



Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH
德国技术合作公司

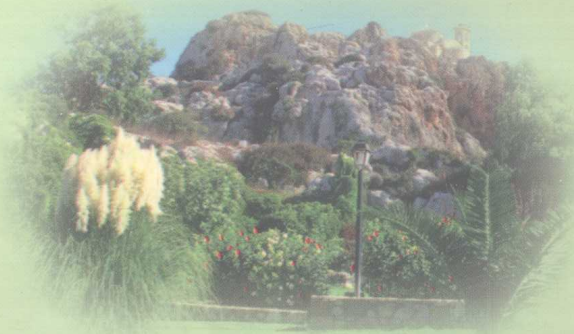
中德技术合作林业培训与进修项目示范教材

城市森林

CHENGSHI SENLIN
PEIYU

培育

王瑞辉 主编



东北林业大学 出版社

中德技术合作林业培训与进修项目示范教材

城市森林培育

王瑞辉 主 编

东北林业大学出版社

图书在版编目 (CIP) 数据

城市森林培育/王瑞辉主编. —哈尔滨: 东北林业大学出版社, 2004.7

中德技术合作林业培训与进修项目示范教材

ISBN 7-81076-628-7

I. 城… II. 王… III. 城市-森林抚育-技术培训-教材 IV. S731.2

中国版本图书馆 CIP 数据核字 (2004) 第 074839 号

责任编辑: 任丹婷

封面设计: 彭 宇



NEFUP

中德技术合作林业培训与进修项目示范教材

城市森林培育

Chengshi Senlin Peiyu

王瑞辉 主编

东北林业大学出版社出版发行

(哈尔滨市和兴路 26 号)

哈尔滨工业大学印刷厂印装

开本 850 × 1168 1/32 印张 11.5 字数 285 千字

2004 年 7 月 第 1 版 2005 年 7 月 第 2 次印刷

ISBN 7-81076-628-7

S·406 定价: 18.00 元

内 容 简 介

本书以生态学原理和森林培育学理论为基础，以维护城市森林生态系统的稳定、高效为立足点。阐述了城市森林兴起的历史背景和发展趋势，概述了城市森林的功能作用和城市林木生长环境的特殊性。详细介绍了城市森林的规划设计、树种选择、结构配置、栽植养护、抚育间伐、灾害防治和改造更新等方面的理论和技术。本书可作为高等农林院校城市林业、林业、园林、园艺等专业的教材，亦可作为林业、园林、城建等部门的培训教材，也可供林业和园林工作者学习参考。

Brief introduction

This book is based on the principles of ecology and the theories of silviculture, in order to maintain the stability and high - efficiency of the urban forest ecosystem. It has explained historical background and developmental trend of the urban forest rises, and has summed up the function of the urban forest and the peculiarity of the trees growth environment in cities. It has introduced the theories and theories of the urban silviculture in detail, such as planning and designing, selection of tree species, forest structure and spatial pattern, planting and maintaining, intermediate cuttings, calamity control, reconstructing and regeneration, etc. This book is not only suitable for the students on speciality of urban forestry, forestry, landscape architecture, but also as a training textbook in forestry, landscape, city construct or as a reference for professionals dealing with urban forest resource and forestry.

中德技术合作林业培训与 进修项目示范教材

编 委 会

- 主 任** 李葆珍 (国家林业局人事教育司)
- 副主任** 朱延福 (北京林业管理干部学院)
Dr. Arno Brune (GTZ 项目长期专家)
- 委 员** 吴友苗 (国家林业局人事教育司)
汪国中 (北京林业管理干部学院)
彭 安 (中南林学院职业技术学院)
邓振义 (杨凌职业技术学院)
史义成 (黑龙江林业职业技术学院)
艾尼·亚生(维族)(新疆维吾尔自治区林业学校)
令狐启霖 (贵州省林业学校)
- 秘 书** 刘凯峰 (北京林业管理干部学院)

本册书编写人员

- 主 编** 王瑞辉
- 副主编** 戴兴安 谢禄山
- 主 审** 马履一

中德技术合作林业培训与进修项目示范教材

出版说明

中德技术合作林业培训与进修项目是中华人民共和国和德意志联邦共和国在林业领域的技术合作项目，项目的目标是由北京林业管理干部学院和地方林业院校的教师们利用培训与进修的方式向林业专业人员和管理人员传授现代林业知识与技能，以推动我国林业的可持续发展。

1999年9月中德技术合作林业培训与进修项目正式启动，5年来，项目为北京林业管理干部学院和选定的5所项目网络学校培训了数以百计的师资，这些师资目前正在各学校的教学、培训一线岗位上发挥着骨干的作用。为了更好地扩散项目引进的德国先进林业技术与教学经验，服务于区域林业建设，由项目协调委员会牵头成立了项目示范教材编委会，并组织各校接受过培训的教师，结合各项目网络学校的优势领域和当地特色，编写了6本项目示范教材。从2004年秋季起，陆续提供给各类林业职业院校和培训机构选用。此外，项目还资助了杨凌职业技术学院凤县林科教一体化实验示范基地面向林农编写的经济林生产实用教材。

在教材编写初期，项目办邀请了一批在相关学术领域有一定造诣的专家学者对此次出版的6本教材的大纲进行了严格的评审，以保证教材的质量。本系列教材从目前林业职业教育的特点出发，结合各项目网络学校多年职业教育、培训的经验，并吸收了德国先进的教育、培训理念，有很强的实用性，适于林业职业

院校和培训机构进行教学、培训使用。

希望各林业职业院校和培训机构积极推广和选用本系列教材，并在使用过程中，注意总结经验，及时提出修改意见和建议，使之不断完善和提高。

中德技术合作林业培训与进修项目
示范教材编委会
2004年6月

Instruction

Demonstrative Teaching Material of Sino – German Cooperation Project: Basic and Further Training in the Forestry Sector

Sino – German Cooperation Project: Basic and Further Training in the Forestry Sector has been carried out in line with a cooperative agreement signed between the People’ s Republic of China and Germany. Its major objective is that the docent staff of Beijing Forestry Management Staff College (BFMSC) and various regional Forestry Colleges transfer modern forestry knowledge and techniques to technicians and management staff in the forestry sector of China so as to ensure that its forestry can achieve sustainable development.

The Project was formally launched in Sep. 1999. During the past five years, it has trained hundreds of teaching staff for the BFMSC and 5 regional networking forestry colleges, and these ever trainees of the project are now playing back – born roles on their training and education positions on the front of the forestry sector. To better diffuse the advanced technology and teaching experience introduced from Germany by the Project in order to meet the increasing demand of the regional forestry construction, the Steering Committee of the Project took the lead to organize the teaching staff trained by the Project to constitute an Editorial Committee, who has compiled a set of demonstrative teaching material of 6 courses by summarizing the academic strengths of each networking school and their local conditions. From the fall of 2004, it will be experimentally applied by various vocational forestry colleges and training insti-

tutions. Meanwhile the Project has also sponsored the Experimental and Demonstrative Site for Forestry Research and Education of Yangling Vocational & Technical College in Fengxian County for their compilation and edition of a series of practical teaching material on production of economic forests, targeting mainly at forestry farmers.

During the initial period of the editorial process, the Project invited a number of scholars and experts excelling in relevant fields to carefully revise the program of the 6 courses to ensure that this set would reach the expected quality. Departing from the characteristics of the current situation of forestry vocational education in China, combing the extensive experience in vocational training and education accumulated by the concerned networking colleges with the advanced educational and training concepts introduced from Germany, this series boasts of strong practicability for forestry vocational colleges as well as for training institutions .

We do hope that it can be adopted and spread by forestry vocational colleges and training institutions around the country, from whom, we warmly welcome any suggestions and opinions to make further publications even better.

Editorial Committee of Demonstrative Teaching Material,
Sino - German Cooperation Project:
Basic and Further Training in the Forestry Sector

June, 2004

前 言

改革开放以来，随着国民经济的迅速发展，我国的城市化水平不断提高。城市化促进了社会经济的发展，但也带来一系列严重的生态环境问题。建立完善的城市森林生态系统是维护城市生态平衡、保证城市生态环境质量的惟一现实可行的措施。20世纪90年代以来，我国的城市森林建设飞速发展，森林面积和森林覆盖率不断提高。当前，我国政府已经把可持续发展作为一项基本国策，全国许多城市也提出了建设生态城市的长远目标，这必将迎来城市森林的更大发展，其培育和养护的任务也将越来越繁重。城市森林由于其培育目标、服务对象、所处立地环境与其他森林有很大差异，因而其培育的理论和技术与森林培育和园林植物栽培有较大的不同，而目前还没有一本专门论述城市森林培育方面的书籍。

本书从1998年以来一直作为中德技术合作林业培训与进修项目的培训教材，并在中南林学院高职园林专业使用，普遍反映良好，同时也收到一些建设性的意见和建议，作者在此基础上进行了修改和完善。并得益于中德技术合作林业培训与进修项目的资助，本书得以正式出版，作者对此表示衷心的感谢。

本书承蒙北京林业大学马履一教授担任主审并给予悉心指导。南京大学李建龙教授，东北林业大学赵雨森教授、陈祥伟教授、张彦东教授等审阅了编写大纲并提出许多宝贵意见。在编写过程中，得到了中南林学院和东北林业大学出版社有关同志的大力支持和帮助，在此一并表示由衷的谢意。

本书的具体编写分工为：第一章的第一、三、四节，第四章，第六章，第七章的第一、二、三、五、六节和附录由王瑞辉编写；第二章，第八章，第七章的第四节由戴兴安编写；第一章

的第二节，第五章，第七章的第七节由谢禄山编写；第三章由王瑞辉和戴兴安共同编写。全书由王瑞辉统稿。

我国地域辽阔，各城市的自然条件和环境状况差异很大，树种繁多，城市森林培育必须因地制宜，因此在使用本教材时宜根据各地的条件和特点灵活掌握。

作为森林培育学的一个新的分支学科，城市森林培育学正处在形成和发展之中，许多理论和技术还需不断探索和实践，加之时间仓促，编者水平有限，书中错误和不妥之处在所难免，敬请广大读者提出宝贵意见。

编者

2004年6月

Preface

With the rapid development of national economy after reforming and opening - up, the urbanization level of our country is improving constantly. Urbanization has promoted the development of economy, but bring a series of serious ecological environment problems. It is the only reality measure of safeguarding the urban ecological balance and guaranteeing the ecological safe of cities, which is to set up a perfect urban forest ecosystem. Since the 1990s, the urban forest in our country has been developed at full speed, forest area and coverage were raised constantly. At present, our government has already regarded sustainable development as a fundamental state policy, a lot of cities have put forward the long - term objective of building the ecological city too. The urban forest will develop on a large scale, so its cultivation will become heavier and heavier.

Site environment, silviculture and service object of urban forest is different from of the forest, so it has own silviculture theories and techniques. At present, however it hasn't been special book on urban silviculture.

This book has been as training materials on Sino - German Technical Cooperation "Basic and Further Training in the Forestry Sector" Project since 1998. And it was used in the speciality of landscape architecture at Vocational technology institute of South - Central Forestry college. The editors were revised and perfected constantly in view of the suggestions. Benefit from subsidy on Sino - German Technical Cooperation "Basic and Further Training in the Forestry Sector" Project, this book can be published formally, the editors express hearty thanks to this. This book has been served as a mainly examined and concentrated one's attention on guidance by Prof. Ma Liyi in Beijing Forestry University. Prof. Li Jianlong in Nanjing University, Prof. Zhao Yusen, Chen Xiangwei and Zhang Yandong in Northeast Forestry University have checked out-lines of writing and put forward a lot of valuable suggestions. In the course of writing, gotten energetically support by Central - south Forestry College and Publishing House of Northeast Forest University, we show sincere gratitude here.

This book consists of 8 chapters. Wang RuiHui – chapter 1 (section 1, 3, 4), 4, 6, 7 (section 1, 2, 3, 5, 6) and appendix; Dai Xing'an – chapter 2, 7 (section 4), 8; Xie Lushan – chapter 1 (section 2), 5, 7(section 7); Chapter 3 is written together by Wang Ruihui and Dai Xing'an. The whole book is interconnected systematically by Wang Ruihui.

Urban forest because the natural conditions of each city are widely different silviculture must be suited to local conditions. We should understand to select flexible while using the teaching material. The urban forest silviculture is developing as a new branch of silviaculture, many theories and technologies also need to explore and practice constantly. The editors hope that this book would provide valuable information on advances in urban forest. The editors also welcome any suggestions for the research and publications.

Authors
June, 2004

目 录

第一章 绪 论	(1)
第一节 城市森林的概念和特点	(2)
一、城市森林的概念	(2)
二、城市森林的特点	(3)
三、城市森林与城市林业的关系	(5)
第二节 城市森林的效益	(5)
一、城市森林的生态效益	(5)
二、城市森林的社会效益	(15)
三、城市森林的经济效益	(16)
第三节 城市森林形成的历史背景、发展现状及趋势	(17)
一、历史背景	(17)
二、发展现状及趋势	(23)
第四节 城市森林培育学的概念和特点	(27)
一、城市森林培育学的概念	(27)
二、城市森林培育学的特点	(28)
第二章 城市森林培育的生态学基础	(30)
第一节 森林生态学与城市森林培育	(30)
一、森林生态学的基本理论	(31)
二、森林生态学原理在城市森林培育中的应用	(37)
第二节 景观生态学与城市森林培育	(39)
一、景观生态学的基本原理	(39)
二、城市景观要素分类及各要素的功能作用	(41)

三、景观生态学在城市森林培育中的应用	(48)
第三节 城市生态学与城市森林培育	(52)
一、城市生态学的概念及基本原理	(52)
二、城市生态系统的结构、特点和功能	(55)
三、城市生态学原理在城市森林培育中的应用	(56)
第三章 城市森林规划	(58)
第一节 城市森林规划的范围	(58)
一、划分城市森林范围的必要性及意义	(58)
二、城市森林范围划分的依据	(59)
三、城市森林范围划分的原则	(61)
第二节 城市森林规划的原则	(64)
一、生态优先原则	(64)
二、创造地方特色	(65)
三、体现时代特征	(66)
四、多功能协调统一原则	(66)
第三节 城市森林规划的方法、步骤和主要内容	(67)
一、方法	(68)
二、操作步骤	(72)
三、主要内容	(75)
第四章 城市森林培育树种选择	(84)
第一节 树种选择的原则	(84)
一、适地适树原则	(84)
二、生态效益优先原则	(86)
三、满足培育目标原则	(86)
四、生物多样性原则	(86)
五、以乔木为主, 乔、灌、草相结合的原则	(87)
六、乡土树种与外来树种相结合, 以乡土树种为主的 原则	(88)

第二节 各种城市森林类型树种的选择·····	(89)
一、防护林·····	(90)
二、公用林地·····	(90)
三、风景林·····	(91)
四、生产用林地、绿地·····	(91)
五、企事业单位林地·····	(92)
六、居住区林地·····	(93)
七、道路林地·····	(94)
八、其他林地、绿地·····	(94)
第三节 不同树木的生态功能·····	(95)
一、净化有毒气体·····	(95)
二、减少粉尘·····	(97)
三、同化二氧化碳、释放氧气·····	(98)
四、杀灭有害病菌·····	(99)
五、防风抗风·····	(99)
第五章 城市森林的结构与配置·····	(101)
第一节 城市森林的结构·····	(101)
一、城市森林结构的概念和内容·····	(101)
二、林分密度与树种组成·····	(103)
第二节 植物配置·····	(109)
一、植物配置的意义和原则·····	(109)
二、植物配置的方式方法·····	(120)
三、几种主要城市绿地植物的配置·····	(126)
第六章 城市森林树木栽植技术·····	(142)
第一节 树木栽植成活的原理·····	(142)
第二节 栽植季节·····	(143)
一、春季栽植·····	(143)
二、雨季栽植·····	(144)

三、秋季栽植	(144)
四、冬季栽植	(144)
第三节 栽植技术	(145)
一、栽植前的准备工作	(145)
二、栽植施工程序	(148)
第四节 非适宜季节树木栽植技术	(165)
一、有预先计划的非适宜季节栽植	(165)
二、无预先计划的非适宜季节栽植	(166)
第五节 大树移栽	(167)
一、大树移栽的意义	(167)
二、大树移栽的特点	(167)
三、大树移栽的技术	(168)
四、其他移植法	(181)
第六节 竹类和棕榈类的移栽	(184)
一、竹类的移栽	(184)
二、棕榈类的移栽	(189)
第七章 城市森林抚育养护	(191)
第一节 成活期管理	(192)
一、扶正培土	(192)
二、抗旱、排涝	(193)
三、抹芽、去萌和修剪	(194)
四、松土除草	(194)
五、成活调查和补植	(195)
第二节 城市树木的土、肥、水管理	(195)
一、土壤管理	(196)
二、施肥	(204)
三、灌溉与排水	(211)
第三节 城市森林抚育间伐	(217)