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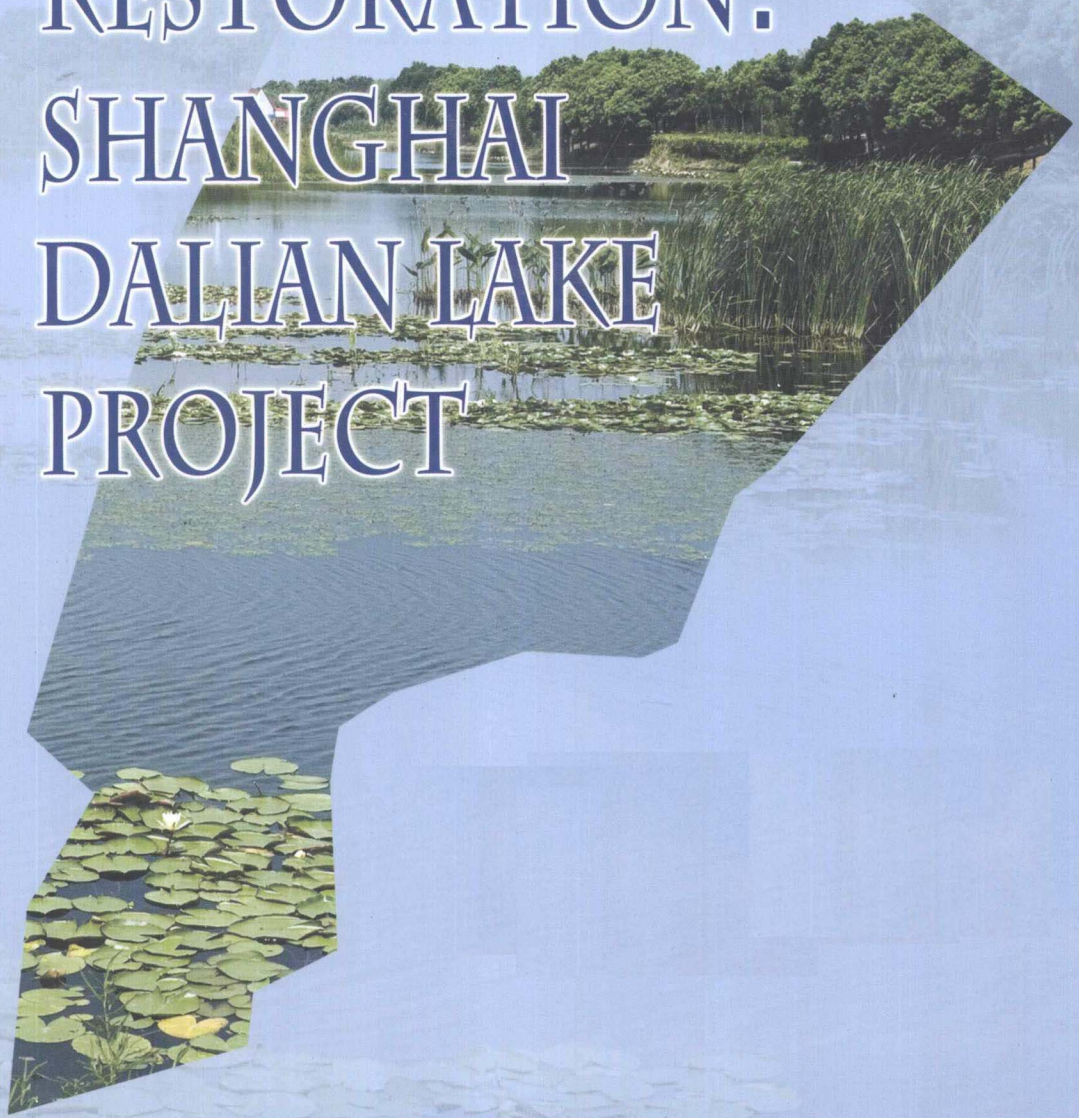
WETLAND RESTORATION: SHANGHAI DALIAN LAKE PROJECT



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Wetland Restoration:
Shanghai Dalian Lake Project

Shuqing An Limin Wang

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藏书章

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Foreword

I am glad to hear the book titled by "Wetland Restoration— Shanghai Dalian Lake Project" would be published very soon. Dalian Lake restoration project is a water source rehabilitation demonstration project launched by our cooperative partner, *i.e.*: World Wide Fund for Nature (WWF), under the support of the "HSBC Climate Partnership" program; in sense of the concerns about the drinking water safety of the megalopolis Shanghai, the project was launched for trying to solve the agricultural non-point source pollution and domestic community pollution in the water source area.

As the sponsor of the project, I was lucky to make a personal survey on the project in the field of Dalian Lake, and I am impressed on it: after rehabilitation, the wetland has not only the beautiful environment, but also the clean water source; the local communities participated in the water source area protection by launching the organic agriculture, which realized the win-win of water source protection and economic benefit. Such "1+1 partner in water source area" mode, namely the mode that attracts and absorbs the local communities, government, experts, NGO and enterprises to participate in, is very worthy of popularization for wetland rehabilitation, organic agriculture popularization and urban water source purification.

I am also glad to hear that the project had won multiple honors after it was implemented successfully, such as "the 1st occasion of Shanghai award for protection of mother river", "Excellent Proposal Award of Shanghai Municipal CPPCC" and "Best Project of the 1st Occasion of Foundation for Guangcai Program". I think this is the affirmation of the government and all circles in the society for the achievements of Dalian Lake project.

In June 2012, HSBC launched a new round of 5-year-term "HSBC Water Resource Program" with WWF and other cooperative partners, aiming to jointly boosting the protection, preservation and sustainable utilization of the water resources in the middle and lower reaches of the Yangtze River. We believe that the future of the Yangtze River basin is very important to the economic growth of China. By being established in enterprise's sustainable development, HSBC is willing to boost the harmonious and healthy development of economy, community and enterprise with our cooperative partner WWF through species protection, wetland restoration, enterprise's participation in water management, environmental friendly fishery industry and integrated watershed management, and then finally help out the green transformation of the Yangtze River basin.

To invest in water is to invest in future; I am herein sincere to express my best wishes for the publishing of the book.

Bijuan Huang
President & Chief Executive Officer
HSBC Bank (China) Company Limited
October 2013

Preface

After Jiangsu Jiangyan Qin Lake "Wetland Forum" conference was convened in April 2008, Dr. Wang Limin, the deputy director of World Wild Fund For Nature (WWF) China Programme Implementation and the director of World Wild Fund For Nature (WWF) Shanghai Programme Office came to my laboratory in Nanjing University for visiting and communication. Dr. Wang was impressed on the achievements of the wetland restoration engineering completed by the ecology department of Nanjing University; after that, Dr. Wang invited me and my wetland restoration engineering team to go to Shanghai Dianshan Lake for conducting the similar scientific research works so as to finally make a contribution to the protection of the water source area of Huangpu River in Shanghai City.

With the support of HSBC Climate Partnership China Programme, the wetland restoration engineering team of Nanjing University conducted a systematic and detailed survey in sense of the ecological environment, social economy and natural geography in Shanghai Dalian Lake, the area where the programme will be launched and its surrounding area in July 2008, and prepared the *Feasibility Study Report on Science & Technology Demonstration Programme for Shanghai Dalian Lake Wetland Restoration*. On such basis, with the vigorous supports of Shanghai Lake Construction and Development Co., Ltd. (formerly Shanghai Dianshan Lake Development Co., Ltd.) and Shanghai Administration for Afforestation and City Appearance, the wetland restoration engineering team of Nanjing University completed the *Protection Planning for Wetland Restoration and Water Source Area in Shanghai Dalian Lake* (2000 mu[①]), *Construction Scheme design for Shanghai Dalian Lake Wetland Restoration* (625mu), and *Shanghai Dalian Lake Wetland Restoration Engineering Based on Community Participation* (150 mu). Among which, the first two were sponsored by Shanghai Municipal Development & Reform Commission and were almost completed; the last one was sponsored by WWF; which is the first "tough" subject in the field of engineering in the sponsorship history of WWF.

With the active collaboration and assistance of the relevant departments of Shanghai Municipality, Qingpu District Government and its related organizations, the 150 mu wetland restoration engineering has achieved satisfactory results. The acceptance & summary conference was convened in September 2010. At that time, the "Water Source Area Forum" was held in WWF exhibition hall of Shanghai Expo., which was highly acclaimed by the leaders and experts of State Forestry Administration, State Water Resources Administration, Ministry of Environmental Protection and relevant departments of Shanghai Municipal

① $1mu \approx 667m^2$

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Government. The senior experts of WWF International, WWF Britain, WWF China, HSBC, and the external senior assessment experts were respectively invited to visit the construction field and make the field monitoring during the construction period; after hearing reports, all experts recognized and commented the project highly, and thought that the project was an example for the ecological rehabilitation of water resource area in megalopolis, and it was leading in the world and had the far-reaching significance.

This book is compiled on the basis of the above projects. This book provides a detailed description for every stage of the wetland restoration project, including the wetland background investigation, overall planning of wetland rehabilitation, detailed design, project construction, tracking, monitoring and assessment of engineering results. Upon the living example of Shanghai Dalian Lake Wetland restoration project, the book furnishes the first-hand data for the wetland restoration project construction and provides a complete and integral narration for the overall implementation process of the wetland restoration project. This book can be used as the reference for the similar wetland restoration project in future.

Shuqing An

December 2013

Acknowledgement

By integrating with the wisdom of Shanghai Huangpu River water resource area protection team and the selfless dedication of all partners, the book, *i.e.*: *Wetland Restoration*: *Shanghai Dalian Lake Project*, will be published. With the highly and sincerely appreciation, I'd like to thank all institutions and individuals that support and care about the programme on behalf of all team members herein.

Shanghai Administration for Afforestation and City Appearance: Youming Cai, Yimin Xie, Zhitong Zhang and Cheng Xue.

Shanghai Lake Construction and Development Co., Ltd.: Jinhua Shen, Ruiyun Zhang, Shuigen Chen, Xiaowei Zhang and Chunhua Chen.

Shanghai Wild Animal & Plant Protection and Management Station: Enle Pei, Shuzhong Xia.

Shanghai Fishery Machinery & Instrument Research Institute Chinese Academy of Fishery Sciences: Xingguo Liu.

School of Life Sciences East China Normal University: Tianhou Wang.

Shanghai Garden Science Research Institute: Xinhong Cui.

Shanghzai Academy of Environmental Sciences: Xianggen Shen, Yuchi Huang.

Shanghai Oasis Ecological Protection Exchange Center: Bing Li, Siwei Chen.

Shanghai Huangpu River Water Source Area Protection Team
World Wild Fund For Nature
Nanjing University
Fudan University
Shanghai Jiao Tong University

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Part One Project Implementation Background

Chapter 1 Locational Features of Dalian Lake

1.1 Geographical Location

Dalian Lake wetland restoration zone is situated in the south of Lanlu Port, 3.5 km in the southwest of downstream zone of Dianshan Lake, Qingpu District, Shanghai City, with the total land of 14.6 km^2 and the core area of 4.6 km^2(Fig.1-1). There are 9 natural villages of 2 towns, namely Jinze Town and Zhujiajiao Town in the wetland restoration zone, where the total population is 7504 (2650 households). Dalian Lake District is 58 km away from Shanghai People's Square and Hu-Qing-Ping Highroad run through the zone to offer a convenient and quick transport(Fig.1-2). Water from Dianshan Lake, getting through Xietang (Lanlu Port), converges with Yuanxiejing and Damao Port in Songjiang River, all three of them constitute Huangpu River; the Lanlu port runs through the whole region of Dalian Lake Zone. According to *Regulations of Shanghai Municipality for Preservations on Upstream Water Sources of Huangpu River*, the zone is an important water source protection zone of Shanghai Municipality, and its local ecological conditions have important strategic significance for Shanghai's sustainable development.

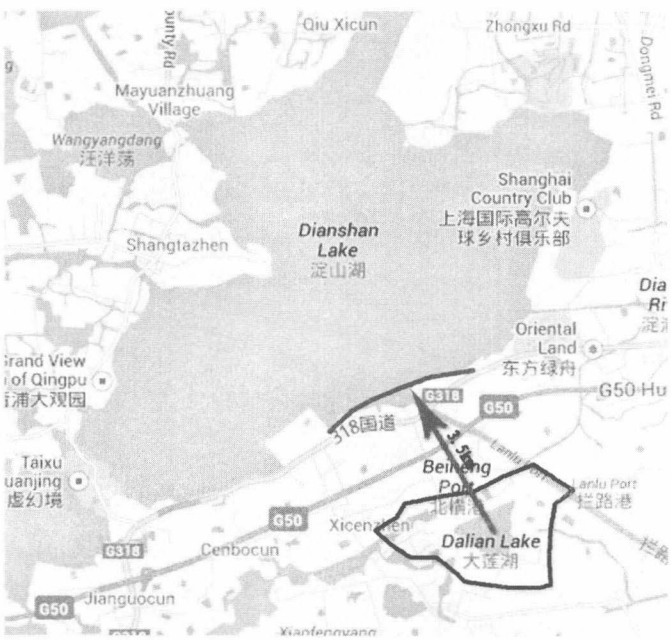

Fig. 1-1 Location of Dalian Lake

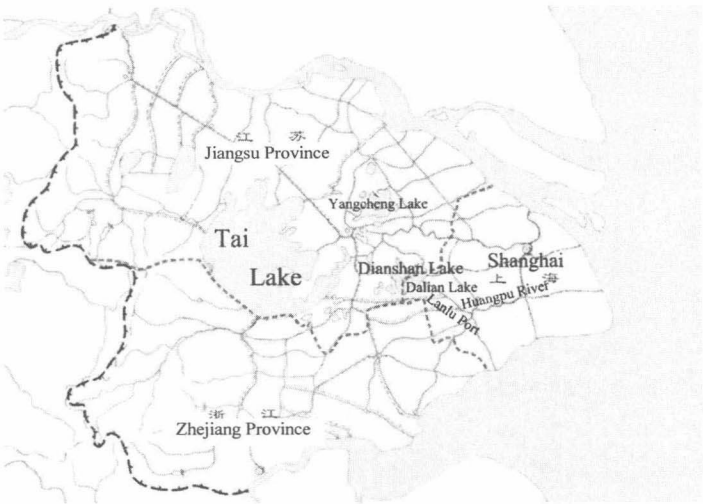

Fig. 1-2 Tai Lake water system

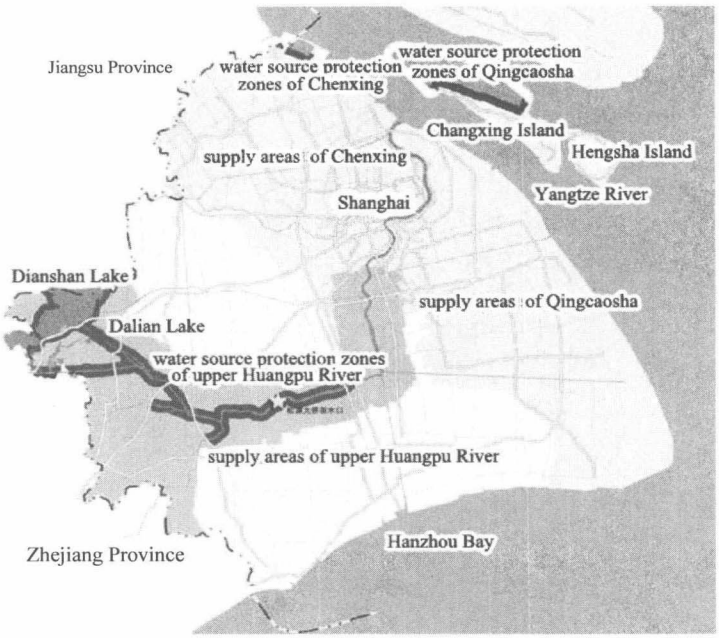

Fig.1-3 Shanghai water source protection zone

The water source area of Dalian Lake is an integral part of Dianshan Lake water system; where the latter is an alternately inflow-outflow lake in Tai Lake Zone, with the water area of 62 km^2, average water depth 2.1m and maximum water depth 3.6m. Dianshan Lake receives mainly the water from Tai Lake; where the water from Tai Lake flows into Dianshan Lake via Jishui Port, Dazhushe and other harbours from Northwest to Southeast, and then discharges into Huangpu River through Lanlu Port, Dianpu River and other rivers; generally it dwells

about 29 days; the Tai Lake water is about 17% of total water yield of Huangpu River and is one of main water sources of Shanghai Municipality(Fig.1-3). The water from Dianshan Lake flows gently, with a flow speed of 0.03m/s approximately; Jishui Port and Dazhushe are the main water intakes of Dianshan Lake, with the water yield of 35% and 33% of the total water inflows respectively; Lanlu Port is the main water outlet of Dianshan Lake, and its water yield is 71% of the total water output. Dianshan Lake is a tidal lake, its water level and water yield are not only affected by upstream water, but also by the tidal level of Huangpu River. Dianshan Lake is not only the drinking water source of Shanghai people, but also plays the role in transportation, agricultural farm irrigation, aquiculture, impounding control and flood discharge and so on.

1.2 Natural Conditions

The water source area of Dalian Lake includes the fresh water lake, marsh, river network, shallow pond, fishpond and waterborne forest. The water source area has the dense water networks and its water area is 55.7% of the total planned area. In this zone there is the largest *taxodium ascendens* forest; it is the largest one existing in Shanghai area currently; the *taxodium ascendens* forest covers a land of 83 mu and has almost 8000 trees; and each of them grows tall and well. There is relatively small population in water source area of Dalian Lake, where the population per square kilometer is 520, which is 1/6 of the average population of Shanghai City, and the per capita arable land is 1.21 mu, which is 4 times of that of farmers of Shanghai City. Dianshan Lake area in which the water source area of Dalian Lake is located has about 80% of the wetland biological species of the fresh lake of Shanghai City. Due to the local biological resources are quite rich and the biological diversity is at a high level, the Dianshan Lake area is always regarded as one of few rare wildlife habitats in Shanghai Area. The water source area of Dalian Lake is the land of Shanghai City for verdurization and is reserved the basic nature of the farm land.

Dalian Lake belongs to the Dianshan Lake water system; its natural conditions are basically consistent with that of Dianshan Lake. Dalian Lake looks like a calabash and covers a land of 4.6 km^2, where the perennial average water depth is about 2 m. Dalian Lake connects with Lanlu Port; in ancient times it was a land.

Dalian Lake area belongs to the North Asian tropical monsoons climate; where it is mild, moist and there are four distinct seasons, sufficient sunlight, rich rainfall and long frost-free period. The yearly average sunshine duration of the lake zone is 1930 hours, and the yearly sunshine percentage is 44%. The time to have the maximum sunshine duration is August, where it is 237 hours averagely and its sunshine percentage is 58%; among the whole winter, the time to have the minimal sunshine duration is February, where it is 112 hours averagely and its sunshine percentage is 36%. According to the record, the sunshine duration in the year

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