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江汉湖群演化与湖区

可持续发展

研究

邓宏兵 / 著



经济科学出版社

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本书系国家重点基础研究计划（973计划）项目“长江流域水沙产输及其与环境变化耦合机理（2003CB415201）”、国家自然科学基金项目“洞庭湖洲滩演化的量化研究及湖泊演变趋势分析（40271119）”、湖北省人文社科重点研究基地“中国地质大学（武汉）资源环境经济研究中心”2004年开放基金项目“湖北省湖泊资源环境变迁与湖区经济可持续发展研究”的成果之一。中国科学院测量与地球物理研究所杜耘、薛怀平、魏显虎参加了部分研究工作。

序

20 世纪 60 年代以来,人口、资源、环境、发展之间的矛盾日益尖锐,引起人类对自身行为的反思和对未来发展的担忧。1962 年,《寂静的春天》的出版引发了人类对自身传统行为和观念的反思。1972 年,《增长的极限》的出版引起人类再一次对未来社会发展的担忧,也为可持续发展思想的产生提供了土壤。1972 年,《人类环境宣言》的发表对推动人类关注环境、实施可持续发展战略发挥了巨大作用。1987 年,《我们共同的未来》提出了“可持续发展”的思想。1992 年,联合国环境与发展大会通过了《里约环境与发展宣言》和《21 世纪议程》两个纲领性文件。《里约环境与发展宣言》是开展全球环境与发展领域合作的框架性文件,《21 世纪议程》是开展全球范围内可持续发展的行动计划。此后,可持续发展成为世界各国普遍关注的问题。

环境演化与区域可持续发展是相互交织在一起的两种动态过程。环境演化对区域社会经济发展会产生深刻而广泛的影响,进而影响到区域的可持续发展进程。人类活动是环境演化与区域可持续发展相互作用的纽带和中间环节。环境演化变迁对区域可持续发展的作用和影响是通过人类活动表现出来的,反之亦然。建立以环境演化为基础的区域可持续发展模式是区域发展的重要内容,从两个过程的内在联系中找到协调的突破口、建立相应的协调机制是该领域今后研究的重点方向之一。

以揭示区域演化变迁——区域资源环境——区域发展互动机理

为内在逻辑线索，以考察历史时期区域环境变迁和演化的轨迹为切入点，以探寻区域可持续发展的一般规律为目标，邓宏兵博士以江汉平原湖区为研究区域，撰写了博士论文《江汉湖群演化与湖区可持续发展研究》。湖（泊）群地区是人类开发和生息的重要区域，是孕育人类古代文明的组成部分之一。同时，又是生态环境变化复杂、对全球变化响应敏感的脆弱地区。江汉平原是我国重要的粮食生产基地和经济发达地区，也是我国生态环境的脆弱地带，湖泊的演化变迁和湖区的合理开发利用是该区可持续发展的重要影响因素。邓宏兵同志的博士论文研究了江汉湖群的历史演化和近代变迁，揭示了江汉湖群演化过程和规律，剖析了影响江汉湖群演化的因素，探讨了湖群演化与湖区可持续发展的内在关联，提出了湖区可持续发展的基本对策，是一部系统研究江汉湖群演变与可持续发展的著作，不乏独到的见解和思考，对丰富可持续发展理论、指导区域发展实践都具有重要参考价值。时值出版之际，为之作序以饯读者，希望有更多的研究者关注这一领域，取得更多的研究成果。

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摘 要

区域可持续发展强调人口、资源、环境的协调以获取区域持久的、稳定的发展能力，区域可持续发展的关键是区域经济的可持续发展，环境生态的可持续性区域可持续发展的根本保证。考察历史时期区域环境变迁和演化的轨迹、揭示区域不可可持续发展的原因、探寻区域可持续发展的一般规律意义重大。湖（泊）群与人类文明起源、社会经济的发展关系密切，探讨湖（泊）群地区发展的基本理论、通过湖（泊）群地区演化过程分析找出规律、提出湖（泊）群地区可持续发展的对策具有重要的理论和现实意义，有助于丰富湖（泊）群地区研究的内涵和可持续发展的理论范畴、指导湖（泊）群地区的合理开发，从更大范围上促进区域的全面发展。江汉湖群位于湖北省境内，是整个长江中下游淡水湖泊的重要组成部分。在地质历史时期，江汉湖群经过了复杂的演化过程；在近代，江汉湖群演化又深深打上了人类的烙印。江汉湖群所在区——江汉平原是我国重要的粮食生产基地和经济发达地区，在我国空间经济布局上有重要地位。同时该地区又是我国典型的生态环境脆弱地区。研究江汉湖群的历史演化和近代变迁，揭示江汉湖群演化过程和规律，剖析影响江汉湖群演化的因素与机制，探讨湖群演化与湖区可持续发展的内在关联，有助于把握湖群演化的趋势、恢复和重建良好的生态环境，使江汉湖群走向可持续发展的道路。

全书共分五章，主要内容如下：

第一章为绪论。阐述了研究的意义和研究区范围、研究目标、研究框架与技术线路、研究内容等问题。文章指出江汉湖群演化与湖区可持续发展研究可以丰富区域可持续发展的理论内涵,指导江汉湖区的发展,并为其他地区发展提供参考。运用 RS/GIS 手段,结合相关研究成果,准确界定了江汉湖群区的范围。研究目标是探讨湖(泊)群地区可持续发展的基本理论,通过湖(泊)群地区演化过程分析找出规律,提出湖(泊)群地区资源利用与可持续发展的对策,丰富湖(泊)群地区可持续发展的理论范畴,为湖(泊)群地区的合理开发提供参考。研究框架与技术线路是,在环境变迁与可持续发展的基本理论指导下,探讨江汉湖群演化的过程与规律,科学评价江汉湖群区的资源,分析江汉湖群区面临的主要生态环境问题,探讨江汉湖区生态环境优化的对策,研究江汉湖区可持续发展的现实途径和基本方略。研究的主要内容包括理论综述与研究进展,江汉湖群演化过程和规律,江汉湖区资源环境与可持续发展,典型地区案例分析。

第二章为理论综述与研究进展。首先阐述了环境变迁与区域可持续发展研究的历史背景和主要成果,揭示了两者的相互关系。然后探讨了湖群环境变迁与湖区可持续发展的基本理论与研究进展,考察了江汉湖群演化和湖区可持续发展研究的现状与问题。文章认为环境变迁与区域可持续发展研究是国内外普遍关心的领域,指出环境变迁过程和规律的研究及区域可持续发展的内涵认识、区域可持续发展理论体系的构建和应用研究是该领域的重点问题。环境变迁与区域可持续发展关系极为密切,不能割裂两者之间的联系。环境变迁与区域可持续发展是相互交织在一起的两种动态过程,人类活动是环境变迁与区域可持续发展相互作用的纽带和中间环节,优化调控环境变迁和区域可持续发展的关系是核心。湖(泊)群环境变迁与湖区可持续发展研究是环境变迁与区域可持续发展研究的重要组成部分,国内外对此十分重视。江汉湖群区研究的主要成果集中在以下方面:对江汉湖群和

湖泊的综合研究、演化研究、对湖区环境地质与化学特征方面的研究、对湖群和湖泊地区开发与可持续发展方面的研究以及相关问题的研究。总的来讲,江汉湖群和湖泊地区研究成果众多,但多从某一侧面进行研究,把湖群和湖泊地区作为一个完整的系统来研究是比较少的。

第三章为江汉湖群演化过程和规律。在探讨江汉湖群演化的地质背景与沉积证据的基础上,揭示了地质构造运动及地貌沉积与湖泊发育的关系,着重剖析了全新世江汉湖群的演化过程和规律以及围垦情况,分析了江汉湖群演化的原因与成因类型。文章认为地质基础及构造运动提供了江汉湖群发育的先决条件,气候变迁、海平面变化及人类活动促进了江汉湖群的演化,现代江汉湖群基本格局主要是全新世以来演变的结果。本章进一步指出:(1)在江汉平原地区,白垩—第三纪发育了大量的咸水湖。(2)从新第三纪开始,江汉平原由内陆盆地盐湖沉积为主转变为外流盆地河湖沉积为主,淡水湖泊开始出现。(3)更新世特别是晚更新世以来的环境变迁对现代江汉湖群形成演化有重大影响。(4)现代江汉湖群是全新世以来湖群演变的产物,早全新世为湖群与湖泊兴起期,中全新世为湖群与湖泊的扩张期,晚全新世为湖群与湖泊演化的波动和衰退期。(5)江汉湖群演化及环境变迁受到诸多因素的影响,构造运动、气候及海平面变化、河网水系变化、垸田开发与围湖垦殖、水利工程、长江中上游生态环境建设等都直接作用于江汉湖群。地质历史时期湖群的演化受到构造运动与气候的影响作用巨大,全新世则气候因子占据主导地位,近现代变化(尤其是近五百年来的变化)主要受人文因素影响大。(6)江汉湖群湖泊从成因上可分为河间洼地湖、河堤决口湖、河流遗迹湖、垸内湖、河谷沉溺湖、壅塞湖六种类型。从分布上看,前四类主要分布在盆地中部,后两类主要分布在盆地边缘。前四类以河流作用为主,后两类则明显叠加了构造运动的影响。

第四章为江汉湖区资源环境与可持续发展。在揭示江汉湖群演

化与湖区资源环境发展之间内在联系的基础上,探讨了江汉湖区土地资源问题,分析了土地资源与湖泊资源永续利用的限制因子和综合利用途径。从洪涝灾害、湖泊水体污染与富营养化、泥沙淤积和沼泽化、血吸虫疫病等方面分析了江汉湖区面临的主要生态环境问题及其治理对策。围绕湖区 PRED 系统研究的背景与意义、湖区 PRED 系统及其优化调控的内涵、影响湖区 PRED 系统演化的因素及调控机理、湖区可持续发展评价指标体系等问题从理论层面探讨了湖区 PRED 系统,从控制人口增长、永续利用湖区资源、加大环境综合整治力度、优化产业结构、强化管理、建立完善的湖区可持续发展保障机制等方面探讨了江汉湖区 PRED 系统优化调控与湖区可持续发展问题。本章认为湖区可持续发展的关键就是湖区 PRED 系统的协调。

第五章为典型地区案例分析。本章选择了两类地区作为案例加以分析:一类是人类活动强烈的城市地区(以武汉市城市湖泊为研究对象);另一类是历史时期湖泊众多,但现在消亡迅速,而同时又处于工程措施修复的地区(以汉江中下游湖泊一流域地区为研究对象)。本章指出城市湖泊主要指位于建城区及其邻近正在非农化地区中的湖泊,也包括位于中心城市周围点状展布的卫星城镇区域范围内的湖泊。由于位于城市中或离城区很近,它们的形成演化、开发利用和保护同城市化过程关系极为密切。在认识武汉市湖泊现状和演化过程的基础上,探讨了武汉市城市湖泊面临的主要环境问题和永续利用和保护问题。提出了以湖泊流域(亚湖群)为载体进行综合开发治理、构建湖城武汉的建议。本章还从问题提出的背景、国外经验教训及理论层面分析了湖泊一流域地区综合治理与可持续发展问题,从理念与目标、开发利用总体框架与治理工程、亟待解决的问题、保障机制与措施等方面探讨了汉江中下游湖泊一流域地区综合治理与可持续发展问题。着重探讨了基于南水北调中线工程的汉江中下游湖泊一流域地区综合治理与可持续发展方略。

最后为结论。对主要观点和结论进行了归纳。

关键词：江汉湖群；湖区；湖区 PRED 系统；区域可持续发展；环境变迁；湖泊一流域；综合治理

Abstract

Regional sustainable development emphasizes the coordinative development among population, resource and environment in order to assure regions in a lasting and stable development. The crux of regional sustainable development is the regional economy sustainable development, and the environmental ecological sustainable development can guarantee the regional sustainable development fundamentally. It is of great significance to study the focus of the evolution of regional environment during the historical time, to reveal the reasons of the unsustainable and to seek the general law of regional sustainable development. Lakes are closely related to the origin of human civilization and the social economy development, so it is of great importance, both in theory and in practice, to research the basic theories of the regional development in lake districts, to try to find the laws by analysis of the lakes' evolution, and then promote countermeasures to assure the sustainable development in lake districts. It is also conducive to enriching the connotation and theoretical category of study on the lake sustainable development, to guiding the lake exploitation reasonably and to accelerating regional development comprehensively. Jiangnan lake groups lying in Hubei Province, is one of the main parts of the fresh water lakes in the middle and lower reaches of the Yangtze River. In the geology historical period, Jiangnan lake groups have gone through a complicated evolution process. In the modern times, humans have branded marks on Jiangnan lake groups' evolution heavily. Jiangnan Plain where Jiangnan lakes are located is an important food production

base and economic developing area of China, and it is of great importance in the space distribution of economy. Meanwhile, this area is the typical spot with fragile eco-environment. To study the historical evolution and the modern changes of these lakes, expose the evolution process and law, analyze the factors and system of such evolution and make an inquiry into the internal relationship between the lake evolution and the regional sustainable development of the whole area, are conducive to holding the evolution trend, recovering and rebuilding sound eco-environment, and promoting development of Jiangnan Lake district in sustainable.

This article is divided into 5 chapters and the main contents are as follows:

The first chapter is an introduction. The significance, study area, objective, frame of the study, the technical line and the study contents are elaborated here. It indicates that study on the evolution of Jiangnan lake groups and the sustainable development of the lake district is useful for extending theoretical connotation of regional sustainable development, providing guidance for the developing of Jiangnan Lake district and reference for the developing of other districts. The range of Jiangnan lake groups is defined exactly with the help of RS/GIS methods as well as some relevant study achievements. The objective is to research the basic theory of sustainable development in lake areas, try to find the law by analyzing the lakes' evolution process, advance countermeasures for exploiting resources and sustainable development of lake areas, enrich the theoretical category of lakes' sustainable development and provide reference for exploiting lake areas reasonably. The study frame and technical line are, on the basis of the basic theories of environmental changes as well as the sustainable development theories, to make an inquiry into the process and law of Jiangnan lake groups' evolution, evaluate the resources scien-

tifically, analyze the main ecological environment issues, to the counter-measures to optimize the Lake's ecological environment and practical way as well as the basic strategy to guarantee the sustainable development in Jiangnan Lake district. The main contents of the study include theory summarization, study process, evolution course and law of Jiangnan lake groups, analysis of sustainable development of resources and environment in Jiangnan Lake and the case analysis in some typical regions.

The second chapter is mainly about theory summarization and research development on this subject. Firstly, it elaborates the historical background and the main research achievements of the study on environmental changes and regional sustainable development, and exposes the relationship of the two. Then the basic theories and research development on environmental changes of lake groups and the sustainable development of lake areas are discussed, as well as the current research situation and problems of the evolution of Jiangnan lake groups and lake area sustainable development. In this article, it argues that study on environmental changes and regional sustainable development has drawn attention both from home and abroad. It also indicates that the focal points of this research area are the study on process and law of the environmental changes, the understanding of regional sustainable development connotation, and the study on theoretical system construction as well as the practical application of the regional sustainable development. Environmental changes has a closely relation with regional sustainable development. Environmental changes and regional sustainable development are mingled together as two types of dynamic processes, and the human activities act as a link of the interaction between environmental changes and regional sustainable development, and as a core of optimizing and regulating the relationship of environmental changes and regional sustainable development. The research on environmental changes of lake groups and the sustainable development of lake

areas is a major part of the research on environmental changes and regional sustainable development, and it draws much attention from both home and abroad. The main research achievements on Jiangnan Lake district are as follows: comprehensive research and evolution research of Jiangnan lake groups and the district, research on geological and chemical features of the lake areas and research on the exploitation and sustainable development of lake groups and lake areas and some other relevant issues. In general, there are numerous researches on Jiangnan lake groups and lake areas, but most of them are the researches from some certain angle. So we lack of the research taking the whole lake groups and lake areas as an integrated system.

The third chapter is the analysis of process and law of Jiangnan lake groups' evolution. On the basis of the analysis of geological background and deposition evidence of the Jiangnan lake groups' evolution, it reveals the relationship among tectonic movement geomorphological formation and lake developing, the evolution process and law of Jiangnan lake groups since Holocene is analyzed emphatically, it analyzes the factors and the genetic type of such evolution. The paper argues that geological bases and tectonic movement are the precondition for the developing of Jiangnan lake groups, climate changes, sea-level changes and the human activities accelerate the evolution of Jiangnan lake groups, and the basic structure of today's Jiangnan lake group is mainly the consequence of the evolution since Holocene. More are pointed out in the article as follows: (1) In Jiangnan Plain, it has developed a large number of saline lakes in Cretaceous-Tertiary; (2) From Neogene on, Jiangnan Plain transformed from an inland basin mainly with saline lake deposition to a outflow basin mainly with river and lake deposition, and fresh water lakes began to appear; (3) The environmental changes, since Pleistocene, especially late Pleistocene, exercised a great influence on the formation and evolu-

tion of the modern Jiangnan lake groups; (4) The modern Jiangnan lake groups are the result of lake groups evolution since Holocene. Lake groups and lakes sprang up in early Holocene, and they had an expansion time in mid-Holocene, and in late Holocene, the evolution of lake groups and lakes was in fluctuation and recession; (5) There are many factors influence the lake groups evolution and the environmental changes. Tectonic movement, climate and sea-level changes, river network system changes, development of polder and closed-farmland encroachment on lakes, hydraulic project and the eco-environmental construction in the Yangtze River's upper and middle reaches have direct effects on Jiangnan lake groups. In the geological historical stage, tectonic movement and climate changes mainly influenced the evolution of lake groups. In Holocene, climate factors played a leading role. In the modern times, especially in the late 500 years, it was mainly influenced by human activities; (6) The lakes in Jiangnan lake groups can be classified into 6 types depending on the different formation factors, which are the lakes located between rivers. The first four types are mainly distributes in the middle of the basin and the remaining two are mainly on the edge of the basin. The first four are mostly of river effects while the last two are more than that, with tectonic movement effect in addition.

The fourth chapter is about resources and environment of Jiangnan lake district and its sustainable development. Based on the reveal of internal connection between the change of Jiangnan Lakes and its resource environment development, the land resources issue in Jiangnan lake area is discussed, as well as the restricting factors of the sustainable utilization of land resources and lake resources and its comprehensive utilization are analyzed. From the aspects of flood disaster, the pollution of lake water and its eutrophication, sediment deposition and swampiness and schistosomiasis, it analyzes the main eco-environmental problems in Jiangnan

lake area as well as the countermeasures. Around the study background and significance of the lake region's PRED System, the connotation of lake region's PRED System itself and its optimization, the influence factors and the controlling mechanisms of the lake region's PRED System's evolution, and the evaluation index system of the lake regional sustainable development, it discusses the lake region's PRES System in theoretical. From the angle of controlling population increasing, using lake resources in sustainable, doing more on environment renovation, optimizing industrial structure, strengthening management and building up integrated guaranteed mechanism for lake sustainable development, the paper discusses the issue on optimization of Jiangnan lake region's PRED System and the lakes'regional sustainable development. It considers that the crux of lakes'regional sustainable development is the coordination of lake region's PRED System.

The fifth chapter is the cases analysis of typical areas. Two types of areas are chosen in the paper. One is the urban area where human activities have strong influence. So the lakes in Wuhan city are one of the objectives. The other is the area with lots of lakes in the historical time, and now disappeared rapidly, meanwhile, the area is in engineering construction renovation, so the lake drainage in Hanjiang's middle and lower reaches is the other objective. The article points out that the urban lakes include the lakes located in the city proper and the non-agricultural areas nearby as well as the lakes situated in the satellite towns of the city center. These lakes are in the city or near the city, so the formation and evolution, development and protection of such lakes have a closely relation with the urbanization. The paper discusses the main environmental issues and the sustainable utilization and protection of the lakes in Wuhan on the basis of the analysis of the current situation and the evolution process of these lakes. Advice is given in the paper that comprehensive exploita-