

普通高等教育“十二五”规划教材

李继清 朱永强 张玉山 编著

# 水利专业英语



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## 内 容 提 要

本书涉及水利水电行业的多个领域,包括水资源、水文学、河流工程、工程结构、环境工程、灌溉、工程施工、水电站设施设备、特殊水电站功能等。

全书分 27 章,分别是水资源、水资源开发规划、水资源可持续发展、水资源可持续发展、水文学、水循环、水文学原理——单位线、河流、洪水、泥沙、坝、堤防、混凝土工程、水环境、水污染、气候变化、灌溉、灌溉方法、运行评价灌溉、大坝的截流和导流、灌浆、土石坝填筑、水电及其特点、水电站构成、水电站的主要设备、抽水蓄能电站、潮汐发电站、航运和娱乐。

本书可作为高等学校水利专业的教学用书,亦可用作水利水电企业工程技术人员和管理人员学习专业英语的培训教材。

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# 前言

本书是作者结合专业英语课程的多年教学和工作经验，悉心设计、细选精编而成。其特点是内容丰富、覆盖面宽，并配有大量的教学辅导内容。本书以服务本科教学为主，同时也可作为水利水电类研究生、大专生以及从事水利水电行业的工作人员提供参考或借鉴。

本书涉及水利水电行业的多个领域，包括水资源（Water Resources）、水文学（Hydrology）、河流工程（River Engineering）、工程结构（Engineering Structure）、环境工程（Environmental Engineering）、灌溉（Irrigation）、工程施工（Engineering Construction）、水电站设施设备（Hydroelectric Power Station）、特殊水电站功能（Special Functions of Hydroelectric Power Station）等9个单元（每3章1个单元）。

全书分27章，分别是水资源（Water Resources）、水资源开发规划（Water Resources Planning）、水资源可持续发展（Water Resources for Sustainable Development）、水文学（Hydrology）、水循环（Water Cycle）、水文学原理——单位线（Principle of Hydrograph—Unit Hydrographs）、河流（River）、洪水（Flood）、泥沙（Sediments）、坝（Dams）、堤防（Levee）、混凝土工程（Concrete Works）、水环境（Water Environment）、水污染（Water Pollution）、气候变化（Climate Change）、灌溉（Irrigation）、灌溉方法（Irrigation Methods）、运行评价灌溉（Irrigation Performance Evaluation）、大坝的截流和导流（River Closure and Diversion in Dam Construction）、灌浆（Grouting）、土石坝填筑（Embankment and Fills）、水电及其特点（Hydroelectricity and Its Characteristics）、水电站构成（Layout of Hydropower Plants）、水电站的主要设备（Main Equipment in Hydropower Plants）、抽水蓄能电站（Pumped Storage Plants）、潮汐发电站（Tidal Power Station）、航运和娱乐（Navigation and Recreation）。

各章（Chapter）分为若干部分（Part），各部分有独立的主题，每一部分就是一篇短文。每一章的各部分既有关联，又可拆分。读者可以根据需要，选择适当的章节自学或组织教学活动。

书中提供了丰富的学习辅导内容。正文之后，有生词表、重点词组、难句解说，便于读者阅读理解；还有英文缩写形式列举、相关专业术语总结，帮助读者加深记忆、重点掌握。形式多样的练习题，有助于读者检验对本章内容的掌握程度，以便改进提高。

各章后面，根据正文中出现的有特点的专业词汇，有针对性地配备了构词方法的总结。

书后附录给出了全书的词汇表和英文缩写，便于读者跨章节查阅及使用。

本书由华北电力大学的李继清、朱永强和国务院南水北调办公室的张玉山等主编。编写过程中，武汉大学的熊立华，郑州大学的左其亭、郭进军及华北电力大学的纪昌明、董福品、王丽萍、吕爱钟等老师提出了宝贵的意见和建议，席锐超、田军、梅艳艳、丁泽俊、王勇、许郁、陈彩虹、王腾飞、王霁景、沈笛等研究生在素材收集、格式整理、部分课文翻译等方面做了大量的工作，在此表示衷心的感谢！

本书的出版得到国家自然科学基金（项目编号：40971300）、教育部留学回国人员科研基金（项目编号：教外司留[2009]1001）、中央高校基本业务费科研基金（项目编号：09MG16）资助，特此致谢！

本书另配有教学辅导书，提供课文的中文译文、习题答案、补充习题和若干模拟试卷，欢迎广大读者配套使用。

**编 者**

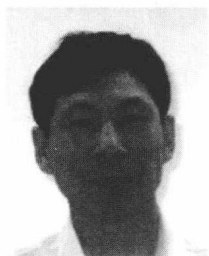
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## 主编简介



李继清，1972年生，博士（后），副教授。

分别获武汉大学水文学及水资源专业硕士和博士学位，2007~2008年在美国加州大学戴维斯分校从事博士后研究工作。现任教于华北电力大学可再生能源学院，为水利水电类专业本科生和研究生讲授过十余门专业课和专业基础课，是水利水电专业英语课程的主讲教师。主要研究方向为水电能源与风险管理理论。曾先后主持国家自然科学基金、教育部留学回国人员科研基金、国家重点实验室开放基金、中央高校基金和企业委托项目十余项。发表学术论文四十余篇，其中由三大检索收录了十余篇。



朱永强，1975年生，博士。

1994年保送进入清华大学电机系，先后获电气工程专业的本科、硕士和博士学位。现任教于华北电力大学电气与电子工程学院，电力专业英语课程的主讲教师，承担了全日制大学本科、大专以及成人教育、函授等多种层次的电力专业英语教学任务，另为国家电网公司高级培训中心等培训机构、电机工程学报和电网技术等重要中文核心期刊的编辑部电力科技英语的培训。出版高等学校“十一五”精品规划教材《电力专业英语阅读与翻译》及配套的《电力专业英语阅读与翻译——教学辅导》，已被国内多所电力院校采用。另有多部其他教材已出版或即将出版，包括《风电场电气系统》、《可再生能源发电技术》、《新能源与分布式发电技术》等。

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# Chapter 1 Water Resources

## Part 1 Water

Water is one of the Earth's natural resources. It is a finite resource, which means that the total amount of water is limited. Most of the world's water supply is saltwater stored in the oceans. Converting saltwater to freshwater is generally too expensive to be used for industrial, agricultural or household purpose.<sup>1</sup>

The type of water we generally use in human activities is fresh water. Only 3% of the world's water supply is fresh water and two-thirds of that is frozen, forming the polar icecaps, glaciers, and icebergs (see Fig. 1.1). The remaining 1% of the total world water supply is freshwater available as either surface or ground water; ground water accounts for two thirds of this amount. Surface water is visible above the ground surface, such as creeks, river, ponds and lakes. Ground water is water that either fills the spaces between soil particles or penetrates the cracks and spaces within rocks.<sup>2</sup>

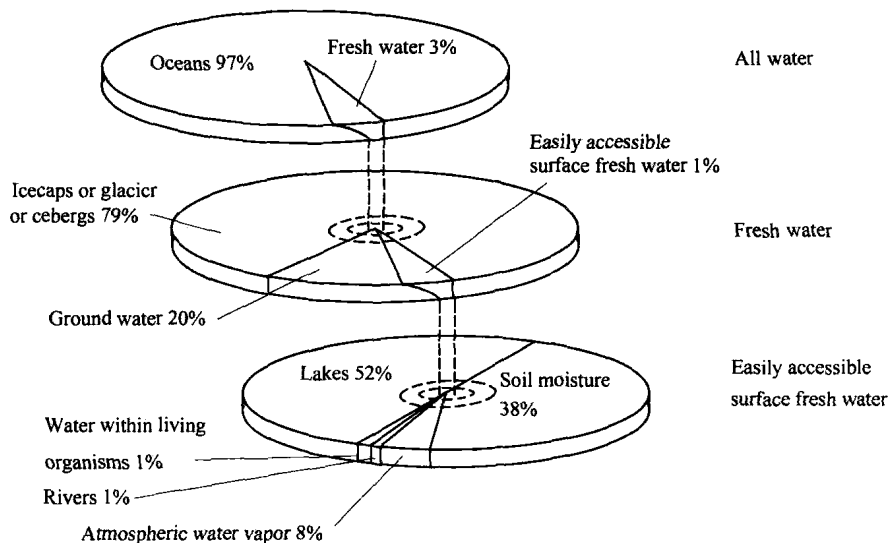


Fig. 1.1 Distribution of the World's Water

Most people get their water from ground water sources. Roughly 9 out of every 10 Public Water Systems (PWSs) operate wells to tap ground water and just over half of the total population served by PWSs drinks water from a ground water source. Millions more get their water from private wells which also tap ground water sources. Ground water systems tend to serve smaller



numbers of people, while surface water systems generally serve large populations. The quality and quantity of the world's water supply depends on how we choose to use water. Our use can be consumptive, which means that the water is not returned to nature (such as drinking water), or nonconsumptive.<sup>3</sup> Nonconsumptive use returns water, polluted or not, to the system. Creating hydroelectric power is an example of nonconsumptive use.

## Part 2 World Water Resources

About 110,000 km<sup>3</sup> of fresh water precipitates on the continents each year. Much of this evaporates or is absorbed by plants. About 43,000 km<sup>3</sup> flows through the world's rivers. Of this renewable fresh water, it is thought that about 9,000 km<sup>3</sup> is readily available for human use, and that somewhat more than 6,000 km<sup>3</sup> of fresh water is withdrawn from all sources (World Meteorological Organization, 1997).<sup>4</sup>

About 69% of world fresh water withdrawals are for agriculture, 23% for industry and 8% for direct human use.<sup>5</sup> (World Resources Institute, 1998) At first glance there seems to be adequate renewable freshwater, but when uses for ecosystem preservation, large differences in the pattern of regional availability and use, and the expense of developing additional supplies are considered, there is less water for human use than might be supposed. Moreover, taking into account population and economic growth, both of which contribute to increased demands on and pollution of water supplies, world fresh water is expected to become substantially more stressed in future decades.<sup>6</sup>

From a world population total of 5.7 billion in 1995, the medium variant United Nations (1996) population estimate for 2020 is 7.7 billion. The forecasts in Netherlands Central Planning Bureau (1992), when extrapolated, suggest that world Gross Domestic Product (GDP) will grow from \$U.S. (1995) 27.8 trillion in 1995 (World Resources Institute, 1998) to more than \$U.S. (1995) 50 trillion in 2020.

As with many problems, the water problem breaks down into component parts which, though interrelated, are amenable to a range of different solutions. Two particularly difficult and costly problems will be maintaining and improving water quality, and insuring that those on the margins have access to safe drinking water. As to the first, some data show that many of China's river reaches are so polluted that they are unsuitable for direct human contact, although such contact is regular part of life in that country. As to the second, it is usually estimated that at least 20% of the world's population, or more than 1 billion people, lack access to safe drinking. (World Meteorological Organization, 1997)

## Part 3 Water Availability and Water Resources Deficit

Water resource distribution over the territory of the Earth is uneven. Also they disagree with