



Cultivated land protection policies in China facing 2030: Dynamic balance system versus basic farmland zoning



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ABSTRACT

The Chinese central government launched two principal campaigns to maintain the quantity and quality of cultivated land across the country and to continuously sustain a growing population. Dynamic balance system and basic farmland zoning focus on protecting the quantity and quality of cultivated lands, respectively. Theoretically, two complementary campaigns can effectively protect the quantity and quality of cultivated land. However, these policies protect the quality of cultivated land minimally. Dynamic balance system replaces basic farmland protection system during implementation by transforming from control planning to development planning. The process increases the conversion of high quality cultivated land into industrial and residential uses, with the supplementary of cultivated land with low quality, thereby reducing the protection on the quality of this land. This study adopts Yiwu City as the study case and analyzes the administration efficiency of dynamic balance system and basic farmland zoning. Evidence suggests that the delimitation of permanent basic farmland is a feasible system arrangement. The central government should deal with the relationships among policies to protect the quantity, quality, and ecosystem of the cultivated land. The government can arrange permanent basic farmland zoning as the core system for cultivated land protection and practice grade protection system on basic farmlands to strictly limit their conversion into construction land, which inevitably weakens the dynamic balance system.

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1. Introduction

The world underwent rapid urbanization in the past 60 years. The United Nations predicted that above 50% of the present urbanization rate will reach 60% by 2030 (Yu, Wu, Zheng, Zhang, & Shen, 2014) and 67.2% by 2050 (United Nations, 2012). Land consumption remained high since the 1960s, especially in countries with rapid economic growth and urbanization (Marlow, Ralph, & Kenneth, 1994; Shan, Yu, & Wu, 2017; Tao, Yuan, & Cao, 2007; Wu, Mo, & Peng, 2017a). In developing countries, urbanization is estimated to increase from 300,000 km² in 2000 to 770,000 and 1,200,000 km² in 2030 and 2050, respectively (Angel, Parent, Civco, Blei, & Potere, 2011). Rapid urban expansion in most developing countries primarily contributes to environmental change (Peng, Lai, Li, & Zhang, 2015; Shen, Peng, Zhang, & Wu, 2012). Considerable

farmland loss occurred because of residential development during Korea's rapid urbanization from 1986 to 1996 (Kim, Mizuno, & Kobayashi, 2003). Accelerated urbanization increased the consumption of high-quality farmland in China (Wei, Pijanowski, & Tayyebi, 2015). In India, urbanization causes rapid conversion of agricultural lands to non-agricultural lands (Fazal, 2016). The loss of high quality farmland during rapid urbanization raises food security concern.

The Food and Agriculture Organization (FAO) defined food security as "a situation when all people, have sufficient physical, economic, and social means, nutritious and safe food that meets food preferences and dietary needs for their active and healthy life at all times" (Schmidhuber & Tubiello, 2007). The 2015 hunger report entitled "State of Food Security in the World" (FAO) indicated that about 795 million people are chronically undernourished mostly in developing countries. As the world's largest developing country, numerous Chinese live below the poverty line. China sets 2300 yuan per person per year (2010 constant price) as the rural poverty alleviation standard. In 2015, over 55 million people are living under the poverty line (National Economic and Social

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Development Statistics Bulletin, 2015).

China underwent rapid urbanization since the Reform and Opening-up in 1978. The country's urbanization level increased from 17.9% in 1978 to 36.2% in 2000 and 56.1% in 2015 (*National Bureau of Statistics of China*, 2016). Urbanization level will reach 60.34%, 68.38%, and 81.63% by 2020, 2030, and 2050, respectively, with an average annual growth rate of 0.793% (*Gao & Wei*, 2013). According to Brown's report in 1994 entitled "Who will feed China?" its continued population growth and dietary structure improvement increased food demand, whereas industrialization and construction of urban areas will consequently reduce the amount of cultivated land which leads to food crisis. China's rural population in abject poverty will face extreme hunger with insufficient food supply. However, as the "world's factory," China's continued expansion by building more factories constantly affected food production. Numerous urban constructions and industrial parks that occupied former cultivated lands increased China's risk of grain supply security and reliance on imported food products (*Wu, Zhang, Skitmore, Song, & Hui*, 2014).

With rapid urbanization and industrialization, urban expansion converted high quality farmlands, which prominently contradicted farmland protection (*Wu, Zhang, & Shen*, 2011; *Wu, Peng, Zhang, Skitmore, & Song*, 2012; *Peng, Shen, Tan, Tan, & Wang*, 2013; *Peng*, 2015; *Bao & Peng*, 2016). The quantity and quality of cultivated land is closely related to national food security (*Song & Pijanowski*, 2014). Hence, in response to food security concerns, the Chinese central government launched two principal campaigns with the aim of maintaining the quantity and quality of cultivated land across China. These campaigns are dynamic balance system and basic farmland zoning, which focus on protecting the quantity and quality of cultivated land respectively. Theoretically, if the two complement each other, they can effectively protect the quantity and quality of cultivated land. However, these policies provide minimal protection in terms of China's cultivated land quality.

According to the *World Bank* (2012), China will replace the United States in 2030 as the largest economy in the world. Rapid expansion will increase demands for energy, food, water, natural resources, and the environment, in which climate change can cause food and water shortages. *Yu* (2009) predicted that China's population will peak at about 1.45 billion around 2035, whereas *Sun, Chen, Chen, and Wuzhati* (2016) forecasted that it will peak at 1.45 billion by 2030 as urbanization level reaches 70.12%. Age and occupation structures, gender ratio, and spatial distribution will considerably change, and demographic dividend will gradually disappear. Thus, 2030 is considered a turning point in China's population development. International urbanization experiences indicate that countries undergo rapid urban development when urbanization rate ranges between 30% and 70%. By contrast, urban development gradually declines when urbanization level exceeds 70%. Hence, 2030 will be a turning point in China's urbanization. China's population will peak in 2030 when urbanization attains a relatively stable period; thus a further study of China's cultivated land protection strategy should be conducted to adapt to this period (*Peng, Shen, Shen, Lu, & Yuan*, 2014a, b; *Wu, Luo, Zhang, & Skitmore*, 2016; *Wu, Zhang, Shen, Mo, & Peng*, 2017b).

This study begins with a literature review of the two principal campaigns. China's cultivated land protection policies play an important role in protecting yet harming the quality of cultivated land. This study uses theoretical comparison to analyze how policies that protect China's cultivated land harm the quality of these lands. The dynamic balance system is part of the development pattern plan, whereas basic farmland zoning is part of the control pattern plan. Basic farmland zoning was replaced by dynamic balance system to a certain extent. The former was transformed into a development pattern plan during implementation, leading to

occupation and lack of protection for high-quality cultivated land. We propose an approach to optimize China's protection policies for cultivated land by analyzing their implementation in Yiwu City, Zhejiang Province.

2. Critical review of protection policies for cultivated land

2.1. Protection policies for cultivated land in developed and developing countries

The goals of cultivated land protection policies differ between developing and developed countries because of different developmental stages. Modernized developed countries attain high quality industrialization and urbanization, whereas developing countries remain at the stage of rapid industrialization and urbanization. Cultivated land protection policies aim to protect traditional farming landscapes and ecological environment in developed countries. However, cultivated land protection policies in developing countries also aim to continue sustaining a growing population during rapid industrialization and urbanization. This goal is particularly true for China as it has the largest population in the world. Land ownership in most countries is private, whereas that in China is public. Hence, research emphasis between developing and developed countries can be clearly observed.

Research in developed countries focuses on protecting rural scenic quality and ecological environment rather than the quantity and quality of cultivated land. Several mechanisms are available for farmland preservation, which span from regulatory, legal, and taxation, to acquisition pathways (*Stoms, Jantz, Davis, & DeAngelo*, 2009). Among the widely used mechanisms are purchase of development rights (PDR), clustering, and transfer of development rights (TDR) programs. *Stoms et al.* (2009) encouraged planners to consider strategic targeting in order to acquire agricultural conservation access as a politically acceptable mechanism to complement traditional planning tools in minimizing low-density sprawl. *Brabec and Smith* (2002) assessed the resulting fragmentation of the three most common types of agricultural land conservation tools in the United States, namely, PDR, clustering, and TDR programs. Meanwhile, *Dorfman, Barnett, Bergstrom, and Lavigno* (2008) focused on the potential preservation of farmland market. Results showed that a market that can preserve the most acres is a tax-funded, state-run program which can permanently preserve over 200,000 acres in 5 years. According to *Fischer et al.* (2012), conservation policy should be transferred from a "preservation strategy" to a "transformation strategy" in traditional farming landscapes. This strategy can empower rural communities to embrace sustainable development that provides a vision for the future rather than an attempt to preserve the past. Through a case study analysis of Richmond suburb in Vancouver, British Columbia, *Newman, Powell, & Wittman* (2015) investigated the relationship between peri-urban farmland preservation efforts and local food movements. The farmland preservation structure of the agricultural land reserve and its support from local urban food movements protected the landscape from urban development and continuously evolved it as an area for food systems engagement even under extreme pressure from suburban housing and related development.

Research in developing countries emphasizes protecting cultivated land for food security. In response to these food security concerns, the Chinese central government formulates a series of policies that aim to protect cultivated land. Some scholars have assessed the performance of China's cultivated land protection policies using statistical and spatially explicit approaches. Two major views emerged in this context. First, cultivated land protection policies are important in reducing the rate of cultivated land

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