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Assessment of livelihood vulnerability of land-lost farmers in urban fringes: A case study of Xi'an, China

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ABSTRACT

Research on rural household livelihood vulnerability to climate change and extreme weather events (e.g., drought, flood and typhoons) has received broad attention; however, relatively few attempts have been made to assess the effects of social, economic, or spatial variation on livelihood vulnerability. With China's rapid urban expansion, many farmers in urban fringe areas are suffering great risks to their livelihoods because of land requisition. Thus, the livelihood of these land-lost farmers has become an important social issue in China. This article applies the livelihood vulnerability analytical framework to the case of land-lost farmers in the urban fringe of Xi'an who have been exposed to rapid urbanization. We developed indicators to assess the impact of exposure/sensitivity and response capacity on the livelihood vulnerability of land-lost farmers. Using a mix of qualitative and quantitative analyses, we combined data from in-person interviews and household surveys in 2015. Four types of livelihood vulnerability for land-lost households were classified: high sensitivity and high response capacity, low sensitivity and high response capacity, low sensitivity and low response capacity, and high sensitivity and low response capacity. The type of crop farmed before losing land had the greatest impact on the sensitivity of land-lost farmers, but no significant impact on response capacity. Having a commercially viable house, income diversity, educational level, land compensation, and social capital are major factors that influence the response capability of land-lost farmers. Our findings highlight the need for land-lost farmers to improve their educational level and occupational skills, and thus enhance their capacity for sustainable and diversified livelihoods. Simultaneously, local government must provide livelihood assistance in the form of employment training, improved social welfare, and limited disorderly urbanization.

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1. Introduction

China has witnessed rapid urbanization in the past two decades, not only in the growth of urban populations but also in urban spatial expansion (Chaolin, Liya, & Cook, 2012; He, Chen, Mao, & Zhou, 2016). According to the China City Statistical Yearbook, the total built-up area has steadily increased from 17,416 km^2 in 1993 to 36,450 km^2 in 2013, with an average annual growth rate of 3.76%. This rapid urbanization has led to a great demand for land, and thus a large proportion of agricultural land has been requisitioned and transferred to construction land. As a result, the number of land-lost farmers has grown each year. By 2008, 50 million farmers had had their lands expropriated (Hui, Bao, & Zhang, 2013). According to the *Annual Report on Urban Development of China* issued in 2011, expropriated farmland was projected to be 3,633,000 ha between 2000 and 2030; correspondingly, the number of land-lost peasants was predicted to increase by 3 million annually, reaching 110 million by the end of 2030 (Haijun Bao, 2016).

China's farmland provides employment, minimum living wage, social security, among other functions, which makes it a peasant's most important livelihood capital. After losing land, most farmers face severe livelihood risks. Not only are they unable to find suitable jobs because of their lack of occupational skills, but they are also unable to achieve the same social security that urban citizens enjoy, including education, medical care, and other basic public services. These farmers have become the most vulnerable group in China's society, a reality directly related to societal development and

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political stability, which are affected by the rise in social tension and injustice (Ding & Lichtenberg, 2011; Tan, Qu, Heerink, & Mettepenningen, 2011). Therefore, it is both critical and urgent to understand how to mitigate the livelihood risks of land-lost peasants and improve their ability to create sustainable livelihoods.

The concept of vulnerability has been a powerful analytical tool for describing states of susceptibility to harm, powerlessness, and marginality of both physical and social systems, and for guiding normative analyses of actions to enhance well-being through the reduction of risk (Adger, 2006). Vulnerability tools and methods have been applied to many fields such as disaster, climate change, social change, urbanization, and land-use change (Cutter & Finch, 2008; Eakin, Lerner, & Murtinho, 2010; Füssel, 2007; Huang, Li, Bai, & Cui, 2012). Vulnerability is the degree to which a system, subsystem, or system component is likely to experience harm from exposure to a hazard—either a perturbation or a stress/stressor (Turner et al., 2003). Despite numerous interpretations, the literature consistently considers the vulnerability of any system to be a function of three elements: exposure to stresses, sensitivity to the exposure, and the capacity of the system to cope, adapt, or recover from the effects of those conditions (Smit & Wandel, 2006). Exposure involves both the degree to which a system experiences environmental or socio-political stress (Kasperson et al., 2005). Sensitivity is the degree to which the system is affected by an internal or external disturbance. Response capacity (also called “coping capacity” or “adaptive capacity”) is the system's ability to adjust to a disturbance, moderate potential damage, take advantage of opportunities, and cope with the consequences of a transformation that occurs (Gallopín, 2006). These elements are usually incorporated into vulnerability assessments in one way or another (Reed et al., 2013).

The original livelihoods concept developed by Chambers (1992) viewed livelihoods as the means of gaining a living, and encompassed livelihood capabilities, and tangible and intangible assets. A livelihoods approach has emerged primarily from the fields of development and poverty alleviation, which analyses and explains assets or capital; five types of defined capital are human, physical, financial, natural, and social. Within the livelihoods framework, the term *sustainability* is often linked to the ability to cope with and recover from stresses and shocks (DFID., 1999). The strength of the sustainable livelihood (SL) framework lies in its comprehensive understanding of sustainable livelihoods based on a combination of livelihood context, livelihood capital, and livelihood strategies (Ifejika Speranza, Wiesmann, & Rist, 2014; Scoones, 1998; C. Wang et al., 2016). Although the SL framework offers many useful insights, it also has a number of limitations. These include its inability to capture the dynamism in assets over time, the substantial resources and skills required to implement the framework on the ground, and the insufficient attention it pays to the often complex ecological consequences of livelihood adaptations (Small, 2007).

In global change research, there appears to be a growing recognition that merging livelihoods and vulnerability approaches may provide useful insights into questions of local-scale risks (Eriksen & O'Brien, 2007; Lin & Polsky, 2016; Nelson, Kokic, Crimp, Meinke, & Howden, 2010). However, few studies have attempted to blend the livelihood framework with a vulnerability perspective. The livelihood approach and its analysis of assets provide important knowledge for identifying key elements in people's daily living practices. The vulnerability approach provides a three-dimensional framework for analyzing livelihoods at risk because of external change. There is thus a compelling need to conduct research that integrates livelihoods approaches with vulnerability dimensions to enable effective evaluation of household-level livelihood vulnerability (Lin & Polsky, 2016). Several studies that have attempted such integration have focused on livelihood vulnerability of rural households affected by climate change or extreme weather events such as drought, flood, or typhoon (Hahn, Riederer, & Foster, 2009; Lin & Polsky, 2016; Paavola, 2008). Nevertheless, few attempts have been made to include the livelihood vulnerability of land-lost households who have been exposed to rapid urbanization and land-use change in urban fringes.

China's urban fringe area is the most rapidly expanding urban area, but is also an area with many problems. The existing literature on China's urban fringe is dominated by studies about identifying boundaries of urban fringe (Cao, Miu, & Liu, 2009; Wang, Zhang, Kang, & Zhao, 2011; Peng, Zhao, Liu, & Tian, 2016), land use change (Zhao, Gong, Xie, & Li, 2009; Chen, Zhang, & Liu, 2003), spatial structure and function (Cui & Wu, 1990; Song, Zhao, & Yu, 2012; Zhao, 2010), social issues, and planning (Wang, Hu, & Zhu, 2016; Zhao, 2017; Yang, Niu, & Chang, 2005). These literatures mainly focus on the physical space of urban fringe areas, and most studies about land-lost farmers focus primarily on employment issues, land compensation, and social security (Li, Gan, & Gao, 2016; Liu, 2006; Chen & Lan, 2004). Livelihood risk caused by land requisition, the degree to which land-lost farmers are affected by land requisition, and the ability of farmers to cope with the consequences of land requisition, has rarely been studied. This paper aims to apply a livelihood vulnerability framework to China's metropolitan fringe areas where rapid urbanization and persistent land requisition has occurred. Based on the three dimensions of this framework (i.e., exposure, sensitivity, and response capacity), we analyze the impact of land expropriation on land-lost farmers, the difference in their sensitivity to the loss, and their ability to respond or cope with land requisition. In this paper, an index system for evaluating livelihood vulnerability was established by combing data from personal interviews and household surveys. Additionally, this paper proposes a livelihood vulnerability index that indicates the degree of differentiation amongst the livelihood vulnerability of land-lost peasant households. Finally, the paper analyzes characteristics of livelihood vulnerability, particularly factors that limit the response capacity of land-lost farmers, and provides strategies for reducing livelihood vulnerability and enhancing coping capacities of relevant management organizations and policy makers.

2. Study area and data sources

2.1. Description of study area

The study area, Xi'an, is the administrative center of Shaanxi Province, which is located in central-northwest China. It is located at 34°16′N latitude and 108°54′E longitude, and has an average elevation of 1027 m above sea level. As a capital of 13 dynasties, and the eastern terminal of the Silk Road, Xi'an is recognized as one of the most important cities in China, both historically and currently. In recent decades, Xi'an has undergone rapid urbanization and urban growth. Its population has increased from 6.31 million in 1993 to 8.07 million in 2013; the proportion of urban population has grown from 38.2% in 1990 to 76.7% in 2013. According to the Xi'an Statistical Yearbook, in 2013, the total urban area was 505 km^2, whereas in 1993 this area was only 148 km^2. The built-up area has expanded almost four-fold in the past 20 years. Since 2000, to promote urban economic development, the Xi'an municipal government proposed seven development zones in the Eleventh Five-Year Plan for Xi'an Economic and Social Development; these are: the Hi-Tech Industries Development Zone, the Economic and Technological Development Zone, the Chan-Ba Ecological District, the Qujiang Culture Industry Development Zone, the XiXian New Area, the International Trade and Logistics Park, and the Civil Aerospace Industrial Base. The development of these zones led to

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