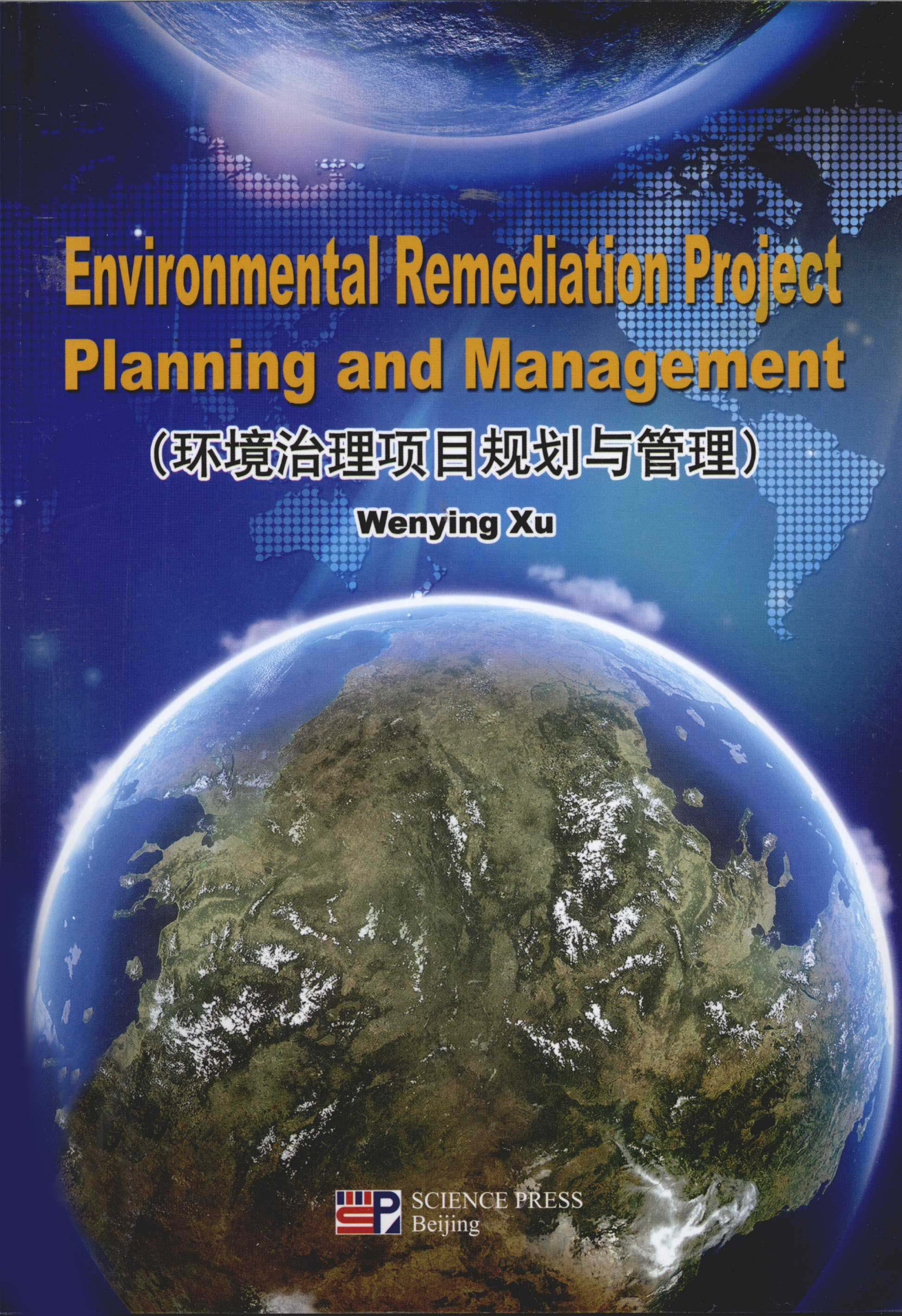




Environmental Remediation Project Planning and Management

(环境治理项目规划与管理)

Wenying Xu



SCIENCE PRESS
Beijing

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内 容 简 介

本书以环境治理项目规划与管理的过程为主线,吸收了国内外最新的环保项目管理的理论和方法,结合案例,完整地阐述了环保项目规划与管理的知识体系。全书共设14章、1个附录和3个案例。主要介绍了以下几个方面的内容:我国环保产业的驱动力、复杂性和特征,项目管理理论,环保项目的规划、追踪和控制,环保项目调研及可行性分析,环保项目的设计,环保项目的实施。

本书可作为高等院校环境科学与工程专业的教材,也可作为环保项目管理工作者的学习和参考用书。

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Preface

Generally, remediation means providing a remedy, so environmental remediation refers to the removal of pollution or contaminants from environmental media such as soil, groundwater, sediment, or surface water for the general protection of human health and the environment or from a brownfield site for redevelopment. Remediation is generally subject to an array of regulatory requirements, and also can be based on assessments of human health and ecological risks where no legislated standards exist or standards are advisory.

This textbook is designed to introduce the generally accepted project management knowledge to the students majored in the environmental project management or environmental engineering and educate them about the key elements of an integrated approach to environmental project management that requires expertise in scientific, engineering, legal, public policy, and project management disciplines. Emphasis is focused on the critical factors that are unique to a major environmental project, such as the uncertainty surrounding scope definition for environmental cleanup projects and the evolving environmental regulation. The students will learn to develop environmental project plans, establish project organization and staffing, define management functions, develop time management approaches, resolve project conflicts, determine project effectiveness, implement integrated project management techniques related to environmental project management, perform pricing and cost estimating, establish cost control, set priorities, and perform tradeoff analyses. A proven environmental project management process is involved in the environmental case-study portion of this book to provide the students with a disciplined and structured approach that can be used to analyze and critically evaluate management aspects of environmental remediation projects. Examples of topics covered in this case study format include pollution prevention/waste minimization projects and environmental technology deployment projects.

This textbook is arranged in a sequence that will have the great contribution to understanding:

- The drivers, complexities, and nuances of the environmental remediation industry
- Project management theory
- Environmental remediation project planning, management and control
- RI/treat-ability studies

- RD process
- RA process

The author is deeply grateful to Prof. Fengting Li, Ms. Emilie Lor and Ms. Juliane Blohme from UNEP, Tongji University IESD, for their valuable contributions. Owing to the our limited knowledge in the field, there could be something defective in this textbook, valuable advices and suggestions in the area are welcome from readers and students.

Wenying Xu
April 2010

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Chapter 1 Introduction

Environmental remediation refers to the performance of engineering/construction projects designed to remedy or restore environmental media, particularly soil and groundwater, degraded by chemical compounds (or elements) that may pose a threat to human health and the environment. Most companies may pose a threat to human health and the environment during manufacturing a product, providing a service, handling chemicals, or producing waste materials under certain conditions. The various ways by which hazardous chemical products or waste materials have entered the environment include:

- Accidental releases or spills during loading, transportation, and unloading operations
- Improper handling, storage, and disposal when the potential hazards associated with various materials were not well understood.
- Leaks from aging or deteriorated equipment such as underground storage tanks and their associated piping.
- International release due to unsophisticated or unethical business practices.

1.1 The environmental remediation industry in China

The companies that provide environmental consulting services, site assessments, remediation engineering, construction, and systems operations are players in the environmental remediation industry, as are the various analytical laboratories, equipment manufacturers, drilling companies, and a host of other service providers. The customers of these services include operators of waste disposal sites and owners of industrial manufacturing operations, oil refineries, chemical processing facilities, and commercial retail petroleum facilities, to name only a few. The various environmental laws and regulations that have been developed to ensure the protection of human health and the environment are drivers for this industry.

Since its beginning, the environmental remediation industry has been complex, dynamic, rapidly evolving, and rich in technical challenge and uncertainty. In the early days, the challenges and uncertainties were considered so monumental that nearly all work was performed on a time and materials basis.

Service companies considered that there was little to be done to control costs or accelerate project completion. In addition, most professionals involved in the early days of the industry felt that it was impossible to make reasonable estimates of the

ultimate cost and time to fulfill a remediation project.

The environmental industry has been proposed as a very significant industry in China since the 1990s, though it emerged in the 1970s along with the increasing focus on ecological and environmental issues. In the 1980s, environmental pollution increased with the rapid growth of the national economy. Many measures were taken to control the pollution, subsequently, the environmental protection industry experienced a further development. In the 1990s, with the deterioration of the environment, relevant laws, regulations and environment standards got improvement. The environmental protection industry developed rapidly during the 9th Five-Year Plan period (China works on Five-Year Plans, Table 1.1).

Table 1.1 Investment in environmental protection in China

Period	Investment (CNY, billion)	% of GDP
6 th Five-Year Plan (1981-1985)	15	0.5
7 th Five-Year Plan (1986-1990)	55	0.67
8 th Five-Year Plan (1991-1995)	80	> 0.8
9 th Five-Year Plan (1996-2000)	360	0.93
10 th Five-Year Plan (2001-2005)	855	Unknown
11 th Five-Year Plan (2006-2010)	1400	1.5

During the 11th Five-Year Plan period, China has continued to enlarge the investment in pollution control and construction of ecological environment. Investment in environmental protection takes up at least 1.5% of China's GDP in the same period. CNY 33.6 billion has been put into eight important projects, including hazardous waste and medical waste treatment, urban sewage treatment, urban solid waste treatment and desulphurization of coal-fired power plant. The average annual growth rate of the environmental protection industry output value is estimated to be about 15%. Annual production value will reach CNY 880 billion, in which comprehensive resource utilization accounts for CNY 660 billion, environmental protection equipments, CNY 120 billion, and environmental services, CNY 100 billion.

The National 11th Five-Year Plan for Environmental Protection specifies for the first time that China will create a group of powerful companies and conglomerates with their own brands, core technology, high market shares and more job opportunities, aiming at making the environment protection industry a new pillar industry of national economy in the five years.

The need for pollution prevention, development and adoption of advanced environmental protection technology and reasonable regulations and laws has increased.

New technologies, techniques and products related to the most areas in pollution treatment and environmental protection are emerging. Environmental laws and regulations have evolved, in many cases becoming more pragmatic. However, despite of technical successes and positive regulatory changes, the cost to achieve cleanup at any given site remains high. Environmental remediation projects have become notorious for their high budget overruns and long schedule delays. This problem is resulted not only from the site owners and environmental service companies, but also from the general public, after all, ultimately it is the public that bears the extra costs in the form of increased costs of goods and services. Benefits that occur from reduced project cost and duration will be shared by all.

1.2 Regulatory overview

There are many environmental protection laws and regulations in China: the Environmental Protection Law of the PRC, the Water Pollution Prevention and Control Law of the PRC, Construction Project Environmental Protection Administration Regulations, and Implementation Details of the Water Pollution Prevention and Control Law of the PRC, etc.

Apart from the laws and regulations, there are also many standards for air, water, solid waste, soil, and ecological environmental quality protection. Vehicle emission is one of the focuses among these standards. At the end of 2004, China started following the 2nd stage emission limit that is equivalent to Euro II. And in 2008, the 3rd stage limit equivalent to Euro III came into force.

Fines or closures of heavily polluting factories are imposed by the government as penalties for violation of the laws and regulations. However, currently there are several barriers to enforcement, including conflicts of interest between environmental and development goals, lack of capacity on the part of local enforcement agencies, and weaknesses in monitoring systems.

A set of sophisticated laws, policies, and systems is needed to ensure intelligent use of the funds and sustainable development of the environmental protection industry; the merit system must be improved to guide local government and relevant departments to take responsibility for harmonizing economic development and environmental protection. Mechanisms required include an environment-related litigation and supervisory system to which the public has easy access; a statistical environmental monitoring system and a system about product standards and technical specifications.

1.3 The changing market for remediation services

Some of the greatest changes in the environmental remediation industry exist in the structure of the market itself. Many of the customers have become increasingly dissatisfied with high cost overruns, long schedule delays, and the apparent lack of direction commonly associated with remediation projects. In an attempt to control costs, customers have adopted more stringent procurement techniques and types of contracts. Time and materials contracts are a thing of the past. Unit cost and firm fixed price contracts are becoming the rule, and many site owners are seeking environmental service firms that will commit to lump sum costs to completion. In general, customers are in search of straight answers to tough questions such as:

- How can we improve project performance?
- How can we ensure that we have the best overall strategy to achieve site cleanup?
- How much is it ultimately going to cost to clean up this site?
- When will this project actually be finished?

Those remediation service companies that can provide answers to these questions will achieve the greatest level of success in what has become a highly competitive marketplace.

In China, the environmental remediation industry gained much momentum in the late 1990s. A shortage of environmental professionals occurred as traditional engineering and construction companies made efforts to enter the lucrative market. In the 2000s, a full-scale boom was in swing. However, the tremendous boom experienced by many remediation companies during the 1990s has been replaced by the increased competition, reduced profits, and in some cases corporate downsizing. Many small or medium sized environmental service companies are in search of new ways to survive and prosper in the new market. The solutions that industrial/commercial site owners and remediation service companies are looking for can be found in increased environmental awareness, reinforced environmental management and introduction of advanced technology, and more importantly, in modern remedial project management techniques. The area of significant cost savings will be found more in the management of technology implementation than in the technology itself. Therefore, industrial site owners need to ensure that the environmental service companies they hire are skilled in modern project management processes. Although it is possible for a particular company to realize increased profits from the introduction of a new investigation or remediation technology, it is unlikely that a sustainable business can be built on a particular technology innovation. This is not to discourage

innovation but only to point out that as environmental service companies struggle to find new ways to survive and prosper in the new market, the answers they are looking for are to be found in improved projects performance achieved by implementation of modern project management processes.

1.4 Modern project management

In the late 2000s, project management has been taken more seriously, relevant professionals are arranged for the management training in environmental companies. The concerned issues for the profession are related to:

- Corporate implementation of modern project management processes and information systems
- Building and leading successful project teams
- Identifying and responding to project variances early in project execution
- Planning and managing project risks

Project success is no longer defined merely as completing a project within schedule and budget while meeting specifications. With modern project management, the customer's overall specification with the outcome of a project is a significant, if not the most important, success factor.

Another success factor, which is directly related to the project manager's business responsibilities, is whether the project earned its expected profit and paved the way for new avenues of business growth or not. In other words, the project manager in modern project management has responsibility for customer's satisfaction as well as business profit and loss.