Additionally, if the flood is severe enough, destruction of buildings that can contain a large array of toxic materials (paints, pesticides, gasoline, etc.) can cause the release of these materials into the local environment, which leads to severe environment pollution.

2.3 Economy

Floods bring too much water which will cause damage to farmland. Crops die in the prolonged accumulation of flood waters in the plantation areas. Rubber, cocoa, palm oil and rice are among the agricultural crops which cannot survive in such conditions. Such damage is a loss for farmers.

2.4 Government

Floods damage public property such as roads, buildings, and telephone and electrical infrastructures. Floods can also bring about many kinds of diseases. The responsibility of repairing the damages and subsidizing medical equipment must be borne by the government. All these involve high maintenance costs. The government must also supply basic necessities such as food, drinking water and medicine, and set up temporary shelters for flood victims.

A wise society would reap the benefits of floods and avoid many of the negatives if they would choose to build cities in ways that can accommodate floods without trying to avoid it. Attempting to go against nature is almost certainly a loosing prospect in the end.

New Words and Phrases

- 1. meander v. 蜿蜒而流
- 2. floodway n. 分洪河道
- 3. floodplain n. 泛滥平原,漫滩
- 4. inundate v. 淹没,使充满
- 5. barrier beach 沿岸沙滩
- 6. ice jam 冰塞
- 7. ice dam 冰坝
- 8. consequence n. 结果, 因果关系
- 9. low-lying a. 低的, 低地的

- 10. torrential a. 奔流的, 急流的
- 11. vehicle *n*. 交通工具, 车辆
- 12. accumulation n. 积聚, 堆积物
- 13. cholera n. 霍乱
- 14. malaria n. 疟疾
- 15. infectious a. 有传染性的, 易传染的
- 16. miliary fever 粟疹(热)
- 17. pneumonic a. 肺的, 肺炎的
- 18. plague n. 瘟疫

- 19. dermatopathia n. 皮肤病
- 20. dysentery n. 痢疾
- 21. common cold 伤寒
- 22. breakbone fever 登革热
- 23. collapse n. 倒塌, 崩溃
- 24. congestion n. 拥塞, 充血
- 25. disrupt v. 使中断, 破坏
- 26. overwhelm vt. 淹没, 覆没
- 27. sewage n. 下水道, 污水

- 28. toxic a. 有毒的, 中毒的
- 29. pesticide n. 杀虫剂
- 30. release vt. 释放, 放弃, 发表
- 31. plantation n. 耕地, 种植园, 大农场
- 32. infrastructure n. 下部构造,基础设施
- 33. responsibility n. 责任, 职责
- 34. subsidize v. 资助, 津贴
- 35. maintenance n. 维护, 保持

Notes

1. Many cities, including Paris, Rome, and Washington, occupy land subject to river floods.

包括巴黎、罗马和华盛顿的许多城市,常遭受河流洪水的侵袭而淹没土地。 subject to 易受……,常遭……;服从于……,受制于……

He's been subject to bouts of rheumatism for many years. 他患风湿病已经好多年了。

All citizens are subject to the laws of the land. 所有公民都受本国法律的约束。

2. A torrential flood can sink and wash away homes as well as damage various other properties such as electrical goods, vehicles and the like.

奔腾的洪水既能淹没、冲走房屋,又能损坏如电器、车辆等类似的其他各种财产。 as well as 既……又……,还有

I bought a map of the world as well as some picture books. 我买了一张世界地图,还买了几本连环画。

as well 同样地,也

China not only possesses enormous quantities of coal and oil, but she is rich in other minerals as well. 中国不仅拥有大量的煤和石油,其他矿产也很丰富。

3. Attempting to go against nature is almost certainly a loosing prospect in the end. 企图与大自然斗争最终都是没有希望的。

go against 违背,反对;不利于,不适宜于

I don't know why everything seems to go against me. 我不知道为什么事事都好像在跟我作对。

The decision went against me. 这个决定对我不利。

Reading Material The Development of Flood Control Projects

The development of flood control projects in China is carried out in accordance with the river-basin and regional planning of flood control, normally including construction of controlling