

国家十五规划重点图书

# 喀斯特森林生态研究

(III)

KASITESENLIN  
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朱守谦 主编

# 喀斯特森林生态研究(Ⅲ)

## ECOLOGICAL RESEARCH ON KARST FOREST(Ⅲ)

朱守谦 主编

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# 前 言

喀斯特森林生态研究的目的是揭示分布、类型、结构、功能、生产力、动态等生态学规律,利用这些规律为喀斯特区生态环境建设、植被恢复、生物生产力提高、森林资源可持续利用、自然保护等提供服务。

鉴于我国南方喀斯特区生境严酷,人地矛盾尖锐,生态环境脆弱性加深,经济发展滞后,人民生活贫困,西部大开发,生态环境建设是基础和切入点,喀斯特区面临挑战和机遇,喀斯特生态研究,除生态学研究共同意义外,更迫切地、突出地要求为生态环境建设和农民脱贫致富服务。

1997年《喀斯特森林生态研究Ⅱ》出版后,我们又相继完成了“乌江流域岩溶石质山地人工造林与植被恢复”、“退化喀斯特森林自然恢复的生态学过程”、“岩溶半石山地次生林形成的生态学过程”等国家科技攻关、国家自然科学基金和贵州省自然科学基金课题。并开始执行贵州省省长基金项目“退化喀斯特森林恢复与重建技术研究”、贵州省自然科学基金课题“喀斯特森林树种无性系种群生态研究”、“喀斯特地区石漠化的形成过程和机理”和“十五”国家科技攻关计划重大项目“中国西部重点脆弱生态区综合治理技术与示范”中“喀斯特(岩溶)高原生态综合治理技术与示范”等课题的研究。在已完成的课题研究中,除提出了喀斯特区人工造林、植被自然恢复的配套技术,并已在生产实践中推广应用外,对生态学的前沿及热点,如恢复生态、无性系种群生态、土壤种子库、化感作用等进行了探索和研究。特别是分别在原生性喀斯特森林区(茂兰)和次生林区(黔中)对退化喀斯特森林自然恢复的生态学过程进行了较全面的研究,提出了一些新观点、新方法,如自然恢复过程是各适应等级种组的有序更替的观点,恢复对策变化是由早期更新对策向中期结构调整对策至后期结构功能协调完善对策更替的观点和更新对策以幼苗库为主,早期阶段对幼苗库的贡献以无性繁殖苗为主,后期以有性繁殖苗为主等观点,自然恢复演替系列构建方法,自然恢复潜力度、程度、速度的评价方法等,无疑对丰富喀斯特森林生态学内容、促进学科发展是有积极意义的。

本书主要搜集了最近五年已完成的课题所撰写的研究论文和报告,其中少量在学术刊物上已发表或在各类学术研讨会上交流过,也包括少量自选课题的论文。主要内容有:喀斯特森林生态研究展望、喀斯特生态环境研究、种群和群落生态研究、恢复生态研究、土壤种子库和化感作用研究及应用生态和实用技术研究等方面。所有研究都是前述课题经费资助的。论文作者大都是上述课题的研究人员。

十多年来,以研究课题为纽带,形成了一个相对稳定的研究集体,其成员大都是我的学生,是全体成员的通力合作、共同努力、艰苦奋斗才完成了研究。所以,本书是集体劳动的成果。

在完成研究课题的同时,一批博士、硕士高学历人才脱颖而出,成为喀斯特生态研究的新生力量和主力军,他们已具有承担大型综合研究课题的能力,取得了完成研究任务和人才培养的双丰收。我作为这个研究集体的学术带头人,和大家一样为此而感到兴奋和喜悦。

我更高兴地看到,贵州大学喀斯特生态环境研究中心的成立,是新形势下社会经济发展和生态环境建设需要的产物。希望以其为核心,吸引更多的学科、更多的研究人员进行多学科、跨学科的综合研究;掌握学科发展动态、趋势,瞄准学科前沿,结合社会经济发展需求和自身条件,在已有研究基础上制订规划,开展更全面、更系统的研究;坚持正确的学术方向,保持优良的学术传统和作风,进行更多的、更广泛的国内、国际学术交流;与各级政府行政管理部门和生产单位保持更密切的联系,促进研究成果的转化,发挥科学技术的第一生产力作用。无疑这对提高科学研究水平,促进喀斯特区的可持续发展是非常有益的。

我们的研究一直受到贵州省林业厅、茂兰国家级自然保护区管理局、贵州大学等单位 and 领导的支持。本书的出版得到贵州科技出版社丁聪社长的关怀和帮助,得到贵州省新闻出版局出版基金的资助。张锦林厅长、张礼安副厅长、官国倍总工程师都给予了热情的关怀和帮助。贵州大学谢双喜教授对全部英文摘要和译稿进行了校核,在此一并致谢。

本着学术争鸣和文责自负的精神,欢迎和恳请同行学者和广大读者提出批评建议。

贵州大学林学院

朱守谦

2002年7月

# Preface

The objects of Karst forest ecological study are to uncover the ecological laws about distribution, type, structure, function, productivity and dynamics etc, and use these laws to serve the ecological environment construction, vegetation restoration, bio-productivity increase, forest resource sustainable utilization, and nature conservation.

For the problems of severe habitat, intensive contradictory between human and land, deeply fragile ecological environment, delayed economical development, poor living condition in south China Karst regions, the West exploitation and ecological environment construction are basis and entering point, and then Karst regions face the challenge and opportunity. Karst ecological study, besides the common meaning of ecology study, its important and urgent demand is to serve the ecological environment construction and help the poor farmer to be rich.

After *the ecological research on Karst forest* II was published in 1997, we have successively finished a series of State scientific and research program, State and Provincial nature science funds such as the afforestation and vegetation restoration to Karst stony hills in Wujiang river, the ecological process of nature restoration of degraded Karst forest and the ecological process of secondary forest formation in Karst stony hills. Meanwhile we begin to implement the fund program of governor of Guizhou Province—the study of forest restoration and reconstruction to degraded Karst forest, Guizhou provincial nature science fund program—the ecological study of clonal populations of karst forest species and the process and mechanism of rocky desertification formation in Karst region, and the key State scientific and research program—the technique and demonstration of comprehensive ecological treatment to Karst plateau region. Among these finished programs, besides the systematic technique of forestation and vegetation restoration that was used in practice, some hot-points of ecology such as restoration ecology, clonal population ecology, seed bank in soil and allelopathy has been studied. Especially the ecological process of both primary Karst forest and secondary degraded forest nature restoration has been studied, and some new views and methods were advanced, such as the view that nature restoration process was an orderly succession of each adaptive species group, the view that restoration strategy change was early regeneration to structure regulation in middle period and finally to structure and function coordination strategy in late period, and the view that regeneration strategy mainly happened in seedling bank mainly consisting of clonal propagation at early stage and sexual propagation at late stage, the construction method of nature succession sere and the evaluation method of nature restoration potential degree and speed etc. All these views and methods are undoubted to have a positive sig-

nificance on enriching the contents of ecology and promoting the development of ecology.

This book mainly collected the research papers and reports from the above programs in recent 5 years, among them a few papers were published in other journals or exchanged in symposiums, also including several papers from the self selected program. The main contents of this book are as following: prospect on Karst forest ecological study, research on Karst ecological environment, research on population and community ecology, research on restoration ecology, research on soil seed bank and allelopathy, applied ecology and practical technique. The programs mentioned above subsidized all studies and most authors were members of the programs.

From the 10 years, a stable research group has been formed through the programs and most members are my students. It is the common cooperation and hard work from the all members that the research could be finished; therefore, this book is a result of common work. During the period of implementing the programs, a body of doctors and masters showed their talents and became the main force in Karst ecology study, and they possessed the ability to take the big and comprehensive research. So these programs have the harvest of both tasks finished and talents trained. As an academic leader of this research group, I am very happy and enjoys with our colleagues.

I am very happy to see that the research center of Karst ecological environment of Guizhou University is now being established; it is a result of social economic development and ecological environment construction demands. I wish that the center attracted more talents from the other disciplines to carry out a multi-disciplinary research, by grasping the science development trend and dynamics, combining the demands of social and economic development with the center conditions, and working out the plan to carry out the overall and systematic research based on the former studies; holding the correct academic direction and keeping the good academic tradition and style to make more domestic and international exchange; contacting closely with the administration and productive units to promote the transfer of research results and to play the role of scientific technique as the first productivity. No doubt, all these are very profitable to improve the scientific research level and promote the sustainable development of Karst region.

Guizhou Provincial Forestry Department, Maolan National Nature Reserve and Guizhou University and their directors were continuously supporting our studies. For publishing the book, Mrs. Ding Cong, the director of Guizhou Publishing House of Science and Technique, Mr. Zhang Jinlin, Mr. Zhang Lian and Mr. Guan Guobei from Guizhou Provincial Forestry Department gave the care and help, and this book were also subsidized by the publishing funds from Press and Publication Administration of Guizhou province. Mr. Xie Shuangxi proofread and corrected the English abstracts. So I would like to thanks all the persons who have helped me with the project.

Zhu Shouqian  
Professor of Forestry Faculty of Guizhou University  
July 2002.

## 内 容 提 要

本书是喀斯特森林生态研究的第三本论文集。主要搜集了最近五年完成的国家科技攻关、国家自然科学基金和贵州省自然科学基金等课题的有关研究论文和报告。主要内容有：喀斯特森林生态研究展望，喀斯特生态环境，种群和群落生态，恢复生态，土壤种子库，化感作用研究及应用生态和实用技术研究等。全书内容丰富，理论联系实际，适合从事林学、生态学、喀斯特学、自然保护等领域的有关科研人员、大专院校师生、政府管理人员及企事业单位相关人员阅读参考。



# 目 录

## 总 论

喀斯特森林生态研究框架 .....	朱守谦	喻理飞(3)
贵州喀斯特区植被恢复的理论和实践 .....	朱守谦 祝小科	喻理飞(11)

## 生 境 特 征

乌江流域岩溶山地地质地貌及土壤特征研究 .....	高华端	朱守谦(20)
乌江流域喀斯特石质山地水分特征研究 .....	朱守谦 韦小丽 祝小科 何纪星	安黔宁(30)
茂兰喀斯特森林小生境特征研究 .....	朱守谦 何纪星 魏鲁明 张从贵	陈正仁(38)
乌江流域岩溶山地立地因子分析 .....	高华端	朱守谦(49)

## 种群生态和群落生态

月月青在喀斯特森林中的作用和地位 .....	赵云龙 朱守谦 祝小科	(62)
月月青生物量构成研究 .....	朱守谦 祝小科 司 健	赵云龙(74)
月月青种群生态学研究——萌枝种群的形成和扩展 .....	赵云龙 朱守谦	祝小科(80)
月月青种群生态学研究——种群的数量特征、年龄结构和分布格局 .....	赵云龙	朱守谦(92)
喀斯特石质山地月月青无性生殖生态研究——根系形态、生物量分配特征 .....	祝小科	朱守谦(105)
木兰科树种光合特性初步研究 .....	何纪星 张 萍 朱守谦	赵执夫(109)
贵州喀斯特台原亮叶水青冈林种——多度结构研究 .....	喻理飞 朱守谦	魏鲁明(116)
贵州柏箐喀斯特台原常绿落叶阔叶林物种多样性研究 .....	喻理飞	(124)
贵州柏箐喀斯特台原区珙桐群落特征研究 .....	喻理飞	(129)
茂兰喀斯特森林水文效应初步研究 .....	冉景丞 何师意 曹建华 熊志斌	陈会明(135)
亚热带喀斯特森林土壤 CO <sub>2</sub> 浓度与排放量动态初步研究		

····· 冉景丞 何师意 曹建华 陈会明 熊志斌 韦玉菊 谭成江 余登利(141)				
喀斯特森林树种营养成分分析初报 ·····	朱 军(149)			
喀斯特森林常见树种热值测定分析初报 ·····	朱守谦 何纪星 陈 普(155)			
荔波县白颈长尾雉种群数量及生境初步研究				
····· 熊志斌 李筑眉 陈正仁 冉景丞 梁伟 谭成江(159)				
贵州茂兰国家级自然保护区蜘蛛名录 ·····	陈会明(164)			

## 恢 复 生 态

退化喀斯特森林自然恢复的过程和格局 ·····	朱守谦 陈正仁 魏鲁明(172)			
退化喀斯特群落自然恢复过程研究——自然恢复演替系列				
····· 喻理飞 朱守谦 魏鲁明 陈正仁 熊志斌(180)				
退化喀斯特森林适应等级种组划分研究				
····· 喻理飞 朱守谦 叶镜中 魏鲁明 陈正仁(189)				
退化喀斯特森林自然恢复过程中群落动态研究				
····· 喻理飞 朱守谦 叶镜中 魏鲁明 陈正仁(197)				
人为干扰与喀斯特森林群落退化及评价研究				
····· 喻理飞 朱守谦 叶镜中 魏鲁明 陈正仁(205)				
喀斯特森林不同种组的耐旱适应性 ·····	喻理飞 朱守谦 叶镜中(212)			
退化喀斯特森林自然恢复评价研究 ·····				
····· 喻理飞 朱守谦 叶镜中 魏鲁明 陈正仁(218)				
黔中退化喀斯特群落自然恢复生态学过程研究——退化群落的数量分类				
····· 李援越 朱守谦 祝小科(227)				
黔中退化喀斯特群落自然恢复生态学过程研究——自然恢复演替系列构建				
····· 李援越 祝小科 朱守谦(233)				
黔中退化喀斯特群落自然恢复生态学过程研究——群落组成、结构、生物量动态				
····· 李援越 祝小科 朱守谦(238)				
黔中退化喀斯特群落自然恢复生态学过程研究——环境动态特征				
····· 李援越 祝小科 朱守谦(248)				

## 土 壤 种 子 库 和 化 感 作 用

贵州修文喀斯特森林土壤种子库研究 ·····	龙翠玲 朱守谦 祝小科(254)		
贵州茂兰喀斯特森林土壤种子库研究 ·····	龙翠玲 朱守谦 喻理飞(265)		
喀斯特森林土壤种子库结构的数量分析 ·····	龙翠玲 朱守谦(276)		
喀斯特森林种子雨的时间变化动态 ·····	龙翠玲 朱守谦 祝小科(285)		
喀斯特森林土壤种子库种子命运初探 ·····	龙翠玲 朱守谦(291)		

贵州悬竹化感作用初步研究 .....	何纪星	朱守谦(295)
月月青化感作用初步研究 .....	何纪星	朱守谦(300)
喀斯特森林树种化感作用实验研究结果统计分析 .....	张 萍 何纪星	朱守谦(305)
喀斯特森林树种化感作用研究——供体化感作用和受体响应的多变性 .....	张 萍 何纪星	朱守谦(312)
喀斯特森林树种化感作用研究——月月青、白茅叶水浸液对女贞、喜树幼苗生长的影响 .....	张 萍 何纪星	朱守谦(322)

### 应用生态和实用技术

乌江流域喀斯特区造林困难程度评价及分区 .....	朱守谦 何纪星	祝小科(328)
乌江流域岩溶山地造林困难地段立地分类与评价研究 .....	高华端	朱守谦(337)
乌江流域喀斯特石质山地人工造林技术试验研究 .....	祝小科 朱守谦 刘济明 喻理飞 廖月清 安黔宁	范玉蓉(351)
利用自然力营造针阔混交林的初步研究 .....	祝小科	朱守谦(361)
乌江流域喀斯特石质山地人工造林配套技术 .....	祝小科	朱守谦(367)
乌江流域喀斯特石质山地植被自然恢复配套技术 .....	祝小科 朱守谦	刘济明(374)
瑶族传统文化与生物多样性保护 .....	陈正仁	余登利(384)
茂兰布依族传统食用植物的民族植物学研究 .....	陈正仁 蒋忠诚 余登利 陈会明 玉 屏	(389)
茂兰保护区喀斯特森林生态旅游的探索与实践 .....	魏鲁明	(396)
参考文献 .....		(403)

## CONTENTS

- The research framework of Karst forest ecology ..... Zhu Shouqian and Yu Lifei(10)
- The theory and practice of vegetational restoration in Karst region of Guizhou  
..... Zhu Shouqian, Zhu Xiaoke and Yu Lifei(17)

### Habitat Characters

- Study on the geologic, geomorphic and soil's characteristics of Karst mountains in  
Wujiang River Watershed ..... Gao Huaduan and Zhu Shouqian(29)
- A study on water characters to Karst rocky hills in Wujiang River Watershed  
..... Zhu Shouqian, Wei Xiaoli, Zhu Xiaoke, He Jixing and An Qiannin(37)
- A study on microhabitats to Karst forest in Maolan  
..... Zhu Shouqian, He Jixing, Wei Luming, Zhang Conggui and Chen Zhegren(48)
- Analysis of Karst mountain site factors in Wujiang River Watershed  
..... Gao Huaduan and Zhu Shouqian(59)

### Population Ecology and Community Ecology

- The role and position of *Itea ilicifolia* in Karst forests  
..... Zhao Yunlong, Zhu Shouqian and Zhu Xiaoke(73)
- A study of biomass construction of *Itea ilicifolia*  
..... Zhu Shouqian, Zhu Xiaoke, Si Jian and Zhao Yunlong(79)
- Studies on the population ecology of *Itea ilicifolia*—Forming and extending process of  
spouting population ..... Zhao Yunlong, Zhu Shouqian and Zhu Xiaoke(91)
- Studies on the population ecology of *Itea ilicifolia*—The quantitative characteristics,  
the age structure and the distribution pattern of population  
..... Zhao Yunlong and Zhu Shouqian(104)
- Study on asexual reproduction ecology of *Itea ilicifolia* in Karst stone mountain  
—Root morphology and biomass allocation ..... Zhu Xiaoke and Zhu Shouqian(108)
- A preliminary study on photosynthetic characters of magnolia species  
..... He Jixing, Zhang Ping, Zhu Shouqian and Zhao Zhifu(115)
- A preliminary study on the species-abundance structure of *Fagus lucida* forest in

Karst platform area in Guizhou province .....	Yu Lifei, Zhu Shouqian and Wei Luming(123)
Study on diversity of evergreen and deciduous broadleaf forest in Baiqing Karst platform area in Guizhou province .....	Yu lifei (128)
Study on characteristic <i>Davidia involucrata</i> community in Baiqing Karst platform area in Guizhou province .....	Yu Lifei(134)
Study on hydrological benefit of Karst forest in Maolan .....	Ran Jingcheng, He Shiyi, Cao Jianhua, Xiong Zhibin and Chen Huiming(140)
Preliminary study on the dynamics of CO <sub>2</sub> consistence and transfer in subtropical Karst forest soil .....	Ran Jingchen, He Shiyi, Cao Jianhua, Chen Huiming , Xiong Zhibing , Wei Yuju , Tan Chengjiang and Yu Denli (148)
A preliminary report on nutrient of Karst forest tree species .....	Zhu Ju(154)
A preliminary report on calorific values measurement of common species under Karst forest .....	Zhu Shouqian, He Jixing and Chen Pu(158)
Investigation of <i>Elliot's pheasant</i> population and its habitat in Libo.....	Xiong Zhibin, Li Zhumei, Cheng Zhengren, Ran Jingcheng, Liang Wei and Tan Chengjiang (163)
A list of the spiders of Maolan Nature Reserve .....	Chen Huiming(169)

## Restoration Ecology

The process and pattern of natural restoration in degraded Karst forest .....	Zhu Shouqian, Chen Zhengren and Wei Luming(179)
Study on the natural restoration process of degraded Karst communities—Successional sere. .....	Yu Lifei, Zhu Shouqian, Wei Luming, Chen Zhengren and Xiong Zhibin(187)
Study on the division of adapt grade species groups for degraded Karst forest .....	Yu Lifei, Zhu Shouqian, Ye Jingzhong, Wei Luming, Chen Zhengren(196)
Dynamics of a degraded Karst forest in the process of natural restoration .....	Yu Lifei, Zhu Shouqian, Ye Jingzhong, Wei Luming and Chen Zhengren(203)
Study on evaluation and degrade of Karst forest community with human disturbance .....	Yu Lifei, Zhu Shouqian, Ye Jingzhong, Wei Luming and Chen Zhengren(211)
The adaptability of drought-tolerance for different species group in Karst forest .....	Yu Lifei, Zhu Shouqian and Ye Jingzhong(217)
A study on evaluation of natural restoration for degraded Karst forest .....	Yu Lifei, Zhu Shouqian, Ye Jingzhong, Wei Luming and Chen Zhengren(226)
A study on ecological process of degraded Karst community natural restoration in central Guizhou—Number classification of degraded Karst forests .....	Li Yuanyue, Zhu Shouqian and Zhu Xiaoke(232)

- A study on ecological process of degraded Karst community natural restoration in central Guizhou—Construction of natural restoration successional sere  
 ..... Li Yuanyue, Zhu Xiaoke and Zhu Shouqian(237)
- A study on ecological process of degraded Karst community natural restoration in central Guizhou—The dynamics on compose, structure and biomass of community  
 ..... Li Yuanyue, Zhu Xiaoke and Zhu Shouqian(247)
- A study on ecological process of degraded Karst community natural restoration in central Guizhou— The characters of environment change.  
 ..... Li Yuanyue, Zhu Xiaoke and Zhu Shouqian(251)

### **Soil Seed Bank and Allelopathy**

- A study of soil seed bank in the Xiuwen Karst forest  
 ..... Long Cuiling, Zhu Shouqian and Zhu Xiaoke(264)
- A study of soil seed bank in the Maolan Karst forest  
 ..... Long Cuiling, Zhu Shouqian and Yu lifei(275)
- The quantity analysis for soil seed bank of Karst forest  
 ..... Long Cuiling and Zhu Shouqian(284)
- The temporal variation of seed rain in Karst forest  
 ..... Long Cuiling, Zhu Shouqian and Zhu Xiaoke(290)
- A preliminary discussion on the fate of seeds in soil seed bank of Karst forest  
 ..... Long Cuiling and Zhu Shouqian(294)
- A preliminary study on allelopathy of *Ampelocalamus caleareus* .....  
 ..... He Jixing and Zhu Shouqian(299)
- A preliminary study on allelopathy of *Itea ilicifolia* .....  
 ..... He Jixing and Zhu Shouqian(304)
- The statistics of allelopathy experiments of Karst forest species  
 ..... Zhang Ping, He Jixing and Zhu Shouqian(311)
- The study on allelopathy of Karst forest species—The variety of donor allelopathy and receptor responsiveness ..... Zhang Ping, He Jixing and Zhu Shouqian(321)
- The study of allelopathy of karst forest species—The effect of water extracts from *Itea ilicifolia* and *Imperata cylindrical* on the growth of *Ligustrum lucidum* and *Camptotheca acuminata* ..... Zhang Ping, He Jixing and Zhu Shouqian(326)

### **Applied Ecology and Practical Techniques**

- An evaluation and dividing area on degree of planting difficulty in Karst region of Wujiang River Watershed ..... Zhu Shouqian, He Jixing and Zhu Xiaoke(336)

Study on site classification and evaluation of difficult regions for forestation on the Karst mountains of Wujiang River Watershed .....	Gao Huaduan and Zhu Shouqian(350)
The experiment of afforestation in Karst rocky hills in Wujiang River Watershed.....	Zhu Xiaoke, Zhu Shouqian, Liu Jiming, Yu Lifei, Liao Yueqing, An Qianning and Fan Yurong(360)
A preliminary study of planting broadleaf and conifer mixed forest by using natural force .....	Zhu Xiaoke and Zhu Shouqian(366)
A systematic technique of afforestation in Karst rocky hills in Wujiang River Watershed .....	Zhu Xiaoke and Zhu Shouqian(373)
A systematic technique of vegetation natural restoration in Karst rocky hills in Wujiang River Watershed .....	Zhu Xiaoke, Zhu Shouqian and Liu Jiming(383)
Study on Yao minority traditional culture and bio-diversity .....	Chen Zhengren and Yu Dengli(388)
Study on national botany of traditional edible plants for Buyi minority in Maolan .....	Chen Zhengren, Jiang Zhongcheng, Yu Dengli, Chen Huiming and Yu Ping(395)
The probe and practice on ecological tourism of Karst forest in Maolan Nature Reserve .....	Wei Luning(402)
<b>References</b> .....	(411)

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# 总 论

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