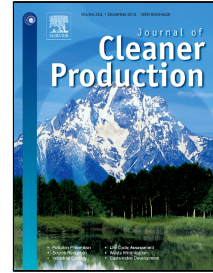


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# Analysis for Spatial-Temporal Changes of Grain Production and Farmland Resource: Evidence from Hubei Province, Central China

Ji Chai <sup>a</sup>, Zhanqi Wang <sup>a,\*</sup>, Jun Yang <sup>b</sup> and Liguozhang <sup>a</sup>

<sup>a</sup> Department of Land Resource Management, School of Public Administration, China University of Geosciences (Wuhan), 388 Lumo Road, Hongshan District, Wuhan 430074, China

<sup>b</sup> School of Geographic and Oceanographic Sciences, Nanjing University, 163 Xianlin Avenue, Qixia District, Nanjing, 210023, China

\* Corresponding author.

E-mail addresses: chajji\_cug@163.com (J. Chai), zhqwang@cug.edu.cn (Z. Wang), junyangland@163.com (J. Yang), zh.liguo@163.com (L. Zhang).

**Abstract:** Grain production and farmland utilization are the key issues to the stability of a region. As China becomes increasingly industrialized and urbanized, there have been many challenges to food security and farmland protection. This study conducts a case study on Hubei Province in Central China, aiming to reveal the spatial-temporal changes and the interaction between grain production and farmland resource by spatial analysis model. And accordingly, it provides suggestion and countermeasures to achieve the goal of strictly protecting farmland resource and safeguarding food security. The gravity center of grain production moved 120.40° and 13.45km in the northwest, while the gravity center of farmland area moved 8.14° and 5.60km to the northeast during the entire period, which revealed that the effects of farmland area change on grain production were more obvious than the inputs of agricultural machinery and chemical fertilizers, and grain production in northern regions accounted for an increasing proportion in Hubei Province. The level of spatial mismatch of farmland resource and grain production in Hubei Province fluctuated during the study period of 2002-2014, but it was gradually remedied after 2011. The quantity of regions with mid and high sensitivity continuously increased from 10 to 25 during 2002-2014, which revealed that the change of farmland area has an increasing influence on grain production in Hubei Province. The results can provide operable recommendations for efficient use of resources, sustainable development and maintaining food security from the aspect of spatial-temporal changes.

**Keywords:** Food security; Farmland protection; Spatial Gravity center; Spatial mismatch index; Sensitivity analysis

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## 1. Introduction

Grain and farmland are important strategic reserve resources and fundamental issues related to the food security and sustainable development of national social economy (Liu et al., 2014; Li et al., 2016a; Zhao et al., 2017). The concept of food security was first proposed by Food and Agriculture Organization of the United Nations in 1983, and defined as “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization of the United Nations, 2017a). Since then, food security has become the focus of the world's attention, especially the food security and grain production in China, owing to the country's a large number of population and limited farmland resource (Wei et al., 2015). The population in China reached 1.38 billion in 2016 (National Bureau of Statistics of

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