

## 基础类成果

# 生态水工学理论体系与技术系统构建

### 【创新性】

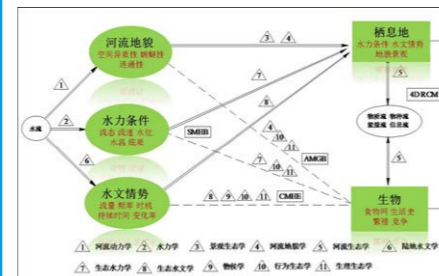
2003年董哲仁提出了生态水工学的理论框架，其定义是：生态水工学作为融合水利工程学与生态学的交叉学科，是研究水利工程在满足人类社会需求的同时，兼顾水生态系统健康与可持续性需求的原理与技术方法的工程学。经过15年的研究与实践，基本形成了学科体系。生态水工学提出了全要素、全过程的河湖生态系统胁迫效应调查分析方法体系；构建了河流生态系统结构功能整体性概念模型；构建了物质流、物种流、信息流在4维空间运动的3流4D河湖水系连通性生态模型；构建了矩阵式河流生态状况分级系统及评价方法；提出了基于生态系统自修复、自组织原理的河湖生态修复自然化准则和技术体系；提出了兼顾生态保护的水库多目标调度方法；研发了基于负反馈调节原理的生态水利工程适应性管理决策支持平台；研发了涵盖水文、地貌、水质和生物等要素的多尺度、多功能生态水工技术工具箱。

### 【影响力】

研究成果在水利部开展的水生态保护与修复试点、水生态文明城市建设试点、河湖水系连通和生态水利工程建设等工作中发挥了重要的科学指导和技术支撑作用。成果丰富，包括3部专著、81篇论文、12项国家专利、5项软件著作权、1项省部级奖励及1部水利行业标准。论文在中国引文数据库(CNKI-CCD)中被引用4254次；在中国科学技术信息研究所编写的《中国期刊高被引指数》中，进入高被引作者排名全国TOP100，分别为第40(2007)和第52(2009)；论文总被引频次在2007-2009年连续三年居水利工程学科第一；在发文5篇以上作者中，2007-2011年发文在2012年的篇均被引次数居水利工程学科第一。专著《生态水利工程原理与技术》获得国家新闻出版总署颁发的第二届中国出版政府奖图书奖提名奖。“生态水工学”列入《中国大百科全书》(第三版)学科、行业发展史类词条。生态水工学作为《水工设计手册》(第二版)第三卷第二章内容。依托成果内容主编水利部行业标准《河湖生态系统保护与修复工程技术导则》，参编水利部行业标准《河湖生态保护与修复规划导则》(SL709-2015)。研究成果获得水利部大禹水利科学技术一等奖。

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受奖单位：水环境所、减灾中心



## THE CONSTRUCTION OF THEORETICAL AND TECHNICAL SYSTEM FOR ECO-HYDRAULIC ENGINEERING

### 【Innovation】

In 2003, Dong Zheren put forward the framework of the ecological hydraulic engineering theory, which can be defined as an interdisciplinary of hydraulic engineering and ecology, studies the principle and technical methods for hydraulic engineering with consideration of aquatic ecosystem health, sustainable demands and demands of human society. The discipline system has been established through 15 years of research and practice: the investigation and analysis methodology for the river and lake ecosystem stress effects of the total factor and whole process was proposed; the Holistic Conceptual Model for the Structure and Function of River Ecosystems was developed; the Three Types Flows via Four Dimensional Connectivity Ecological Model was built; a matrix grading system for the river ecology status and

its evaluation method were established; the naturalize standards and technical system for ecological restoration of rivers and lakes based on the ecological self-restoration and self-organization principle were put forward; the multi-objective reservoir scheduling method with ecological protection taken into account was proposed; an adaptive management decision support platform for eco-hydraulic engineering based on the principle of negative feedback regulation was developed; a multiscale and multi-function eco-hydraulic technology toolbox that involves multiple elements, such as hydrology, geomorphology, water quality, biology, etc., was developed.

### 【Influence】

The research results have played an important scientific guiding and technical supporting role in the pilot projects of protection and restoration of the aquatic ecology, the pilot construction of aquatic ecological civilized cities, the connectivity of river and lake water systems and the construction of ecohydraulic engineering, which were launched by the Ministry of Water Resources. The achievements are abundant, including 3 monographs, 81 papers, 12 national patents, 5 software copyrights, 1 provincial/ministerial level award and 1 industrial standards. Related papers have been cited for 4,254 times in China's CNKICCD; in the publication entitled Chinese Journal Highly-Cited Indicators, which was compiled by the Institute of Scientific and Technical Information of China (ISTIC), Prof. Dong Zheren ranked No. 40 in 2007 and No. 52 in 2009 among the top 100 highly-cited authors; the total cited frequency of these papers had taken the top spot in the hydraulic engineering subject for three consecutive years between 2007 and 2009. Among the authors who published more than five papers, our papers published from 2007 to 2011 ranked No. 1 in the hydraulic engineering subject by the frequency of

each paper cited in 2012. The monograph, Principles and Technologies of Eco-Hydraulic Engineering, was awarded the nomination prize of the 2nd Chinese Government Award for Publishing Books conferred by the General Administration of Press and Publication. The term of eco-hydraulic engineering was listed into the Encyclopedia of China (3rd Edition) as an entry in the category of discipline and industrial development history, and the related content is part of the chapter two of volume three of the Handbook of Hydraulic Structure Design (2nd Edition). Based on the achievements, our Academy has compiled the industry standard, Guidelines for Aquatic Ecological Protection and Restoration technology, and participated in the compilation of the industry standard of Guidelines for Aquatic Ecological Protection and Restoration Planning (SL709-2015). Related research was awarded the first prize of the Dayu Hydro-scientific Technology Prize granted by the Ministry of Water Resources.

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