

## CHAPTER 1

### INTRODUCTION

#### 1. The purpose of this study and previous studies

This study provides a micro-level examination of the relationship between land-use change and land-use decisions of agents in an urban land market<sup>1</sup>.

'Land' can be thought as a system which comprises many subsystems concerning climate, landforms, soils, water, landscape, ecosystem, and production of mineral resources (Mather, 1986; Ganderton, 1994). The system varies with regional characteristics. 'Land-use' is the output of the system used by many human activities. Therefore land-use examination requires a comprehensive geographical viewpoints (Himiyama, 1992). Watanabe (1958) pointed out that the geographical significance of land-use studies was characterized by the following two points. The first point was the spatial understanding of many phenomena by drawing land-use maps, and the second point was the comprehensive analysis of study areas with historical, natural-environmental, and regional viewpoints.

Geographical studies of land-use change have been at both micro and macro levels of analysis. Stamp (1947) and Coleman (1961) studies are good examples of macro level analysis. In these studies, they drew land-use maps throughout Great Britain and discussed the relationships between land condition and food production. In Japan, there are also macro-level studies using topographical or land-use maps, which are revised at regular intervals and distributed by the Geographical Survey Institute of Japan (Yamamoto *et al.*, 1977; Seto, 1977; Ishizawa, 1989). After statistical data were

provided in the 1980s, land-use combinations, pattern of land-use change, and the relationship between land condition and land-use have been analyzed at the macro level using Digital Land Information provided by the National Land Agency of Japan (Akagiri, 1987; Bito, 1992; Tsutsumi, J., 1995). Using the Geographical Information System (GIS), Hashimoto and Kimura (1997) addressed the problem of incompatible data format (raster versus vector), which had plagued previous studies. Macro-level studies have the advantage that analysis is not constrained by municipal boundaries, and can range in scale from several square kilometres to prefectural and even national levels.

At the micro-level, there have also been a large number of land-use studies, particularly on issues that concern the leading indicators of urbanization<sup>1</sup>. In the beginning, concern over land-use issues focussed on areas where rural land-use dominates the landscape. Yajima (1942) gave a clear description of truck farming in the western suburbs of Tokyo particularly in terms of land-ownership change, and stated that farmers demonstrated tendencies to sell part of their own land and to rent apartment houses. After World War II, with high growth in the Japanese economy, there was some change in farmers' behaviour in a time of urbanization. The spread of urban land-use extended into rural areas, gradually giving rise to land-use conflict between rural and urban land. In general, although the proportion of part-time farmers expanded steadily, most of the farmers had a tendency to spare their farmland as much as possible (Arizono, 1972). Conversely, some farmers reduced their proportion of land dedicated to farming, and instead turned to renting their properties for apartment houses, parking lots, and so on (Fukuhara, 1971; Nagashima, 1972; Harada, 1976). Moreover, in a body of literature on the conversion of prime land to urban land through

an Application Roll for Urban Development (*nouchi-tenyo*), regional characteristics of land-use change were also analyzed (Takahashi, N., 1977).

During the 1960s and early 70s, a period of highly industrialization occurred in Japan, causing conflict between rural and industrial land-use. In this period, factory location in agglomerated areas formed a striking contrast with that in the small local cities; capital-intensive divisions remained in highly industrialized areas, while labour-intensive divisions dispersed into rural areas. Small local cities were characterized by an influx of factories from large companies based in big cities. This trend was called 'heteronomous urbanization (*taritsuteki-toshika*)' (Tanabe, 1960; 1979). When a factory moved to a rural area, much farmland was replaced not only by a factory itself but also by company houses, welfare facilities and shops attached to the factory (Takahashi, N., 1968).

After the late 1970s, a leading indicator of urbanization gradually switched from factory location to service industries due to advances in technology and socio-economic change (Morikawa, 1990; Hino, 1996). As service industries constituted a large proportion of land-use, land-use issues were considered in the context of office location (Aoki *et al.*, 1979; Hayashi, 1995). For example, the accumulation of urban office functions, such as administrative offices or management division of firms, has a close relationship to urban growth<sup>3</sup>. In Japan, it was the most striking feature of urbanization. During the late 1960s and the early 1970s, such accumulation of urban office functions was only seen in big cities. But, after the late 1970s, accumulation of urban office functions also became a good indicator of urban growth in medium-sized cities with an industrial structure like other western countries (Yoshida, 1974; Abe, 1991; Hino, 1996). There are two viewpoints to an analysis of urban growth in terms

of accumulation of urban office functions. They are the inter-city and intra-city levels of analysis (Hayashi, 1991). Many land-use issues are dealt with mainly at the intra-city level. New location or transfer of high-rise buildings (e.g., office buildings) changes land-use inside the city and causes reorganization of intra-city (urban) structure. With building growth, land-use inside the city undergoes functional differentiation, not only horizontally but also vertically (Todokoro, 1986). Although land-use studies in terms of the centralization of several urban functions are often limited to the central business districts (CBD), some articles have confirmed the general characteristics of three-dimensional land-use in built-up areas: lower floors of buildings tend to be occupied by shops, restaurants and financial or insurance companies; middle floors by shops and offices; higher floors by shops, offices, hotels and residencies (Kuwejima, 1984; Matsumura, 1992; Suzuki, 1979; 1981; Todokoro, 1986; Yamashita, 1987; 1996; 1999).

Given these general observations on land-use studies, two levels of analytical viewpoints are identified. One is the macro-level study analyzing objectively the spatial pattern of land-use by the mesh method (grid pattern analysis). The other is the micro-level study in relatively smaller study areas in built-up or rural-urban fringe areas. Typically, such are several hundreds meters or several kilometers square, consisting of housing, industrialization and the accumulation of urban office functions, which are leading indicators of urban growth (Bourne, 1976; Johnson, 1974; Mather, 1986; Rhind and Hudson, 1980).

On the other hand, Kiuchi (1985) suggested, in relation to the fact that land-use issues have been analyzed separately at micro or macro levels, land-use issues should be argued from the view point of 'whole city' or 'whole urban field', not from the

narrow view point of each study area. That is because land-use is the mirror of socio-economical and cultural activities in the city. In this context, there are three related works. (1) In terms of commercial activity, Todokoro (1991) argued for the close relationship between the decline in existing shopping districts in the city centre and the remarkable growth of shopping malls in the suburbs. (2) Concerning to the relationships between specialization or purification of land-use (micro-level phenomena) and the decentralization of urban functions (macro-level phenomena), Tanabe and Nishihara (1978) tried to harmonize these two viewpoints using the distribution of wholesale offices in Sendai city as their example. (3) Yamaga (1981, pp.88-113) analyzed the urbanization process in Koganei city, a western suburb of Tokyo, from Stage 1 (rural) to Stage 5 (complete urban), from the viewpoints of housing, industrializing, and transfer of universities in accordance with the leading indicators of each stage.

These three works are important for their emphasis on achieving a proper balance between different viewpoints and scales, even though their main purposes were not land-use analyses. In addition, in Europe and North America (especially in Canada), the balance between macro and micro scales and between individual and synthetic analyses have attracted the attention of many geographers in academic journals, who have promoted similar view. Most of these studies analyze land-use issues in a chain of land-development stages from rural to urban. These studies are categorized in 'land conversion studies', and many related issues has been under study since the late 1980s (Pierce, 1981; Gore and Nicholson, 1991; Pond and Yeates, 1993; 1994a; 1994b; Ganderton, 1994).

Bryant (1981) and Clawson (1971) stated that land-use analysis at the micro-level

in sample areas should be synthetically considered in the context of natural and socio-economical environments surrounding a city. In relation to this statement Kikuchi<sup>4</sup> analyzed interactions between several factors affecting urban land-use change by using example areas situated in different zones in the Auckland metropolitan region, New Zealand. In a series of studies, he regarded development stages and a different strength of the potential urbanization forces in the same metropolitan region as important. In one sample area situated close to the built-up area of Auckland where urban pressure was high, definite conversion to urban land-use was identified due to increased interactions between such factors. In the other sample area situated in the city's countryside, most of the agricultural land-uses were sustained, although the area was under urban pressure. Kikuchi's works were noteworthy because he tried to synthesize a number of factors such as urbanization, change in farming management, innovations in farming, land-ownership change and regulations<sup>5</sup>, increase of urban newcomers in the original rural communities (*konjuka*)<sup>6</sup> which were usually treated separately in previous studies. However, the studies were insufficient in that they did not address behavioural factors (e.g., decisions for land-use and farming management), which couldn't be discussed before.

In the 1960s and early 70s, there were strong arguments for and against incorporating the decision-making process into geographical studies in the context of criticism toward quantitative geography. Kohsaka (1975) called the inclusion of the decision-making process into geographical analysis, 'spatial process issues'. These sorts of studies were regarded as the 'behavioural approach', and attracted the attention of many geographers (Wakabayashi, 1985). In the late 1970s, however, 'spatial process issues' were out of vogue. Early studies on this issue overestimated individual

cognition and preference, and lacked in an attempt at considering several restrictions in spatial or social frameworks (Gold, 1992; Okamoto, 1998). That is, in the geographical literature, 'spatial process' which includes the decision-making process was treated as a 'black box', because it was beyond the domain of geography. Conversely, in other sciences like psychology, sociology, and behavioural sciences, as mentioned later, there have been a large number of studies on cognitive processes, which control human behaviour. As a result, during the 1980s, there has come to be the common recognition that human behaviour could be considered as an output of rational decision making under several restrictions. Corresponding to the common recognition of human behaviour, some geographers have come to a new understanding of the necessity for 'spatial process issues' (Hayashi, 1991; Walmsley and Lewis, 1984; Okamoto, 1998). In addition, the progress in efficiency of computers during the last decade and the spread of the Geographical Information System (GIS) have made it easier to map and process data, supporting the revival of the behavioural approach to geographical studies (Bryant *et al.*, 1982; Golledge and Stimson, 1987; Walmsley and Lewis, 1984). Some example studies with behavioural approach are: Tanaka (1982), who investigated the urban growth process from the viewpoint of how did the farmers transfer their land ownership, using a case study of Mitaka city, a western suburb of Tokyo. Nakamura (1995) focused on the farmers' recognition processes to choose crops which were most suitable for particular natural conditions. Pyle (1986; 1989) analyzed the decision-making process of landowners and revealed that their decisions were closely related to shape patterns of land-use. Ganderton (1994) also analyzed the relationship between spatial pattern of land-use and land-use decisions of agents, and the characteristics of decision-making processes of agents. Pond and Yeates (1993; 1994a;

1994b), in a series of articles, regarded land-ownership as an important indicator of urban influence and made clear the characteristics of land-ownership change and land-transactions by each zone. These studies were notable examples of the behavioural approach.

There have been a large number of studies of the general land-use issues as observed above. However, one important aspect which has been paid only little attention is the 'driving force' viewpoint of land-use. That is, the relationship between land-use change and land-use decision-making. Human behaviour has an increasing influence over land-use change. It becomes important, then, to analyze the effect on spatial land-use pattern from the viewpoint of the decision-making process of agents (e.g., occasions, conditions, and timing of their decisions). In addition, it is also important to consider the land-use and decision-making processes not only at a micro-level, but synthetically at the macro-level, just like the whole process viewpoint of urban development.

From these general observations, this dissertation has the following objectives: analyze the land conversion process at the micro-level from the viewpoint of decision agents in an urban land market (e.g., landowners, land buyers, intermediate actors, etc); and discuss this analysis at the macro-level in view of the whole process of urban development from rural to urban. These objectives are pursued by undertaking a case study of Maebashi city.

## **2.Viewpoints and methods**

As for the decision-making process, little study has been conducted within geography, while a large number of studies appear in other sciences like psychology,

sociology and behavioural sciences (Giddens, 1979; Innami, 1997). The studies in other sciences concerning to decision-making process are categorized into two groups. One is 'descriptive analysis of individual cases' in which agents are considered to be 'active' and their behaviours are treated as expressions of their independent decisions. The other is 'determinismistic analysis' in which agents are considered to be 'passive' and their behaviours are treated as results of their decisions under several restrictions (Okamoto, 1998). However, a single viewpoint, especially in empirical analyses, is not sufficient to explain human behaviour. Therefore, some intermediate point of view becomes necessary (environmental-psychologism). It is commonly thought that human behaviour derives from rational decisions under several restrictions (Mamada, 1991). As mentioned before, the behavioural approach, although in decline in the past, is again drawing the attention of geographers. This recent appeal is due to a reconception of the behavioural approach that is neither descriptive nor determinismistic (Golledge and Stimson, 1987).

The proper balance between macro and micro scales, and between individual and synthetic analyses were employed for the analysis in this dissertation. In other words, at first the author considers land-use and decision-making processes at a micro-level, and analyzes them synthetically at a macro-level for the whole process of urban development from rural to urban. For this viewpoint, a medium-sized city with a population of approximately 200,000 to 300,000 with only one core developed area is appropriate. In addition, relatively little analysis on the development processes has been conducted on medium-sized cities (Hino, 1996), even though most prefectural capitals in Japan are this size. For these reasons Maebashi city makes for a suitable case study.

The dissertation consists of six chapters. The author puts forth the assumption made in this thesis, and gives a historical background for Maebashi city in the rest of this chapter. An outline of the urbanization process for the city is presented in chapter 2. Digital Land Information is employed for selecting two example areas for micro-level analysis. Chapters 3 and 4 explain the decision-making processes of agents (e.g., landowners, land buyer and intermediate actors), in the example areas. Chapter 5 focuses on the proper balance between different scales. In this chapter, the author discusses the micro-level analyses of decision-making processes of agents, that are introduced in the previous chapters, in the context of the whole process of urban development. Finally, conclusions are presented in chapter 6.

In order to obtain land-ownership data<sup>1</sup>, land assessment rolls were used. The Property Tax Division of Maebashi City Hall houses the rolls that are cross-referenced with the data at Maebashi's Legal Affairs Bureau (*homukyoku*). By using the rolls, it was possible to compile an array of information about land-ownership including the name and address of landowner, the lot size, in some cases, the date of sale or inheritance, and so forth. The selection of agents in the urban land market was based on land trade and land inheritance data from files housed in Maebashi City Hall (Figure 1). The data of 1980 and 1993 were examined for the sample areas. The sample areas are located in central Maebashi (1,159 lots); and the Rokku area (2,008 lots), an example of rural-urban fringe. The land-use survey for the Rokku area was conducted in August, 1993; and for the central area in August, 1997. To obtain information on the decision-making processes, the author interviewed the selected agents during the period September, 1993 to August, 1994 for the Rokku area. The interviews were repeated for the central area during the period March, 1997 to March,

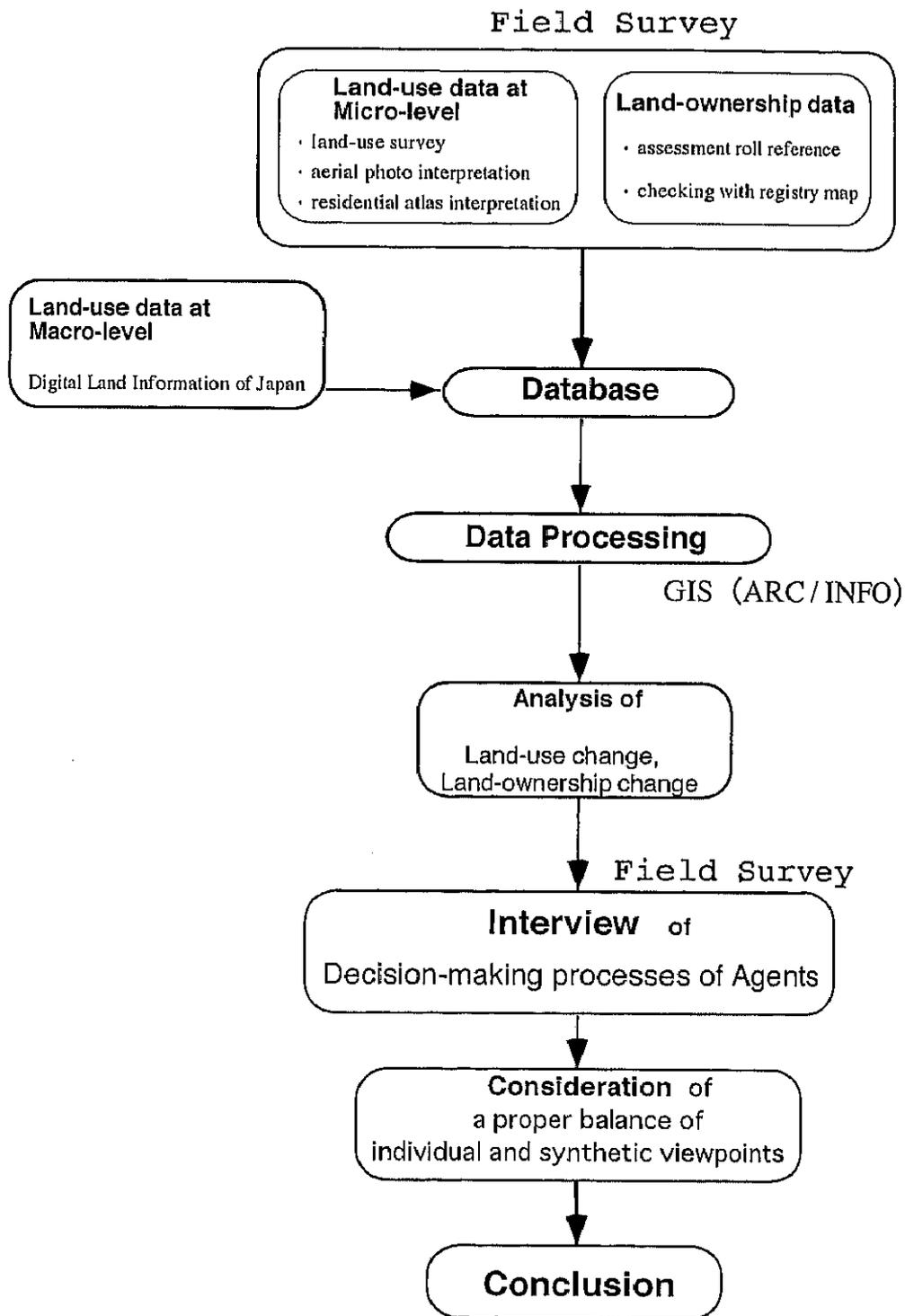


Figure 1. Methods of collecting and processing data.

1998. Aerial photographs, topographic maps and residential atlases were used to interpret land-use in 1980 for both areas. The GIS package<sup>b</sup> was used to assist in representing, processing and visualizing (mapping) spatial data.

In this dissertation the author makes the following assumption. The author assumes that the relationship the primary agents and land-use change differs with each zone (e.g., CBD, rural-urban fringe and rural land, which are located at different distances from the city centre). This assumption is supported by noting that when urban development is low, most of the main decision-makers seem to be farmers. When housing and industrialization is on the increase office workers (households or individuals), factory-owners and shop-owners come to be the important agents. In the final stage of the urban development process, especially in the CBD, the roles of office-managers, financiers and developers become very significant, while the impact of shop-owners and office workers decline. Moreover, the proportion of lots owned by corporations expand steadily with city development.

### 3. Outline of study area

The case study for this dissertation on land-use decisions of agents is Maebashi city, a medium-sized city in Japan. Maebashi city had a population of approximately 280,000 in 1997. The trends in population decentralization and associated rural land-use changes have been similar to those of other cities of almost the same size in population. Raw silk trading has been the mainstay of the economy since the *Meiji* period (about 120 years ago). When railroads were laid (about 100 years ago), it was decided to locate the central station at the edge of the city to avoid the crowded built-up area (Maebashi Municipal Office, 1978; 1984). The road from the origin of Route

50 (national road) to Maebashi station can be regarded as the most important street of the city (simply, the main street). Both sides of the main street have been occupied by leading merchants of raw silk since the *Meiji* period to the early 1940s. During World War II, most of the built-up area was destroyed by an air raid<sup>1</sup>. After the war, the task of land re-adjustment was undertaken by the Gunma Prefectural Government, a post-war reconstruction project. This work was the foundation for later development of the city. After the late 1960s, large scale financial institutions (banks and insurance companies) decided to open branch offices in Maebashi along the main road. Now the blocks along the main road form the CBD of Maebashi (Todokoro, 1983).

The rapid rise of land prices beginning in 1983 in central Tokyo had peaked in 1987-88 in the Tokyo metropolitan area (within a radius of about 60 kilometer). The influence on land prices in Maebashi, about 100 km from Tokyo, lagged by several years. According to land-price assessment (*chika-koji*) in 1991, the average increase in land prices in Gunma was 29% (commercial district), which was the largest increase ever (Planning Division of Gunma prefecture, 1997). According to the land-price assessment of 1997, the highest priced piece of land in Maebashi was 'Maebashi 5-2', which lay along Route 50 and had a price of 1,900,000 yen per square meter<sup>10</sup>.

Many of the residential estates in Maebashi were developed by land re-adjustment programs<sup>11</sup> (Figure 2). Land re-adjustment programs are undertaken either by public housing associations (e.g., prefectural or city housing associations), or government institutions. One of the most notable features of housing policy in Maebashi is that most land re-adjustment was undertaken by the Maebashi Municipal Office itself. In general, land re-adjustment works constitute 40% of total housing, which has tended to be easily converted to urban use (Chiba, 1994; 1998). A proportion of land developed

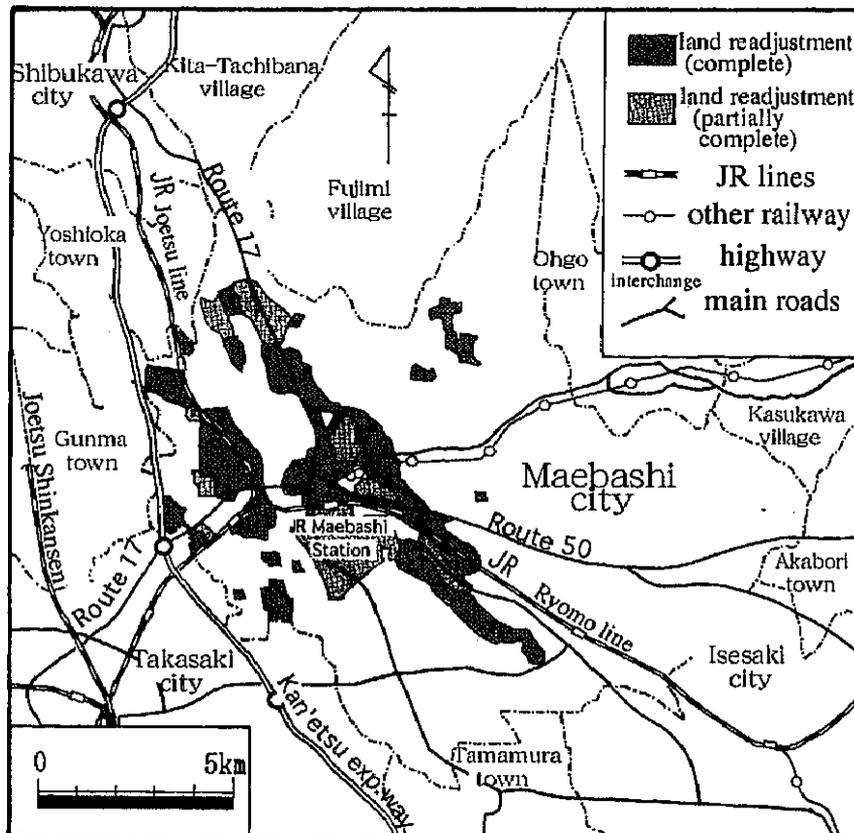


Figure 2. Study Area in 1995.

under re-adjustment works to the total 'Area Designated for Urbanization (*shigaika-kuiki*)' (simply, ADFU) is almost 50% in Maebashi city, which ranks as one of the highest in Japan (Tsutsumi, 1995) <sup>13</sup>.

The first work on land re-adjustment in Maebashi was restoration from damage caused during World War II. Most of the built-up area seen today is a result of this work. After the General Urban Plan of Maebashi was decided in 1957, one of the important issues in the city's development, several land re-adjustment works were taken up in the suburbs surrounding the already developed built-up area. Most of early land re-adjustment projects were relatively small in scale (about 20 ha). After the late 1970s, the scale of works increased, due to the high economic growth: principal roads were widened with rapid development of industrial and residential estates. As of the end of 1997, the ADFU was 4,627 ha. The area completely developed by land re-adjustment was 1,871 ha, which accounts for 40.5% of the ADFU. When partially developed works are completed, the total developed area will increase to 2,532 ha (54.7% of the ADFU), placing greater pressure on rural areas. The areas currently under development are situated in the rural-urban fringe areas in the southern, south-eastern, northern, and western suburbs.