

Preventing and controlling land subsidence in Shanghai –towards more integrated and effective land use and ground water governance in the Yangtze Delta

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The Yangtze Delta, covers 210,700 square kilometers and with 156 million inhabitants (NRDC, 2010; The National Bureau of Statistics, 2011), is one of the areas most severely affected by land subsidence in China. Up to 2012, the area with cumulative subsidence above 200 mm in Yangtze Delta has been closed to 10,000 square kilometers. Shanghai, located at the estuary of the Yangtze River and with a population of 23 million, is the most densely populated city in Yangtze Delta (The National Bureau of Statistics, 2011). Since 1921, the recorded cumulative subsidence has been 200 to 300 mm in the central area of the city (Chai, Shen, Zhu, & Zhang, 2005). Excessive pumping of groundwater is considered to be the leading reason, accounts for nearly 70%, of the city's land subsidence, the weight of skyscrapers and global warming also play hefty roles (30%) (Springer, 2012). Research has shown that the main method to control land subsidence in Shanghai is to prevent groundwater from dropping (Chai, Shen, Zhu, & Zhang, 2005), the city has made great efforts in this regard since 1965 (the beginning of the so-called "control period"), for example, it has been recharging underground water through 121 wells with more than 60,000 tons every day since 2012 (Chinadaily, 2012). It is a huge burden considering the city has been suffering from a shortage of fresh water. In 2013, with the other two provinces of Jiangsu and Zhejiang in Yangtze Delta, Shanghai signed a delta cooperation agreement on the prevention and control of land subsidence and jointly issued a Prevention and Control Planning on Land Subsidence in Yangtze Delta (2014-2020), which aims to establish a long-effect mechanism in the delta scope.

This research aims to analyze and assess the land and groundwater governance arrangements related to land subsidence in the Yangtze Delta in general and Shanghai in specific, in order to develop optimizing adaptation strategies and associated governance arrangements. It examines the institutional arrangements of land subsidence prevention and control at three levels, i.e. the national level, the regional level (Yangtze Delta) and the city level (Shanghai). A three-step interdisciplinary diagnostic method, based on water system analysis, economics, law and public administration, will be applied.