



Land use transitions and land management: A mutual feedback perspective



Hualou Long^{a,b,c,*}, Yi Qu^{a,b,d}

^a Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China

^b Center for Assessment and Research on Targeted Poverty Alleviation, Chinese Academy of Sciences, Beijing 100101, China

^c College of Resources and Environment, University of Chinese Academy of Sciences, Beijing 100049, China

^d University of Chinese Academy of Sciences, Beijing 100049, China

ARTICLE INFO

Article history:

Received 15 January 2017

Received in revised form 16 March 2017

Accepted 20 March 2017

Keywords:

Urban-rural transformation development

Urban-rural land use system

Theoretical model

Socio-economic path

Environmental path

Mutual feedback mechanism

Policy-institution innovation

ABSTRACT

This paper develops a theoretical model of regional land use transitions based on expanding and deepening the concept and connotations of land use transition. With the socio-economic development, transformations between different land use types during a certain period of time cause the change of the conflicts resulted from regional land use morphology pattern from strong to weak. These transformations will lead to a new balance of regional land use morphology pattern consists of different land use types corresponding to related economic departments, respectively, and will finally realize the qualitative transformation of urban-rural land use system. Then, the mechanism of mutual feedback between land use transition and land management was probed based on a three-fold framework of natural system-economic system-managerial system. Generally, land use transitions are affected by land management via economic measures, land engineering, policy and institution. Land use transitions can also contribute to the adjustment of land management measures via socio-ecological feedback. The authors argue that the formulation of land management policies and institutions needs to take into account the land use transition phase of targeted region, not only current land use transition phase but also its subsequent phase corresponding to regional socio-economic development transformation.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

Land use transition was firstly put forward based on the researches of forest transition (Grainger, 1986; Mather, 1990, 1992), referring to the dominated national land use morphology of forest changes over time corresponding to the stages of regional socio-economic development (Grainger, 1995). From then on, the research of forest transition as the core of land use transition research has been pushed forward, mainly focusing on the theoretical development and empirical studies in the Europe countries (Mather, 2004; Mather and Needle, 1998) as well as countries in Asia (Mather, 2007) and America (Grau and Aide, 2008; Ye and Huang, 2013). Although many of the evidences supported the original forest transition hypothesis and trajectories, there were still some researches showed different opinions. For example, it showed that forest cover change involves complex trajectories,

some of which are cyclical and reversible, while others linear and permanent (Carmona and Nahuelhual, 2012). Barbier et al. (2010) developed a more comprehensive theory of the forest transition and argued that long-run changes in forest cover in a country or region cannot be separated from the national or regional pattern of land use changes, taking into account of the competition among different land use.

The research of land use transitions including forest transition has been the foci of studying land change science since the turn of the new millennium (Turner et al., 2007; Mizutani, 2012; Romo-Leon et al., 2014; Long et al., 2007; Su et al., 2011, 2012; Li and Zhao, 2011; Rounsevell et al., 2012), ranging from those who favor the development of analysis methods and detection technologies (Ferreira et al., 2015; Guo et al., 2015; Ye and Huang, 2013), the dynamic driving mechanism (Jadin et al., 2016; Li et al., 2015a,b; Liu and Long, 2016; Nourqolipour et al., 2016; Tsai et al., 2015; Wolfersberger et al., 2015), the environmental effects (Liu et al., 2015a,b; Long et al., 2014; Nuissl et al., 2009), to those who try to understand the relationship between land use transitions and socio-economic development (Chen et al., 2014; Grau and Aide, 2008; Lambin and Meyfroidt, 2010; Nizalov et al., 2016).

* Corresponding author at: Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, 100101, China.

E-mail address: longhl@igsnr.ac.cn (H. Long).

Accelerated urbanization and subsequent increase of human activities are triggering tremendous land use transitions in China (Liu et al., 2014; Long, 2014a; Tan et al., 2011). Land use transitions can be seen as primary forces of driving the transformations of rural systems, and bring about direct socio-economic and environmental effects on rural sustainability, e.g., resulting in farmland loss and soil degradation, affecting biodiversity and the ability of ecosystems to serve human needs, polluting the rural environment, influencing agricultural production and food security, and causing the socio-economic and spatial restructuring of rural area. With the introduction of land use transition research into China (Long and Li, 2002; Long, 2003), related researches combining land use transitions with the sustainability of rural China have been carried out extensively (Long, 2014a,b; Long and Liu, 2016), e.g., morphology evolution and functional transition of the rural settlements and cultivated land (Long et al., 2007; Long and Li, 2012; Song et al., 2015; Fang and Liu, 2014; Zhu et al., 2014; Yang et al., 2016; Fang et al., 2016; Wang et al., 2016; Zhang et al., 2016), urban village and hollowed villages (Liu et al., 2010a,b; Long et al., 2012; Lin and De Meulder, 2012; Zacharia and Lei, 2016), the spatio-temporal patterns and driving forces of rural housing land transition (Tan and Li, 2013; Song and Liu, 2014; Liu et al., 2015a,b; Li et al., 2015a,b), land use transitions and rural transformation development (Long, 2012; Li et al., 2015a,b), and land use transitions and rural livelihoods (Xu et al., 2006; Su et al., 2014; Tian et al., 2016; Zewdie and Csaplovics, 2016).

Land use transition is a two-edged sword for rural sustainability. Recently, there has been an increasing trend emphasizing land resource in formulating rural development policy and affecting rural sustainability (Long et al., 2016). Optimal allocation and efficient management of land resource are favor of sustainable rural development. However, the process of land use transitions affected by the allocation and management of land resource is complicated, as the value of one land use type relative to that of its competing use changes over time. Sometimes, the actual values that are used to allocate land may be far from optimal, and undermine the rural sustainability by the distorted economic and political incentives due to the policy and institutional failures (Barbier et al., 2010). So, there is an urgent need to examine the interconnections between the environment, the social setting and resultant tensions in considering how land use transitions can achieve multiple benefits (Robinson and Carson, 2013), i.e., how to control land use transitions by efficient land use management. Aiming at this point, a better understanding of the mutual feedback between land use transitions and land management is an important premise for promoting rural sustainability via land use transitions, by which land use transitions can be adjusted to appropriate trajectory by implementing land management measures in the direction of sustainable regional socio-economic development.

As such, it is pivotal to establish a theoretical framework in order to develop land management policy that can promote future land use transitions capable of meeting multiple goals and satisfying demands from various stakeholders by incorporating a broad spectrum of disciplines. The aims of this paper are: (1) to develop a theoretical model of regional land use transitions based on expanding and deepening the concept and connotations of land use transition; (2) to probe the mechanism of mutual feedback between land use transitions and land management; and (3) to illustrate the mutual feedback between land use transitions and land management based on the practices of land use management in China, for the purpose of translating the research of land use transitions into the practical countermeasures of land use management to cope with the land use issues resulted from rapid urban-rural transformation development in China.

2. Land use transitions and land management: a theoretical framework

2.1. Regional land use transitions: a theoretical model

Land use transition is a new theme of the comprehensive research of land use/land cover change (LUCC) (Cai, 2001a; Long, 2003), the concept of which was first introduced into China with an initial meaning of temporal changes in land use morphology corresponding to socio-economic development transition, and the land use morphology means mainly the quantity and spatial structure characteristics of land use in a region at a given time (Grainger, 1995; Long and Li, 2002). However, with the socio-economic change and innovation, only focusing on the quantity and spatial structure characteristics of land use morphology cannot meet the demands of the research on land use transition (Lambin and Meyfroidt, 2010; Long and Li, 2012). With the in-depth research of land use transition, the concept and connotations of land use morphology were further developed and expanded as two kinds, i.e., dominant morphology and recessive morphology (Long and Li, 2012).

The dominant morphology refers to land use structure of a certain region over a certain period of time, with features such as the quantity (area, proportion) and spatial pattern of land use types. While the recessive morphology is a special morphology which relies on the dominant morphology but can only be observed by the means of analyzing, testing, monitoring and surveying, includes the land use features in the aspects of quality (nutrient, pollution, degradation), property rights (state-owned, collective-owned), management mode (individual, joint-stock system, transfer and large-scale management), input (capital, technology, labor), output (yield, output value, input-output ratio) and function (production, living, ecology, culture) (Long, 2012). Accordingly, the concept of land use transition may be further developed as the changes in land use morphologies, including dominant morphology and recessive morphology, of a certain region over a certain period of time driven by socio-economic change and innovation, and it usually corresponds to the transformation of socio-economic development phase (Long, 2012).

To some extent, the regional land use transitions are essentially a process during which different land use types representing the benefits of different departments conflict in space and try to alleviate these conflicts by changing the morphologies in time. Accordingly, the theoretical model of regional land use transitions is established as follows: with the socio-economic development, transformations between different land use types during a certain period of time cause the change of the conflicts resulted from regional land use morphology pattern from strong to weak, i.e., a trend towards coordination; these transformations will lead to a new balance of regional land use morphology pattern consists of different land use types reflecting the development trend of corresponding economic departments, respectively, and finally realize the qualitative transformation of urban-rural land use system (Fig. 1).

Land use transition refers to the changes of regional land use morphology, and the regional feature is an important aspect of land use transition research. Strictly speaking, the transformation of single land use type, e.g., farmland was changed to forested land, cannot be treated as land use transition, which can only be treated when it is put into the context of regional land use structure and functions to analyze the changes of land use morphology.

Usually, the process of land use transitions comprises long-term and trend changes of regional land use morphology. The fundamental change of land use morphology or the turn of its changing direction indicates an accomplishment of land use transitions in a certain period. New land use issues arise with the socio-economic development will bring about new conflicts of regional land use

Download English Version:

<https://daneshyari.com/en/article/6546380>

Download Persian Version:

<https://daneshyari.com/article/6546380>

[Daneshyari.com](https://daneshyari.com)