

Putting China's wetlands on the map

In his attempt to track avian flu in China, Peng Gong ended up creating the only comprehensive wetlands map the country has. When Gong compared that map, described in an article published in Chinese last month, to another as-yet unpublished one, he found that nearly 30% of China's natural wetlands vanished between 1990 and 2000.

The Chinese government plans to create its own, even more comprehensive, maps as it pumps money into wetlands restoration and conservation projects. Together, the new research will fill a hole for scientists and conservationists who had to watch as marsh and other wetlands were developed, often as farmland, without knowing the full extent of the loss.

Gong, an environmental scientist who holds a joint position at the University of California, Berkeley, and the Institute of Remote Sensing Applications in Beijing, took on the project because he wanted to track migrating birds, which are suspected of spreading avian influenza and which often spend summers or winters in wetlands.

But he had little to go on. A national wetland survey conducted between 1995 and 2003 merely listed total area in square kilometres attached to political districts. Other maps focused only on large lakes; for tracing avian flu, Gong needed more detail to see, for example, where there might have been smaller wetlands next to poultry farms. So he compiled Landsat satellite imagery of China taken around 1990 and 2000.

Demin Zhou, a hydroecologist at the Northeast Institute of Geography and Agroecology in Changchun, helped ground Gong's satellite imagery by providing detailed information on local water features. "It will be a goldmine for us and for other researchers," he says.

For now, the gold is in documenting how wetlands have shrunk. In the Sanjiang Plain wetland in the north-east, where endangered red-crowned cranes spend their summers, Gong notes a drop from 22,932 km² to 10,114 km². "It's a huge threat," he says. Melting glaciers increased wetlands in regions such as Tibet and Qinghai, but the glacier retreat would also disturb the ecosystem (Z. Niu *et al. Science in China Ser. D: Earth Sci.* in press; 2009).

The map has its shortcomings. Given the limited field work that cross-checked satellite data, Gong could not categorize the wetlands in the same detail as given in the



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Red-crowned cranes on their way to their summer home — or what's left of it.

Ramsar Convention on Wetlands. A team led by Shuqing An, a wetland ecologist at Nanjing University, has found at least 26 natural and 9 man-made types of wetland in China. An says that Gong's high-resolution map will pick up a lot of small wetlands, but that their lack of detail will probably lead to misidentification of wetland types and make their use "confusing".

Gong says he would like to release the map in full detail (a lower resolution version is available at <http://tinyurl.com/bbuszg>) publicly later this year. But China is guarded about its geographical data (see *Nature* 451, 871; 2008), and he needs to get approval from the State Bureau of Surveying and Mapping. He also plans to update the map with data from 2008.

The Chinese State Forestry Administration started a wetland mapping project last October, with an investment of 100 million renminbi (US\$14.6 million). This will include remote-sensing data and much denser ground data than Gong's. The maps are meant to help organize restoration, conservation and 'wise use' initiatives, including ecological tourism and wetland national parks, for which the government has set aside 16.5 billion renminbi for its 2006–10 five-year plan.

Meanwhile, some Chinese institutions are moving quickly to set up international collaborations in wetlands research. One university — which did not want to be named until plans are finalized — is forming a new institute to span

life, environmental, physical and social sciences, and policy studies, and hopes to collaborate with the Wetlands Biogeochemistry Institute at Louisiana State University in Baton Rouge.

A starting point for collaboration could be *Spartina alterniflora*, a salt-marsh grass introduced to China in the 1960s for land reclamation and whose spread has caused higher levels of sediment accumulation in the Yangtze delta. In its native habitat, along the US Mississippi River delta, the grass does not wreak such havoc. Irving Mendelssohn, a plant ecologist at Louisiana State University, says that comparative studies on topics such as *S. alterniflora* and nutrient cycling will be made before moving on to how best to conserve or restore wetlands. "The basic concept is to compare ecology, management and restoration of the coastal Yangtze River delta with the Mississippi River delta," he says. Last December, Tulane University in New Orleans and East China Normal University in Shanghai also signed a statement of intent for a collaboration comparing these two deltas.

The speed at which China seems ready to move has impressed foreigners. Douglas Meffert, an environmental scientist at Tulane, hopes their collaboration will accelerate the laggard 'master plan' for water-diversion projects to fix wetlands along the US Gulf Coast. Strategies tested in China could convince those in the United States to act. "China can move with much more alacrity to pull off large-scale restoration projects," he says. ■

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