

RF-067 Recycling-oriented society and urban-rural sustainable land-use planning in the urban fringes of Asian large cities (Abstract of the Final Report)

Contact person HARA, Yuji
Project Assistant Professor
Integrated Research System for Sustainability Science (IR3S)
The University of Tokyo
Hongo 7-3-1, Bunkyo-ku, Tokyo 113-8654, Japan
Tel: +81-3-5841-1541 Fax: +81-3-5841-1549
E-mail: hara@ir3s.u-tokyo.ac.jp

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[Abstract]

Suburbanization in Asian countries is creating many serious environmental problems, hence sustainable urban-rural planning in the context of Asian land environment is immediately needed. To improve our understanding of the current urban-rural mixture and provide future regional visions in such cities, we conducted case studies in the suburban areas of Bangkok, Thailand and Tianjin, China. We first focused on the material flows, and evaluated the current urban-rural land-use mixture. Then we made two contrastive land-use scenarios for 2020; high-rise compact development vision and low-story sprawl development, and compared them each other in terms of material input and energy consumption. We found that, on the premise of the current infrastructures and technologies, the later scenario was advantageous in both material input and energy consumption than the former scenario, thereby supporting positive aspects of urban-rural mixture. Finally, based on these results, we pointed out which parts of the current planning systems have to be improved.

1. Introduction

Large Asian cities in monsoonal areas are situated mainly on deltaic lowlands. Recent economic growth has led to the expansion of urban areas into peripheral agricultural areas, and broad areas of mixed urban-rural land use are emerging. Mixed urban-rural land use is creating many environmental problems, so that effective control of urban growth is urgently needed (Yokohari et al., 2000).

The current spatial planning system implemented into these cities derived from Western planning concept, which aims to purify urban from rural area. However, the progress of urban-rural land-use mixture has been overwhelming such a system. Hence we have to elaborate urban-rural planning strategies for Asian urban fringes where land uses are inherently highly variable (Takeuchi and Hara, 2006).

2. Research Objective

This case study aims to evaluate positively urban-rural land-use mixture using four indicators flowing between urban and rural lands: Building and filling materials; Solid wastes; Water/nutrients flow; and Population. We focus on the peripheral mixed land-use areas in Bangkok, Thailand and Tianjin, China. This study can provide useful information toward the establishment of new urban-rural planning strategies for Asia.

3. Methods

We field surveyed the Nonthaburi Province, suburban area of the Bangkok Metropolitan Region, during 2006-2007 for a total of two months. We also field investigated the suburban four counties of Tianjin, during 2006-2007 for a total of two months.

3.1. Collection of the basic spatial and statistical data

We visited several provincial, municipal and district offices to obtain the basic spatial and statistical data that can be applied to our GIS analyses. The collected data includes a time series of aerial photographs, paper and digital maps, and population, solid wastes, hydrological statistics and reports for our study area. They are generally not available through the internet nor the retailers, thereby having high originality.

3.2. Interview and questionnaire surveys for evaluating minimum units and flow structures

We conducted interview survey using questionnaire to understand minimum units of the four indicators (e.g., waste generation from each house or consumption of the fertilizer for one farming parcel) as well as the spatial structures of these flows.

3.3. Measuring household waste generation, water level and water quality in the field

We field measured actual weights of household wastes according to waste composition. We also monitored water level and quality along the canal to estimate nutrient flow.

3.4. GPS tracking survey

We carried out tracking survey for the municipal garbage trucks using GPS (attached to the trucks) with kind permission from the local government. This data can be used to support the estimation of waste generation and flow model.

3.5. Scenario development

We developed two contrastive land-use scenarios for 2020 with a projection of 5000 population increase; high-rise compact development vision and low-story sprawl development vision, and compared them each other in terms of material input and energy consumption.

4. Results and discussion

Figure 1 is the results of our scenario development for a part of the Nonthaburi Province, showing material input, stock and output per each irrigation districts.

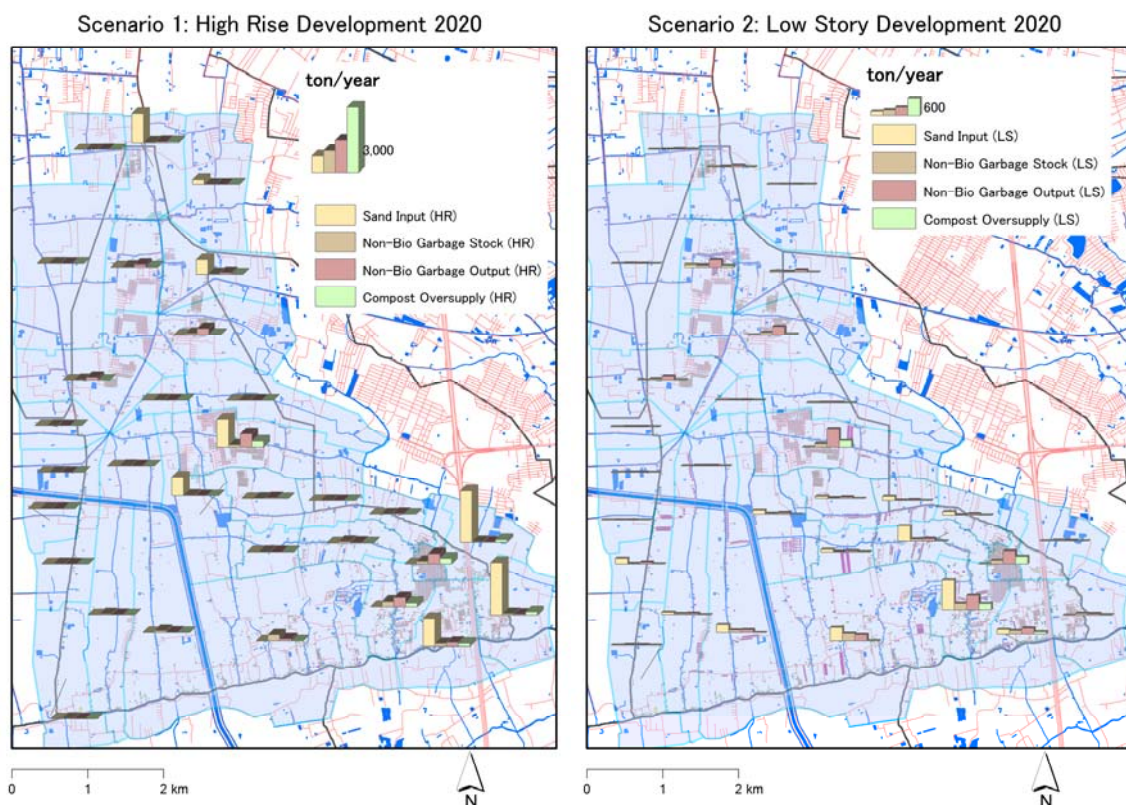


Figure 1: Scenario maps for Nonthaburi case study

Scenario 1 has higher sand input for constructions than Scenario 2. As for waste generation stocked in the area, there is no significant difference in it between Scenario 1 and 2. Overall, on the premise of the current infrastructures and technologies being kept without any innovations, the later scenario was advantageous in both material input and energy consumption than the former scenario, thereby supporting positive aspects of urban-rural mixture. Based upon it, we proposed that the present gap between urban land-use plan and agricultural irrigation plan must be bridged (Figure 2).

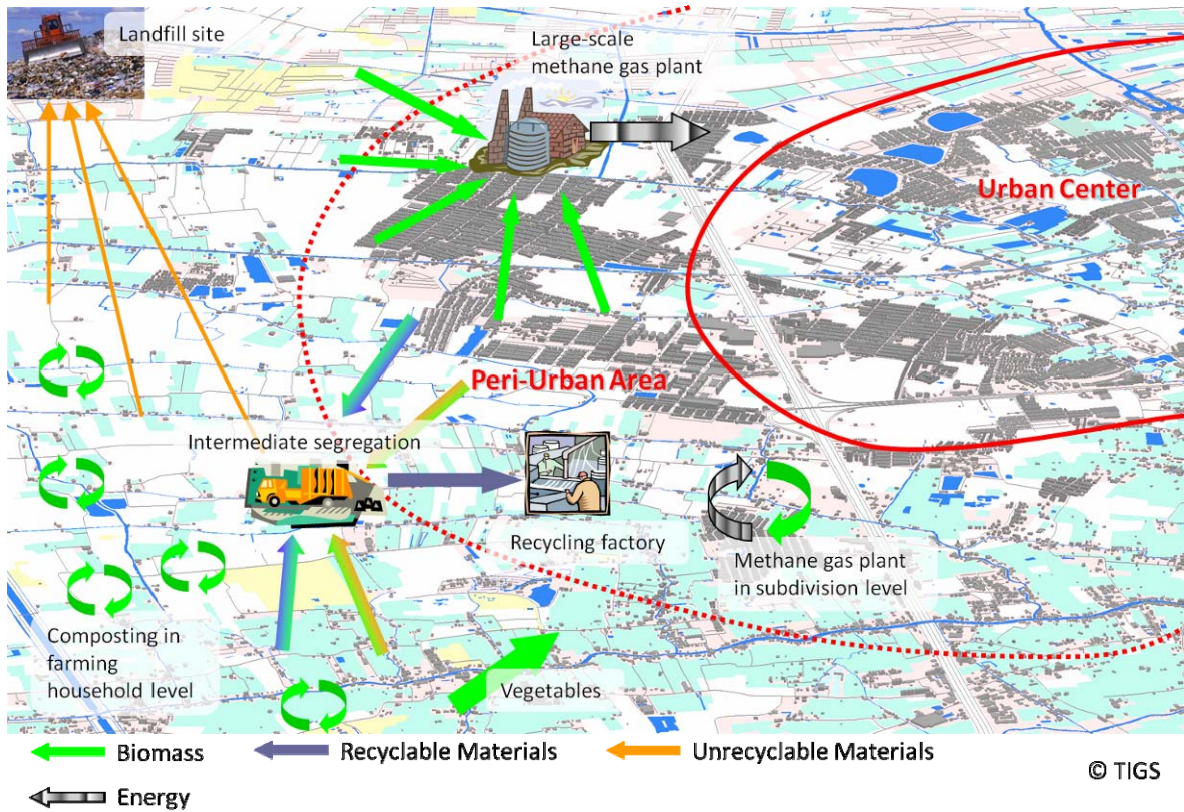


Figure 2: Urban-rural future vision

As for Tianjin case study, we found that the current urban and rural planning are seriously separated each other. We pointed out that new urban land development must include the management scheme to surrounded farmlands (Figures 3 and 4).

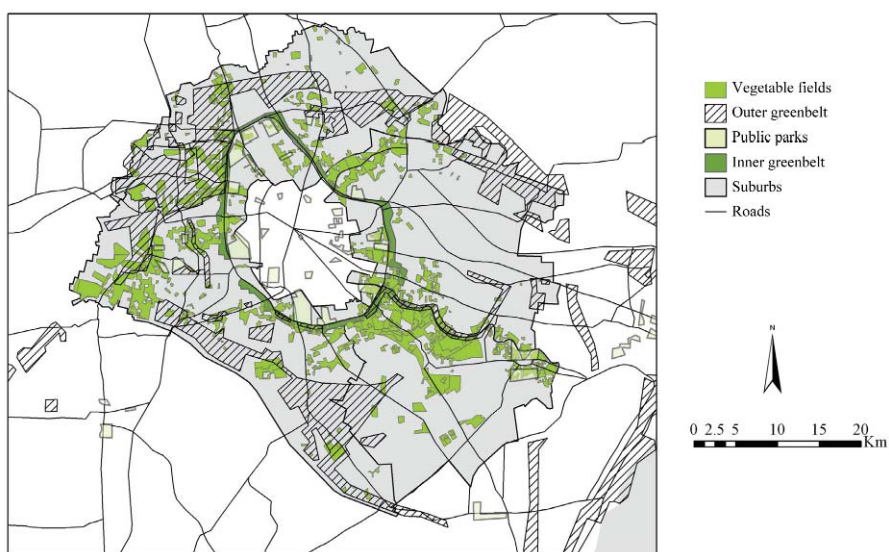


Figure 3: Green network including both urban green spaces and farmlands



Figure 4: Urban-rural harmonious development vision

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