

鄱阳湖资源环境与人类活动研究



《鄱阳湖地理与环境研究丛书》

编辑说明

鄱阳湖是中国最大的淡水湖泊。鄱阳湖承纳赣江、抚河、信江、饶河与修水五大江河来水,构成一个完整的鄱阳湖流域,其边界与江西省行政边界高度吻合,是开展多学科“人—地”关系研究不可多得理想场所。其水位的高动态性和季节性,以及与长江复杂的吞吐型水情关系形成了“洪水一片、枯水一线”的独特淡水湖泊湿地生态系统及其景观。鄱阳湖湿地是具有国际影响的重要湿地和候鸟栖息地。鄱阳湖对长江中下游的调蓄洪水、航运、城市供水、维护生物多样性等诸多方面具有不可替代的作用。鄱阳湖地区是长江三角洲经济区、珠江三角洲经济区、海峡西岸经济区等重要经济板块的直接腹地,是中部地区正在加速形成的增长极之一,具有发展生态经济、促进生态与经济协调发展的良好条件。2009年12月国务院正式批复《鄱阳湖生态经济区规划》,标志着鄱阳湖生态经济区建设上升为国家战略,成为国家区域协调发展战略的重要组成部分。

江西师范大学对鄱阳湖地理与环境的研究已经有长期的历史和科学积累。例如朱宏富先生等关于从自然地理特征探讨鄱阳湖的综合治理和利用;从构造因素讨论鄱阳湖的形成与演变;鄱阳湖区的发展战略和经济发展;三峡工程对鄱阳湖区农、牧、渔业的影响等方面的论著,为现代鄱阳湖研究提供了基础性工作。

鄱阳湖湿地与流域研究教育部重点实验室(江西师范大学)于2003年以江西省和教育部的省部共建的方式筹建,2007年通过教育部验收并更名为现有名称。重点实验室遵循“前沿科学研究与辅助政府决策并举”的宗旨,以“开放、流动、联合、竞争”为建设方针,以鄱阳湖复杂环境系统为研究对象,重点围绕鄱阳湖湿地与流域的关键科学问题,开展流域地表过程和水生态安全、湖泊湿地生态和环境健康、区域开发与资源可持续利用、空间信息模型方法与系统应用,以及时空动态监测网络系统与决策支持等方向的理论、方法和应用研究,取得了一系列科研成果。

2013年恰逢鄱阳湖湿地与流域研究教育部重点实验室成立10周年。在重点实验室

成立以来的十年历程中,在学术委员会的指导之下,在各级领导和全体同仁的共同努力之下,实验室正在逐步成为国内外具有重要影响的开放性、多学科、综合性鄱阳湖地理与环境及其湿地与流域科学的研究基地、理论与应用型人才培养基地、科技创新和成果转化基地和学术交流平台。

温故而知新。为了坚持对鄱阳湖研究的长期性和系统性,总结江西师范大学对鄱阳湖地理与环境科学研究的历史,并配合鄱阳湖湿地与流域研究教育部重点实验室成立 10 周年庆祝活动,我们组织出版《鄱阳湖地理与环境研究丛书》系列文集专著。本专著系列第一期丛书按时间段和科研专题编辑。第一辑由郑林教授主编,以“鄱阳湖人地关系与区域可持续发展”为主线,包括 1979~2003 年间发表的有代表性论文 46 篇。第二辑由舒晓波教授主编,以“鄱阳湖湿地与流域:资源环境与人类活动”为主线,包括 2004~2013 年间发表的论文 32 篇。第三辑由赖格英教授主编,以“鄱阳湖湿地与流域:湖泊水文、湿地生态与流域生态环境”为主线,包括 2004~2013 年间发表的有代表性的论文 34 篇。作为姊妹篇,本专著系列还包括刘影教授主编的《鄱湖缘,鄱湖情——鄱阳湖湿地与流域研究教育部重点实验室成立十周年纪念文集》。

该系列文集回顾和反映了我们关于鄱阳湖地理与环境研究的历史和发展进程,为我们今天所取得的成绩提供鼓励和借鉴,为我们今后的工作提供鞭策和参考。希望本系列文集能使我们关于鄱阳湖地理与环境科学研究的工作得到记载,方向得到继续,思想得到传承,精神得到发扬,并在今后出版的后续文集中得到体现。

王野乔 郑林

2013 年 9 月

Research on Geosystem and Environment of Poyang Lake

Poyang Lake is the largest fresh water lake in China. It is fed by the tributaries of the Gan, Fu, Xin, Rao and Xiu rivers and connected to the Yangtze River through the lake mouth in the north. The tributaries form a completed Poyang Lake watershed. As controlled by the water from the five rivers as well as the Yangtze River, the Lake's highly dynamic and seasonal variations in water level present a unique landscape of fresh water lake-wetland ecosystem. The variation of the size of the lake is illustrated as an ocean when flooded and as a line of river when withered. The Poyang Lake wetland is a key habitat site for wintering migratory birds with global importance. The lake plays an irreplaceable role for flood control, river shipping, city water supply and conservation of biological diversity of middle and lower reaches of Yangtze River. The boundary of the watershed matches almost perfectly with the administrative boundary of the Jiangxi Province which makes the Poyang Lake and the watershed an ideal test bed for studying the intertwined relationships between natural and anthropogenic factors within a coupled human-natural system. The Poyang Lake region is the hinterland of the Yangtze River delta economic zone, the Pearl River delta economic zone, the West-bank economic region of the Taiwan Strait, among other important economic plates. The Poyang Lake region is also one of the economic growth poles in China with appropriate conditions for advancements in eco-economy and promoting coordinated development with coexistence of ecosystem integrity and growing regional economy. In December 2009, the Plan for Poyang Lake Ecological Economic Zone was officially approved by the State Council of China. It symbolizes that the plan is upgraded to a national strategy, which is an important component of coordinated national and regional development.

Jiangxi Normal University has established tremendous amount of scholarship in the

long-term research on geosystem and environment of Poyang Lake. Studies by Professor ZHU Hongfu and his colleagues, such as on comprehensive management and utilization of Poyang Lake from perspective of physical geographical characteristics; formation and evolution of the lake from aspects of geological structure; regional development strategy and economic development; influence of Three Gorges Dam Project on agriculture, husbandry and fishery of Poyang Lake region, have laid a foundation for modern time research on Poyang Lake.

The Key Laboratory of Poyang Lake Wetland and Watershed Research was established in 2003 by the joint support from the Jiangxi Provincial government and the Ministry of Education of China. The Laboratory passed the credential assessment in 2007 and became an official key laboratory of the Ministry of Education. The mission of the Laboratory is to promote cutting-edge scientific research and support governmental decision-making. Adhering to principles of “Open, Exchange, Cooperation and Competition”, the Laboratory dedicates its efforts in study of the complex environmental system of the Poyang Lake with achievements. The Laboratory’s research directions include land surface process and water ecological security of the watershed, lake-wetland ecology and environmental health, regional development and sustainable utilization of resources, spatial information modeling and system applications, and spatial-temporal dynamic monitoring network systems and decision support.

As a Confucius saying pointed out that review of what has already been studied is the path to learn the new. In order to summarize research findings on geosystem and environment of Poyang Lake by the faculty of Jiangxi Normal University, as well as to celebrate the 10th anniversary of the Key Laboratory of Poyang Lake Wetland and Watershed Research, we edit and publish this book series. The series is compiled by research topics in a chronological order. Professor ZHENG Lin serves as the Editor for the Volume 1, which, under the theme of human-land relationship and regional sustainable development of Poyang Lake, includes 46 representative articles published between 1979 and 2003. Professor SHU Xiaobo serves as the Editor for the Volume 2, which, under the theme of Poyang Lake wetland and watershed: resources, environment and human activities, includes 32 articles published between 2004 and 2013. Professor LAI Geying serves as the Editor of the Volume 3, which, under the theme of Poyang Lake wetland and watershed: lake hydrology, wetland ecology and ecological environment, includes 34 articles pub-

lished between 2004 and 2013. As a companion volume of the above theme books, Professor LIU Ying serves as the Editor for a memorial collection under the title of “Deep Affinity and Love with Poyang Lake: the 10th Anniversary of the Key Laboratory of Poyang Lake Wetland and Watershed Research”.

This book series reflects the history and development of the studies on geosystem and environment of Poyang Lake by the faculty of geography and those with affiliation to the Key Lab within the Jiangxi Normal University. I hope that we can derive strength and inspiration and draw experience and reference from this series. I hope that this series will serve as a recorded history of the studies, extend our research directions, improve our knowledge and inspire our thoughts. I also hope that new developments and achievements along the line will be reflected in the future books of this series.

WANG, Yeqiao

October, 2013

前 言

地理研究与地方环境密切相关。不同的地理环境,形成了不同的地理研究特色。

鄱湖明珠,赣抚沃土。这是大自然恩赐于我们休养生息的富饶丰盈的栖息地,也因其独特的地理环境特征而成为具有国际影响的重要生态功能区。长久以来,身处赣鄱大地的江西师范大学地理工作者们一直以地理学独特的视角——生态与空间——对这块热土进行着观察,用热情与梦想,探索着这样一个区域的各种地理现象、过程的规律,创新和开拓着这样一个区域的开发、治理的思路,并以此形成了江西地理研究的特色——大湖流域地理与环境研究。他们在紧张纷繁的教学工作之余,笔耕不辍,将自己的研究与思考写成论文,在各级各类专业学术刊物上公开发表。

为了加强论文成果的交流与推广,为了记录江西师范大学地理工作者们精耕细作的足迹,同时,也为了从侧面记载鄱阳湖湿地与流域研究教育部重点实验室(江西师范大学)迅速发展的道路,在重点实验室成立十周年之际,作为经过精心策划的系列纪念活动之一,我们从老师们已经公开发表的论文中,拾取其中一部分编印成册,是为《鄱阳湖地理与环境研究丛书》。

《鄱阳湖地理与环境研究丛书》共分3集,本集以湿地与流域研究为主题,以资源环境与人类活动为主线,共收录2004—2013年间公开发表的学术论文32篇。论文内容涉及环境灾害与公共卫生、土地利用与土地覆盖、区域格局与区域政策、人类活动与生态环境等方面。具体包括洪涝灾害规律与风险分析,钉螺空间分布与血吸虫病亚类疫区特征研究;土地利用/土地履盖变化及其影响分析,沙化土地特征、成因与植被恢复措施研究;国内外湖区开发的经验借鉴研究,区域人口、外商投资、旅游景区及经济发展的空间格局分析,农村人力资源开发与劳动力转移研究,产业创新与产业发展研究;生态环境变迁与人地关系转变研究,湿地生态系统服务功能与生态补偿研究,湿地资源综合开发与生态经济协调发展研究,能源、交通等基础设施建设研究等等。各种类型的作品云水相关、相映成辉,使得这本论文集显得景象万千。即便如此,本论文集收录的论文也并未能囊括老师们的全部

成果,见微知著是我们的期望。

透过这本论文集,令人清晰地感受到作者们背后艰辛的劳动,感受到作者们对这块热土的呵护和眷恋!当今社会物欲膨胀,便捷功利的做法已不足为怪,而作者们能坚持探索与创新之风、坚持实事求是的科学精神实属可贵。希望本论文集的出版,能使我们关于鄱阳湖地理与环境科学研究的工作得到继续,思想得到传承,精神得到发扬!

衷心感谢各位同仁为本论文集的选编提供的无私帮助和付出的辛勤劳动!

舒晓波

2013年9月

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一、环境灾害与公共卫生

鄱阳湖区平垸行洪、退田还湖后的防洪减灾形势分析

吴敦银 李荣昉

摘要:根据鄱阳湖区“退田还湖”的实际资料,采用洪水模拟的方法分析计算出“退田还湖”降低湖口站洪水位和减少 1954 年洪水超额分洪量。分析“退田还湖”后鄱阳湖区的防洪减灾形势,提出应继续加强对鄱阳湖区防洪工程的建设,探讨“退田还湖”后江湖洪水关系的变化趋势。

关键词:退田还湖;降低洪水位;防洪减灾形势;鄱阳湖

1 引言

鄱阳湖位于长江中下游南岸,江西省北部。鄱阳湖是长江最大的通江湖泊,也是我国最大的淡水湖泊。它承纳赣江、抚河、信江、饶河、修河五大河流及湖区各支流之来水,经调蓄后由湖口注入长江。鄱阳湖在湖口与长江一口相通,在长江高水期承纳长江洪水的倒灌入湖,对长江洪水起调蓄作用。因此,鄱阳湖的调蓄作用不仅对鄱阳湖区有防洪作用,而且对于长江中下游总体防洪也具有重要意义。

然而,长期以来人们为了满足日益增长的人口对粮食的需求和能有一个稳定的生产、生活环境,鄱阳湖区和长江中下游其他地区一样,不断地对江湖洲滩进行围垦,使得江湖面积逐渐减小,导致江湖行洪、蓄洪能力下降。历史上长江中下游有众多的湖泊与洼地调蓄洪水,至 1949 年尚有通江湖泊 17 200km²,目前只剩有鄱阳湖和洞庭湖两个通江湖泊,共有湖泊面积 6 600 余 km²。据调查自 1954 年到 1978 年,鄱阳湖区在 21m 高程围垦总面积就达 1 210km²[1]。鄱阳湖区 1978 年以后基本停止了围垦,天然湖面得到相对的稳定,湖口站水位 22.50m 的湖水面积 4 060km²,相应容积 316 亿 m³。

1998 年长江发生次于 1954 年的大洪水时,长江中下游宜昌至大通河段中的大部分河段以及洞庭湖和鄱阳湖的水位均超过历史最高水位,鄱阳湖水位达 22.59m,超过 1954 年洪水位 0.91m。鄱阳湖区的人民群众遭受了非常严重的洪涝灾害,湖区大小圩堤溃决数百

座,其中有 138 座保护农田 66.7hm^2 以上的圩堤溃决,淹没耕地 4.60 万 hm^2 ,受灾人口 60 万人^[2]。

1998 年大洪水后,在国务院治理大江大河的“32”字方针指导下,鄱阳湖区开展了大规模的“平垸行洪,退田还湖,移民建镇”工作,目前该项工作已基本完成,实施平退圩堤 270 座(引自江西省平垸行洪、退田还湖工程措施总体实施方案(修订本),江西省水利规划设计院,2002 年),实现了高水还湖面积 873.1km^2 。

鄱阳湖区“平垸行洪、退田还湖”的实施对降低湖水位究竟有多大作用,退田还湖后鄱阳湖地区的防洪减灾形势如何,对江湖关系将产生怎样的影响,这不仅是水利部门关心的问题,相关研究领域和社会各界对此也十分关注。本文根据鄱阳湖区退田还湖的实际情况,通过调查分析,按实际平退圩区面积编制了圩区的高程容积关系曲线,并采用洪水模拟分析的方法^[3],计算出退田还湖后降低湖口站洪水位的作用,为正确评价退田还湖的防洪减灾作用和明确退田还湖后的防洪形势提供科学依据,使湖区防洪减灾工作更有针对性,从而实现湖区经济社会稳定、快速和可持续发展。

2 鄱阳湖区平垸行洪、退田还湖实施概况

鄱阳湖区平垸行洪、退田还湖工作从 1998 年起开始实施,经过几年的努力,鄱阳湖区(不含五河尾间区)实际平退圩堤 270 座,实现了高水还湖面积 873.1km^2 。在 270 座平退的圩区中,有 91 座总面积 130.7km^2 为双退圩区,圩区内有耕地面积 $7\,870\text{hm}^2$ 。179 座总面积 742.4km^2 为单退圩区,圩区内有耕地面积 $56\,163\text{hm}^2$ (圩区面积在 667hm^2 以下的 154 座,总面积 265.5km^2 ,圩区面积在 667hm^2 以上的 25 座,总面积为 476.9km^2)。

为了确保纳入“平垸行洪,退田还湖”的双退圩区能够还河、还湖增加河湖的行洪能力,和单退圩区在河湖水位达到规定的圩区进洪水位时能及时进水的蓄洪要求,江西省已对湖区的平退圩堤采取了适当的工程措施:①对于双退圩堤分别在圩堤上、下游设置一个扒口,扒口长度 $100\sim 300\text{m}$,扒口深度为相应湖口水位 18.50m ;②对于圩区面积在 667hm^2 以上的单退圩堤采取新建滚水坝一座、进出洪闸一座的工程措施,滚水坝的坝顶高程为相应湖口水位 21.68m ;③对于圩区面积在 667hm^2 以下单退圩堤按相应湖口水位 20.50m 的进洪水位改建进出洪闸一座。

3 鄱阳湖区退田还湖降低洪水位作用的分析计算

3.1 计算方法与模型

由于鄱阳湖与长江是连通水体,鄱阳湖的汛期高洪水位主要受长江洪水控制,因此,