

Coastal Wetlands: Coupling between Ocean and Land Systems

Author: Bao, Kunshan

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Coastal Wetlands: Coupling between Ocean and Land Systems

Kunshan Bao

State Key Laboratory of Lake Science and Environment
Nanjing Institute of Geography and Limnology
Chinese Academy of Sciences
Nanjing 210008, China
ksbao@niglas.ac.cn

In the wake of the ambitious initiative of ocean research in China (Tollefson, 2014), we believe it is urgent for the country to pair coastal wetlands study with the "Deep Dive" and "Deep Exploration" programs (the SinoProbe). The coastal wetlands are the transitional zone between terrestrial and aquatic systems and could be linking the ocean data to conditions in the uplands.

As one of the most significant ecosystems in the world, coastal wetlands have many intrinsic values, including high resilience against extreme weather (Fagherazzi, 2014), wide varieties of plant and animal species, significant socioeconomic benefits to fisheries, and substantial carbon storage (Bauer *et al.*, 2013). However, they are vulnerable to climate change and direct anthropogenic disturbance. As a result of continued population growth and increasing global food demand, around 25–50% of the world's coastal wetlands have been converted into farmland and aquafarms. Recent 20–45% loss of coastal wetlands is attributed to their conversion to open water as a result of sea-level rise associated with global warming (Kirwan and Megonigal, 2013). The numerous benefits gradually diminish with the disappearing coastal wetlands.

Meeting future global food and energy demands while mitigating the potential detrimental environmental impacts has emerged as one of the greatest challenges in exploitation and conservation of coastal wetlands in China. For example, the tidal flats in northeast Jiangsu Province ($\sim 5.1 \times 10^5$ ha) are the largest coastal wetlands in China and the world-renowned habitats for many rare and endangered species (Gao *et al.*, 2012). Although two wetland reserves of international importance have been established, the Dafeng National Nature Reserve (DNNR, Ramsar site no. 1145) and the Yancheng National Nature Reserve (YNNR, no. 1156), the outlook of protection is not optimistic. From 1988 to 2006, the decrease rate of the grass flat in YNNR was ~ 900 ha y^{-1} , but the increase rates of the farmland and pond areas are ~ 600 ha y^{-1} and

1400 ha y^{-1} (Ke *et al.*, 2011). This is not an individual case in China. It was reported that 57% of China's coastal wetlands have disappeared due to land reclamation since the 1950s (Qiu, 2011).

We think the main reason for decreasing coastal wetlands at the same time as protection efforts are increasing is the lack of a national long-term strategic plan such as the one developed for ocean research. Therefore, multidisciplinary research on the coastal environment and a broader perspective of wetland management at the national level are required for optimizing the trade-offs between exploitation and conservation in China.

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