

# *China's Wetlands: Conservation Plans and Policy Impacts*

**Zongming Wang, Jianguo Wu,  
Marguerite Madden & Dehua Mao**

**AMBIO**

A Journal of the Human Environment

ISSN 0044-7447

Volume 41

Number 7

AMBIO (2012) 41:782-786

DOI 10.1007/s13280-012-0280-7

Volume 41 · Number 7 · November 2012 · ISSN 0044-7447

**AMBIO**  KUNGL.  
VETENSKAPS-  
AKADEMIEN  
THE ROYAL SWEDISH ACADEMY OF SCIENCES  
A JOURNAL OF THE HUMAN ENVIRONMENT



THE WATER TABLE: THE SHIFTING FOUNDATION OF LIFE ON LAND

MARINE CONSERVATION, MEDITERRANEAN SEA • FLOODING, SOCIO-ECONOMIC IMPACT, CHINA • ENVIRONMENTAL INDEX, BALTIC SEA • INFLUENCING PUBLIC BEHAVIOR, AUSTRALIA • FOREST MANAGEMENT, FENNOSCANDIA • DEFORESTATION AND LIVELIHOODS, BURKINA FASO, GHANA • URBAN METABOLISM, A CRITIQUE • COMPULSIVE USE OF ENGLISH • WATER SCARCITY, REDUCING RISKS • CLEANUP OF WATERWAYS, SINGAPORE • WETLANDS, CHINA

 Springer

 Springer

**Your article is protected by copyright and all rights are held exclusively by Royal Swedish Academy of Sciences. This e-offprint is for personal use only and shall not be self-archived in electronic repositories. If you wish to self-archive your work, please use the accepted author's version for posting to your own website or your institution's repository. You may further deposit the accepted author's version on a funder's repository at a funder's request, provided it is not made publicly available until 12 months after publication.**

## SYNOPSIS

# China's Wetlands: Conservation Plans and Policy Impacts

Zongming Wang, Jianguo Wu, Marguerite Madden,  
Dehua Mao

Received: 27 February 2012 / Accepted: 1 March 2012 / Published online: 29 March 2012

---

This synopsis was not peer reviewed.

---

## INTRODUCTION

Since the Ramsar Convention on Wetlands in 1971, wetland conservation (maintenance and sustainable use) and restoration (recovery of degraded natural wetlands) have been high priorities for many countries. China has the world's fourth largest wetland area, which exceeds the whole territory of Great Britain. While the Chinese government has increasingly recognized the importance of wetland protection, particularly after joining the Ramsar Convention in 1992, natural wetlands in China have suffered great loss and degradation. To address this problem, China has implemented the National Wetland Conservation Program (NWCP)—one of the largest of its kind in the world—with ambitious goals, massive investments, and potentially enormous impacts. Furthermore, NWCP has global implications because it aims to rehabilitate habitats for water birds of international importance, enhance carbon sequestration, conserve soil and water, and protect important headwaters of international rivers and lakes.

## BACKGROUND OF THE PROGRAM

Natural wetlands occupy 3.8 % of China's land (An et al. 2007). Of the total area of 362 000 km<sup>2</sup>, 137 000 km<sup>2</sup> are marshes and swamps, 84 000 km<sup>2</sup> are lakes, 82 000 km<sup>2</sup> are rivers, and 59 000 km<sup>2</sup> are marine and coastal wetlands (State Forestry Administration 2005). China's natural

wetlands provide a significant amount of ecosystem services, including freshwater supply, flood control, water purification, wildlife habitat, and aquatic life preserves. More than  $0.3 \times 10^9$  people's livelihood depends on China's natural wetlands and the total value of these wetlands could account for 54.9 % of the annual ecosystem services in China. For example, 82 % of freshwater resources in China are contained in natural wetlands. China's natural wetlands are home to ~5000 plant species, 3200 animal species, and 700 fish species, providing habitats for 60 % of the species of cranes and 26 % of the species of geese and ducks in the world (State Forestry Administration 2005). In addition, natural wetlands contribute to the gene bank for wildlife. For example, a number of high-yield hybrid rice varieties were developed from wild rice growing in natural wetlands (Yuan 1996).

Over the past 60 years, China has lost 23.0 % of freshwater marshes, 16.1 % of lakes, 15.3 % of rivers, and 51.2 % of coastal wetlands due to agricultural developments (Gong et al. 2010), severe population pressure, and misguided policies—such as the “Learn from Dazhai in Agriculture” movement (1964–1978)—resulting in the conversion of a great number of lakes, marshes, and coastal areas to croplands (Liu 2010). According to the First National Inventory, of the 323 investigated wetland sites (i.e., 40 % of the whole national wetland area), 39.5 % of lakes, 27.2 % of coastal wetlands, and 24.5 % of marshes suffered from water pollution. Among these wetland sites, 40.7 % of lakes, 26.4 % of coastal wetlands, and 19.8 % of marshes were threatened by overfishing; 60.0 % of lakes and 28.0 % of marshes were threatened by overuse of water resources; and 43.3 % of lakes were threatened by sediments (State Forestry Administration 2005). The shrinkage and degradation of natural wetlands have led to

loss of biodiversity, damage to ecological services, as well as increased environmental disasters, such as severe droughts in 1997, 2009, and 2010 (Qiu 2010), catastrophic floods in 1998 (Zong and Chen 2000), and the Taihu Lake algal bloom and drinking water crisis in 2007 (Guo 2007). These events directly affect public health and social order in China.

## GOALS AND BUDGETARY ALLOCATION

The Chinese government developed the China National Wetland Conservation Action Plan in 2000 and approved the 2002–2030 NWCP in 2003 (Editorial Committee 2009). The NWCP had a set of ambitious goals, including: establishing 713 wetland reserves—with more than 90 % of natural wetlands effectively protected by 2030; restore  $1.4 \times 10^9$  ha of natural wetlands; and building 53 national pilot zones for wetland protection and prudent use. In 2005, the Chinese State Council approved the 2005–2010 NWCP Implementation Plan (State Forestry Administration 2006), and also included wetland conservation as one of the key areas in the national Eleventh Five-Year Plan.

The short-term goals (2005–2010) of NWCP were to effectively protect 50 % of natural and 70 % of important wetlands, halt shrinkage and degradation, and enhance monitoring, management, research, and prudent use of wetlands. To accomplish these goals, four sub-programs were prioritized: the Wetland Reserve Construction Program (WRCP), the Degraded Wetland Restoration Program (DWRP), the Sustainable Use Pilot Program (SUPP), and the Management Capacity Building Program (MCBP). Eight wetland regions across the whole country were regionalized (Fig. 1). Planned investments for these four priority programs during 2005–2010 will exceed  $9 \times 10^9$  RMB (about  $1.4 \times 10^9$  USD). NWCP aims to establish 222 new wetland reserves and 13 protected areas for wild rice cultivars, resettle 19 169 persons living in core areas of the 4 national wetland nature reserves, supplement water to 12 important wetlands, restore 588 000 ha of natural wetlands, construct 20 national wetland parks, fill the second national wetland inventory, and build sophisticated monitoring, research, and technical training systems for natural wetlands, by 2010.

## POLICY EFFECTS

Overall, progress has been made toward achieving the short-term goals of NWCP. A total of  $4.2 \times 10^9$  RMB has been earmarked for WRCP;  $\sim 38$  % of which was anticipated from the central government and the remainder from local governments. By August 2011, China established 316 new

wetland nature reserves at the national, provincial, and county levels (Wetland Conservation and Management Center of State Forestry Administration 2011). By 2011, China has 37 sites designated as wetlands of international importance with a total surface area of  $3.9 \times 10^9$  ha (The Ramsar Convention on Wetlands 2011). During 2005–2010, 15 planned national level in situ wetland protection areas for habitat of wild rice cultivar were established, including nine sites in the south, two in the northwest, two in the east, and two in central China, demonstrating the success of the program (Wang et al. 2009).

Two hundred million RMB was planned to be invested by the central government in DWRP. By now, more than  $5 \times 10^9$  m<sup>3</sup> of water have been diverted into 12 national important wetlands short of water due to droughts (Wetland Conservation and Management Center of State Forestry Administration of China 2008; Agency of China Economy Times 2009; State Forestry Administration 2010a). These wetlands include Xianghai, Zhalong, Honghe, the Yellow River estuary, Yumenkou-Tongguan, Baiyang Lake, Hengshui Lake, the lower reaches of the Tarim River, Juyan Lake, Taihu Lake, Dianchi Lake, and Nansi Lake. Demonstration projects, such as the reduction of non-point pollutant inputs and restoration of water environments, have been carried out to control eutrophication in four lakes with great ecological values but are severely polluted (Wu and Wang 2006); these include Yangcheng and Zhen in Jiangsu, Bosten in Xinjiang, and Ulansuhai in Inner Mongolia.

The Chinese government has decided to provide  $424 \times 10^9$  RMB for building infrastructure of SUPP. By 2009, the program established 10 national demonstration zones for integrated management of agriculture, livestock, and fishery, with total area of 248 000 ha in intensively used wetland sites (State Forestry Administration 2010b). In the meantime, one demonstration zone of constructed wetlands (300 km<sup>2</sup>) in Changzhou of Jiangsu Province (Changzhou Daily Agency 2007) and two demonstration zones for rational utilization of mangroves were also established (Economic Information Agency 2007; People Daily Agency 2010). More than 140 national wetland parks were also created under SUPP (People Daily Agency 2011).

MCBP developed wetland monitoring information platforms and designed electronic atlases for wetland protection and utilization based on remote sensing and geographic information systems at the national and local levels (Xinhua News Agency 2011). Moreover, information dissemination, public education, and training for wetland protection and management were also conducted. The instrument, equipment, and research capacities of more than 40 wetland research institutions were also upgraded significantly (Lu 2008). By the end of 2010, 15 provinces

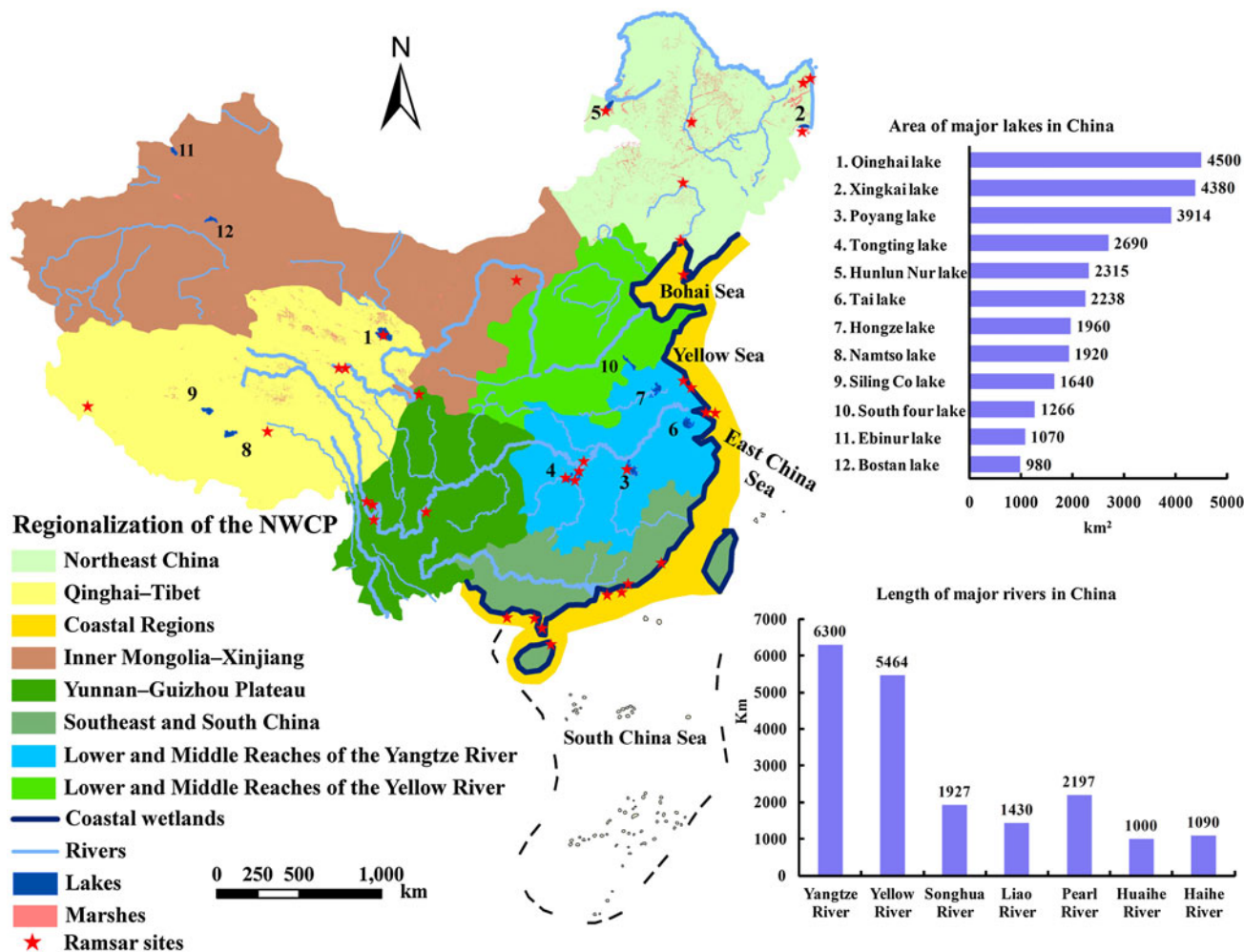


Fig. 1 Distribution of natural wetlands and the regionalization of the NWCP in China

have been covered by the second national wetland inventory and the task will be completed nationwide by 2012 (Xinhua News Agency 2010).

**CHALLENGES AND RECOMMENDATIONS**

NWCP, however, has not been successful in all areas. Only 34 % of the planned investments for the period 2005–2010 were in place by the end of 2010 (People Daily Agency 2011). Such insufficiency of funds has hindered the implementation of ecological migration in WRCP and vegetation and habitat recovery in DWRP (NPC Standing Committee of Jilin Province, China 2010; Wetland Conservation and Management Center of State Forestry Administration 2009; Northeast China Net 2011). In addition, the achievements of NWCP in natural wetland conservation and restoration have been compromised by rapid urbanization, excessive land reclamation for polders, preference of constructed wetland parks to preservation of

natural wetlands, and insufficient legislation to protect wetlands (People Daily Agency 2011). China will be one of the most impacted regions in the world by future climate changes (IPCC 2007), and severe droughts like those in 2011 have already seriously threatened some wetland sites of international importance (People Daily Agency 2011). Thus, more active mitigation efforts must be made to cope with climate change. Despite increasing threats of climate change to wetlands, specific mitigation and adaption policies are still lacking.

The greatest challenge is to find effective approaches to regulating the behavior of and relationships between the various stakeholders (e.g., different levels of government, the industrial sector, the public, and even other countries) who often have conflicting objectives and expectations. To effectively conserve wetlands in China, one problem that must be addressed is the scattering of authority across different agencies. While the State Forestry Administration was authorized to organize, coordinate, and supervise wetland conservation, it is not authorized for integrated

wetlands managements. At present, wetlands are jointly administrated by the Ministry of Land and Resources, the State Forestry Administration, the Ministry of Agriculture, the State Environmental Protection Administration, the Ministry of Water Resources, the State Oceanic Administration, and the Ministry of Housing and Urban–Rural Development. It will be formidable to efficiently implement wetlands conservation plans without breaking down these bureaucratic barriers.

To execute integrated management and fulfill long-term goals for conservation, a national wetland protection law is most crucial and urgent at this time. China has established a number of environmental laws and policies covering wetlands, but each focuses only on a specific aspect of wetlands, often ignoring the interactive effects among different components of these ecosystems. For example, there are separate national laws and policies regarding the protection of forest, water, grassland, and oceanic ecosystems. Although 11 provinces have issued their own regulations for wetland protection, it will be difficult to enforce them because of the lack of national level laws. The National Wetland Protection Regulation has been listed in the legislation plan of the Chinese State Council in 2006, but the time to promulgate and enact it is still uncertain.

The success of wetland conservation programs depends on the timing, duration and efficacy of their implementation, as well as the complex interactions among existing and emerging forces (e.g., socioeconomic, political, demographic, and technological). Enhanced and diversified funding from various project beneficiaries is needed. Enforcement of existing laws and regulations and effective management needs to be greatly strengthened. Moreover, systematic planning and monitoring, integrative wetland protection at the watershed level (Niu et al. 2011) as well as conservation education can help ensure the success of future endeavors. For NWCP to succeed, interdisciplinary research, technical innovation, policy and institutional design, and wetland conservation legislation and enforcement are all crucial. Finally, it is also important to change the way local people use wetlands and have them involved directly in the governance of these resources.

These are grand challenges, but there is hope. In March of 2011, wetlands protection was highlighted in China's National Twelfth Five-Year Plan (2011–2015). Certainly, China's economic strength provides an unprecedented opportunity for conserving and restoring its wetlands. We hope that this is an opportunity seized, not missed.

**Acknowledgments** This research was jointly supported by the National Basic Research Program of China (Nos. 2012CB956103, 2009CB421103) and the National Natural Science Foundation of China (No. 40930527).

## REFERENCES

- Agency of China Economy Times. 2009. Pain and rebirth of wetlands in China. <http://www.cet.com.cn/20091029/i1.htm> (in Chinese).
- An, S., H. Li, B. Guan, C. Zhou, Z. Wang, Z. Deng, Y. Zhi, Y. Liu, et al. 2007. China's natural wetlands: Past problems, current status, and future challenges. *AMBIO* 36: 335–342.
- Changzhou Daily Agency. 2007. The first demonstration zone of constructed wetlands was initiated in Changzhou. <http://news.sina.com.cn/c/2007-07-26/142613533136.shtml> (in Chinese).
- Economic Information Agency. 2007. Mangroves act as ecological guards in the Beibu Gulf of China. <http://finance.sina.com.cn/chanjing/b/20070706/13113760793.shtml> (in Chinese).
- Editorial Committee. 2009. *China wetlands encyclopedia*. Beijing: Beijing Science and Technology Press.
- Gong, P., Z. Niu, X. Cheng, K. Zhao, D. Zhou, J. Guo, L. Liang, X. Wang, D. Li, et al. 2010. China's wetland change (1990–2000) determined by remote sensing. *Science China Earth Sciences* 53: 1–7.
- Guo, L. 2007. Doing battle with the green monster of Taihu Lake. *Science* 317: 1166.
- IPCC. 2007. *Climate change 2007*. Cambridge: Cambridge University Press.
- Liu, J. 2010. China's road to sustainability. *Science* 328: 50.
- Lu, X. 2008. *Wetlands and wetland researches in China*. Shijiazhuang: Hebei Sci-Tech Press (in Chinese).
- Niu, Z., H. Zhang, and P. Gong. 2011. More protection for China's wetlands. *Nature* 471: 305.
- Northeast China Net. 2011. We are in great need of solving conflicts between humans and water birds in the Zhalong Nature Reserve. <http://heilongjiang.dbw.cn/system/2011/01/20/052946393.shtml> (in Chinese).
- NPC Standing Committee of Jilin Province, China. 2010. Report on construction and management of provincial nature reserves. [http://www.jlrd.gov.cn/cwhgb/2010/2009d8q/201008/t20100825\\_771189.html](http://www.jlrd.gov.cn/cwhgb/2010/2009d8q/201008/t20100825_771189.html) (in Chinese).
- People Daily Agency. 2010. Dongzhaigang Nature Reserve of Hainan protects mangroves. <http://env.people.com.cn/GB/13343002.html> (in Chinese).
- People Daily Agency. 2011. Loss of wetlands. <http://env.people.com.cn/GB/211746/213647/13850391.html> (in Chinese).
- Qiu, J. 2010. China drought highlights future climate threats. *Nature* 465: 142–143.
- State Forestry Administration (SFA). 2005. *China Forestry yearbook 2005*. Beijing: China Forestry Press (in Chinese).
- State Forestry Administration (SFA). 2006. *Implementation plan for National Wetland Conservation Program*. Beijing: State Forestry Administration (in Chinese).
- State Forestry Administration (SFA). 2010a. Diversion of water from the Yellow River into the Yellow River Delta to nourish wetlands. <http://www.forestry.gov.cn/portal/main/s/72/content-450621.html> (in Chinese).
- State Forestry Administration (SFA). 2010b. *China Forestry statistical yearbook 2010*. Beijing: China Forestry Press (in Chinese).
- The Ramsar Convention on Wetlands. 2011. The list of wetlands of international importance. <http://www.ramsar.org/pdf/sitelist.pdf>.
- Wang, J., Y. Chen, J. Huang, W. Qiao, W. Zhang, and Q. Yang. 2009. Comparison of genetic diversity between in situ conserved and non-conserved *Oryza rufipogon* populations in China. *Acta Agronomica Sinica* 35: 1474–1482.
- Wetland Conservation and Management Center (WCMC) of State Forestry Administration (SFA). 2009. Building eco-fence in the

- upper reaches of the Yellow river. [http://www.shidi.org/sf\\_EBB4BD176C824300AE82D6C0DF9BED19\\_151\\_cnplph.html](http://www.shidi.org/sf_EBB4BD176C824300AE82D6C0DF9BED19_151_cnplph.html) (in Chinese).
- Wetland Conservation and Management Center (WCMC) of State Forestry Administration (SFA). 2011. The list of wetland nature reserves of China. <http://www.shidi.org/lib-reserves-district.html> (in Chinese).
- Wetland Conservation and Management Center (WCMC) of State Forestry Administration of China. 2008. Compensation of water to rejuvenate wetlands in the Honghe National Nature Reserve. [http://www.shidi.org/sf\\_C829F94BB120458B9B6CB92475EE E5DF\\_151\\_hw.html](http://www.shidi.org/sf_C829F94BB120458B9B6CB92475EE E5DF_151_hw.html) (in Chinese).
- Wu, H., and X. Wang. 2006. Progress of evaluation of wetlands' ecological restoration effects in China. *Wetland Science* 4: 304–310 (in Chinese).
- Xinhua News Agency. 2010. China effectively protected its wetlands with an area of 17.95 million ha. <http://www.shidi.org/lib-reserves-district.html> (in Chinese).
- Xinhua News Agency. 2011. China has finished the second wetland resources inventory in fifteen provinces. [http://news.xinhuanet.com/2011-02/16/c\\_121088099.htm](http://news.xinhuanet.com/2011-02/16/c_121088099.htm) (in Chinese).
- Yuan, L.P. 1996. Hybrid rice breeding in China. In *Advances in hybrid rice technology*, ed. S.S. Virmani, E.A. Siddiq, and K. Muralidharan. Hyderabad: International Rice Research Institute.
- Zong, Y., and X. Chen. 2000. The 1998 flood on the Yangtze. *Natural Hazards* 22: 165–184.
- Zongming Wang** (✉)  
*Address:* Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, No.3195, Weishan Road, Changchun 130012, Jilin Province, China.  
e-mail: zongmingwang@neigae.ac.cn
- Jianguo Wu**  
*Address:* School of Life Sciences & Global Institute of Sustainability, Arizona State University, Tempe, AZ 85287, USA.  
e-mail: Jingle.Wu@asu.edu
- Marguerite Madden**  
*Address:* Center for Remote Sensing and Mapping Science (CRMS), Department of Geography, The University of Georgia, Athens, GA 30602-2503, USA.  
e-mail: mmadden@uga.edu
- Dehua Mao**  
*Address:* Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, No.3195, Weishan Road, Changchun 130012, Jilin Province, China.  
e-mail: woshimaodehua@126.com