# 中國荷花

## 新品種圖誌 I

陳俊愉 北京書

# New Lotus Flower Cultivars in China


**张行言**／主编　**Zhang Xingyan** / Chief Editor
**陈龙清**／译　**Chen Longqing** / Translator
**王其超**／审校　**Wang Qichao** / Reviser



中国林业出版社
CHINA FORESTRY PUBLISHING HOUSE

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**图书在版编目（CIP）数据**

中国荷花新品种图志Ⅰ：汉英对照 / 张行言主编；陈龙清译. —北京：中国林业出版社，2011.7

ISBN 978-7-5038-6198-7

Ⅰ. ①中… Ⅱ. ①张 …②陈… Ⅲ. ①荷花－品种－中国－图集
Ⅳ. ①S682. 320. 292-64

中国版本图书馆CIP数据核字（2011）第104549号

**策划、责任编辑**：陈英君

**出　　版**：中国林业出版社
（100009 北京西城区德内大街刘海胡同7号）
**网　　址**：www://lycb.forestry.gov.cn
**电　　话**：（010）83224477
**发　　行**：新华书店
**制　　版**：北京美光制版有限公司
**印　　刷**：北京华联印刷有限公司
**版　　次**：2011年7月第1版
**印　　次**：2011年7月第1次
**开　　本**：889mm × 1194mm　1/16
**印　　张**：18
**字　　数**：576 千字
**印　　数**：1～3000 册
**定　　价**：199.00元


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# 前言 PREFACE

1989～2005年的16年间，我们先后编著出版《中国荷花品种图志》（1989年中国建筑工业出版社，1994年台湾淑馨出版社）、《中国荷花品种图志·续志》（1999年中国建筑工业出版社）和《中国荷花品种图志》（2005年中国林业出版社）3本书。原以为今生与《荷志》的缘分终结，未想到5年后，我们这对耄耋老者还有机会仍在荷花科研一线发挥余热。眼见中国荷花育种工作取得惊人进步，抑制不住内心的喜悦，莲缘牵动《荷志》缘，促使我们奋笔继续编撰《中国荷花新品种图志》Ⅰ。

本册图志，其所以加一个“新”字，一则有别于前3册《荷志》书名；二是书中所载品种，都是前3本《荷志》未载的新秀；三是育种者增加了新人、新手；四是品种形态、性状记载增加了新内容；五是为了与国际接轨，创建荷花品种分类新系统；六是介绍了新发现的自然界偶尔出现的“三蒂莲”。

荷花品种是本书讨论的主题。书中综述篇收录荷花发展前景展望、荷花展览创新的思考、泰国荷花访闻录等文，是因为这些文章直接或间接涉及到品种。附录中采用两篇中外人士对前《中国荷花品种图志》的评说，这是因为《新荷志》系连贯前3册图志的续篇，读者可从评说中了解荷花的起源以及中国荷花栽培历程，特别是对中国荷花品种的演进和品种资源的分布有一个粗略的认知。

《中国荷花新品种图志》Ⅰ原计划2010年出版，推迟出书的重要原因是品种形态、性状记载，曾要求育种者参照统一的“记载标准”

During the 16 years from 1989 to 2005, we compiled and published three books on lotus, *Chinese Lotus Flower Cultivars* in 1989 published by China Building Industry Press and by Taiwan Shuxin Press in 1994, *Chinese Lotus Flower Cultivars* (*Continued*) in 1999, and *Lotus Flower Cultivars in China* in 2005 by China Forestry Publishing House. We thought that we would not have a chance to write another book on lotus, and did not expect that we, octogenarian couple, still have the opportunity to do some contributions in lotus scientific research 5 years later. Witnessing that great progress has been made in lotus cultivar breeding, we experience great and joyful feeling that development of lotus boosts the publication of serial books, which urges us into compiling *New Lotus Flower Cultivars in China Ⅰ*.

The reasons why we use ‘new’ in the title of book are as follows. Firstly, it can be distinguished from the previous three books; secondly, the cultivars in this book are all new varieties which are not included in the previous books; thirdly, there are new participants in the breeding projects; fourthly, new contents are added in cultivar characteristics; fifthly, bring our work in line with international practice and set up a new lotus cultivar classification system; finally, it introduces a new ‘triplet flower lotus’ which appears occasionally in nature.

The subject of this book is lotus cultivars. Part I of this book includes The Developmental Prospect of Lotus, Discussions on Innovation of Lotus Expositions, The Investigations of Lotus in Thailand and so on, because cultivars are involved in these articles directly or indirectly. In appendix, we use two pieces of comments on the previous books by both Chinese and foreign readers. It is because *New Lotus Flower Cultivars in China Ⅰ* is the continuation of the previous three books, and by reading these comments the readers can learn something about the origin of lotus as well as the Chinese lotus cultivation history, especially the evolution and distribution of lotus cultivars.

*New Lotus Flower Cultivars in China Ⅰ* was originally planned to be published in 2010. The reason why we postponed the publication is that some breeders did not describe the characteristics according to the unified ‘record

操作，由于各育种人对“标准”的理解不一，各行其是，不够规范，这是以前由我们自己育种、自己观察记载不曾遇到的问题。2010年，编者不得不从育种人手中索取部分品种的种藕，集中栽培，重新观察记载，这样做必然延误出版。为了防患于未然，《中国荷花新品种图志》Ⅰ撰写“荷花新品种记载”一章，蓄意较前几册《荷志》所载关于“品种形态、性状记载标准”详细许多，旨在引起后继育种者的注意。

《中国荷花新品种图志》Ⅰ是集体劳动创新的结晶。育种人都是我们的好友，尽管分散在全国各地，为追求新品种观察记载的准确性、规范性，育种朋友积极配合编者对每一品种不厌其烦地反复更新资料，直到符合要求为止。育种人的这种通力合作的团队精神和求实的科学态度，是这本书能较圆满完成的根本保证。谨此，向我们的合作伙伴致以诚挚的谢意！

为了方便国际交流，本书采用中、英文对照形式。我们敦请华中农业大学林业园林学院园艺系系主任陈龙清教授负责翻译。我们曾经多年共事协会工作，这次联手共济，合作得十分愉快。谨向陈教授和他的助手致谢！

几十年来，我们每编著或主编一册荷书，都得到恩师陈俊愉院士的大力支持和热情鼓励。陈老不是题辞就是写序，字里行间充满了中国老一辈园艺家对大自然的热爱和对后生的真情关怀。每当我们重温这些题辞或序言时，一股暖流涌向心头，仍感无比亲切。现陈老福体康健，毕竟是九十有四的高寿老人，《中国荷花新品种图志》Ⅰ付梓之前，我们不忍心再烦陈老为之写序，只恭请为该书题写了书名，这是何等的珍贵！值此，我们谨向恩师致以真诚的感谢！

本书共汇集203个品种、250余幅彩图。编者力求图文并茂，集科学性、知识性、实用性于一体，以“新”的《荷志》面貌呈现在读者面前，为中国的荷花育种工作贡献一份力量。诚然，这仅仅是编者的初衷，有待读者批评指正！

张行言

庚寅年冬月

standards' due to different understandings, which was a situation we did not encountered during our own breeding, observation and recordings. In 2010, we have to demand rhizomes of some cultivars from the breeders, cultivate, observe and record them together, which delayed the publication. To prevent this happen again and arouse attention from the breeders, we add more details in section of The Criteria for Recording Cultivar Morphological Characteristics and the pictures compared with the previous several books.

*New Lotus Flower Cultivars in China Ⅰ* is the fruit of collective intelligence and innovation. The breeders in this book are all our good friends; although located around the country, to meet the accuracy and standard of new cultivars' recordings, they cooperate with us to update the data repeatedly with great patience. The breeders' team spirit of cooperating and scientific attitudes of seeking truth from facts guaranteed the completion of this book. We would like to express sincere gratitude to all these partners!

In order to promote international exchanges, we issue an English version together with Chinese version, as the way used in *Chinese Lotus Flower Cultivars* (*Continued*). We invite Professor Chen Longqing, chairman of Gardening Department, College of Horticulture & Forestry Sciences, Huazhong Agricultural University, to be responsible for translation. We have worked together in the Lotus Branch for years, therefore we cooperate happily this time. We forward our sincere gratitude to Professor Chen and his assistants!

In several dozens of years, every time we write or edit a book on lotus, we are supported vigorously and encouraged warmly by our mentor, Academician Chen Junyu. Chen always writes forewords or titles for us without any hesitation, and between the lines it is full of deep love of nature and sincere concern about the younger generations from the elder horticulturists. His words always warm our hearts whenever we read them. Now Chen is healthy, but, after all he is an elder of 94. Thereby, before the publication of the *New Lotus Flower Cultivars in China Ⅰ*, we do not want to bother him again to write the foreword and just invite him to write the title for the book. How precious it is! Hereby, we extend sincere thanks to our mentor!

*New Lotus Flower Cultivars in China Ⅰ* altogether contains 203 cultivars and more than 250 color pictures. Looking forward to presenting readers with 'new' book on lotus and making some contributions in China lotus breeding project, editors strike for a book with excellent texts and pictures, a book with scientific, intellectual and practical values. As a matter of fact, this is editors' original intention merely, there must be some mistakes in this book. We would be grateful if our readers give us critical comments.

Zhang Xingyan, Winter of 2010

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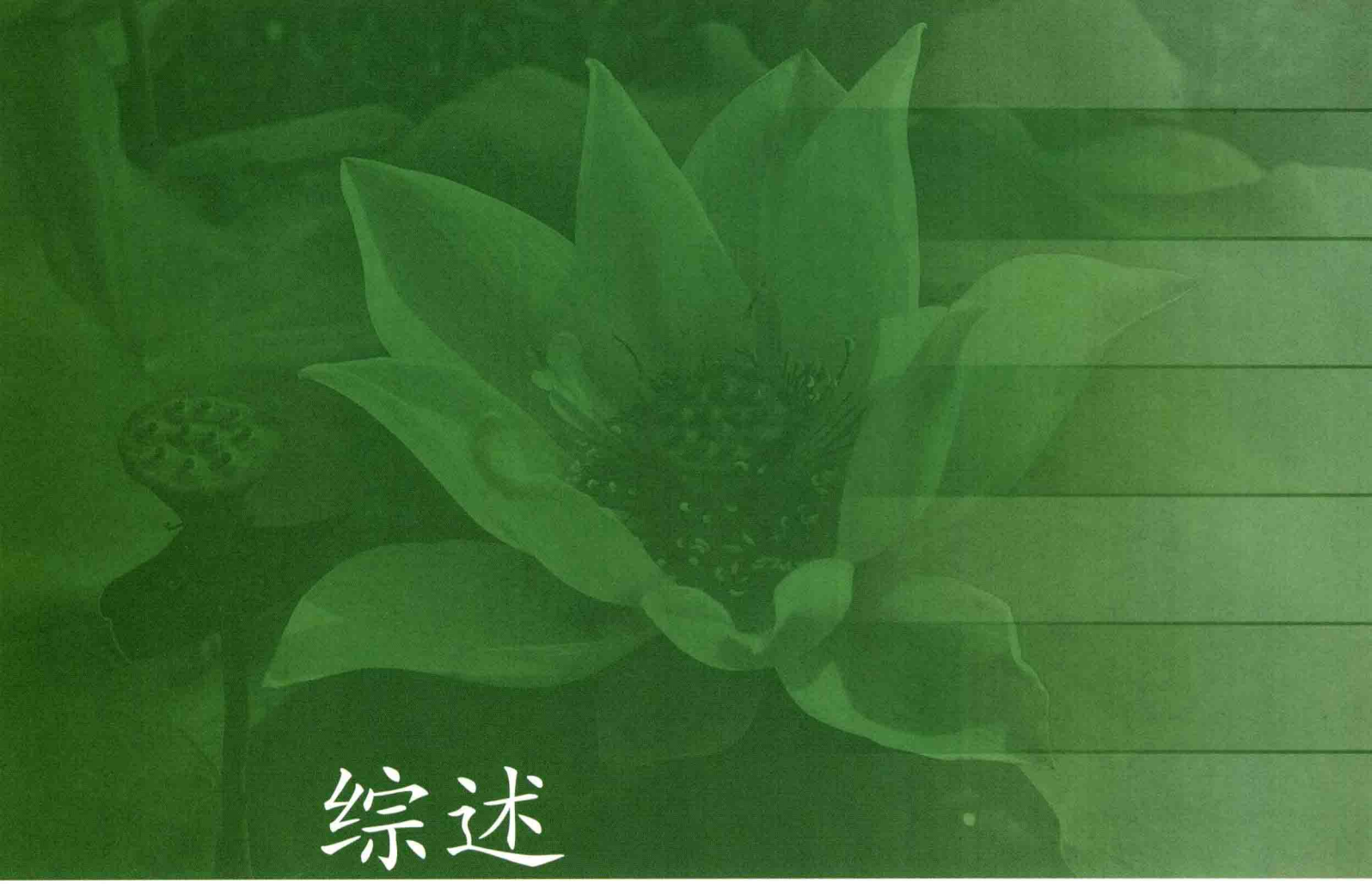

# 综述
# PART I

# 一、中国荷花发展前景展望

## The Developmental Prospect of Lotus

### 1. 概　况

荷花在中国有2500年以上的栽培历史，北达黑龙江，南抵海南岛，东至台湾，西迄新疆，除西藏和青海外，芳迹遍及全中国。自古以来，荷花就是中国各族人民最熟知、最喜爱的花卉。荷花是重要的经济植物，其地下茎——藕，莲子，历来就是中国人最常吃的蔬菜和滋补品。2000年前，先人发现荷花各部器官均具药效而载入中国最古老的药典《本草经》。由于人们长期对荷花用途认知和需求的不同，后来才发展为子莲、藕莲和花莲三大系统，选育出各自不同的品种群和各成体系的栽繁技术，在中国各地都有较大范围和不同程度的发展。无疑，中国已成为世界荷花的栽培中心。荷花在日本、朝鲜半岛、东南亚各国及印度也都有悠久的栽培历史。进入21世纪，我们友邦的莲友，无论是在荷花的科研方面还是在观赏或实际应用方面，都有新发现、新进展、新进步。

近半个世纪以来，荷花在中国的发展速度、成就都超过了历史上的任何时期。中国拥有花莲品种资源800个以上，大江南北、长城内外，凡有水域的城镇

### 1. Introduction

Lotus, with a cultivation history of over 2,500 years in China, is widely distributed throughout the country except the Tibet Autonomous Region and Qinghai Province. Lotus has been the most popular flower in China since the ancient time. People used its underground stem--lotus rhizome and seed as vegetables, and other organs as herbs. 2,000 years ago, its medical functions were described in the oldest Chinese pharmacopoeia *Ben Cao Jing*. As there are different uses of lotus, gradually, it is cultivated as seed lotus, flower lotus and rhizome lotus groups with different cultivation techniques. It is no doubt that China has been the lotus cultivation center in the world. Meanwhile, Japan, Korean Peninsula, Southeast Asia and India also have a long history of lotus cultivation. The growers and horticulturists in these countries have also made great progress in lotus science research and applications in the 21st century.

In China, during the past five decades, the lotus-related careers have achieved more success and developed much faster than any other periods in history. There are over 800 cultivars, and numerous artificial and natural wetlands with lotus, making China the largest country with respect to cultivars and scenic spots for seeing and enjoying lotus. In 1990s, Chinese lotus researchers found a kind of lotus living normally in Puzhehei Lake of Yunnan Province, in depth

图 1　云南普者黑有耐 3.2m 水深的荷花
Figure 1. Lotus can live in the 3.2m deep water in the Puzhehei scenic spot, Yunnan Province

公园、旅游景区无不种有荷花，中国是全球荷花品种最多、赏荷景点最多的国家。20世纪90年代，中国荷花科考人员在云南“普者黑”高原湖泊中发现在水深3.2m处的荷花开花繁茂，从而改写了荷花只能耐水深2m的生存极限（图1）。近年，科考人员又在珠江出海口附近的南沙湿地，发现荷花与离开海水无法存活的红树林共生共荣的奇观，表明荷花有极强的耐盐碱能力（图2）。本世纪初，我们从栽培实践中发现自然界荷花的分布，与地理纬度密切相关。原本存在东南亚热带地区生态环境下（终年不停顿生长），形成与中国大陆温带型荷花截然不同生态型的热带型荷花。中国江西广昌白莲研究所20世纪90年代育成的“太空莲”系列品种，除已在江西全省广为种植外，还推广至湖南、湖北、浙江、安徽诸省，年栽培面积约达53300hm$^2$。藕莲发展更快，以长江流域为主，从中原至山东半岛，南至广东、广西沿海以及西南地区均有分布，栽培面积约达266600hm$^2$。产品走出国门，远销至日本、新加坡等国。

当前，随着中国市场经济的繁荣，荷花在一些地区形成拳头产品，成为发展地方经济、文化的支柱产业，

of 3.2 m (Figure 1). The fact changed the opinion that lotus can only live in a lake or pond shallower than 2 m. Recently, at Nansha wetland, near the estuary of Zhu River, researchers found that lotus live together with mangroves which cannot live without sea water (Figure 2), which demonstrates that lotus has strong salinity tolerance. At the beginning of the 21$^{st}$ century, it was found that the distribution of lotus is closely related with the geographic latitude. Lotus in

图 2　珠江口莲与红树林共生
Figure 2. Lotus live together with mangroves in the estuary of Pearl River

图 3 日本东京大贺莲藕馆研制的莲柄纤维

Figure 3. Fibers of lotus stalk at Ohga Lotus Museum in Tokyo, Japan

被国家相关部门授予荣誉称号。如广东东莞桥头镇被命名为“中国荷花名镇”，江西广昌县被命名为“中国白莲之乡”，湖南湘潭县被命名为“中国湘莲之乡”，江苏宝应县和山东临沂市河东区先后被命名为“中国莲藕之乡”。这些荣誉称号大大提升了当地的知名度、产品的影响力，从而促进了地方经济增长，农民增收。

荷花全身是宝，在中国的利用还远远没有达到物尽其用的地步。中国广阔的尚待修复的湿地、城镇被污染的湖塘、居民区里的人工水池，是其大放异彩的天地。迄今，子莲和藕莲的食用绝大多数是直接利用资源，少数加工产品尚处于粗加工阶段，且未形成真正的规模化生产，品牌效应不突出。提炼荷花有效成分制成的药品、保健品片剂、注射剂较为罕见。至于利用荷叶、荷杆开发工业产品，仅见有研究报道。2004年我们访问日本，参观东京大贺莲藕馆，初次见有利用莲杆纤维制成的工艺品（图3）。可见，全面研究、开发利用荷花全身之“宝”，空间辽阔，大有作为，任重而道远。

## 2. 发展道路宽广

为了保护人类赖以生存的载体——地球，实现绿色、环保、生态、低碳经济和社会生活，已成为新世纪各国政府和人民共同的奋斗目标。荷花本身就是绿色、环保、生态、低碳植物，发展荷花事业，无疑将在全球应对气候变化的伟业中做出有益贡献。

### （1）走景观与生态相结合之路

营建人工植物水景，荷花是主角，也要尽量保护

Southeast Asia and other tropical regions are quite different ecotype compared with those in temperate areas. Lotus cultivars achieved by means of outer space irradiation in 1990s by researchers in Guangchang of Jiangxi Province, have been widely planted in Jiangxi, and later in Hunan, Hubei, Zhejiang and Anhui provinces. The total cultivation area has reached to 53,300 $hm^2$. At the same time, lotus rhizome industries expanded rapidly, mainly in Yangtze River regions, and then to the Central Plains, Shandong Peninsula, southwest areas, and the coastal areas of Guangdong and Guangxi, with a cultivation area of about 266,600 $hm^2$. The rhizome were sold well and exported to Japan, Singapore and other countries.

Nowadays, with the rapid development of economy, lotus has become the pillar products in some places that have won various awards by the state. Qiaotou Town of Guangdong has been titled as the ‘Town of Lotus in China’, Guangchang County of Jiangxi as ‘Hometown of White lotus’, Xiangtan County of Hunan as ‘Hometown of Xianglian’, Baoying County of Jiangsu and Hedong District of Linyi City in Shandong as ‘Hometown of Chinese Lotus Rhizome’. All those honors helped make the places famous, and then promote the development of economy and increase the income of local people.

Every part of lotus is useful. However, we did not make full use of it. It can be used in the unrestored wetlands, the polluted rivers in town and the artificial ponds in residential areas. Up to now, the use of lotus is still at low levels. Usually, rhizome lotus was eaten directly, and a few rough processed products of lotus have not formed large-scale production yet; medicines, health products and injections extracted from lotus are rare in the market. As for products made of lotus leaves and stems, they are still at an experimental stage in China. At the same time, we have seen some craftworks made from fibers of lotus stem when we visited the Ohga Lotus Museum in Tokyo, Japan (Figure 3). In a word, a comprehensive study of developing and utilizing lotus will bring us abundant benefits in the future, but it will be a heavy task and have a long way to go.

## 2. Extensive developmental ways

To protect our earth, creating a green, environmental, ecological, low-carbon life has become a common goal of governments and people in the new century. As lotus is an Eco-friendly plant, the development of lotus will surely make great contributions to cope with the global climate changes.

### (1) The combination of landscape and ecology

To build up an artificial wetland, lotus should be the main plant.

图 4　黑天鹅选北京圆明园自然湿地筑巢安家
Figure 4. Black swans settle down in the natural wetland in Gardens of Perfect Brightness.

原水域里自然繁衍的其它水生植物。那些被贬为“杂草”的野生植物，正是生物间相互竞争、适者生存的胜利者。以保护生态环境为前提，种荷花不应除尽它们。2007年北京圆明园为举办第二十二届中国荷花展览，拟将园内一处约3hm$^2$面积的荒湖进行改造，然后引种新荷。我们得悉后进行实地考察，发现该湖已有一些北京土生土长的荷花，星点散布在野生的丛丛芦苇、香蒲、蔗草等周围，笑迎岸边架起长枪短炮的摄影家。这处小小“荒湖”，是大北京城区内难得觅见的历史遗留的原生态湿地，决不能“改造”它！圆明园领导接受了我们的建议，听任湖里“杂草”、“野荷”自由生长，只对湖的周边环境进行整治。2008年春，奇迹出现了，一对远方贵客——黑天鹅来巡视过，后飞至颐和园上空盘旋几日，未找到“家”的感觉，最后还是选定圆明园里的这座人们眼里的“荒湖”筑巢成家，孵育儿女（图4）。7月荷会开幕时，这对黑天鹅夫妻正带着它们的4个北京籍儿女，在它们喜爱的“荒湖”乐园里戏水觅食。那年夏天，经媒体宣传，一时，北京人“到圆明园看黑天鹅去”的劲头超过观荷！诚然，游客中只有少数有缘人才能目睹黑天鹅一家的风采。保护生态，和谐自然，从我做起，善有善报。黑天鹅回归的实例，对人们的教育何等深刻！

**（2）走观赏与实用相结合之路**

营建湖塘观荷景观，我们接触的业主往往要求配植多品种。殊不知湖塘若不进行分隔处理，品种越多越易混杂。而且，大湖赏荷，旨在宏观效果，即花灿若锦，碧叶接天，气势磅礴，蔚为大观的自然美。所以，我们主张湖塘植荷造景，为避免景色过于单调，务实的做法是保持一定距离，营建“色块”景观（图5），

Besides, we should protect the other aquatic plants which are winners in the natural selection and competition. In order to protect the environment, these so-called ‘weeds’ should not be removed when planting lotus. In 2007, when preparing for the 22$^{nd}$ Chinese Lotus Exposition, the faculty in Gardens of Perfect Brightness intended to rebuild a lake of 3 hm$^2$. As soon as we had gotten the news, we made a field research and found that there were a few native lotus together with reed, cattail and scirpus. The scene attracted many photographers at the time. We suggested that this ‘abandoned lake’ not be destroyed by the so-called construction as it is a rare original wetland in Beijing. At last, the officials adopted our advice and those ‘weeds’ were kept. In the spring of 2008, valued guests – a pair of black swans came from afar. After hovering in the sky over the Summer Palace for a few days, they settled down in the ‘abandoned lake’ (Figure 4). When the Lotus Exposition began in July, the black swan couple together with their 4 children were playing and looking for food in their favorite lake. The news was reported and many people went there for the swans. The story proves that it is our duty to protect the ecological environment and create a harmony between man and nature, and it will pay us in the future.

### (2) The combination of appreciation and utilization

When designing the lotus scenic spots, many owners want various cultivars. Actually, too many cultivars tend to be mixed up. As for visitors, they preferred to enjoy the magnificent scene rather than appreciate its elaborate beauty. Therefore, we suggest the owners to plant red, pink, and white-colored cultivars separately or even the yellow ones so that the viewers can appreciate ‘colored pieces’ from a certain distance (Figure 5). After the decision of colors, the owner should choose the cultivars with abundant seeds so that visitors can pick the lotus seeds while seeing and enjoying lotus. In this way, we

图 5　杭州西湖一处荷塘分堰植荷
Figure 5. Lotus planted in separated ponds in the West Lake, Hangzhou City

即从荷花品种中选红、粉、白3色，有条件的可增黄色或间色品种，将基本花色相同的品种混栽一块。这样，在一处湖塘里可欣赏不同花色的荷花。品种选择的关键，是花色确定后，要选择本花色品种中结实丰满者，以便观花的同时或花后还可采摘青熟莲蓬和老熟莲子，达到既观赏又实惠的目的。

**（3）走荷文化与精神文明、物质文明相结合之路**

中国荷文化源远流长，底蕴深厚，渗透到人们生活的方方面面。尤其是荷花“出淤泥而不染”的崇高品德，自古以来便是中国人赞赏的洁身自爱、廉洁奉公的行为准则。而贪污腐化已成为当今世界各国的通病，中国政府正大力开展“反腐倡廉”活动，倡导社会文明。不少地方以莲园为依托，建“廉政馆”（广东三水荷花世界正建设廉政园）教育世人，特别是为官者应以荷花为榜样，自律自省，做一个像诗人描绘的那样的清官：“一品青莲若为官，光风霁月伴清廉。世人都学莲花品，官自公允民自安”（高占祥诗《清廉》）。

荷花中偶尔出现“并蒂莲”现象，十分罕见，古人视为吉祥、幸福、美满、同心、和谐的象征。广东三水人会做荷文化文章，他们抓住荷文化中的并蒂莲不放，从拍摄的并蒂莲照片中触动灵感，端详着世人对并蒂莲景仰的心态，打并蒂莲品牌，从邮品做起，在短短4年时间，带出印刷品、玉雕、金饰、陶瓷、绣品、结婚用品、服装、皮具、音像制品、食品等11大产业，产品畅销国内和20多个国家及地区。这是由挖掘荷文化资源产生的巨大经济效益的典范。

**（4）走综合利用与科学开发之路**

营建人工水景，单一地种植荷花，远不及与其它水生植物配植的生态效果和景观效果。事实上，原生态水景，从来就是莲群落与其它水生植物群落如香蒲、芦苇、睡莲、菱、荇菜、槐叶萍、菹草、眼子菜、狸藻等和谐共生而构成立体生态景观（图6、7）。近10余年来，中国各地水生园造景中已朝这个方向迈出坚实的一步，并带动了各地莲圃的其它水生植物和湿生植物的蓬勃发展。

中国人民对荷花的藕、莲子和花粉习惯直接食用。藕的出口加工只是“刨刨皮、去去节、泡泡水”，唯有传统产品“藕粉”仍受青睐。莲子的加工侧重于去壳、剥皮、通芯的机械操作，以替代手工作

can appreciate and utilize lotus at the same time.

### (3) The combination of lotus culture, spiritual and material civilization

Lotus culture has a long history in China and affected all aspects of people's lives. The proverb, 'out of mud without being sullied', has became a code of conduct in China, which requires people to respect themselves and to be honest in performing duties. Nowadays, Chinese government put forward a series of 'anti-corruption' campaigns to build up a harmonious society as corruption has become a common problem around the world. Under these circumstances, many places build up museums to advocate probity based on lotus gardens (such as the Lotus world in Sanshui of Guangdong) and educate people, especially officials to learn from lotus spirit. As the poet Qinglian says, if an official is honest and upright, he will be free from corruption; if all people learn from lotus, the officials will be fair and the people will live happily.

As twin flower lotus is rare, the ancient people deemed it as the symbol of good luck, happiness, harmony and so on. The faculty in Lotus world in Sanshui of Guangdong got inspirations from the culture. Using just 4 years, they developed 'twin lotus' brand for 11 industries, including stamps, printing products, jade carving, gold, ceramics, embroidery, wedding supplies, clothing, leather, food, audio and video products. The products were well sold and exported to 20 countries and regions. This is a successful example of making use of lotus to bring economic benefits.

### (4) The combination of comprehensive utilization and scientific development

It is better to plant lotus with other aquatic plants than plant lotus

图 6 人工湿地景观之一
Figure 6. Artificial wetland I

图 7　人工湿地景观之二
Figure 7. Artificial wetland II

业。市场上常见的莲食品，多为“莲蓉”馅糕点。荷叶制品仅见“荷叶茶”。这些部位加工前后的大量废弃物，如荷叶、叶柄、花柄、藕节、莲蓬壳（花托）、莲子壳（果皮）等的利用甚少。荷花全身的“宝”，有待于我们全面科学地发掘利用。

## 3. 发展前景光明

### （1）修复湿地　保护生态

这是全球性的共同目标。中国许多城镇的湖泊和流经的河道，成为湿地生态修复的重中之重。举有“梦里水乡”、“百湖之市”的武汉市为例，20世纪50年代初，全市区有大小湖泊127个，现仅存38个，90年代初，这38个湖泊面积为6533hm$^2$，后又被填湖造地1080hm$^2$，至2009年缩小至不足5330hm$^2$。而且，这些湖泊都受到不同程度的污染。严峻的现实，引起全社会的关注，呼吁一定要保住这38个湖泊，还它一湖秀水！促使政府出台《武汉市湖泊保护条例》、《武汉市水生态系统保护修复规划》。实现该规划，必须

alone when constructing artificial wetlands. In fact, the original ecological wetland are always made up of lotus and other aquatic plants such as typha, reeds, water lily, water chestnut, Nymphoides, Salvinia natans, Potamogeton and Utricularia. These plants coexist harmoniously, making a three-dimensional ecological community (Figure 6, 7). In the recent 10 years, great progress has been made in building up ecological lotus gardens, resulting in the rapid development of other aquatic plants and wet plants.

Chinese people are used to taking the lotus rhizome, seeds and pollens as food directly. When processing lotus rhizome, they just peel the skin, remove the rhizome nodes and wash in water. There are few processed products except lotus rhizome starch, seed paste, and leaves tea. As for petioles, stalks, rhizome nodes, floral receptacles and seed shell, they are usually discarded. These materials need to be exploited in the future.

## 3. Brilliant developmental future

### (1) Restore wetlands and protect ecology

This is a common goal around the world. In China, many rivers and lakes need to be restored. Taking Wuhan, ‘the city

图 8 深圳洪湖公园人工湿地

Figure 8. Aquatic plants are used to purify the water at Honghu Park, Shenzhen city

恢复水生植被，这就需要巨量的荷花、睡莲等多种水生植物。因为各种水生植物不仅能美化水景，都有不同程度的吸收、吸附、分解、富集、沉淀水体营养盐和污染物的本领，而且能向水体和底泥输氧，改善水体和底质的氧化还原环境，激活附生和共生的微生物并为其提供有机物等等。故水生植物在生态修复、天然和人工湿地净化水体中得到广泛应用。如：深圳市洪湖公园人工湿地，采用复合垂直流湿地系统，成片栽种了多种水生植物，将污染较重的布吉河水，通过湿地净化为补充洪湖的清洁水，各项污染指标的去除率均在80%以上，是为成功的范例（图8）。

至于各地城乡冠“湿地”之名，正在启动或正在规划中的人工湿地公园，为荷花及其它水生植物提供了大显身手的平台。

在河道湿地修复方面。山东省枣庄市包围台儿庄的涛沟河下游段、大沙河分洪下游段及两河口的京杭运河段，湿地修复规划总面积2592hm$^2$，现已建成“十里荷花廊”、“百荷园”的湿地公园，绵延7.5km；北京永定河门头沟段即将完成88km的河道修复工程，在河道两旁将开辟6～7个湿地景观带，实现一路荷花百里香。中国类似这样待修复的、待恢复生态的河道极多，等待荷花及其它水生植物材料发挥作用。

**（2）美化环境　丰富生活**

中国城镇化的进程加快，城市高楼大厦林立，居民对生活的社区绿化要求越来越高，以有水域的楼盘最受住户欢迎。过去对社区内池塘的装点，人们多迷

of one hundred lakes', as an example, the number of lakes has dropped from 127 in 1950s to 38 at present. At the beginning of 1990s, the area of these 38 lakes has declined from 6,533 hm$^2$ to 5,330 hm$^2$. Meanwhile, all the lakes were polluted to some extent. The severe realities aroused the concern of the whole society, impelling the government to draft the *Regulations on river and lake management in Wuhan* and *Regulations of water ecosystem protection in Wuhan*. To implement these regulations, we should plant a huge amount of lotus, water lily and other aquatic plants in that they have the abilities to adsorb, decompose, accumulate and precipitate the nutritional salt and pollutants as well as provide organic compounds and activate the symbiotic microbes. For example, various aquatic plants have been planted to clear the water from Buji River in the Honghu Park wetlands of Shenzhen city. The systems provide clear water for Honghu Lake and remove 80% of pollutants (Figure 8).

Nowadays, more and more artificial wetland parks are planned or under construction around China, which provides a useful platform for developing lotus and other aquatic plants.

The channel wetlands restorations have also started in China, such as Beijing-Hangzhou canal around Taier Zhuang of Zaozhuang city, Shandong Province. The whole planned area of wetland restoration is 2,592 hm$^2$, and now 7.5 km long of wetland parks have been established. Around Yongding River in Beijing, a renovation project of 88 km is near completion, which will establish 6-7 wetland scenes and spread out the lotus aroma over one hundred miles. In China, many similar river channel wetland need to be restored and need lotus, other aquatic plants play a role in the projects.

**(2) Beautify environment and enrich life**

The urbanization process of China is accelerating, high-rise buildings occupying more and more places in the city, residents demanding high green quantity in the community and many of them preferring the houses with water landscape. People used to decorate ponds with rockery and fountain before, now they are in favor of some beautiful aquatic plants such as lotus, water lily and iris in order to pursue a green and environmental-friendly ecosystems (Figure 9). Therefore, there is a great space for developing lotus and other aquatic plants in the years ahead.

Nowadays people fancy planting bowl lotus in courtyards or balconies of their houses, especially the ones with small containers and abundant flowers. In the summer of 2010, Yameijia Aquatic Plant Company in Chongqing found out a kind of rapid propagation technology in the growth season. And then they provided 200 pots of lotus plants every day, which is in short supply in the market. It