

STUDIES ON MULTI-FUNCTION TIMBER FOREST

多功能用材林

研究

江 波 戚连忠 等著
袁位高 朱锦茹



6

中国林业出版社

多功能用材林研究

Studies on Multi-Function Timber Forest

江波 戚连忠 袁位高 朱锦茹 等著

Jiang Bo Qi Lianzhong Yuan Weigao Zhu Jinru et al.

江苏工业学院图书馆
藏书章

中国林业出版社

China Forestry Publishing House

图书在版编目(CIP)数据

多功能用材林研究/江波等著.-北京:中国林业出版社, 2001.6
ISBN 7-5038-2817-X

I. 多… II. 江… III. 用材林-森林经营-研究 IV. S759.1

中国版本图书馆 CIP 数据核字(2001)第 036743 号

出版: 中国林业出版社

北京市西城区刘海胡同 7 号, 100009

网址: www.naturalbook.com

印刷: 北京地质印刷厂

发行: 新华书店北京发行所

版次: 2001 年 6 月第 1 版

印次: 2001 年 6 月第 1 次

字数: 302 千字

印张: 11

开本: 889mm×1194mm, 1/16

印数: 1~1000 册

定价: 33.00 元

《多功能用材林研究》

主要编著人员

主 编：江 波

副主编：戚连忠 袁位高 朱锦茹

编 委：（以姓氏笔画为序）

方培泉 卢 刚 史 舟 申屠福军 孙雪忠

孙敏华 江 波 朱光权 朱锦茹 许利群 张承发

张钧民 吴发荣 钟哲科 顾炳贤 袁位高 黄开泽

黄春华 戚连忠 蔡忠明

内 容 提 要

本书是根据浙江省“九五”科技重大项目“富春江两岸多功能用材林效益一体化技术研究”(计划编号: 962103050)成果为基础,并结合浙江省“八五”科技重点攻关项目“短轮伐期工业用材林定向培育与加工利用研究”(计划编号: 914212)和浙江省重点科技项目“优质大径杨木产业化技术研究”(计划编号: 944077)等课题部分材料编著而成。全书共分 9 章,包括多功能用材林的概念、国内外研究进展、立地分类与数量化评价、多功能用材树种的引进和选择、理想林型及其经营技术、森林多种功能的计量与评价、生态景观系统结构优化、资源管理信息系统及沿江生态区建设等。本书可供林学、生态学、景观学、农学、地植物学、木材利用学、环境科学等有关学科的教学、科研、生产人员和相关管理部门的决策人员参考。

随着全球人口的激增和工业、技术的进步,人类对森林资源开发利用的需求日趋高涨,由此出现了世界性的,特别是不发达国家的大面积森林过伐、毁林开垦、滥樵滥猎等。各种人类破坏森林活动,其结果严重地威胁到全球生命支持系统的持续性,导致水土流失加剧、河床抬高、环境恶化、抗洪防暴能力下降,生物多样性急剧下降。我国作为发展中国家,正经历着前所未有的经济高速增长时期,长期以来对森林的破坏和由此导致的生态环境问题也不例外,生态系统功能脆弱,自然灾害发生频率及其危害程度逐年提高,对工农业生产和社会经济发展造成巨大损失。这已引起了我国政府和全社会的普遍关注,目前,我国正着力实施天然林保护工程、长江上中游、黄河中上游绿化工程、三北防护林工程、退耕还林还草工程、防沙治沙工程、自然保护区建设工程等六大林业生态工程,并同时大力营造人工用材林基地,推动现代高效持续林业。由此,森林生态环境功能的有关科学研究也正在深入广泛地开展。

在 20 世纪末,浙江省基本实现“五年消灭荒山、十年绿化浙江”后,林业任务正面临一个重大转折。浙江省地处我国东南沿海、江南水乡,水系多、滩地多、水热条件丰富和经济相对发达,这正是区别于其他各地的特色。这里拥有丰富的冲积河滩和平原水网潮土,交通方便、人口集中,是集约经营工业用材林的良好基地,同时浙江省也是具备很高的园林和景观美学价值,而成为人们观光旅游和休闲的旅游大省。针对目前浙江省水土流失加剧、河床抬高、环境恶化、抗洪防暴能力下降,生态功能脆弱,自然灾害发生频率及其危害程度逐年提高等生态环境问题,结合林业建设,为全面提高浙江省的生态安全保护体系,大力营造多功能的用材林,不仅提供木材等林产品以建设现代化的林业产业体系,同时也能发挥改善生态环境,发展生态旅游功能,以建立一个健全的林业生态保障体系。因此,发展有特色的多功能用材林是浙江省林业建设的主要方向和重要任务。

本书是以浙江省“九五”科技重大项目“富春江两岸多功能用材林效益一体化技术研究”成果为基础,结合浙江省“八五”科技重点攻关项目“短轮伐期工业用材林定向培育与加工利用研究”和浙江省重点科技项目“优质大径杨木产业化技术研究”等课题部分材料编著而成。本书的作者紧密结合现代林业建设对森林多种功能效益的需求,针对江河两岸滩地的特点,在充分考虑当前经济发展前提下,兼顾防风抗洪、固土护堤、净化大气和旅游景观效果,研究多种效益有机结合为一体的多功能用材林生态系统及其综合栽培技术,系统地开展了“滩地多功能优良树种引进与选择,多功能理想林型及其经营技术,森林多功能效益计量评价、多功能用材林生态景观系统结构优化”等研究,形成了多功能用材林效益一体化的“立地类型质量评价,

林型划分模式栽培,定向培育经营管理,生态功能计量与效益评价,优化模式栽培,滩地生态治理复合经营开发,森林资源管理调控等”综合配套技术,颇具“适地适林种、树种乡土化、多样化、经营集约化和可持续经营,以及单项技术优化组合”等特点。

2000年12月,我应邀参加了“富春江两岸多功能用材林效益一体化技术研究”项目的成果鉴定会,专家委员会给予了高度的评价,认为:“该项目研究提出了富春江两岸多功能用材林效益一体化的综合配套技术和多种优化模式,特别是研究提出的整套合理轮伐期更新技术和以杨树林为主体的多功能用材林的计量评价方法等,对多功能用材林的建设在理论上有新的进展,在技术上有所创新,区域性的成功实践在国际上少见。该成果就富春江两岸林业发展成融用材林、水土保持林和生态景观林为一体的黄金旅游区段及富春江沿江生态区的建设开发提供的成套技术,对浙江省乃至全国江河滩地林业生态结构及可持续发展具有重要的推广借鉴作用,并为同类地区的农业产业结构调整提供技术贮备。”

在该书即将付梓之际,谨向林学、生态学、景观学、木材利用学、环境科学等有关学科的教学、科研、生产管理工作者推荐,并作短序,聊表贺忱!

蒋明浩
2001.4.16

第二次世界大战以来,随着人口、资源、环境和社会发展中出现的种种矛盾的展现,在世界范围及我国都提出了多种应付各种局面的林业经营理论,其中较为重要的有森林多用途利用(Multiple use forestry)、林业分工论和木材培育论,新林业(New forestry)、近自然林业(Nature-closed forestry)、生态林业(Ecological forestry)、可持续林业(Sustainable forestry)等。但自1992年巴西里约热内卢召开的世界环发大会以后,“现代林业”可持续发展原则被提到了空前未有的高度,关于林业的可持续发展原则、内涵、标准和指标,在全世界都作了广泛的研讨(沈国舫,1994;蒋有绪,1997),为此我国制定了《中国21世纪议程林业行动计划》。在全球经济向一体化发展的趋势明显及全球环境已开始恶化到威胁人类生存和社会发展的形势下,森林作为陆地生态系统的主体对全球环境有着重大的影响,现代林业就是要满足人类文明延续发展所需要的物产、生态环境及其他服务需求的问题。

随着人口的增加和工业、技术的进步,人类正以前所未有的规模和强度影响环境、改变环境,使全球生命支持系统的持续性受到严重的威胁。如何发展经济,如何把经济发展与生态保护协调起来,是人类面临的严重任务。“保护环境就是保护人类自己”已成为全世界的共识。20世纪50年代以来,特别是改革开放以来,中国的林业建设已经取得了突飞猛进的进展。但由于底子的薄弱,认识的局限以及人口和社会需求的种种压力,再加上前一阶段有过一些决策的失误与执行的偏离,使得我们没能摆脱资源不足和环境恶化的困境,在局部地区及领域面临巨大的难题。

当前,我国生态环境建设面临的形势十分严峻,由于流域中上游地区的不合理开垦和下游的盲目开发导致生态环境恶化,自然灾害频频发生,人口增长与资源紧缺、环境容量的矛盾日趋突出,已成为社会经济可持续发展的严重障碍。为此全国先后确立了以遏制水土流失、改善生态环境、扩大森林资源为主要目标的十大林业生态工程。1998年11月国务院颁布了《全国生态环境建设纲要》,提出了明确的总体目标。浙江省自1998年开始实施平原绿化建设、沿海防护林体系建设、治沙工程、太湖流域防护林体系等四大林业生态工程以来,林业生态环境得到了一定程度的改善,但与国民经济发展和改善生态环境的要求还很不适应,主要体现在:水土流失加剧、河床抬高、环境恶化、抗洪防暴能力下降、生态功能脆弱,自然灾害发生频率及危害程度逐年提高,给工农业生产和社会经济发展造成了巨大损失。如占浙江省总面积47.2%的钱塘江流域,年均泥沙流失量达 $1305.1 \times 10^4 \text{t}$,每年发生洪涝灾害4.46次,20世纪60年代平均每年发生3.3次,70年代每年3.6次,而到了80年代每年发生5.9次,且受灾程度连年加重;旱灾连年不断,平均每4年就有1次超过 250km^2 的流域性旱灾。因此,在社会持续稳定发展的今天,最为重要、最为迫切的任务是如何积极有效地开

展生态环境工程体系建设。

20 世纪末,浙江省基本实现了消灭荒山、绿化浙江,林业任务面临重大转折。平原绿化、城镇绿化、防护林建设和现代新农村建设等进入了新纪元,森林综合功能的挖掘开发利用已提到议事日程,人们对生存环境、绿色的追求也有了更高的需要。浙江省河流纵横,主要有钱塘江、甬江等八大水系和人工开挖的大运河,具有 $24.3 \times 10^4 \text{hm}^2$ 面积的冲积河滩和平原水网潮土,交通方便、人口集中,是集约经营工业用材林的良好基地。但是这里的森林更应具备较高的美学价值,成为理想的旅游、休息和观赏场所,也需具备防风抗洪、水土保持、阻止沙丘移动和减轻农田、房屋破坏力的防浪林作用。水系多、滩地多、水热条件丰富和经济相对发达正是浙江省区别于其他各地的特色,但水患、污染也相当严重。

在经济高速增长而生态破坏日趋严重的情况下,浙江省科技厅率先将“富春江两岸多功能用材林效益一体化技术研究”立为“九五”科技重大攻关项目(计划编号:962103050),具有一定的超前性和现实意义。该项目是根据富春江两岸滩地的特点和功能需求,如何从林学观点和经济角度以及生态景观效益上进行“综合”、“再创造”的一个系统工程技术研究项目。经过 5 年协作攻关,全面超额完成了研究任务,并于 2000 年 12 月 26 日在浙江杭州通过了由蒋有绪院士、王人潮教授主持的成果鉴定,专家委员会一致认为:该项目理论上有突破、技术上有创新、区域性的成功实践国际上少见,整体达国际同类研究先进水平。通过项目的实施,进一步推动了富春江两岸经济的稳步发展,促进了两岸生态、景观、经济功能整体效益的综合发挥和协同,提高了“两江一湖”这一黄金旅游线的含金量,并对全省乃至全国江河滩地林业的持续发展具有重要的借鉴推动作用。

本书就是根据浙江省“九五”成果为基础,并结合作者完成的“八五”等其他 2 个项目的研究成果编著而成。参与本成果编著的有关课题负责人和主要参加人情况如下:

1. 浙江省“九五”科技重大项目“富春江两岸多功能用材林效益一体化技术研究”(计划编号:962103050)

主持人:江波、袁位高(浙江省林业科学研究院)

主要参加人:戚连忠、朱锦茹、许利群、钟哲科、孙敏华、卢刚(浙江省林业科学研究院);吴发荣、顾炳贤、孙雪忠、张承发、黄春华(富阳市林业局);申屠福军、蔡忠明、张钧民、方培泉、黄开泽(桐庐县林业局);史舟(浙江大学农业遥感与信息技术研究所)

2. 浙江省“八五”科技重点攻关项目“短轮伐期工业用材林定向培育与加工利用研究”(计划编号:914212)

主持人:江波、袁位高(浙江省林业科学研究院)

主要参加人:孙敏华、戚连忠、朱光权(浙江省林业科学研究院);顾炳贤、应忠全、徐国民、吴发荣(浙江省富阳市林业局);任德唐、朱白玉、罗亚奋(浙江省上虞市林业局);郑益欢、黄彩来(浙江省苍南县林业局);丁秋生、杨国强(浙江省杭州市木材总厂);童叶根、申屠福军(浙江省桐庐县林业局)。

3. 浙江省重点科技项目“优质大径杨木产业化技术研究”(计划编号:944077)

主持人:袁位高、江波(浙江省林业科学研究院)

主要参加人:戚连忠、孙敏华、朱锦茹、钟哲科(浙江省林业科学研究院);徐国明、吴发荣、顾炳贤、张承发、应钟全(浙江省富阳市林业局);方培泉、申屠福军、黄开泽(浙江省桐庐县林

业局); 叶根法、任德唐(浙江省上虞市林业站)。

本书的著者有: 江波(前言, 第一章, 第二章, 第四章第一节, 第五章第一、二、三、四、五、六节, 第六章第一、二节, 第七章第一、二、四、五节, 第九章); 戚连忠(第三章第一、三节, 第四章第三、四节, 第七章第一节, 第八章); 袁位高(第三章第二、四节, 第五章第一、二节, 第六章第三、四、五节, 第七章第一节); 朱锦茹(第四章第二节, 第五章第一、七节, 第六章第二节, 第七章第二、三节); 许利群(第六章第四、五节); 吴发荣(第三章第二节, 第四章第四节, 第五章第一、二节, 第六章第一节); 申屠福军(第三章第四节, 第四章第四节, 第五章第一、三节)。全书由江波、戚连忠、朱锦茹、袁位高统稿完成。本书的作者紧密结合现代林业建设对森林多种功能效益的需求, 针对江河两岸滩地的特点, 在充分考虑当前经济发展前提下, 兼顾防风抗洪、固土护堤、净化大气和旅游景观效果, 研究多种效益有机结合为一体的多功能用材林生态系统及其综合栽培技术, 系统地开展了“滩地多功能优良树种引进与选择, 多功能理想林型及其经营技术, 森林多功能效益计量评价, 多功能用材林生态景观系统结构优化”等研究, 形成了多功能用材林效益一体化的“立地类型质量评价, 林型划分模式栽培, 定向培育经营管理, 生态功能计量与效益评价, 优化模式栽培, 滩地生态治理复合经营开发, 森林资源管理调控等”综合配套技术, 颇具“适地适林种, 树种乡土化、多样化, 经营集约化和可持续经营, 以及单项技术优化组合”等特点。它必将对滩地林业发展及沿江生态区建设提供先进的技术支撑, 对浙江省乃至全国江河滩地林业的持续发展具有重要的借鉴作用。但本专著其中涉及的一些问题有待进一步深入研究。研究和撰写过程中, 得到了有关领导和专家的大力支持, 同时参考了一部分同仁的文献, 谨此致谢。

由于时间仓促, 水平有限, 书中有错漏和不妥之处, 衷心希望同行专家和广大读者批评指正。

江 波

浙江省林业科学研究院

2001年3月30日

PREFACE

After World War II, along with contradictions of population, resources. Environment and social development, forestry management theories were advanced in the world and in China to deal with complicated situations, among which, important theories namely multi-function forest, division forestry and wood cultivation, new forestry, nature-closed forestry, ecological forestry, sustainable forestry, etc. Since the Conference of World Environment and Development in Rio de Janeiro, Brazil, in 1992, sustainable principle of "modern forestry" has been attached importance to Wide-range studies and discussions were made on principles, contents standard and demands of sustainable forestry, therefore, "Forestry Action of 21th Century Agenda in China" was proposed. In the condition evident trends of global integral economic development and affect global environment, modern forestry should meet the demands of ecological environment and other services for continuous development of human civilization.

In pace with population growth and improvement of industry and technology, an unprecedentedly scale and intensity influence and change environment, thus menacing sustain of global life support system. Economic development and coordination with ecological protection is the hard task for human beings. "Protection of environment is protection of human beings" becomes the common interest in the world. Since liberation, especially since reform and opening, Chinese forestry construction has advanced by leaps and bounds, but caused by poor foundation, knowledge limitations, pressure of population and social demands, some unwise decisions and deviations in implementation, we could not be lifted eat of poor resources and deteriorated environment, and face with great difficulties in some areas and fields.

At present, ecological environmental construction in China is in a grim situation caused by irrational cultivation in upper and middle reaches of the river and unchecked exploitation in lower reaches, thus deteriorating ecological environmental, occurring frequent natural calamities, sticking out contradictions between population growth and poor resources, environment capacity, which become obstacles for sustainable social economic development. Consequently, 10 forestry ecological projects were determined with focus on water and soil erosion, improving ecological environment, increasing forest resources. In November 1998, the state council issued "The National Programme for Ecological Environment Construction", which advanced a clear overall aim. Since 4 forestry ecological projects implemented from 1998 namely plain afforestation, protective coast-forest network, sand control project and protective forest around Taihu drainage area, forestry ecological environment in the province has improved to a certain

degree, but falls far short of the demands of national economy development and ecological environment improvement, such as intensified, water and soil erosion raised riverbed, deteriorated environment, decreased capacity for flood-resistant and rain storm-resistant, fragile ecological function, increased natural calamity occurrence and damage, thus causing enormous losses of agriculture and industry production, social and economic development. For example, the Qiantang River Valley, 47.2% of the total area of Zhejiang province, its annual silt erosion reaches 13 051.000t with 4.46 times year flood and water-logging, (3.3 times/year in the 1960s, 3.6 times/year in the 1970s, 5.9 times/year in 1980s) which had damages heavier and heavier. Successive years of drought happened, every 4 years had a valley drought, damaged area overpassed 250 km², Therefore, the most important and urgent target for sustainable and stab social development is to advance actively and efficiently ecological environment construction.

After realization of “Afforestating barren mountains in five years and making Zhejiang green in 10 years” by the end of twenty century, forestry tasks are faced with turning point. Plain afforestation, city and township afforestation, protective forest construction and modern countryside construction start upsurge, and comprehensive exploitation and utilization of forest functions are already listed in agenda. Human beings demand better existence environment and nature. Zhejiang province has criss-cross rivers, mainly 8 river system like Qiantang river, Oujiang river, etc, and the grand Canal with 243 000 km² alluvial bottom land and wetland in plain river network, where has transport facilities, very large population and is a good base for intensive management of industrial timber forest. What is more forests here should not only be an ideal place for tour. Rest and visit, meanwhile, but also have functions as wind-resistant, flood-resistant, water and soil conservation, stopping dune movement, reducing damage to farmland and buildings. Zhejiang province has rich rivers systems, rich bottom land, rich water and heat condition, relative developed economy, but serious flood and pollution.

Under the circumstances of high growth of economy and serious ecological environment, Zhejiang science and Technologies Department choused “Study on Integral Techniques of Multi-function Timber Forest in Fuchun River Beaches” as a key project in the “Ninth Five-year plan”; which has leading and practical significance. This project was a “comprehensive” and “creative” system engineering from the view of forestry, economic and landscape benefit on the basis of the characters and function demands by bottom land of Fuchun River beaches. Five years coordinated researches completed target studies and passed on December 26, 2000 the appraisal directed by academician Jiang Youxu and Professor WANG Renchao in Hangzhou, Zhejiang. The expert committee hold identical views that creative theory and technology, successful implementation in the region came up to advanced world standard in this field, The implementation of the project promoted stable economic development in Fuchun River area, accelerated comprehensive benefit of ecological, landscape and economic function, enhanced vainglorious title of “Two Rivers and One Lake”, promoted sustainable development of bottom land forestry in the province and even in China.

Based on this achievement, this book included results of other two projects completed in the eighth “Five-years plan”, Responsible and main participants of achievements above-mentioned are as follows:

1. Key science project of the ninth "Five-years plan" in Zhejiang: Study on integral techniques of Multi-function Timber Forest in Funchun River beaches (No 962103050)

Directed by: Jiang Bo, Yuan Weigao (Zhejiang Forestry Academy)

Main participants:

Qi Lianzhong, Zhu Jinru, Xu Liqun,

Zhong Zheke, Sun Minhua, Lu Gang

(Zhejiang Forestry Academy)

Wu Farong, Gu Bingyan, Sun Xuezhong,

Zhang Chengfa, Huang Chunhua

(Fuyang Forestry Bureau of Zhejiang)

Shentu Fujun, Cai Zhongmin, Zhang Junmin)

Fang Peiquan, Huang Kaizhe

(Tonglu Forestry Bureau of Zhejiang)

Shi Zhou (Agricultural Remote Sense and Techniques Institute, Zhejiang University)

2. Key science project of the eighth "Five-Years Plan" in Zhejiang: Study on oriented cultivation and utilization of short rotation industrial forest. (No. 914212)

Directed by: Jiang Bo , Yuan Weigao (Zhejiang Forestry Academy)

Main participants :

Sun Minhua, Qi Lianzhong, Zhu Guangquan (Zhejiang Forestry Academy)

Gu Bingyan, Ying Zhongquan, Xu Guomin, Wu Farong (Fuyang Forestry Bureau of Zhejiang)

Ren Detang, Zhu Baiyu, Luo Yafen (Shangyu Forestry Station of Zhejiang)

Zheng Yihuan, Huang Cailai (Cuangnan Forestry Bureau of Zhejiang)

Ding Qiusheng, Yang Guoqiang (Hangzhou Timber Mill of Zhejiang)

Tong Yegen Shentu Fujun (Tonglu Forestry Bureau of Zhejiang)

3. Key science project of zhejiang: Study on industrial technique of high quality and large D.B.H. poplar (No: 944077)

Directed by: Yuan Weigao, Jiang Bo (Zhejiang Forestry Academy)

Main participants:

Qi Lianzhong, Sun Minhua, Zhu Jinru, Zhong Zheke (Zhejiang Forestry Academy)

Xu Guomin, Wu Farong Gu Bingyan, Zhang Chengfa, Ying Zhongquan (Fuyang Forestry Bureau of Zhejiang)

Fang Peiquan, Shentu Fujun, Huang Kaizhe(Tonglu Forestry Bureau of Zhejiang)

Ye Genfa, Ren Detang (Shangyu Forestry Station of Zhejiang)

Authors of this book: Jiang Bo (preface, chapter one, chapter two, section one of chapter four, section one, two, three, four, five, six of chapter five, section one and two of chapter six, section one, two, four,

five of chapter seven, chapter nine), Qi Lianzhong (section one and three of chapter three, section three and four of chapter four, section one of chapter seven, chapter eight), Yuan Weigao (section two and four of chapter three, section one and two of chapter five, section three, four and five and chapter six, section one of chapter seven), Zhu Jinru (section two of chapter four, section one and seven of chapter five, section two of chapter six, section two and three of chapter seven), Xu Liqun (section four and five of chapter six), Wu Farong (section two of chapter three, section four of chapter four, section one and two of chapter five, section one of chapter six), Shentu Fujun (section four of chapter three, section four of chapter four, section one and three of chapter five). The whole book was unified by Jiang Bo, Qi Lianzhong, Zhu Jinru, Yuan Weigao. In the light of forest functions demanded by modern forestry construction, of bottom land characters in river beaches, the authors carried out studies on ecological system of integral Multi-function Timber Forest and comprehensive cultivation techniques, considering current economic development and integrated functions like wind protective, flood-resistant, soil-fixation and bank protective forest, hurricane of the air, landscape. Studies “on introduction and selection of fine-tree species for multi-functions forest in bottom land, on ideal forest type and management technique, on evaluation of multi-functions benefit of forest, on better structure of landscape effect of Multi-function Timber Forest ”, forest type classification, mode cultivation, oriented cultivation management, estimation of ecological functions and benefit evaluation, optimization mode cultivation, multiple management of bottom land for ecological control, forest resources control ”, etc. With characters of suitable tree species, like native species and diversity species, intensive and sustainable management, integrated optimization technique. These achievements provide advanced technologies for bottom land forestry development and ecological area construction in river beaches, and experiences for sustainable development of bottom land forestry in Zhejiang, even in China. But same problems heed to be further studied. Grateful acknowledgment is due responsible directors and experts for their support, and some colleagues for references.

Because of time and knowledge limitations, mistakes may have been incurred. We ask readers kindly indicate any deficiencies in the text.

Jiang Bo

Zhejiang Forestry Academy

March 30, 2001

目 录

序

前言

第一章 国内外研究概况及发展趋势	1
第一节 多功能用材林的概念及其意义	1
第二节 国内外研究进展	2
第三节 富春江两岸多功能用材林研究成果	8
第二章 自然经济条件与研究方法	11
第一节 自然经济条件	11
第二节 暴雨洪水特性及水污染现状	13
第三节 研究方法与技术路线	18
第三章 立地分类与数量化评价	20
第一节 滩涂地立地区分	20
第二节 湿地土壤的基本特征	23
第三节 滩涂地杨树立地质量数量化评价	26
第四节 土壤养分与林木生长	32
第四章 多功能用材树种的引进与选择	36
第一节 荒滩地造林先锋树种	36
第二节 江河滩地多功能用材树种的筛选	38
第三节 滩地多功能用材林体系主要林种树种功能优化	40
第四节 杨树新无性系的引进与选择	46
第五章 多功能理想林型及经营技术	54
第一节 优质胶合板材定向培育	54
第二节 短轮伐期纸浆林定向培育	63
第三节 滩地复层混交群落类型及其生长效益	69
第四节 滩地林农复合经营模式	73

第五节 轮伐期的确定	77
第六节 生态约束下的采伐更新	89
第七节 病虫害防控	94
第六章 滩地森林多种功能的计量与评价	96
第一节 森林资源游憩效益核算	96
第二节 森林风景功能的计量评价	100
第三节 树木根系固土功能	106
第四节 多功能用材林的滞尘效应	112
第五节 多功能用材林对大气的净化作用	114
第七章 多功能用材林生态景观系统结构优化	121
第一节 杨树人工林结构栽培优化模式	121
第二节 景观分类及系统多样性	125
第三节 景观格局分析	129
第四节 植被景观斑块分布特征与生态潜力评价	134
第五节 护岸护堤林林带宽度及土地潜力	140
第八章 多功能用材林资源管理信息系统	144
第一节 多功能用材林资源管理信息系统的研制	144
第二节 GIS 支持下的江河滩地杨树立地质量评价	147
第九章 沿江生态区建设	151
参考文献	153

CONTENT

Introduction

Preface

Chapter One	survey and trends of studies at home and abroad	1
Section One	Concept and significance of Multi-function Timber Forest	1
Section Two	Advance of studies at home and abroad	2
Section Three	Study result on Multi-function Timber Forest in Fuchun River banks	9
Chapter Two	Natural economic conditions and study methods	13
Section One	Natural economic conditions	13
Section Two	Main study content	15
Section Three	Study methods and technique	21
Chapter Three	Site classification and quantitative evaluation	23
Section One	Site division of bottom land	23
Section Two	Basic characters of slash soil	26
Section Three	Quantitative evaluation of bottom land site quality	30
Section Four	Soil nutrient and forest growth	37
Chapter Four	Tree species introduction and selection of multi-functions forest	41
Section One	Pioneer for afforestation in waste bottom land	41
Section Two	Selection of tree species for multi-function forest in bottom land	43
Section Three	Function optimization of main forest and tree species for multi-functions forest in bottom land	46
Section Four	Introduction and selection of new poplar clones	52
Chapter Five	Ideal multi-function forest type and management technique	61
Section One	Oriented cultivation of forest for high quality plywood	61
Section Two	Oriented cultivation of short-rotation pulpwood	71
Section Three	Multi-lagers mixed forest type and growth benefit	78
Section Four	Ecological action and management mode for bottom land	83
Section Five	Detemination of short rotation	88
Section Six	Felling regeneration under ecological limit	101