

ENVIRONMENTAL SUSTAINABILITY AND SCENARIOS OF URBANIZATION IN ARID AREA —A Case Study in Wuwei City of Gansu Province

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ABSTRACT: Based on data of questionnaire and field survey and two developing models of Business As Usual (BAU) and the Intensive Urbanization (IU), this article, taking Wuwei City, a medium size city and typical oasis arid area in Gansu Province with very vulnerable and sensitive natural environment but long history of oasis economy, as an example, evaluated the sustainability of its environment and analyzed the scenarios of Wuwei's household energy consumption, waste discharge in transportation industry, primary industry, secondary industry, tertiary industry, by the integration of the systematical dynamics model Stella and Polestar language to simulate the future development of the research area. The results showed that, first, the developing model of IU was propitious to Wuwei City named for oasis economy and vulnerable natural environment. The strategy of "Intensive Urbanization" can change the structure of energy utilization, and improve the efficiency of energy utilization. Second, the proportion of domestic energy consumption will decrease with industrialization and economic development, while that of tertiary industry, secondary industry and transportation will gradually grow up according to strategy of "Intensive Urbanization". Third, the Wuwei City is facing a severe eco-environmental crisis under the conventional patterns of development and a better future under a sustainable urbanization scenario, in the next 10 to 20 years. The different developing trends were clarified and the relative countermeasures were put forward for the policy makers according to the driving forces.

KEY WORDS: impact of urbanization on environment; sustainability of eco-environment; scenario analysis; Wuwei City; arid area

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1 INTRODUCTION

The western China is facing growing problems of ecological and economic development. The disparities between the socio-economy of the western and eastern China were enlarging, and the major ecological problems still evolve as past (HU *et al.*, 1995). Too many people concentrated on rural space, exerting great pressure on local ecology and socio-economy. That was the essential barrier impeding the sustainable development (JEROEN, 1996). Wuwei City is one of typical oasis arid areas in Hexi Corridor in developing western China. The eco-system of Wuwei City is very fragile. As we know, the contradiction between economic development and ecological environment in vulnerable area is more and more conspicuous (DONG *et al.*, 1996;

BRENGLE, 1982; SONG *et al.*, 2000). Many cases showed that there are characteristics named Environmental Kuznets Curve between economic development and environment (AGRAS and CHAPMAN, 1999; BERGGREN, 1999; BOULDING, 1966; VINCENT, 1997; TORRAS and BOYCE, 1998). Urbanization is one way to realize eco-economy development in vulnerable area, then we can develop economy and decrease environmental pollution (CONSTANZA, 1991). Urbanization is an important spatial representation of modern society in the aspects of social, economic and cultural behavior (CAMERON, 1993). Urbanization is included in the complex system, which comprises social, economic and ecological factors, and now it becomes one of the driving forces of evolution of eco-economic system (MALTE *et al.*, 1996). China's average urban-

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