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# Planning for regional environmental quality : the case of Japan's National Capital Region

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AN ABSTRACT OF THE THESIS OF Duane E. Roberts for  
the Master of Science in Geography presented November 30, 1977.

Title: Planning for Regional Environmental Quality: The Case of  
Japan's National Capital Region.

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

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James G. Ashbaugh, Chairman

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This study is concerned with Japan's National Capital Region  
Development Plan. How to modify the capital plan and some of the  
correlative land policies of the Tokyo Metropolitan Government to  
more fully protect regional air and water quality is the  
problem dealt with in the study.

The research is based on published and unpublished data  
obtained during a nine-week visit to Japan in the summer of 1972,  
on interviews conducted in Tokyo with representatives of various  
government agencies and other knowledgeable authorities, and upon

substantial American materials. The principal Japanese data sources are the English-language publications of the National Capital Region Development Commission and of the Tokyo Metropolitan Government's Bureau of Capital City Development and Research Institute for Environmental Protection. Various state-of-knowledge reports prepared for the Office of Land Use Planning of the U. S. Environmental Protection Agency are the principal American data sources. The basic approach has been to apply the findings of primarily American technical literature concerning the environmental impact of land use to particular problems of the Tokyo-centered National Capital Region. This methodology is based on the assumption that environmental problems of the United States and Japan are basically similar: in both countries pollution is an outgrowth of urbanization combined with industrialization.

In evaluating the success of the capital plan, it is concluded that while steady progress has been made toward the stated objective of promoting the build-up of outlying industrial centers, little progress has been made toward the objectives of restricting the growth of employment in the inner urban area or controlling land use in suburban areas.

In attempting to relate the capital plan more closely to water quality, it is recommended that steps be taken to control the location of development within watersheds. In particular, it is proposed that

restricting development near streams should be made a goal in the planning of regional and prefectural parkland additions. Another recommended planning measure concerns specifying the type and design of development within watersheds with emphasis on limiting the construction of impervious areas and designing sewerage facilities to provide temporary storage of storm runoff.

Regarding the improvement of air quality, it is speculated that the development of a subcenter at Shinjuku will roughly provide a 10% reduction in the amount of CBD traffic that would have been experienced had the subcenter not been built, but that the achievement of this reduction will encourage additional automobiles to enter the CBD. It is also speculated that the subcenter's effect on Shinjuku will be to greatly increase traffic congestion. To reduce this effect on Shinjuku, it is recommended that on-site or nearby housing be built for the employees of the subcenter. It is further recommended that sites for the two other proposed subcenters be moved to suburban or peripheral area locations, especially near one of the large-scale housing projects in the Suburban Redevelopment District. One of these, the Tama New Town project, is found to be a particularly suitable site.

It is also noted that the policies of siting public housing in outlying suburban areas, and of making loans available exclusively for new construction have contributed to the commuter problem. To



reduce commuting in the long run, it is recommended that a substantial portion of new public housing be sited in or near the core area of Tokyo in closer proximity to jobs.

In evaluating the impact on congestion of the Tama New Town project, it is found that the new town is sited too close to Tokyo to allow the development of a truly independent new town, but that the provision of jobs on land within or near the project would make possible a greater degree of independence than exists at present.

PLANNING FOR REGIONAL ENVIRONMENTAL QUALITY:  
THE CASE OF JAPAN'S NATIONAL CAPITAL REGION

by

DUANE E. ROBERTS

A thesis submitted in partial fulfillment  
requirements for the degree of

MASTER OF SCIENCE  
in  
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Portland State University  
1978

TO THE OFFICE OF GRADUATE STUDIES AND RESEARCH:

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## PREFACE

This study of regional environmental quality of the National Capital Region of Japan is based on published and unpublished data obtained during a nine-week visit to Japan in the summer of 1972, on interviews conducted in Tokyo with representatives of various government agencies and other knowledgeable authorities, and upon substantial American materials. The principal Japanese data sources for the study were the English-language publications of the National Capital Region Development Commission and of the Tokyo Metropolitan Government's Bureau of Capital City Development and Research Institute for Environmental Protection. Various state-of-knowledge reports prepared for the Office of Land Use Planning of the U. S. Environmental Protection Agency were the principal American data sources. The basic approach has been the application of primarily American methodological literature concerning the environmental impact of land use to the particular problems of the Tokyo-centered National Capital Region. This was based on the assumption that the environmental problems of the United States and Japan are basically similar -- in both countries most pollution is an outgrowth of urbanization combined with industrial development.

It is important to make clear that the field work for this

study was done prior to the occurrence of the 1973-1974 world inflation-energy crises. Because of Japan's high degree of dependence on foreign natural resources, the "oil crisis" has greatly affected assumptions regarding future levels and directions of national economic growth. However, because of data limitations no attempt is made to deal with the implications for regional planning of the changed economic and energy situation facing Japan. Thus, although post-1974 conditions are not wholly neglected, much of the analysis and projections incorporated in this study are based on the facts as they existed as of the eve of the "oil crisis."

Another thing that should be noted about the study is that a relatively large amount of attention is given to transportation congestion, particularly road congestion. The problem of transportation congestion is highlighted because of its role as a source of air pollution.

## ACKNOWLEDGEMENTS

I would like to thank Dr. James Ashbaugh, Dr. John Dart, Dr. Alexander Gassaway, and Dr. Willert Rhynsburger for their comments and helpful suggestions. I would also like to thank all the persons in Tokyo who helped me during my visit there in 1972. Lastly, I am grateful to Ron Cihon for drawing the maps.

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## CHAPTER I

### INTRODUCTION

Air and water pollution are problems plaguing large metropolitan areas throughout the world. Most attempts at solving these problems have emphasized the implementation of emission control standards. In a large number of cases such controls have significantly reduced ambient concentration of many pollutants. A difficulty is that because of the continued increase in polluting activities, emission standards may not be sufficient to ensure that long-range goals will be met. Under such circumstances, much more attention is being paid to the importance of land-use in dealing with environmental problems. This is not a new idea. Environmental concerns have traditionally been given consideration in land-use planning. What is new is the direct and systematic introduction of such concerns into land-use planning. What is also new, particularly in the United States, is an emphasis on the role of metropolitan-regional level land-use planning in the preservation and improvement of the environment.

Although it faces some of the most severe pollution problems, Japan has not carried this trend toward better land use very far.

This can probably be explained by the fact that "zoning and other controls on private land use traditionally have been rather unimportant in Japan."<sup>1</sup> A related factor is the direct involvement of the central government in urban planning and its view that active regulation of land development would tend to have a braking role on economic growth. The failure of the national Environment Agency as of early 1978 to support legislation introduced in the Diet to require reports on the adverse environmental effects of major projects and proposals is illustrative of this continuing dominant concern with economic growth.<sup>2</sup>

Land development in Japan has been in progress at its most rapid tempo (and with the most adverse environmental consequences) in metropolitan Tokyo. Many have emphasized the need to guide and divert this development into patterns which would be less harmful to the environment.<sup>3</sup> But, largely for the reasons just mentioned, very little effective land planning in this vein has been attempted.

The policy guide to decisions about the physical development of the Tokyo region is the National Capital Region Development Plan (NCRDP or capital plan). More particularly, the NCRDP is the long-range plan for the development of Tokyo Prefecture and the seven other prefectures (as later explained, Tokyo is both a city and a prefecture) that make up the National Capital Region (NCR or capital region) of Japan. Essentially, the NCRDP is a plan for regional

decentralization similar in design to the 1944 plan for Greater London. Like the Greater London Plan, it subdivides the region into three concentric areas (Figure 1). First of these is an inner zone called the Built-Up District, which mainly includes the cities of Tokyo, Yokohama, and Kawasaki. In this zone the basic aim has been to alleviate overconcentration primarily through restrictions placed on industrial expansion and the development of three business and commercial subcenters, all located along Tokyo's inner loop railroad. Encircling the Built-Up District is the Suburban Re-development District. Here priority has been given to housing construction and the improvement of residential conditions, mainly through the preservation of large areas of open space for recreation purposes. The remainder of the NCR is the Outer Development District. Within this district rural industrial centers have been established to receive population and employment decentralized from the Built-Up District.<sup>4</sup>

### THE PROBLEM

The primary purpose of this paper is to discuss some ways in which the capital plan, as adopted in 1958 and revised in 1968, might be modified to improve the environment of the region. Particular attention is given to the land use and planning measures that might be implemented to improve air and water quality in the city



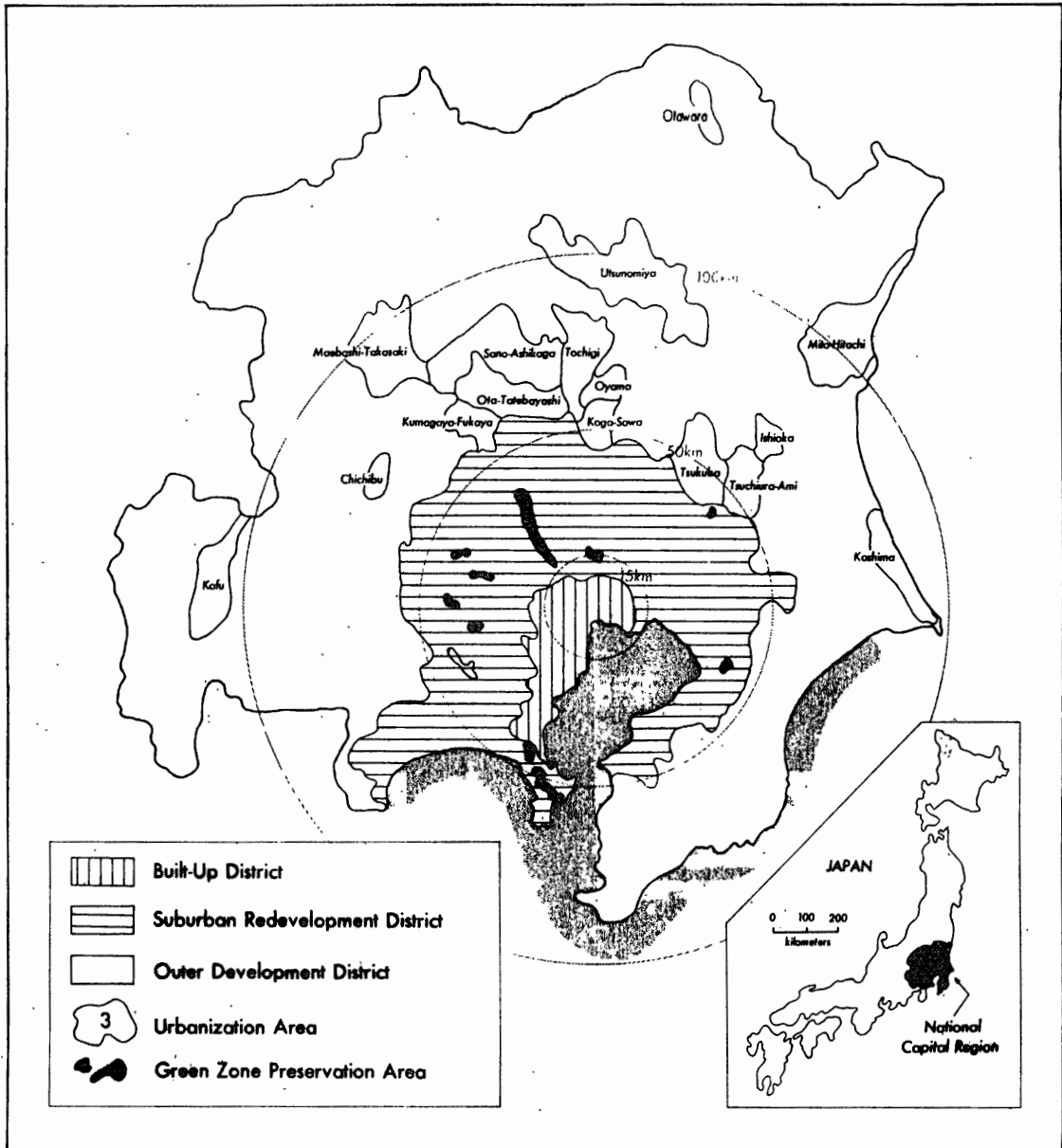


Figure 1. National Capital Region Development Plan, 1968. (Drawn from: Tokyo, Bureau of Capital City Development, Planning of Tokyo, 1972 [Tokyo, Tokyo Metropolitan Government, 1973], p. 4.)

and prefecture of Tokyo. Although the dominant focus is on recommended changes to the capital plan, some attention is also given to possible ways of improving the planning policies of the prefectural government of Tokyo from an environmental point of view. Thus the particular problem dealt with is more effective regional-level and, less fully, prefectural-level land-use planning for air and water quality.

### SCOPE OF THE STUDY

The major elements of the study are as follows: The remainder of this chapter is concerned with the political, administrative, and physiographic structure of the study area; the history of the development of Tokyo; and the environmental situation as of the mid-seventies. The second chapter presents background information relating to the size and growth of the region's population and to the problems undertaken in the study. Future population estimates are presented for Tokyo Prefecture, South Kanto, and the capital region as a whole in the period 1980 to 1985. The likely impact of these projected populations on the environment are noted. Included are discussions on transportation congestion, water resources, and land use changes, all mainly pertaining to Tokyo Prefecture.

The third chapter reviews the general features of the capital plan and considers the problems regarding its implementation.

Chapter four concentrates on new policies needed to protect the region's water quality. Policy changes needed to protect the region's air quality are the subject of chapters five and six. In particular, chapter five focuses on the plan for decentralizing the center of Tokyo and its probable impact on traffic congestion and automobile pollution emissions. In chapter six the policy of building housing estates in outlying areas is examined, with special emphasis on the Tama and Tsukuba New Town projects. The final chapter contains a summary of main points presented in the study.

The main conclusion reached is that the attempt to solve the problems resulting from over-concentration -- an attempt through the dispersal of industry to outlying areas -- has met with only limited success. This is because the major sector of new employment growth in the Built-Up District is the tertiary sector. The study recommends location controls on offices to reduce congestion, location of employment close to existing housing, location of new housing closer to the Built-Up District, and stream protection.

#### AREA DEFINITION

The study area is the National Capital Region of Japan. The capital region is made up of the eight prefectures listed in Table I. It extends over an area of some 36,500 km<sup>2</sup> and contains fifty-five cities of 100,000 or more inhabitants.<sup>5</sup> For statistical purposes,

TABLE I  
AREA DIVISIONS, NATIONAL CAPITAL REGION  
1976

---

SOUTH KANTO (TOKYO METRO- POLITAN AREA) PREFECTURES	PERIPHERAL PRE- FECTURES
Saitama Tokyo Kanagawa Chiba	Gunma Tochigi Ibaragi Yamanashi

SUBDIVISIONS OF TOKYO PREFECTURE

<u>Ku</u> District (Central City) . . . .	23 <u>ku</u> (wards)
<u>Shi</u> District (Suburbs) . . . . .	26 <u>shi</u> (cities)
<u>Gun</u> District (Mountain Land) . .	2 towns & 4 villages

---

it is useful to refer to inner and outer prefectural areas within the capital region. The inner area is known as South Kanto or the Tokyo Metropolitan Area. It includes Tokyo Prefecture and three adjacent prefectures (Figure 2). The outer area comprises the four peripheral prefectures: Gunma, Tochigi, Ibaragi, and Yamanashi.

Tokyo Prefecture is divided into an urban area consisting of twenty-three ku (wards), a suburban area consisting of twenty-six shi (small cities), and a gun (rural) area consisting of two towns and

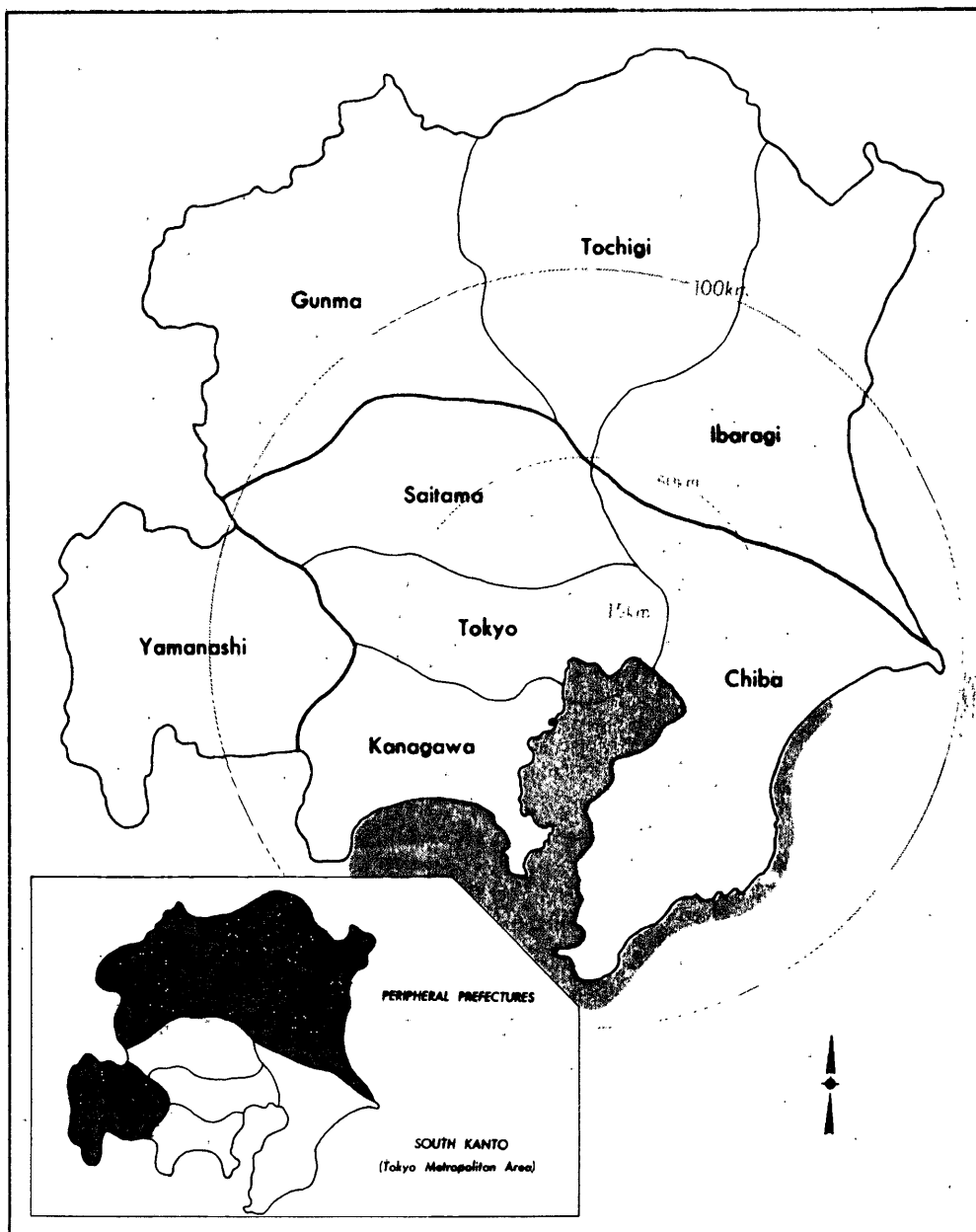


Figure 2. The eight prefectures and two subregions composing the National Capital Region, 1968. (Drawn from: Tokyo, Bureau of Capital City Development, *Planning of Tokyo, 1972* [Tokyo, Tokyo Metropolitan Government, 1973], p. 4.)

four villages (plus an offshore area consisting of a string of seven islets stretching for 300 kilometers south of Tokyo Bay) (Figure 3). The ku district, or city proper, serves as the capital of the prefecture and of the nation. Chuo-ku, Chiyoka-ku, and Minato-ku form the CBD.

Thus, one has Tokyo City, Tokyo Prefecture, the Tokyo Metropolitan Area (or South Kanto), and the National Capital Region. It is common for both Tokyo City and Tokyo Prefecture, and sometimes the Tokyo Metropolitan Area, to be referred to as "Tokyo." In this study the term "Tokyo" means the city of Tokyo. The prefecture is referred to as Tokyo Prefecture.

#### LAND USES IN THE STUDY AREA

Physiographically, the National Capital Region consists of the Kanto Plain, which occupies some 35-40% of the area included in the region, and the hill and mountain area that borders it on the north, west and south (Figure 4). The plain is formed by a succession of diluvial terraces intersected by numerous alluvial plains, with coastal swamps and unfilled lakes occupying sections of the plain near the seacoast to the east. Approximately two-thirds of the plain is under cultivation. Irrigated rice is grown in the areas of alluvial soil and takes up some 40% of all arable land. Important crops and farm activities on the diluvial uplands include barley, soy beans,

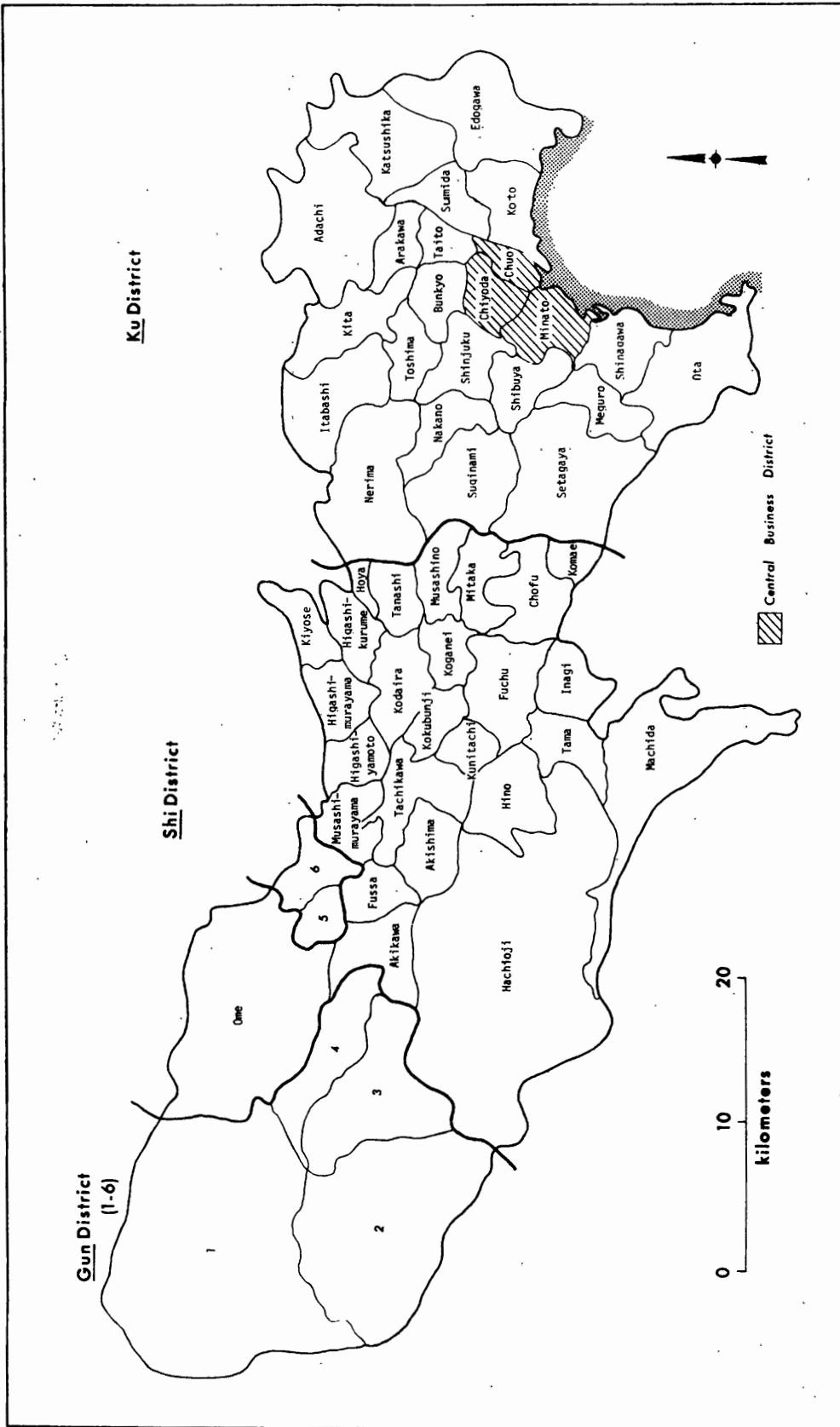
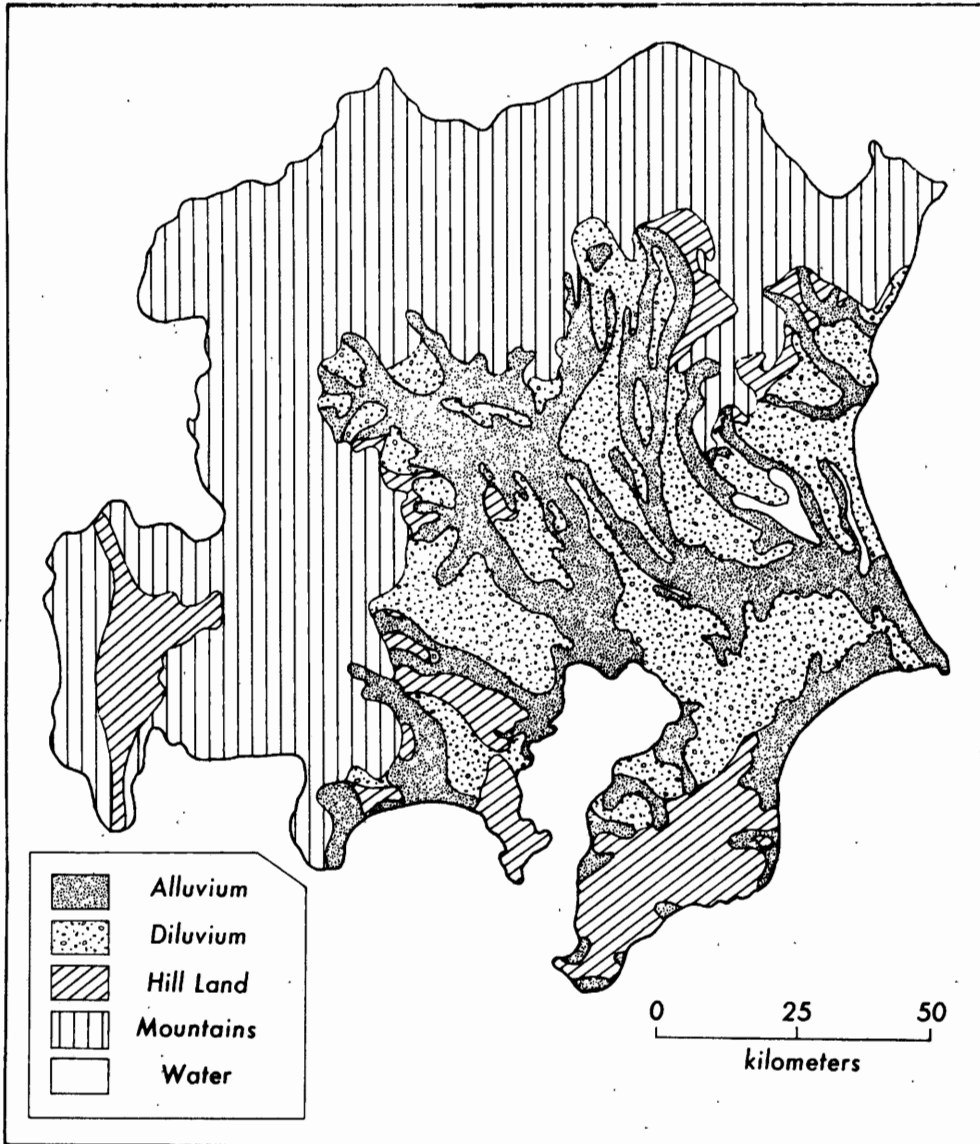


Figure 3. Tokyo Prefecture showing principal subdivisions, 1975. (Drawn from: Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1975, XXVII, end paper.)



**Figure 4.** Terrain features of the National Capital Region. (Drawn from: Glenn T. Trewartha, *Japan: A Geography* [Madison and Milwaukee, University of Wisconsin Press, 1965], p. 439; *Teikoku's Complete Atlas of Japan* [Tokyo: Teikoku-Shoin, 1969], pp. 30-31.)



vegetables, flowers, tobacco, sericulture, dairying, and pig and poultry raising.<sup>6</sup> Woodland predominates in the mountainous part of the Capital Region and is the largest single land type in the region. Built-up land takes up the smallest portion of land with only 4.5-6.5% of the region's total land area devoted to this purpose.

Within Tokyo Prefecture, in contrast, built-up land takes up largest portion of land, 44% of the prefecture's total area (Table II). Forest land, mainly concentrated in the mountainous western part of the prefecture, is next with 28% of the total area. Agriculture occupies only 15% of the land, with dry field crops taking up five times as much land as paddyfield rice.

#### HISTORICAL REVIEW OF THE PLANNING AND DEVELOPMENT OF TOKYO

To better understand the impact of land use on Tokyo's environment, it is useful to consider some of the historical features of the planning and development of the city.

First and most important is that Tokyo began its development in the seventeenth century as the headquarters of the first Tokugawa Shogun, or military governor of Japan. To frustrate attackers the city was planned with narrow, angular streets and almost completely lacking in open space.<sup>7</sup> Despite the destruction of most of Tokyo by earthquake and fire in 1923 and by Allied bombing in World War II,

TABLE II  
 AREA AND LAND USE  
 TOKYO PREFECTURE  
 Jan. 1, 1976\*

Land Use	Area(hectares)	Percent
Built-up Land	48,697	43.6
Commercial	(3,555)	(7.5)
Industrial	(5,854)	(12.0)
Residential	(35,883)	(73.7)
Other	(3,303)	(6.8)
Agricultural Land	16,748	15.0
Paddyfields	(2,574)	(15.4)
Dry fields	(14,184)	(84.6)
Forest	30,800	27.6
Wasteland	2,838	2.5
Ponds and swamps	55	.0
TOTAL	111,691	100.00

\*Tokyo, Statistics Division, Tokyo Statistical Yearbook:1975, XXVII pp. 2, 3.

the physical plan of the city has remained basically unchanged to the present day. Thus, the road network contains many T-shaped intersections and dead-end streets. These contribute to road congestion and make it difficult to build sewer lines. Open space is useful in reducing pollution carried by runoff, in dispersing air pollution, and

in separating conflicting types of development. In present-day Tokyo, however, parks and open space make up only 0.6% of the total city area.<sup>8</sup>

In 1868, with the fall of the shogunate and restoration of the Emperor Meiji, Tokyo became the imperial capital. Under the rule of the emperor, physical planning became synonymous with the construction of roads, harbors, water works and other infrastructure needed to support industrial development. Little emphasis was laid on pollution controls or the zoning of different activities, including, most importantly, industry and housing.<sup>9</sup> One result was the location of a large number of small and medium-sized factories in residential districts directly adjacent to the core area.

By and large, this trend has continued unchecked to the present day. In Tokyo, as a whole, there were 82,956 small factories (factories with 19 or fewer employees) in 1973. Of these, 36,430 were located in the six easternmost ku -- Arakawa, Sumida, Taito, Edogawa, Katsushika, and Koto -- which form the largest of the factory/residential areas.<sup>10</sup> The effect of this close intermingling of factories and residences has been to make this an area where people live and also where environmental problems are greatest.

It was in the Meiji period, also, that the urbanization of surrounding rural areas took place with little change in the irregular pattern of fields. This resulted in the creation of city blocks in all

shapes and sizes; and by this means, the outward expansion of Tokyo took place in conformity with the confused layout established in the feudal period.<sup>11</sup>

In the post-World War II period, physical planning has been marked by an emphasis on "land readjustment" (the replotting and rehabilitation of small areas), development of infrastructure, and zoning, with wide powers left to private industry regarding other aspects of development.<sup>12</sup> In the late sixties the problems of housing, sewerage, and environmental pollution began to receive increased attention. An emphasis on the environment was fostered by the increased levels of environmental pollution that accompanied the tremendous growth of the sixties and by a greater public awareness of pollution.<sup>13</sup>

#### RECENT TRENDS IN ENVIRONMENTAL QUALITY

As a result of clean-up efforts, the worsening of environmental conditions was halted and reversed in the early seventies. The most significant advances were made in the fight against air pollution. In Tokyo ambient air concentrations of carbon dioxide declined substantially from an hourly average of 3.4 ppm in 1971 to 2.2 ppm in 1975, sulfur oxide concentrations declined from .038 ppm in 1970 to .024 ppm in 1975, and particulate concentrations declined from .11 milligrams per cubic meter in 1971 to .06 milli-

grams in 1974.<sup>14</sup> In a 1970 comparison, nitrogen oxide concentrations were about half as great as in New York, sulfur oxide concentrations, mainly from burning of coal and oil, were the same in the two cities; while particulate concentrations were one-and-a-half times greater than in New York.<sup>15</sup>

Modest progress was also made in the effort to improve water quality. Despite the low flow conditions prevailing in 1974, from 1969 to that year stream quality improved at eight of Tokyo Prefecture's twenty-one check points, remained unchanged at eight and deteriorated at only five.<sup>16</sup> Data for 1975 reflected continued improvement in the quality of the prefecture's streams.<sup>17</sup> Despite this progress, however, it is important to note that water pollution still exceeded five BOD (BOD is the amount of oxygen needed to allow oxygen-using organisms to reduce polluted water to a non-harmful state), the level at which fish life becomes endangered, at fifteen of the twenty-one stations in 1973. Moreover, in 1974 the Ayase River in Saitama Prefecture and the Tsurumi River in Kanagawa Prefecture were among the five most polluted rivers in the country<sup>18</sup> (Figure 5).

The population growth pattern closely connected with these improving but still serious environmental conditions is examined in detail in the next chapter. Following this is a discussion of the history of regional-scale planning for the metropolis -- which began with the adoption of the NCRDP in 1958.

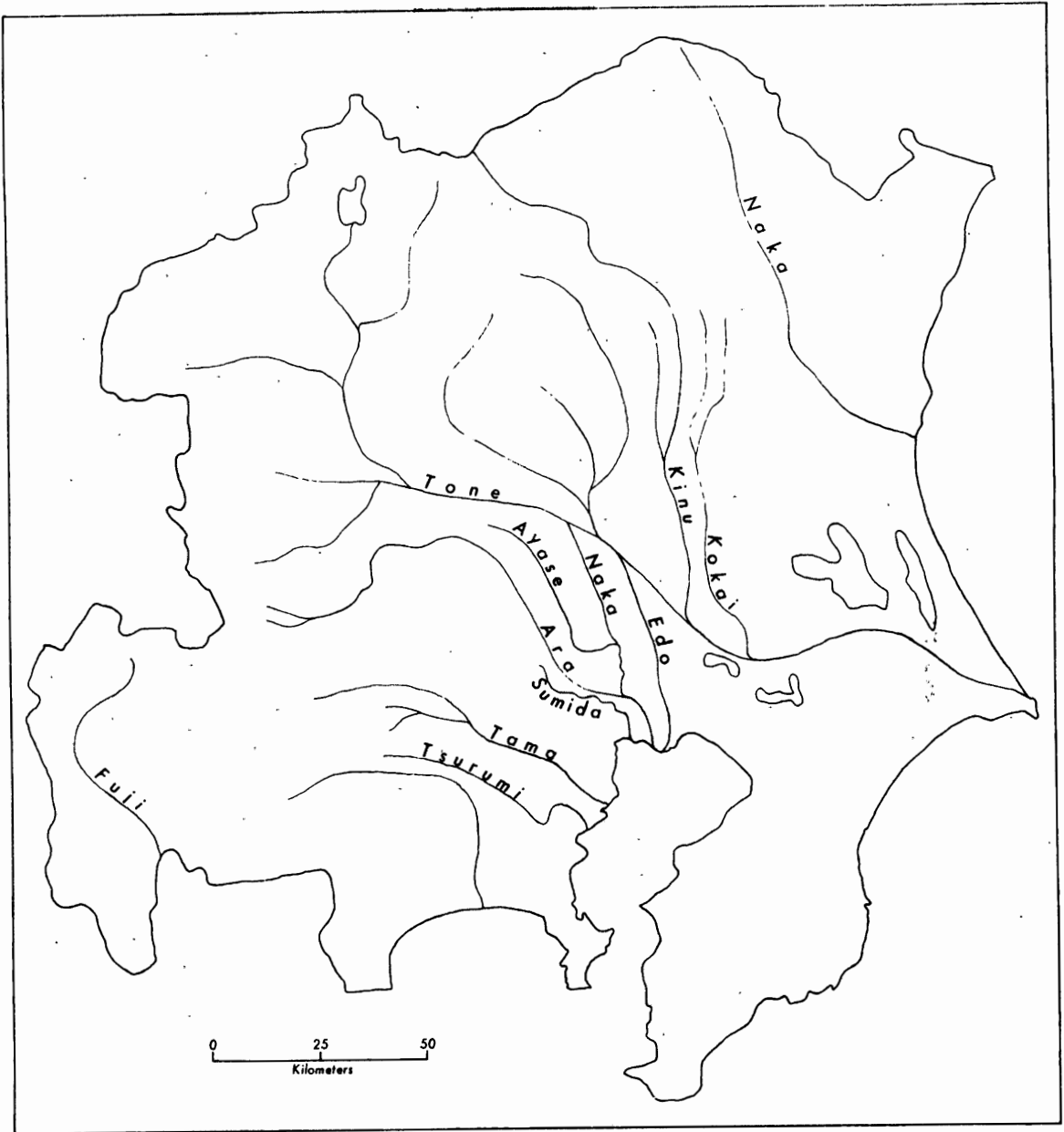


Figure 5. Major Rivers of the National Capital Region, 1969. (Drawn from: Teikoku's Complete Atlas of Japan [Tokyo: Teikoku-Shoin, 1969], pp. 30-31.)

## FOOTNOTES

<sup>1</sup>Edwin Mills and Katsutoshi Ohta, "Urbanization and Urban Problems," Asia's New Giant: How the Japanese Economy Works, eds. Hugh Patrick and Henry Rosovsky (Washington, D.C.: Brookings Institute, 1976), pp. 733, 734.

<sup>2</sup>Japan Times, Jan. 13, 1978, p. 2.

<sup>3</sup>"Transportation in Tokyo," wheel extended, I, Summer 1974, p. 32; Japan, Science and Technology Agency, Utilization of Resources and Promotion of the Environment in High Density Areas, 1972, p. 23-25.

<sup>4</sup>Japan, National Capital Region Development Commission, Outline of National Capital Region Development, 1971, pp. 7-17.

<sup>5</sup>Computed from: Japan, Bureau of Statistics, 1975 Population Census of Japan, I, 65, 68, 70, 72, 76, 79, 82, 94.

<sup>6</sup>George B. Cressey, Asia's Lands and Peoples (New York: McGraw-Hill, 1963), pp. 238-240; Glenn T. Trewartha, Japan: A Geography (Madison and Milwaukee, University of Wisconsin Press, 1965), pp. 438-441.

<sup>7</sup>Tokyo, Bureau of General Affairs, Tokyo Fights Pollution, TMG Municipal Library No. 4 (Tokyo: Tokyo Metropolitan Government, 1971), p. 17.

<sup>8</sup>Robert Shaplen, "A Reporter at Large (Japan--111)," New Yorker, August 18, 1975, p. 45.

<sup>9</sup>Masahiko Honjo, "Tokyo: Giant Metropolis of the Orient," World Capitals: Toward Guided Urbanization, ed. H. Wentworth Eldredge (New York: Doubleday, 1975), pp. 367, 368; Tokyo Fights Pollution, op. cit., p. 21.

<sup>10</sup>Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1975, XXVII, 102.

<sup>11</sup>Honjo, op. cit., p. 366.

<sup>12</sup>Japan Times, Jan. 6, 1972, p. 12.

<sup>13</sup>Charles F. Gallagher, "The Environment in Japan," XX, No. 2, East Asia Series, 1973, American Universities Field Staff, p. 1.

<sup>14</sup>William A. Robson, Second Report on Tokyo Metropolitan Government (Tokyo: Tokyo Metropolitan Government, 1969), p. 87; Diane Baerwald and Chizuko Saeki, The Urban Way: A Guide to Research on Japanese Cities, Council of Planning Librarians, Exchange Bibliography No. 160-161 (Monticello, Illinois), p. 16. (Mimeographed)

<sup>15</sup>Mills, Op. Cit., pp. 733, 734,

<sup>16</sup>Tokyo, Bureau of General Affairs, Tokyo Municipal News, XXIV, Feb. -March 1974, 13.

<sup>17</sup>Japan Times, July 22, 1976, p. 2.

<sup>18</sup>Japan Times, Oct. 30, 1974, p. 2.



## CHAPTER II

### OVERVIEW OF POPULATION

This chapter describes the characteristics of the population of the National Capital Region with particular reference to size, density, and growth and the effect of all these on the environment. The essential facts are the following: Tokyo is one of the most densely populated cities in the world. Tokyo has shared with major United States cities a steady loss in population of the central area and a rapid growth in population of suburban areas. Employment has been slower to leave the central area. Projections of growth through 1985 indicate a continuation of present trends, with population growth predominately occurring in the shi district of Tokyo Prefecture and in Chiba, Kanagawa, and Saitama. In conjunction with the growth and suburbanization of regional population have come the environmental problems of increased automobile usage, shortages of water supplies, inadequate sewerage, and withdrawal of agricultural land.

#### POPULATION SIZE AND DENSITY OF THE NATIONAL CAPITAL REGION

The total population of the National Capital Region in 1975 was

33.6 million, of which 27.0 million were in South Kanto and 6.6 million were in the four peripheral prefectures. Table III shows the population by prefecture. The overall regional density in 1975 was 711 persons per square kilometer ( $\text{km}^2$ ), South Kanto having about seven times the density of the peripheral prefectures.

#### POPULATION SIZE AND DENSITY OF TOKYO PREFECTURE

As shown, Tokyo Prefecture had a 1975 population of 11.7 million. Of the prefecture's three main subdivisions, the ku district had the largest population with 8.6 million, or 74.1% of the total. The shi district accounted for 2.9 million, or 24.8%, followed by the gun district with 99 thousand or 0.9%.

The overall population density of the prefecture in 1975 was 5,441 persons/ $\text{km}^2$  (Figure 6). The density of the ku district was 14,882 persons/ $\text{km}^2$ , compared with corresponding figures of 3,997 and 227 persons/ $\text{km}^2$ , respectively, for the shi and gun subdivisions. The densities of individual wards ranged from a low of 5,352 persons/ $\text{km}^2$  in Chiyoda (CBD) to a high of 24,679 persons/ $\text{km}^2$  in Toshima (residential). Within the shi district the extremes ranged from 12,648 persons/ $\text{km}^2$  in Musashino to 828 persons/ $\text{km}^2$  in Ome.<sup>1</sup>

In substance, these figures indicate that extremely large size and extremely high average density are basic features of population in

TABLE III  
 POPULATION AND DENSITY BY PREFECTURE AND  
 MAJOR SUBAREA NATIONAL CAPITAL REGION  
 1975\*

	Population	Density Persons/km <sup>2</sup>
South Kanto	27,041,789	3,056
Tokyo	11,673,554	5,441
Kanagawa	6,397,748	2,676
Saitama	4,821,340	1,269
Chiba	4,149,147	811
Peripheral Prefectures	6,579,731	288
Ibaragi	2,342,198	385
Gunma	1,756,480	276
Tochigi	1,698,003	265
Yamanashi	783,050	175
Whole Region	33,621,520	914

\*Japan, Bureau of Statistics, 1975 Population Census of Japan, I, 65, 68, 70, 72, 76, 79, 82, 94.

the prefecture. In fact, Tokyo is counted as the world's second largest city in population size (next to Shanghai), and is exceeded only by Hong Kong in population density.<sup>2</sup>

#### REGIONAL POPULATION GROWTH

Between 1970 and 1975 the total population of the NCR increased by 3.3 million, or 11.1%. The contrast in growth rates among

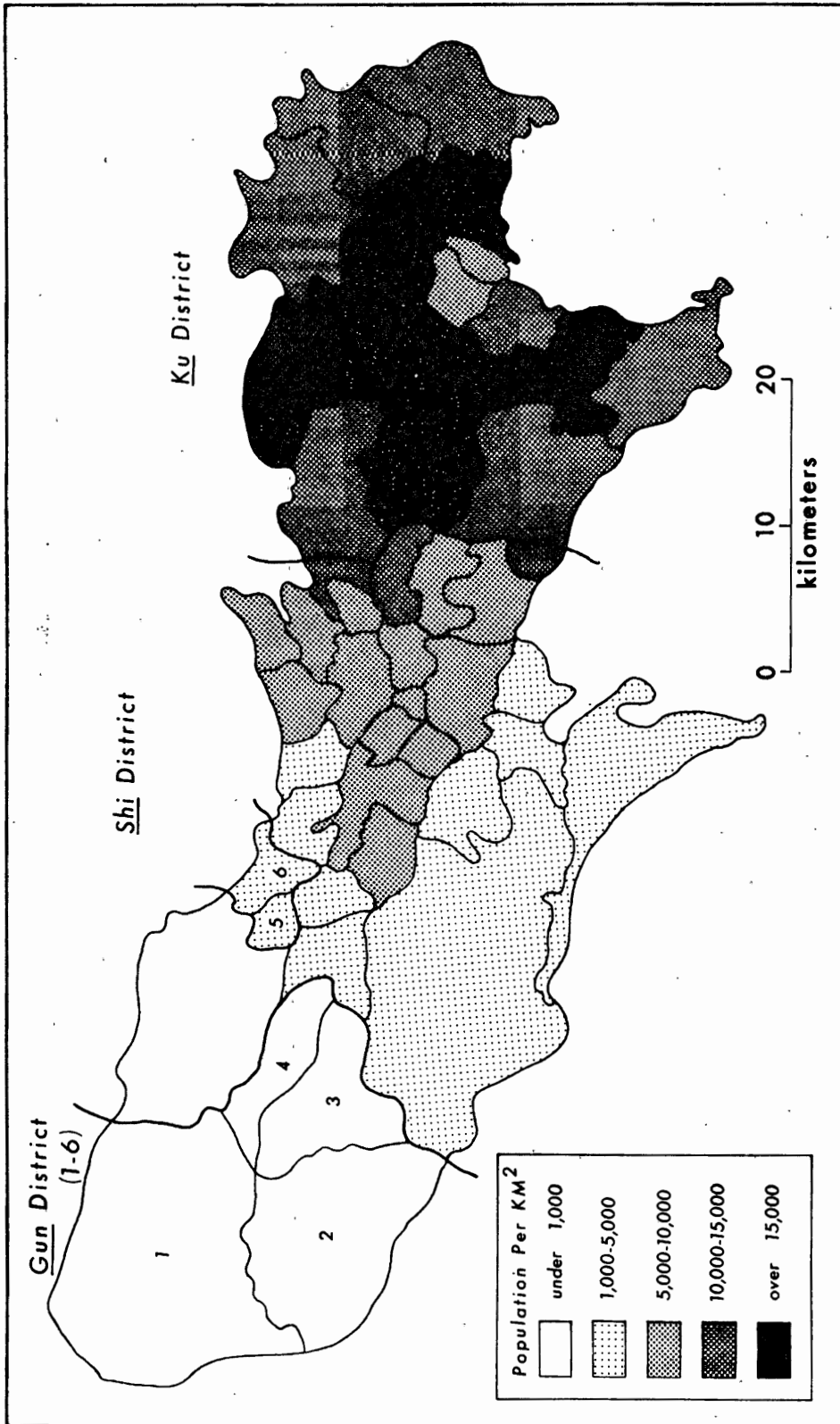


Figure 6. Population Density of Tokyo Prefecture by district, 1975. (Data from: Japan, Bureau of Statistics, 1975 Population Census of Japan, I, 79.)

individual prefectures during the period is shown in Table IV. The growth rates of Kanagawa, Saitama, and Chiba far exceeded the average for the region, whereas the rates for Tokyo and the four peripheral prefectures were all below this average. Although the gap between prefectures is still rather wide, these data reflect an appreciable narrowing of range from the last quinquennium, 1965-1970.

### POPULATION GROWTH OF TOKYO PREFECTURE

As indicated, for Tokyo Prefecture during the period 1970-1975, population increased by 265,483, or 2.3%. This rate is the lowest of any post-war period; the prefecture has registered growth at steadily diminishing rates, amounting to 28.0%, 20.5%, 12.2%, 5.0%, and 2.3% in each respective five-year period from 1950 to 1975.<sup>3</sup>

Sharp internal differences are evident in the 1970-1975 data for the prefecture's three major subdivisions. While the ku district experienced a decline of 194,422 (-2.2%) during the period, the shi and gun populations increased by 442,685 (18.1%) and 16,500 (19.9%), respectively. The considerable difference in growth rates among the ku is worth noting; though the population of Tokyo declined, six ku increased in population during the period. As shown in Figure 7, these included all but three of the outer circle of ku. The rates of increase ranged from a high of 6.5%

TABLE IV

POPULATION GROWTH BY PREFECTURE AND MAJOR SUBAREA  
NATIONAL CAPITAL REGION  
1965-1975\*

	1965	1970	Percentage Increase 1965-1970	1975	Percentage Increase 1970-1975
South Kanto	21,016,797	24,113,414	15.7	27,041,789	12.1
Tokyo	10,869,244	11,408,071	5.0	11,673,554	2.3
Kanagawa	4,430,743	5,472,247	23.4	6,397,748	16.9
Saitama	3,014,983	3,866,472	28.2	4,821,340	24.7
Chiba	2,701,827	3,366,624	24.6	4,149,147	23.2
Peripheral Prefectures	5,946,531	6,144,510	3.1	6,579,731	7.1
Ibaragi	2,056,097	2,143,551	4.3	2,342,198	9.3
Gunma	1,606,141	1,658,909	3.3	1,756,480	5.9
Tochigi	1,521,099	1,580,021	3.9	1,698,003	7.5
Yamanashi	763,194	762,029	-0.2	783,050	2.8
Whole Region	26,963,328	30,257,924	12.2	33,621,520	11.1

\*Japan, Bureau of Statistics, 1970 Population Census of Japan, I, 67, 70, 72, 74, 77, 80, 83, 95: 1975, I, 65, 68, 70, 72, 76, 79, 82, 94.

or 37,234 for Adachi to a low of 1.4%, or 7,700 for Suginami.

Extensive depopulation, on the other hand, occurred in the central part of the city. The highest rate of loss was -16.9%, or 12,529 for Chiyoda. The lowest rate was -0.1%, or 491 for Koto.<sup>4</sup>

The outstanding fact about the above regional and prefectural

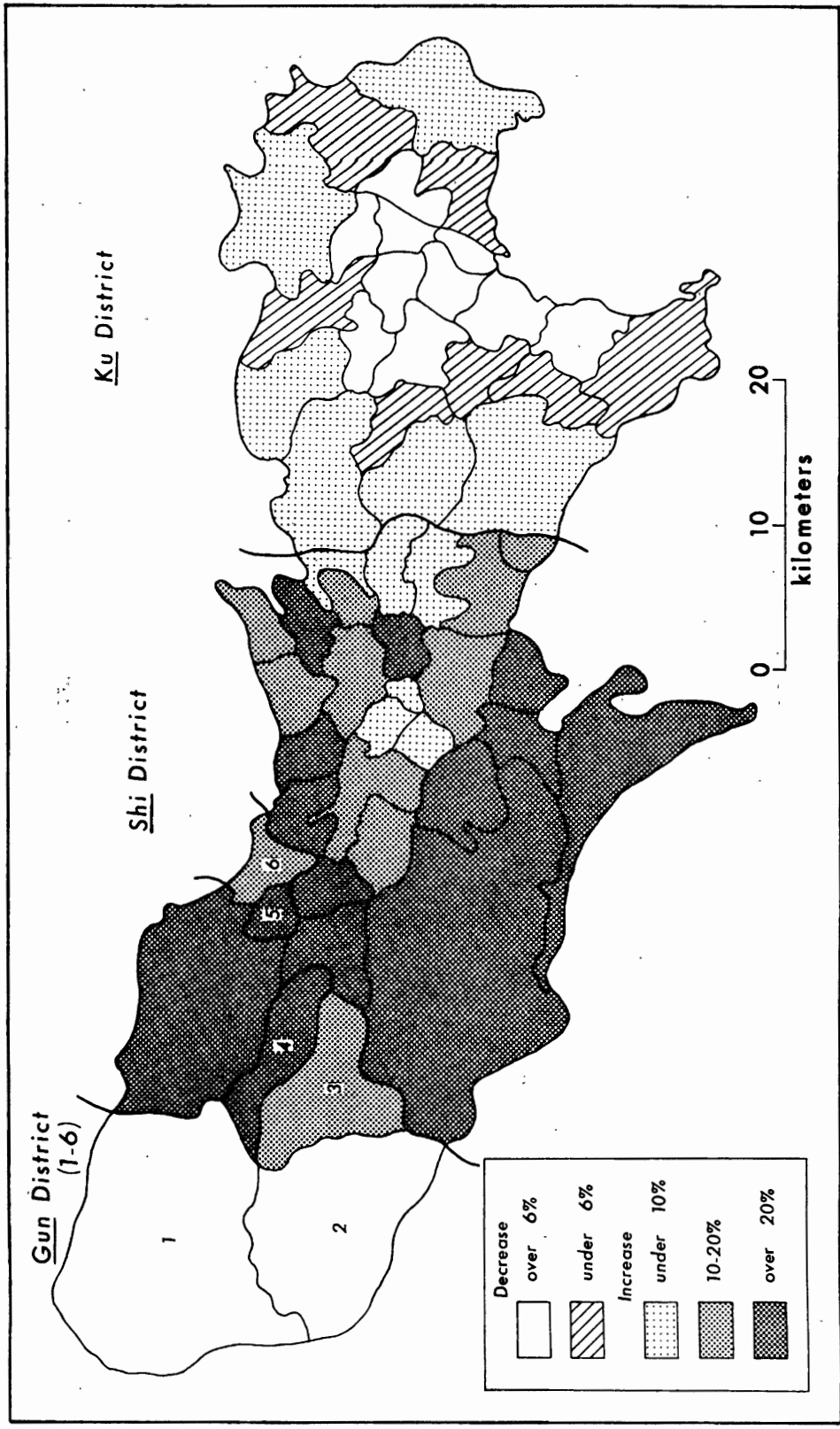


Figure 7. Population change in Tokyo Prefecture by district for the five-year period, 1970-1975. (Data from: Japan, Bureau of Statistics, 1975 Population Census of Japan, I, 79.)

data is the well-defined pattern of growth around the periphery of Tokyo reflected in the large gains in population in the shi district of Tokyo Prefecture and in Kanagawa, Saitama, and Chiba. Altogether these four contiguous areas accounted for 50.1% of regional population in 1970, but captured 92.3% of regional growth in 1970-1975. The data for the last quinquennium are even more impressive. In 1965 the same four areas accounted for 44.6% of regional population, but captured 95.1%, or virtually all, of regional growth in 1965-1970.<sup>5</sup>

#### GROWTH OF DAYTIME POPULATION

Simultaneous with the growth of population in suburban areas has been the concentration of new employment in Tokyo's core area. Thus, while the resident population of the Tokyo CBD declined by 60,939 (-13.2%) during 1965-1970, the daytime population increased by 23,0%. This resulted in a difference of 1,796,000 between the day and night populations in 1970.<sup>6</sup>

As may be expected, this inward concentration of employment coupled with the outward movement of residences has perforce increased commuting distances and times. As of 1970, it was estimated that 40.0% of the employees and students living in communities forty kilometers from central Tokyo held jobs or attended school in the CBD.<sup>7</sup> In areas sixty to seventy kilometers distant, the proportion was approximately 10.0%. As for travel time, surveys



of people working in Tokyo who hold mass transit passes indicate that the average one-way commuting time increased from fifty-seven minutes in 1970 to sixty-five minutes in 1975.<sup>8</sup>

For the future, it has been projected by the Tokyo Metropolitan Government that between 1970 and 1985 the daytime population of the CBD will increase by 32.0%.<sup>9</sup> Its resident population, on the other hand, is expected to decrease by 56.0% over the same period.<sup>10</sup> In combination, these estimates suggest an increase of 928,500, or 52.0%, in the rate of commuting to 1985. Because Tokyo's transportation system is already overburdened, the prospect of an increase of this magnitude is cause for concern. A Toyota Motor Company study published in 1973, for example, warned of a possible transportation paralysis if the metropolis continued to develop and expand as it has in the past.<sup>11</sup>

Another problem arising from daytime population trends is that the daytime population of the CBD is increasing faster than the increase in CBD sewerage capacity.<sup>12</sup> Presumably, this situation in time could lead to a lesser degree of treatment, or to the direct dumping of excess sewage into Tokyo Bay.

## POPULATION PROJECTIONS

Table V presents a series of population estimates covering the period to 1985 for the National Capital Region and its principal

TABLE V  
POPULATION PROJECTIONS, NATIONAL CAPITAL REGION  
1975-1985\*

	1980	Percentage Increase 1975-1980	1985	Percentage Increase 1980-1985
National Capital Region	36,392,000	9.0	39,069,700	7.4
Peripheral Pre- fectures	6,762,200	4.4	6,927,400	2.4
South Kanto	29,629,800	10.1	32,142,300	8.5
Tokyo Prefecture	11,917,300	2.3	12,066,500	1.3

\*Computed from: Hidehiko Hama, "Second Revised Population Estimates by Prefecture, Japan: 1975, 1980, 1985 (Provisional)," Journal of Population Problems, Japan, Institute of Population Problems, No. 119, 1971, pp. 2, 3.

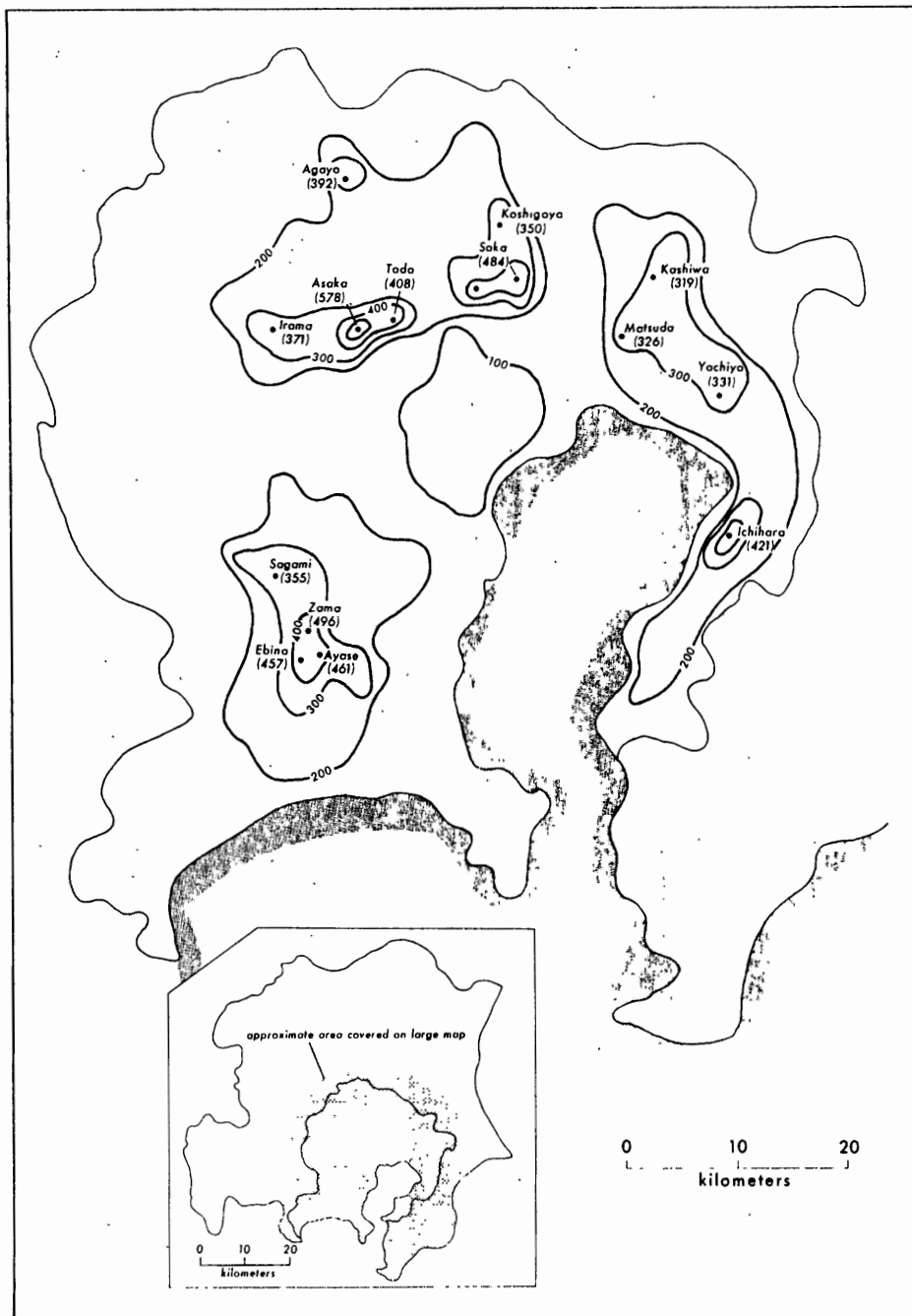
subareas, as well as for Tokyo Prefecture. The estimates were derived from estimates prepared in 1971 by the National Institute of Population Problems. The estimates are the middle or most plausible of three variants prepared by the institute.

According to these projections, the National Capital Region, which had a total population of 33.6 million in 1975, is expected to add about three million to this total in each quinquennium to 1985. Within the region, population growth in the four peripheral prefectures

taken together is predicted to continue to be decidedly below the area's share in regional population, while the opposite observation will continue to hold true for South Kanto. In absolute numbers, the population of the peripheral prefectures, which totalled about 6.6 million in 1975, is forecast to increase during 1975-1985 by about 451,000. On the other hand, in South Kanto, which had a total population of 27.0 million in 1975, there would be a gain of about 5.2 million. Excluding Tokyo, this projection for South Kanto for 1985 is based on increases over 1970 of 182.3% for Saitama, 154.3% for Chiba, and 143.1% for Kanagawa. It is of interest that these rates are, respectively, the first, second, and fourth highest predicted for this period among Japan's forty-seven prefectures.<sup>13</sup>

The estimate for South Kanto has been used to produce a population map showing the spatial pattern of projected population growth between 1970 and 1985 (Figure 8). According to the map, the population of Tokyo will remain unchanged through 1985. It is significant to note that the 400 isoline north of Tokyo containing Soka City is an area of extensive public housing served by rail transit. Similarly, the 400 isoline to the northwest encompasses a large concentration of public housing located at Asaka City. This shows the effect that housing development is exerting on patterns of population increase. This matter is discussed in Chapter V.

With regard to Tokyo Prefecture, the total population is



**Figure 8.** Projected distribution of population growth in South Kanto, 1970-1985, based on relative increase from 1970. (1970=100.) (Drawn from: Hidehiko Hama, Various Aspects of Japan's Future Population, Japan, Institute of Population Problems, [1972], p. 18.)

forecast to increase by 658,429 over the 1970-1985 period. Since the ku district population is expected to remain constant throughout the projection period, all of the increase under this projection will occur in the shi and gun districts. The two together will hence increase by an average quinquennial rate of about 8.6% during 1970-1985. Compared to an increase of 27.0% experienced in the 1965-1970 period, this represents a substantial slow-down in the growth of the two districts. The projected growth, especially in terms of total numbers (about 660,000 to 1985), is not unexceptional, however, in view of the unrestricted type of development that has predominated in the districts up to now.

#### THE PROBLEM OF WATER SUPPLY

Prospects are that these projected increases in population will have a major impact on the environment of the region. This is especially true with regard to the problems of air and water pollution as well as the closely related problems of water supply, withdrawal of open land, and of traffic congestion and sewerage treatment noted earlier. Perhaps the most pressing of these is the problem of water supply. In the mid-seventies, in the absence of stronger efforts to control population and industrial growth, there is expected to arise in South Kanto an extreme shortage of supplies of water. Estimates of the probable extent of this shortage vary widely.

In 1973 the National Construction Ministry estimated that South Kanto's water requirements by 1985 will be some 2.0 billion cubic meters greater than supplies.<sup>14</sup> In the same year the National Economic Planning Agency put the yearly deficit in 1985 in the range of 2.2 to 4.1 billion cubic meters.<sup>15</sup>

As one method of dealing with the water supply problem, both of these agencies have suggested that population and industry be relocated to areas where water is more plentiful.<sup>18</sup> The Economic Planning Agency, in particular, has proposed that the population of the subregion be limited to twenty-nine million to 1985, or about four million less than the official projection for that year mentioned above. However, since the lowest of the three plausible variants prepared by the Institute of Population Problems for 1985 in South Kanto is 925,000 above twenty-nine million, there would seem to be little promise of achieving this target.<sup>16</sup> In any case, the Economic Planning Agency's proposal had not been adopted as of 1977, and there existed no policy to intentionally limit the future size of South Kanto's population.

In Tokyo Prefecture, where the need for water is greatest, shortages of water supplies have already emerged. In 1971 the yearly demand for water exceeded supplies by approximately 8%,<sup>17</sup> and in 1973 water requirements were 15% greater than supply capacity from June 24th to July 15th of that year.<sup>18</sup> In its planning, the Tokyo

Metropolitan Government is attempting to meet the water problem through the accelerated construction of water storage facilities within the boundaries of the prefecture and through the adoption of water conservation measures.<sup>19</sup> Requiring the installation of water recycling systems in some new highrise buildings, and requiring the installation of special water-saving faucets in all newly constructed buildings are two examples of the conservation measures that have been adopted.<sup>20</sup>

### CONVERSION OF FARMLAND

Land conversions generated by demographic patterns between 1965 and 1974 are shown in Table VI. For the NCR as a whole, there was an upward trend in the total amount of land in crops, and then a downward movement, resulting in a slight overall decrease of -0.3%. Within the region, farmland in both major subareas has been in continuous decline since 1969, with farmland in South Kanto decreasing at about twice the rate as in the peripheral prefectures.

Not surprisingly, among the eight prefectures comprised by the capital region, the two with the fastest growing suburban areas, Tokyo and Kanagawa, showed the greatest percentage of agricultural losses during the 1965-1974 period (Figure 9).

The average annual rate of loss for Tokyo Prefecture during 1965-1974 was 1066.6 hectares. An important point is that if this

rate of loss were to continue, there would be no cropland in Tokyo Prefecture by 1987. The considerable tapering off of population growth in the shi and gun districts forecast to 1985, however, may lead to some relative decline in the rate of land conversion from the 1965-1974 period. Nevertheless, if not completely urbanized, the outlook is that Tokyo's 14,400 hectares of cropland that remained in 1974 will be severely reduced in area in the 1980s. Since Tokyo Prefecture accounted for only 1.7% of the total regional supply of cropland in 1973, the total conversion of its cropland would have a relatively minor impact on the overall amount of land in the NCR devoted to agriculture. On the other hand, 14,400 hectares would represent an additional 30% of urban land in Tokyo Prefecture.

#### CONVERSION OF FOREST LAND

The area occupied by forests has also been changing. In Tokyo Prefecture, the 31,019 hectares of forest land that existed in 1967 decreased to 26,604 hectares in 1976. The ku district accounted for 153.1 hectares of the total loss, the shi district for 2,393.9 hectares, and the gun district for 1,867.5 hectares.<sup>21</sup>

#### SUMMARY

The major portion of this chapter has been an examination of the pattern of regional population growth and expected future



TABLE VI  
CROPLAND AREA, NATIONAL CAPITAL REGION  
1965-1974\*

(Kilo-hectares)

	1965	1970(est.)	1972	1974
Capital Region	863	916	887	860
Peripheral Prefectures	493	543	532	521
South Kanto	370	374	355	338

\*Tokyo, Tokyo Statistical Yearbook: 1966, XVIII; 1970, XXII, 2, 3; 1971, XXIII, 2, 3; 1972, XXIV, 2, 3; 1973, XXV, 2, 3; 1975, XXVII, 2, 3.

growth and of the air, water, and land problems associated with this growth. It was indicated that during the 1965-1975 period, suburbanization of population was accompanied by a slower suburbanization of employment. Forecasts indicate a continuation of this process, with the daytime/nighttime difference in the Tokyo CBD reaching 2.7 million in 1985. The total population of the NCR is forecast to reach the 39 million mark in 1985, an increase of 5.4 million over 1975. All this adds up to considerably greater pressures on the environment. Particularly important is that a major water shortage in South Kanto seems unavoidable.

The effort to solve the problems of the capital region through regional decentralization is the subject of the next chapter.

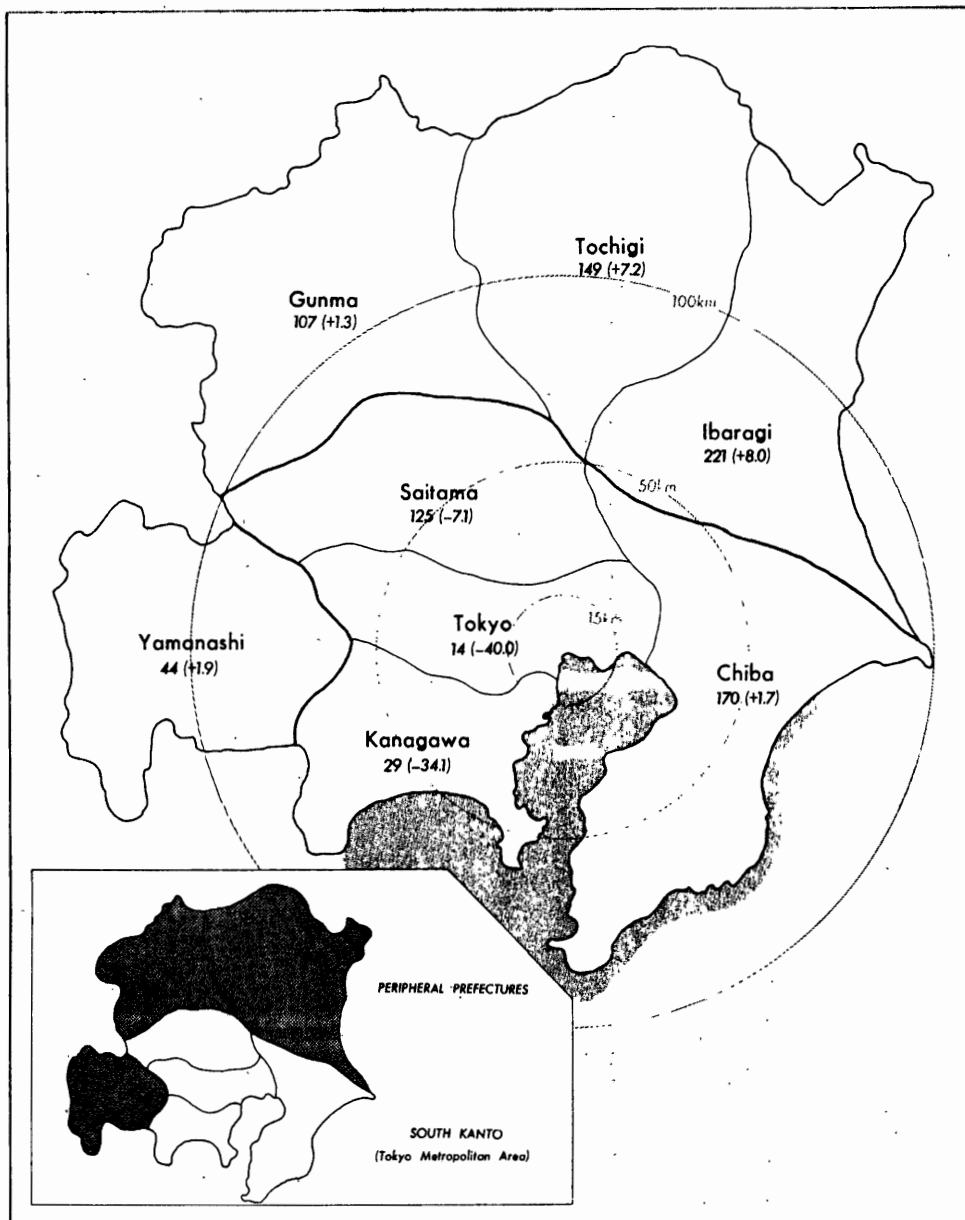


Figure 9. Area (kilo-hectares) of arable land in the National Capital Region in 1974 and percentage change from 1965. (Data from: Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1966, XVIII, 558; 1975, XXVII, 484.)

## FOOTNOTES

<sup>1</sup>Japan, Bureau of Statistics, 1975 Population Census of Japan, I, 79.

<sup>2</sup>Philip M. Hauser, "City," World Book Encyclopedia (Field Enterprises: Chicago, 1977), p. 452Q.

<sup>3</sup>1975 Population Census of Japan, op. cit., 13.

<sup>4</sup>Ibid, p. 79.

<sup>5</sup>Computed from: 1970 Population Census of Japan, I, 67, 70, 72, 74, 77, 80, 83, 95.

<sup>6</sup>Tokyo, Bureau of General Affairs, Tokyo Municipal News, XXII, Sept. 1972, p.

<sup>7</sup>Tokyo, Bureau of Capital City Development, Planning of Tokyo, 1972, TMG Municipal Library No. 4 (Tokyo, Tokyo Metropolitan Government, 1973), p. 4.

<sup>8</sup>Japan Times, April 1, 1977, p. 4.

<sup>9</sup>Tokyo, Bureau of General Affairs, Tokyo for the People: Concepts for Urban Renewal, TMG Municipal Library No. 6 (Tokyo: Tokyo Metropolitan Government, 1972), p. 25.

<sup>10</sup>Hidehiko Hama, Various Aspects of Japan's Future Population, Japan, Institute of Population Problems, (1972), p. 18.

<sup>11</sup>Quoted in: "Transport Countermeasures," the wheel extended, IV, Summer 1974, 32.

<sup>12</sup>Tokyo, Bureau of General Affairs, Tokyo Municipal News, XXIV, Jan. 1974, 1.

<sup>13</sup>Computed from: Hidehiko Hama, "Second Revised Population Estimates by Prefecture, Japan: 1975, 1980, 1985 (Provisional)," The Journal of Population Problems, Japan, Institute of Population Problems, No. 119, 1971, p. 4.

<sup>14</sup>Tokyo Municipal News, XXIV, July 1974, 3.

<sup>15</sup>Ibid.

<sup>16</sup>Hama, op. cit., p. 4.

<sup>17</sup>Computed from: Tokyo Municipal News, XXIII, July 1973, 1.

<sup>18</sup>Japan Times, Jan. 11, 1973, p. 2.

<sup>19</sup>Tokyo Municipal News, XXIV, July 1974, 3, 4.

<sup>20</sup>Ibid., Aug. 1974, p. 4; XXV, Nov. 1975, p. 5.

<sup>21</sup>Computed from: Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1966, XXVIII, 5, 7; 1975, XXVII, 3, 5.

## CHAPTER III

### THE NATIONAL CAPITAL REGION DEVELOPMENT PLAN

A corollary of the heavy concentration of population and economic activity in South Kanto in the 1950s was the creation by the national Diet of the NCRDP. The main features of the NCRDP were described in the Introduction. In this chapter are discussed the history of the capital plan, the measures adopted regarding its implementation, and the effectiveness of these measures. The general conclusion is that while steady progress has been made toward the stated objective of promoting the build-up of outlying industrial centers, little progress has been made toward the objectives of restricting the growth of employment in the inner urban area or controlling land use in suburban areas.

#### HISTORY OF THE CAPITAL PLAN

The capital plan was adopted in 1958 to solve the urban problems of South Kanto. Rapid and unexpected growth of population in suburban areas led to the revision of the plan ten years later. The revisions included enlargement of the intermediate zone (Suburban Redevelopment District) from a width of roughly ten kilometers to a

width of about thirty kilometers. Most important was a change in the concept of the intermediate zone as a clearly defined greenbelt (separating the Built-Up District from the Urbanization Areas) in the Outer Development District (Figure 1) to the concept of its development as a residential area, with as much open land to be preserved as possible, without specifying exactly how much this might be. Among other changes were: (1) The extension of the boundary of the NCR by approximately twenty-five to fifty kilometers to include the entire area of each of the region's four prefectures (formerly, sections of these were not included in the NCR); (2) the redesignation of the peripheral growth centers to include broader areas; and (3) an increase in the amount of central government grants to local governments for the provision basic infrastructure, and payment of interest on prefectural government loans made for the same purpose.<sup>1</sup>

#### MEASURES FOR IMPLEMENTING THE NCRDP

Various steps have been taken to implement the NCRDP. Within the Built-Up District, a 1959 law has restricted the location or expansion of factories and educational institutions covering more than a certain land area. Until mid-1972 this ranged from 1,000 to 1,800 square meters for factories, and from 800 to 1,500 square meters for educational institutions.<sup>2</sup> Since then the minimum size of factories under restriction has been 500 square meters.<sup>3</sup> Excluded

are industries dependent on a coastal location.

To 1974 there were no similar restrictions on office structures in the Built-Up District. From 1975 offices have been subject to a congestion tax intended to promote some decentralization of office development. The tax is considerably less severe than the restrictions on new industrial facilities, however, and current and past policy is that most offices need to concentrate in central Tokyo.<sup>4</sup> Also under way in the seventies was the implementation of a plan to relocate wholesale facilities scattered throughout Tokyo to five new wholesale distribution centers located on the outskirts of the city (Figure 10).<sup>5</sup>

Included in plans for the Suburban Redevelopment District are the construction of eighteen large scale public housing apartment projects (60,000 to 410,000 residents), all within commuting distance of Tokyo, and the general improvement of residential conditions (Figure 11). The latter includes the designation of recreational and scenic areas, called Suburban Green Zone Preservation Areas. Fourteen such areas had been designated as of 1971 (Figure 1).<sup>6</sup>

Within the Outer Development District, fifteen Urbanization Areas, each a center for industrial development including one or more cities, were designated at various dates between 1960 and 1970 (Figure 1). Most of these are or will be connected to the inner area and to each other by arterial highways. Several will also be

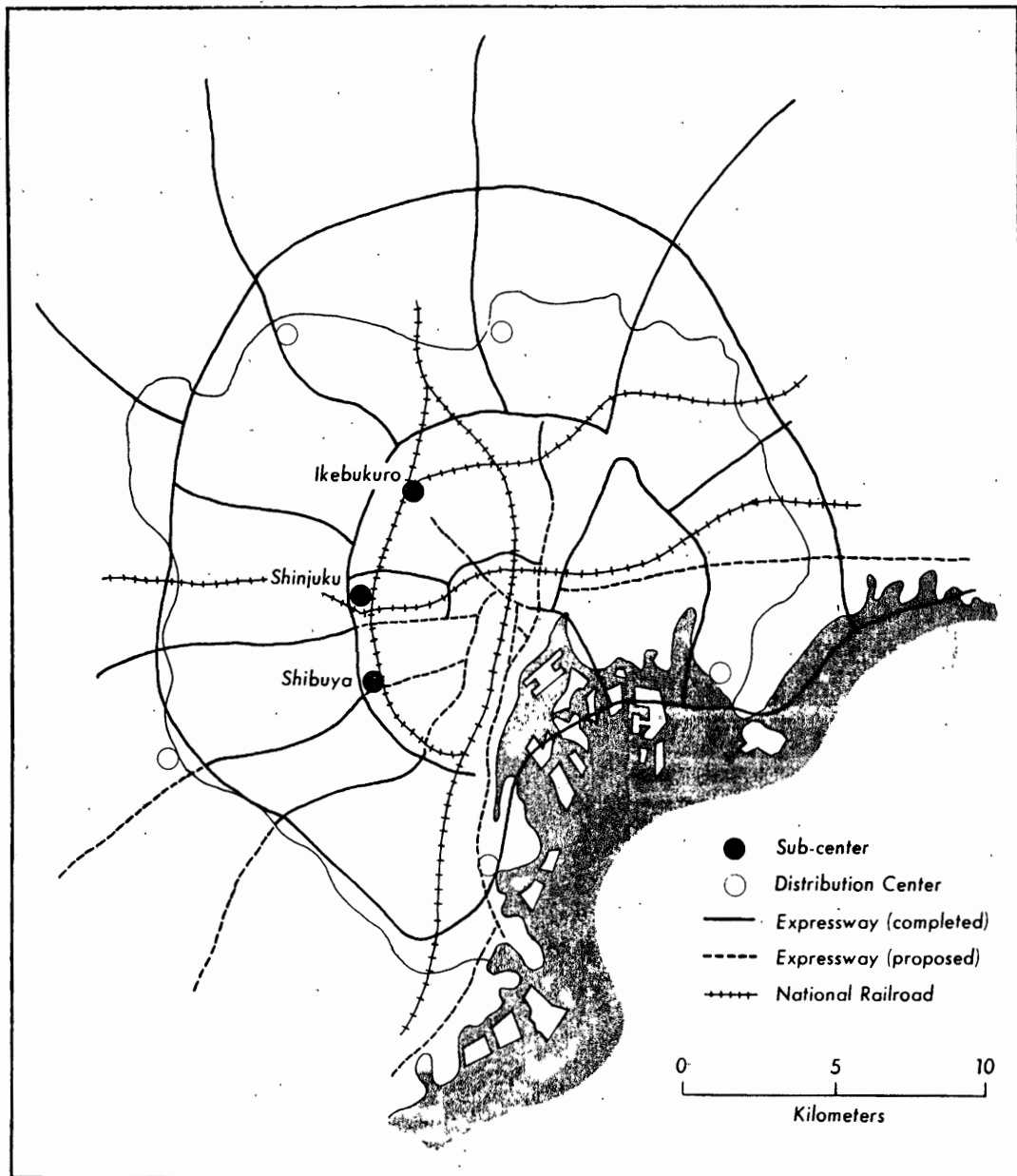


Figure 10. Planned location of distribution centers and subcenters in Tokyo, 1968. (Drawn from: Noboru Kawazoe, et. al., "Tokyo," the wheel extended, I [Autumn 1971]; 9.)



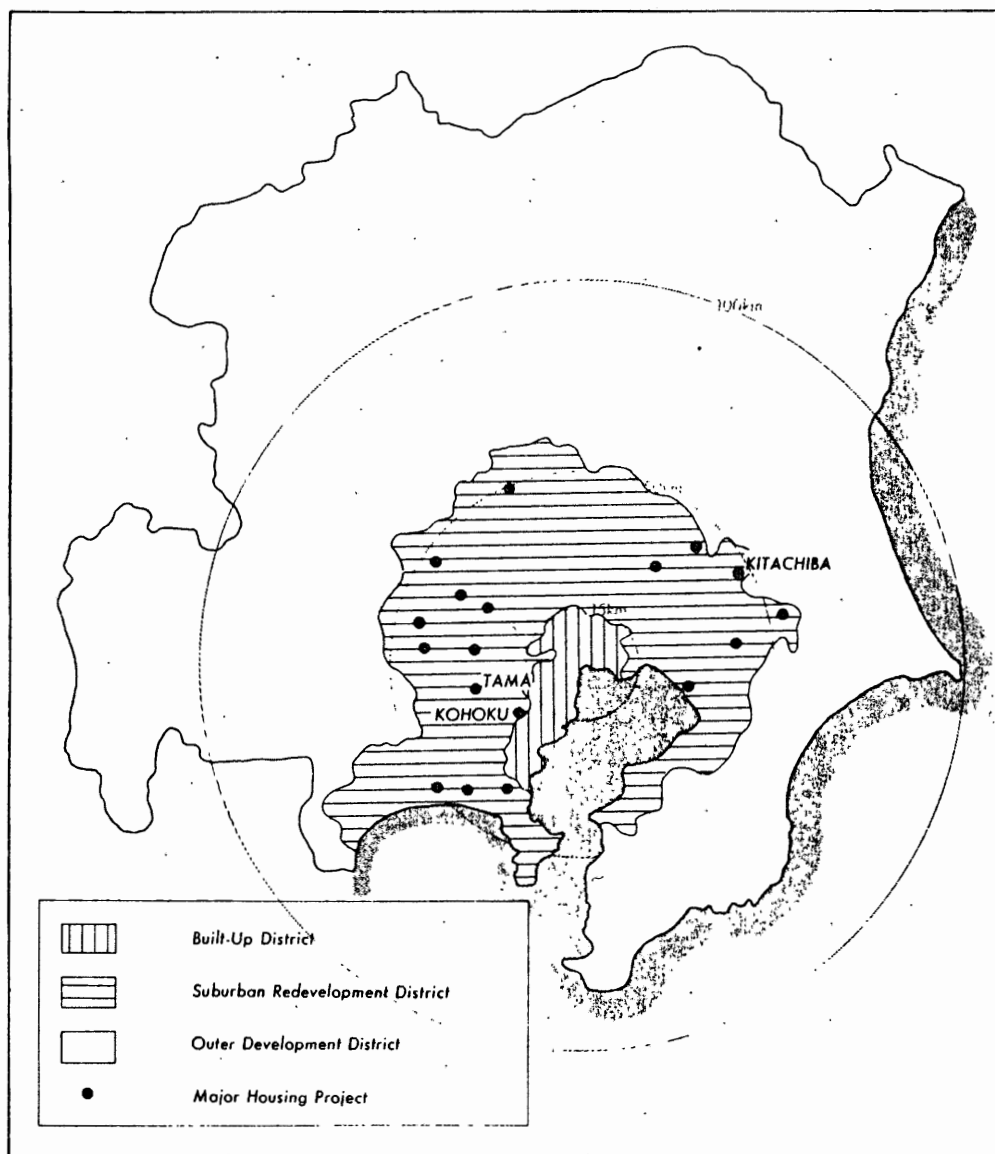


Figure 11. Planned location of major housing projects in the National Capital Region, 1968. (Drawn from: M. E. Witherick, "Master Plan for the Japanese Capital Region," *Geography*, LVII [Jan. 1972], 44.)

directly linked with the inner area by new railroad lines. The combination of improved major transportation facilities and the provision of plant sites furnished with comprehensive infrastructure is the main incentive to industry to set up in the industrial centers. A sixteenth growth center, Tsukuba City, is being built as a center for educational and research institutions (Figure 1).<sup>7</sup>

As indicated, various improvements are being made in the region's transportation network, with first priority being given to long-distance traffic facilities serving the outer areas. The road network is being improved by the construction of six radial and four loop highways, totalling 3,000 km in length. One of these is a proposed loop route bordering the shore of Tokyo Bay and making a combination bridge-tunnel crossing of the bay between Kawasaki and Kisarazu. Railroad capacity is being expanded by the extension of six existing lines outward to between fifty and one hundred km from the city center, and the quadruple-tracking of various lines (Figure 12). The quality of service is being improved by the establishment of reciprocal interline service between public and private railroads. This will eliminate the need to change trains en route to central Tokyo from outlying areas. Lastly, steps are also being taken to improve bus service in the Built-Up and Suburban Districts, as, for example, by reorganizing bus routes around mass transit stations.<sup>8</sup>

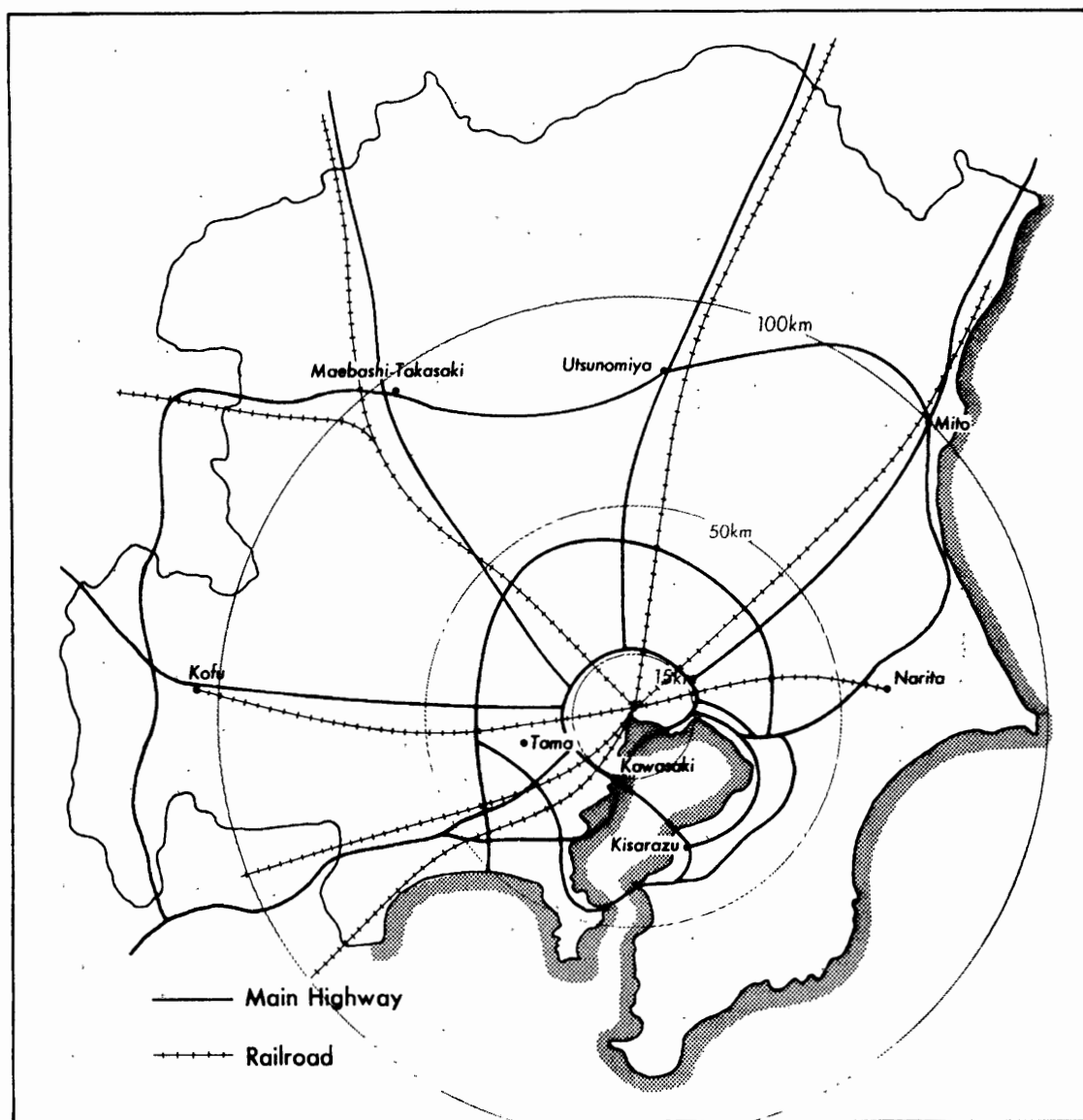


Figure 12. National Capital Region transportation proposals, 1968. (Drawn from: Yoshinari Norota, National Capital Region Development is Key Task for 70's [Japan: National Capital Region Development Commission, n. d.] , p. 1.)

## IMPACT OF DECENTRALIZATION MEASURES

The record shows that to 1975 the measures taken to promote decentralization within the capital region had produced no positive results with respect to population and mixed results with respect to industry.

Table VII shows the population trends of the Urbanization Areas. For the period 1965-1970 the average growth rate of the areas was notably lower than that of the region as a whole. Only three areas increased in population more rapidly than the regional average. During the period 1970-1975 the average growth rate of the areas was slightly greater than the regional average. It is important to note, however, that only six areas grew more rapidly than the region as a whole. In both periods, Kashima was the only case wherein the growth rate was especially high. This data and the prefectural growth data presented in Chapter II lead to the conclusion that the Urbanization Areas did nothing to aid the decentralization of population to the Outer Development District in 1965-1970 or 1970-1975.

Employment data for 1963-1972 for the four peripheral prefectures, where thirteen of the fifteen industrial Urbanization Areas are situated, provide a rough view of the situation regarding manufacturing (Table VIII). The data indicate that throughout 1963-1972

TABLE VII  
POPULATION INCREASE OF URBANIZATION AREAS  
NATIONAL CAPITAL REGION  
1965-1975\*

	Year of Designation as Urbanization Area	1965-1970	1970-1975
Ota-Tatebayashi	1960	7.0	9.9
Kumagaya-Hukaya	1960	11.7	9.5
Maebashi-Takasaki	1960	8.1	14.4
Mito-Hitachi	1961	8.1	9.4
Utsunomiya	1961	8.7	14.8
Oyama	1962	16.2	14.2
Tsuchiura-Ami	1962	12.9	18.6
Koga-Sowa	1963	11.1	11.2
Sano-Ashikaga	1964	3.0	4.4
Ishioka	1964	7.4	10.6
Tsukuba	1966	-1.0	7.1
Tochigi	1966	4.4	6.6
Kofu	1966	6.9	10.2
Kashima	1967	32.5	33.9
Otahara	1970	0.7	7.2
Chichibu	1970	1.2	2.4
Average growth rate of areas		8.0	11.6
Whole region		12.2	11.1

\*Computed from Japan, National Capital Region Development Commission, Outline of National Capital Region Development, 1971, pp. 32, 33; Japan, Bureau of Statistics, 1975 Population Census of Japan, I, pp. 65, 68, 70, 72, 94.

TABLE VIII

EMPLOYMENT IN MANUFACTURING, NATIONAL CAPITAL REGION  
1963-1972\*

Area	1963	1966	Percentage Increase		1969	Percentage Increase		1972	Percentage Increase		
			1963-66	1963-66		1966-69	1966-69		1969-72	1969-72	
Outer De-velopment District	138,439	156,111	12.7	203,213	30.2	238,298	17.3	208,744	14.0	221,567	5.1
Ibaragi Pref.	129,968	150,210	15.5	183,161	21.9	208,744	14.0	221,567	5.1	62,014	14.8
Tochigi "	167,315	181,060	8.2	210,888	16.4	221,567	5.1	62,014	14.8	730,623	12.2
Gunma "	44,475	47,203	6.1	54,019	14.4	62,014	14.8	730,623	12.2		
Yamanashi "	480,197	534,584	11.3	651,281	21.8						
Total											
Suburban Development District	316,680	372,354	17.5	453,608	21.8	487,312	7.4	278,872	12.6	770,419	1.8
Saitama Pref.	151,955	193,721	27.4	247,671	27.8	278,872	12.6	770,419	1.8	217,854	8.8
Chiba "	580,063	645,520	11.3	756,796	17.2	770,419	1.8	217,854	8.8		
Kanagawa "	--	168,907	--	200,263	18.5						
Shi Dist. of Tokyo Pref. (minus Musashino and Mitaka)											
Total	1,048,698	1,380,502	15.5	1,658,338	20.1	1,754,454	5.8				
Tokyo	--	1,633,047**	--	1,624,427***	-0.5	1,591,607****	-2.0				
Built-Up District	--	7,949**	--	9,205***	-15.8	9,822****	-6.7				
Musashino-shi	--	17,948**	--	18,752***	4.5	16,861****	-10.1				
Mitaka-shi	--	1,658,944	--	1,652,384	-0.4	1,618,290	-2.1				
Total											
Whole Region	2,983,499	3,134,223	5.1	3,481,629	11.1	3,468,723	-0.4				

\*Japan, Ministry of International Trade and Industry, Census of Manufacturing, 1963, Report by Cities, Towns, and Villages, 1966, p. 2; 1969, p. 2, 3; 1972, p. 2.

\*\*Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1966, XXIX, 104.

\*\*\*Tokyo Yearbook: 1970, XXII, 94-96.

\*\*\*\*Tokyo Yearbook: 1972, XXIV, 89, 90.

the average growth rate of the four prefectures, as measured by total employment in manufacturing, was well above the regional average. By three-year periods, these prefectures increased at twice the rate for the region as a whole in 1963-1966, by twice again in 1966-1969, and in 1969-1972 they increased by 12.2% while at the same time industrial employment in the region as a whole was static.

The same data for Kanagawa, Chiba, Saitama, and Tokyo (shi district), which are representative of the Suburban Redevelopment District, and for Tokyo (ku district) and the neighboring cities of Musashino and Mitaka, representing the Built-Up District, provide a rough indication of the industrial trends in the two other component parts of the NCR (Table VIII). A look at the data for Kanagawa-Chiba-Saitama-Tokyo (shi district) show that these four accounted for more new industrial employees during 1963-1972 than the peripheral prefectures: some 150,000 more in 1963-1966, 140,000 more in 1966-1969, and 10,000 more in 1969-1972. This suggests that significant manufacturing development took place beyond the perimeter of the Built-Up District, specifically in the Suburban Redevelopment District, despite the steps taken since 1960 to promote the long-distance decentralization of industry to Urbanization Areas. The distribution of new and expanded industrial facilities of more than 1,000 square meters locating in the Kanto region in 1970

(Figure 13) appears to confirm this conclusion.

A feature of this situation reflecting more favorably on decentralization policy is that in comparison with four areas approximating the Suburban Development District, the rate of growth of manufacturing in the peripheral prefectures trended upward throughout 1963-1972. The peripheral prefectures recorded a somewhat lower growth rate than Saitama-Chiba-Kanagawa-Tokyo (shi district) in the first three-year period, about the same growth rate in the second period, and a much higher growth rate in the last period. This is clear evidence that despite substantial industrial development in the Suburban Development District, the trend is toward the long-distance decentralization of industry.

As alluded to, a second favorable feature (Table VIII) is the gradual decline in the number of manufacturing employees in Tokyo-Musashino-Mitaka. During the 1966-1972 period, this decline amounted to 40,654, or -2.5% of manufacturing employees in the three cities -- with other survey data indicating a much higher rate of decline during this same period.<sup>9</sup>

In commenting on the Built-Up District, however, it is important to point out that because of spectacular increases in tertiary employment, total employment in Tokyo-Musashino-Mitaka increased by 1,152,877, or 23.7% during 1963-1972.<sup>10</sup> This is strong evidence that the strategy of dispersing industry has by no



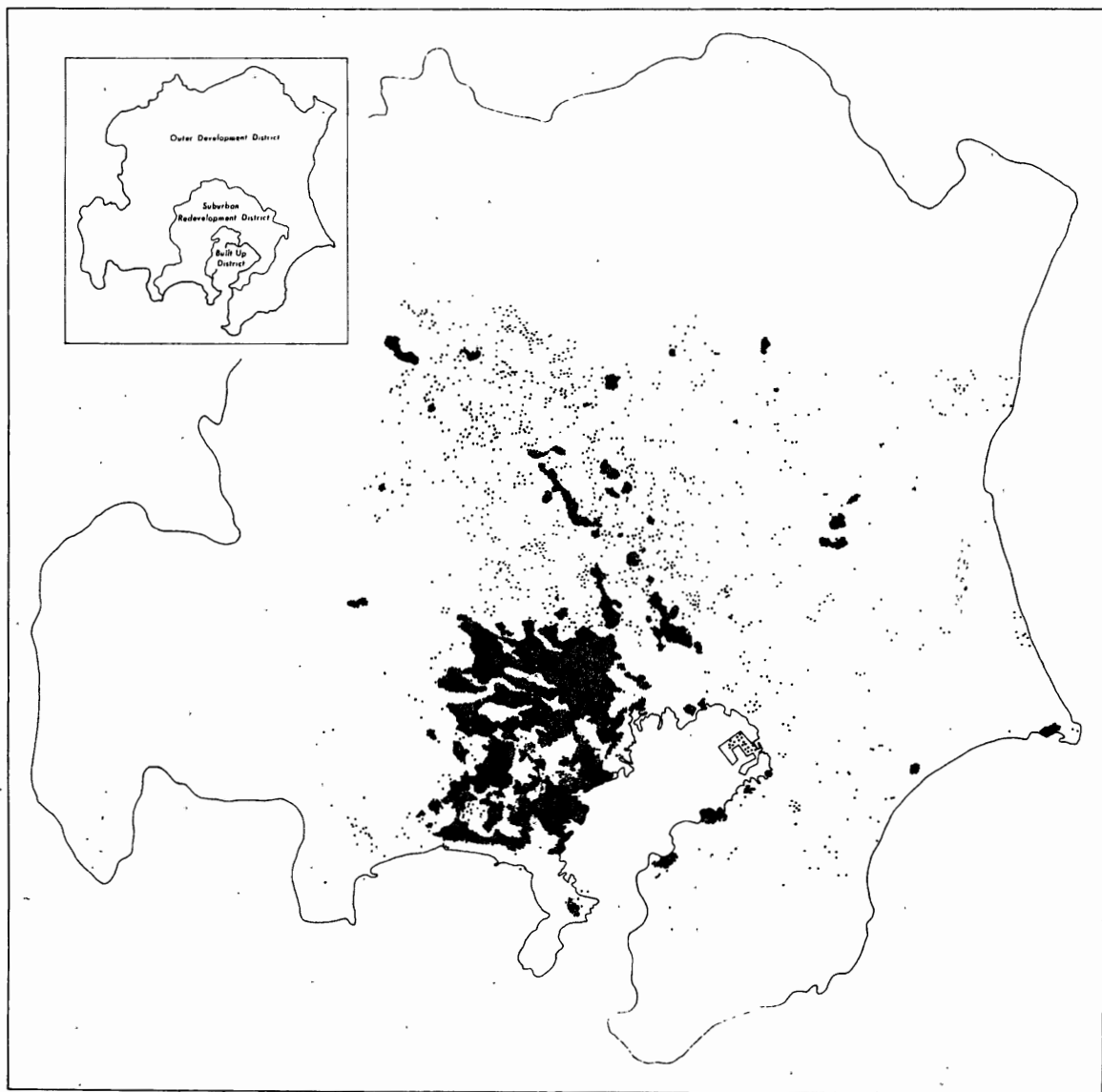


Figure 13. New Industrial plants and plant expansions, exceeding 1,000 square meters in building area, within the Kanto region, 1970. (Drawn from: Japan, Environment Development Center, Report of Survey of Development Plans for the Living Environment, 1972, p. 240.)

means checked the "overconcentration" of total employment in the Built-Up District.

To recapitulate, based on data that are imperfect in areal coverage but believed to be fairly representative of the three main divisions of the NCR, the general industrial trends outlined above (1963-1972) were as follows: In line with policy objectives, industrial employment was on a gradual decline in the Built-Up District and on a steady increase in the Outer Development District. Representing major departures from NCRDP policy were the locating of significant industrial development in the Suburban Redevelopment District and the steady increase in overall employment in the Built-Up District.

#### IMPACT OF ZONING

Briefly, also of prime importance regarding the implementation of capital plan is that very little control has been exercised over the form of development that has occurred in areas outside the Built-Up District. As a result, the typical pattern of land use in the Suburban Redevelopment District, particularly, is one of sprawl.<sup>11</sup> The main reason for this is that NCR and prefectural government authorities have lacked effective powers to control land use.<sup>12</sup> But it also appears that a substantial part of sprawl development has been due to the lax enforcement of zoning regulations.<sup>13</sup> Two reasons are given for this lax enforcement. One is that illegal

construction is a long-established social custom in Japan.<sup>14</sup> The other is that the strict enforcement of zoning regulations would intensify the housing shortage by reducing density and reducing the land available for housing.<sup>15</sup>

As noted in the introduction, the purpose of this study is to discuss possible ways of changing the NCRDP to control pollution, with some attention given to changing the land policies of the Tokyo Metropolitan Government for the same purpose. As such, the next chapter deals with the new regional and prefectural land-use policies needed to help keep stream-water pollution in check. Following this are two chapters that deal with, respectively, the adverse air quality effects of subcenter and housing development, and with ways in which the two programs might be changed to lessen these effects.

## FOOTNOTES

<sup>1</sup>Japan, National Capital Region Development Commission, Outline of National Capital Region Development, 1971, pp. 1-3.

<sup>2</sup>Ibid., p. 23.

<sup>3</sup>Tokyo, Bureau of General Affairs, Tokyo Municipal News, XXII, Sept. 1972, 12.

<sup>4</sup>Japan Times, July 16, 1973, p. 2.

<sup>5</sup>Outline of National Capital Region, op. cit., pp. 10, 11.

<sup>6</sup>M. E. Witherick, "Master Plan for the Japanese Capital Region," Geography, LVII, January 1972, 44.

<sup>7</sup>Outline, op. cit., pp. 20, 21.

<sup>8</sup>Japan, National Capital Region Development Commission, Master Plan for the National Capital Region, 1968, pp. 20-23.

<sup>9</sup>Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1966, XVIII, 160; 1972, XXIV, 116.

<sup>10</sup>Ibid., 1966, XVIII, 105; 1972, XXIV, 88.

<sup>11</sup>Master Plan for the National Capital Region, op. cit., p. 12.

<sup>12</sup>Witherick, op. cit., 46, 47.

<sup>13</sup>Eiichi Isomura, "Complete Provision of Life Necessities," Area Development in Japan, I, Sept. 1968, 10; Koichi Inomata, "A Study of the Land Use Problem in City Planning," Final Report of the Ford Research Project, ed. Graduate School of Public Administration (Tokyo: International Christian University, 1967), p. 256.

<sup>14</sup>Interview with Yasuo Masai, Associate Professor, Ochanomizu University, July 23, 1972.

<sup>15</sup>Interview with Yukinori Ichihashi, Director of City Planning, Department of Capital City Development, Tokyo Metropolitan Government, August 14, 1972.

## CHAPTER IV

### RELATING THE CAPITAL PLAN TO WATER QUALITY

A basic problem in relating the capital plan to water quality is the apparent shortage of data for Japan concerning the water quality associated with different amounts, types, and location of urban development and land use. What information is available illustrates the following: Annual studies of the Kanto Plain have indicated that stream-water quality has decreased with increasing population and development.<sup>1</sup> Other studies have indicated that sewerage development within particular drainage areas has resulted in the improvement of the average water quality of local area streams.<sup>2</sup> Investigations dealing with the direct dumping of untreated and partially treated sewage into receiving streams have estimated that about 80% of the organic pollution of the Sumida River is caused by industrial sewage and about 20% by residential sewage.<sup>3</sup> Still other studies have estimated that residential sewage accounts for 70% of the organic pollution of the middle and upper reaches of the Tama River.<sup>4</sup> This summarizes the totality of Japanese research through 1973 on the relationship between urban development and

water quality.

Few studies were undertaken and the only watershed variables investigated in these studies were size of population, population in sewerer dwellings, and amount of residential and industrial sewage disposed of by direct dumping. Other watershed variables, such as population density, distance of development from the stream channel, design of development, and land fill disposal of sewage appear not to have been the object of research in any respect. An important corollary is the absence of any systematic study of the potential of specific land-use measures to improve stream quality.

#### U. S. RESEARCH ON THE RELATIONSHIP BETWEEN URBAN DEVELOPMENT AND STREAM QUALITY

Available U. S. data regarding the typical effects of urban development with watersheds has been summarized as follows:

...relatively large increases in chemical concentrations are associated with watershed population in unsewered dwelling units, and with population in dwelling units whose sewage is disposed of within the watershed. (Sewage from dwelling units served by sewerage systems which involve disposal within the watershed affects water quality both by the content of the effluent from the disposal plant and by leakage from the sewer system.) Smaller, but nevertheless significant, increases are associated with population in dwelling units whose sewage is sewerer out of the basin. The latter results indicate that urbanization is likely to cause lower water quality regardless of what is done with sewage. ... the contribution of population in unsewered

dwelling units to stream-water pollution is related inversely to the distance of such units from the stream channel. Other findings ... are that chemical concentrations are systematically related to manufacturing employment and to soil drainage characteristics.<sup>5</sup>

Based on these data, U. S. environmental reports suggest that an effective planning program for the preservation of water quality should include a combination of strategies for (1) controlling the location of development in a watershed, (2) specifying the type and design of development, and (3) limiting the total amount of urbanization.<sup>6</sup>

With regard to controlling the location of development, it is suggested that development should be restricted near streams, on steep slopes, and in the headwaters of streams. "The specific distance that development should be restricted from the stream would vary with the soil characteristics of a particular area."<sup>7</sup>

Specifying the type and design of development would minimize the deterioration of water quality associated with street dirt, rubber dust, industrial runoff and other surface debris transported to streams by storms. Estimates are that such debris constitutes 40 to 80% of the organic and chemical pollution entering receiving waters.<sup>8</sup> The recommended abatement alternative is to avoid the construction of large contiguous paved areas and to construct storm sewers or storage lagoons to provide temporary storage of storm water. Storage allows



pollutants to settle out. It is calculated that designing storm sewers to collect the first one-third inch to one inch of rainfall would collect over 50% of runoff-carried pollutants.<sup>9</sup>

#### CONTROLLING THE LOCATION OF DEVELOPMENT IN THE NCR

The U. S. research summarized above suggests several ways in which the capital plan might be modified to help preserve water quality. The first relates to the restriction of development near streams.

Thus far, no attempt has been made by regional authorities to control the location of development in order to maintain water quality. In fact, rather than restricting development near streams, planning reports indicate that considerable future residential, new town, and other development will be sited close to stream channels.<sup>10</sup> Particularly important is the fact that planning to preserve open space has not been related to the preservation of water quality. As mentioned earlier, there are fourteen Suburban Green Zone Preservation Areas (Figure 1). Only one, albeit the largest, contains a significant amount of streamside land relative to its total area. This one exception straddles the middle part of the Ara River for a distance of about twenty-four kilometers, extending between ten and one thousand meters from either side of the channel. The two Suburban

Green Zone Preservation Areas sited in Tokyo Prefecture are more typical, however. The two together cover a total area of about sixteen square kilometers, but contain a combined length of only about 2.5 kilometers of river channel.

In Tokyo Prefecture the arrangement of prefectural designated parkland shows more of a coincidence with the local stream pattern (Figure 14). However, it may be observed that in many places land classified as open space is actually in agricultural or industrial uses. One example is the 3.6 kilometers of open space shown as bordering the Sumida River. Topographic maps show that this land is almost entirely in urban and industrial uses.<sup>11</sup> Likewise, topographic maps indicate that the land classified as open space along the lower ten kilometers of the Ara River is predominately occupied by industry.<sup>12</sup> This observation of widespread encroachment was confirmed in the case of areas classified as "natural parks" (Tokyo Prefecture's parklands are classified into natural, open space, and scenic beauty grouping) by a Tokyo Metropolitan Government advisory council report issued in 1975. Of the prefectures eight natural parks, the council recommended that, because of extensive urban development, two units should be removed from the list of natural parks.<sup>13</sup>

The first possible measure suggested by the material quoted above, then, is that water quality preservation should be made a goal in open space planning. Important in this regard is the fact that

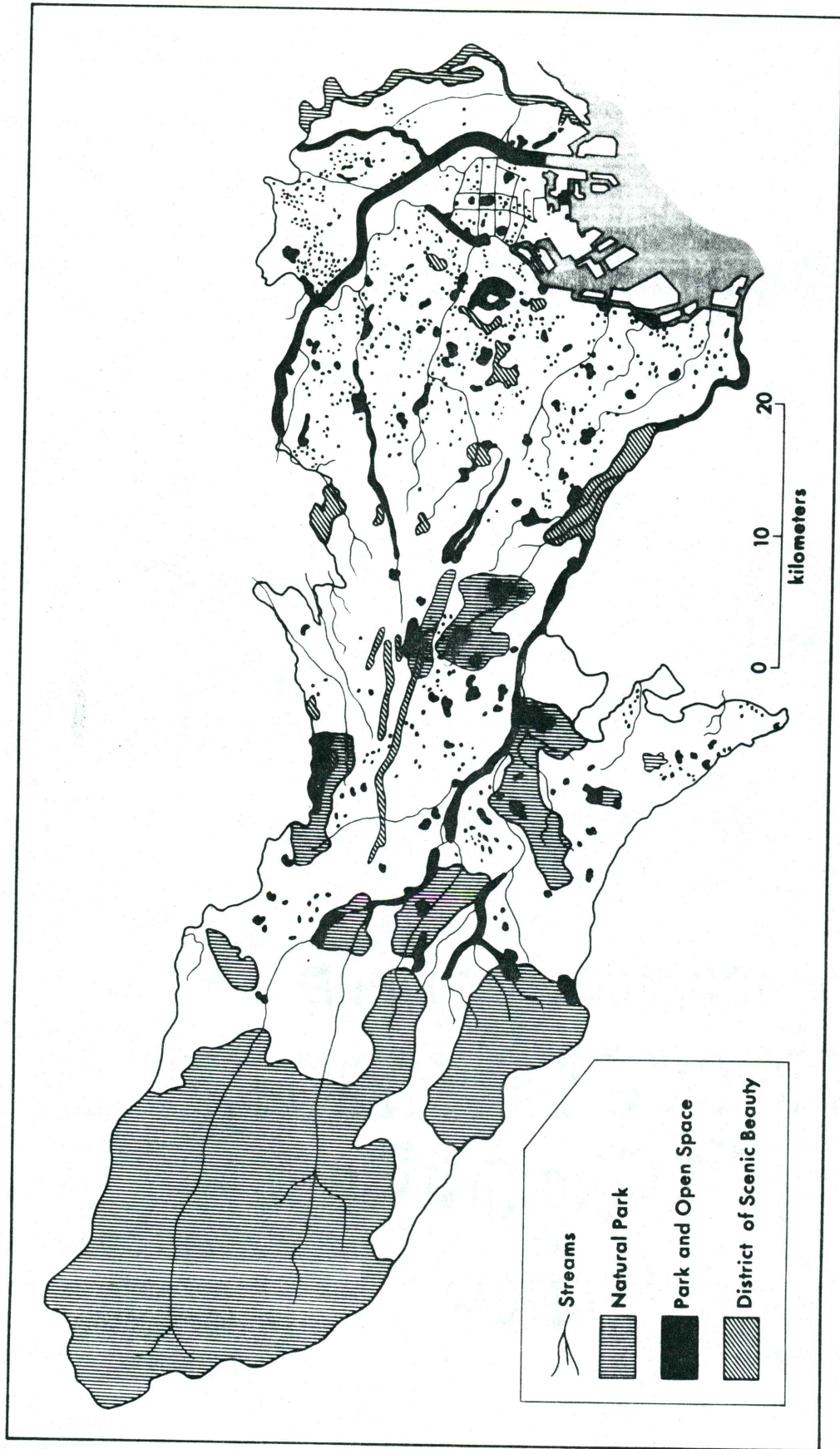


Figure 14. Land reserved for open space in Tokyo Prefecture, 1972. (Drawn from: Tokyo, Bureau of Capital City Development, Planning of Tokyo, 1972 [Tokyo, Tokyo Metropolitan Government, 1973], p. 41; Tokyo, Bureau of General Affairs, Tokyo Municipal News, XXV, Oct.-Nov. 1975, 2.)

the capital plan calls for eventually expanding the area of regional open space from the present 13,000 hectares to 50,000 hectares.<sup>14</sup> Also of great importance is that the Tokyo Metropolitan Government, in 1976, was developing a plan to double the existing area of prefecturally designated open space by 1980.<sup>15</sup> These proposals suggest that a considerable amount of lightly developed streamside area could be protected if stream quality were made a facet in planning the size, arrangement, and topographic characteristics of future regional and prefectural parkland additions.

With regard to upper watershed areas, it is significant that a substantial portion of the hill and mountain land bordering the Kanto Plain on the north, west and southwest lies within five large national parks -- Chichibu-Tama, Joshinetsu, Nikko, Fuji-Hakone-Izu, and South Alps (Figure 15). However, because they are not maintained in a natural state, the significance of the parks for stream-water preservation is probably not as great as the large areas involved (121,600; 188,915; 140,698; 122,309; and 35,799 hectares, respectively) might indicate. The most notable case is that of Chichibu-Tama, a quasi-national park administered by Tokyo Prefecture. Chichibu-Tama, which covers the eastern part of Tokyo Prefecture and parts of Saitama and Yamanashi Prefectures, had a permanent population of over 15,000 in 1975.<sup>16</sup> Moreover, Chichibu-Tama contains within it the Ogochi Reservoir, which serves Tokyo

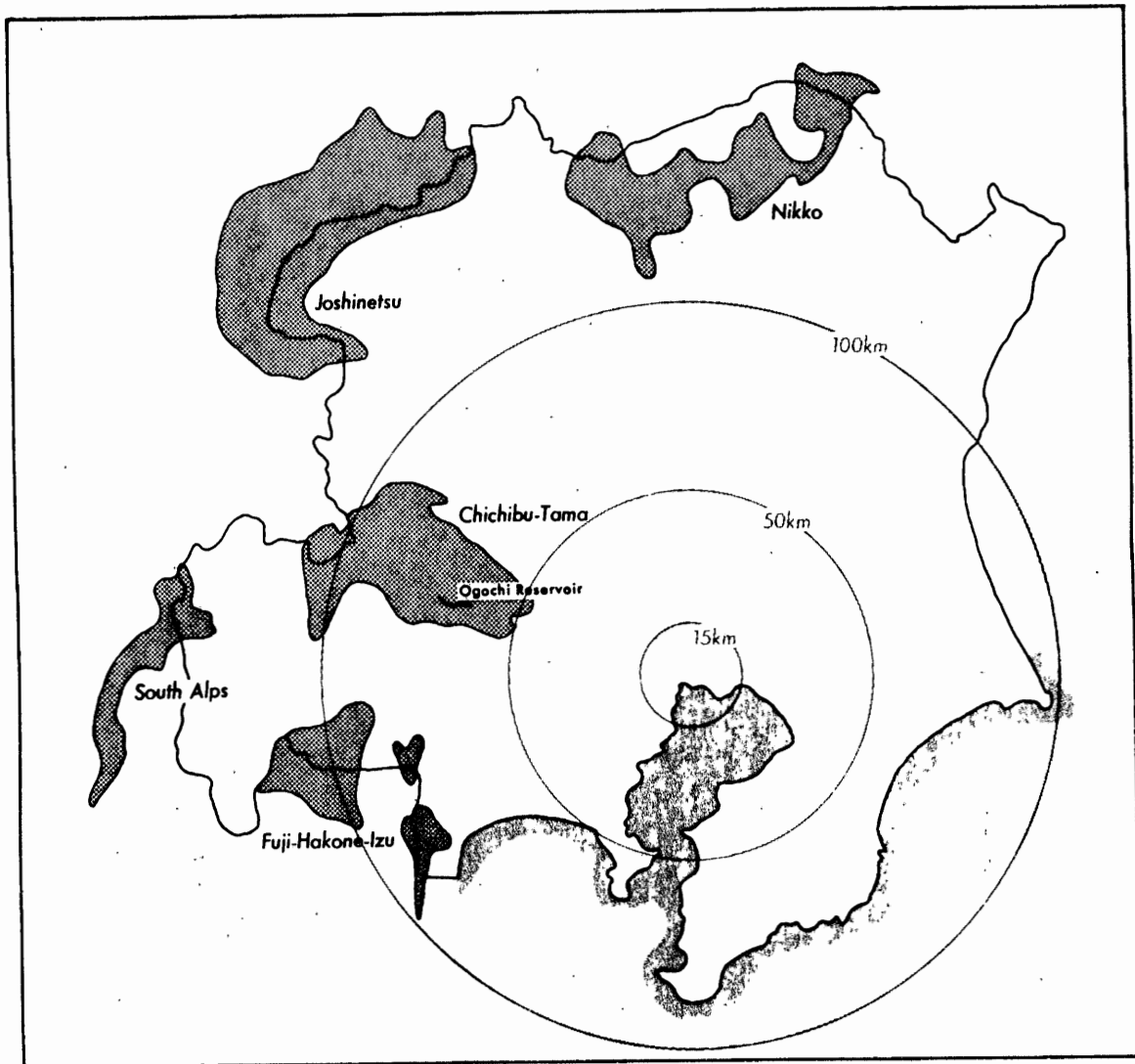


Figure 15. National Parks adjacent to the National Capital Region. (Drawn from: Teikoku's Complete Atlas of Japan [Tokyo: Teikoku-Shoin, 1969], pp. 30-31.)

Prefecture and is considered the world's largest reservoir used exclusively for water supply.<sup>17</sup> Much of the land surrounding the reservoir is protected from logging and urban development.<sup>18</sup> Yet in 1971 about seventy-five structures housing a permanent population of several hundred were sited along Ogochi's northern shore.<sup>19</sup>

Although population maps indicate that the permanent populations of the four other national parks are smaller than that of Chichibu-Tama, all of the parks are heavily used by visitors.<sup>20</sup> Indeed, a total of 129.5 million individual visits were made in 1974 to Fuji-Hakone-Izu, Joshinetsu, and Nikko National Parks.<sup>21</sup> This equals fully half the number of visits that were expected in 1976 to the entire system of national parks, monuments, and recreational areas of the United States.<sup>22</sup> Further reducing the value of the parks as places where water quality is safeguarded is evidence of wide-spread illegal quarrying, forestry, and commercial development.<sup>23</sup>

Fortunately, efforts are being made to control development activities within these and Japan's other national parks. Under a set of statutory regulations that became effective April 1, 1975, no new structures can be built on a lot of less than twenty hectares, the floor spaces of new buildings will be limited to 10% to 20% of parcel size, and no structures will be permitted in areas of more than thirty degree slope. Control measures concerning mining and

forestry operations were also to be strengthened.<sup>24</sup>

Insufficiency of data make it difficult to speculate on the adequacy of these regulations for stream quality protection. The regulations are more severe than before. Most likely, their effectiveness will depend on enforcement endeavors. On the other hand, the regulations do not address the problems resulting from the large amount of existing development, or the problem of the increasingly heavy use of parklands by visitors.

#### SPECIFYING THE DESIGN OF DEVELOPMENT

The second possible planning measure relates to the design of development. As mentioned, U. S. research indicates that a significant improvement in stream quality can be achieved by preventing the construction of large impervious areas, such as parking lots, and by designing storm sewers to temporarily retain storm water. In terms of economic considerations, a big advantage of measures for restricting the construction of impervious areas is that they would not require an allocation of public funds. As to sewerage, the NCRDP called for supplying combined sewers to 50% of the region's households by 1975.<sup>25</sup> The planned systems were inadequate in capacity for the treatment of storm flows, however, This being so, consideration should be given to upgrading existing and proposed facilities to provide for the storage or treatment of

sewage overflows. In this regard, the Tokyo Metropolitan Government environment agency in 1970 corroborated the need for storm sewers to cope with the problem of runoff-carried pollution in Tokyo Prefecture.<sup>26</sup> The increase in the national subsidy for sewerage improvements in 1974 from 40 to 60% may help overcome the difficult problem of financing storm pollution facilities.<sup>27</sup>

### RESTRICTING THE AMOUNT OF DEVELOPMENT

The third approach to minimizing the harmful effects of urban development on stream-water quality concerns restricting the amount of development within drainage areas. The tremendous demand for land, plus past difficulties experienced in controlling land use, clearly make this the least feasible of the three planning measures. Moreover, as indicated in Chapter II, the idea of establishing controls on the growth of population has not been favored by NCR authorities. Nevertheless, the plan formulated by the national Environment Agency for limiting the density and location of development within the national parks, or a plan similar to it, may be of realistic planning interest in the case of certain of the non-park hill lands that lie within the capital region, especially those to the west in closest proximity to Tokyo. Feasible density limitations may also be appropriate in certain other areas that face rising development densities in the absence of planning, as part of a much needed policy for the more



orderly development of the region.

To summarize: It is necessary to plan now for the effects on water quality of the general outward spread of urban development from Tokyo. As detailed above, such planning should focus on restricting development near streams and designing development to retard the flow of storm water to stream channels. Given the pressures for development, setting limits on density in other than a few sections of the capital region, such as critical upper watershed areas, is probably beyond the implementation capacity of regional and prefectural authorities.

#### SEWERAGE DEVELOPMENT

One of the major barriers to the more rapid improvement of regional stream quality is the inadequacy of sewerage facilities, with only about one-third of the region's households having sewerage in 1970. The NCRDP's aim is to correct this deficiency through a phased program of sewerage construction. The goal of 50% coverage of the region's population by 1975 was reported above.

In Tokyo Prefecture, where about 60% of the ward population and about 30% of the shi-gun population were served by sewerage in 1975,<sup>28</sup> the need is being met by a three-part construction program. The plan is to extend sewerage to 100% of the ku area by 1978, the Tama River Basin portion of the shi area by 1980, and all other

urban areas by 1985.<sup>29</sup> Tertiary treatment in the ku and Tama River Basin areas is planned by 1980.<sup>30</sup>

Under the Tokyo Metropolitan Government plan, in 1985 the sewerage systems belonging to the shi and gun districts will cover a combined area of 49,191 hectares and will have the capacity of treating the sewage of a total population of 3,600,000.<sup>31</sup> Based on the current rates of conversion to urban land in the districts (between 1967 and 1976, urban land increased in area at an average rate of 590 hectares per year), the projected area of urban land in 1985 is approximately 23,500 hectares.<sup>32</sup> As noted in Chapter II, the projected population of the two districts in that year will be roughly 3,222,000. Hence for 1985 the sewered area is twice the area of urban land, and the designated population exceeds the projected population by 256,000. It would thus appear that the planned shi-gun systems would provide complete collection and treatment at the end of the proposed construction period. However, it is important to note that while collection facilities allow for considerable extension of urban area in the years after 1985, treatment facilities allow for only a small (7%) increase in future population.

Regarding the sewerage facilities planned for the ku district, the service area in 1978 matches the designated area of urban land in that year, but the projected population exceeds the planned capacities of treatment works. As adverted to in Chapter II, the

error in planned treatment capacities was due to an underestimation of the amount of growth in daytime population. In 1972, appraising the problem of unanticipated daytime increases, a Tokyo Metropolitan Government sewerage advisory committee expressed doubt that the 1978 target date for 100% treatment of ward sewage could be met.<sup>33</sup> As of 1976, it appeared that nothing had happened to make the 1978 target date any less doubtful.

In summary, the planned development of region-wide sewerage will make a measurable contribution to the improvement of stream-water quality. The sewerage plan to Tokyo Prefecture is a catch-up program, in which the proposed treatment works allow for little or no increase in population after the area target dates of 1978, 1980, and 1985. The enlargement of treatment facilities after these dates will be needed to keep pace with the growth of prefectural night and day population.

The next chapter discusses the effect on air quality of the development of a business center in Shinjuku ward.

## FOOTNOTES

<sup>1</sup>Kazuo Mitsui, "Changes in Water Characteristics of Rivers in Kanto District, Japan," International Geography, 1972, eds. W. P. Adams and F. M. Helleiner (Toronto: University of Toronto, 1972), I, 167.

<sup>2</sup>The Japan Times, May 18, 1973, p. 2.

<sup>3</sup>Tokyo, Bureau of General Affairs, Tokyo Fights Pollution, TMG Municipal Library No. 4 (Tokyo: Tokyo Metropolitan Government, 1971, p. 94.

<sup>4</sup>Ibid., p. 23.

<sup>5</sup>Robert E. Coughlin and Thomas R. Hammer, Stream Quality Preservation through Planned Urban Development, Environmental Protection Agency, 1:23/3:73-019 (Washington: U. S. Government Printing Office, 1973), p. 2.

<sup>6</sup>Ibid., p. 10.

<sup>7</sup>Ibid., p. 2.

<sup>8</sup>Anne M. Vitale, et al, Total Urban Water Pollution Loads: The Impact of Storm Water, Environmental Quality Commission Report No. 302/PB - 23-730 (Washington, U.S. Government Printing Office, 1974), p. 3.

<sup>9</sup>Ibid., p. 161.

<sup>10</sup>Japan, National Capital Region Development Commission, Master Plan for the National Capital Region, 1968, p. 29.

<sup>11</sup>Japan, Geographical Survey Institute, Standard Topographic Maps of Japan, GSI Series 1:25,000, Sheet No. NI-54-25-2-4, 1969.

<sup>12</sup>Ibid.

<sup>13</sup>Tokyo, Bureau of General Affairs, Tokyo Municipal News, XXV, Sept.-Oct. 1975, 1, 3.

<sup>14</sup>Japan, National Region Development Commission, Outline of National Capital Region Development, 1971, p. 25.

<sup>15</sup>Tokyo, Bureau of Capital City Development, Planning of Tokyo 1972, TMG Municipal Library No. 4 (Tokyo Metropolitan Government, 1973), p. 40.

<sup>16</sup>Japan, Bureau of Statistics, 1975 Population Census of Japan, I, 79.

<sup>17</sup>Tokyo, Bureau of Waterworks, Waterworks in Tokyo 1972 (Tokyo: Tokyo Metropolitan Government, 1972), p. 49.

<sup>18</sup>Ibid., p. 31.

<sup>19</sup>Standard Topographic Maps, op. cit., Sheet No. NI-54-25-14-3, 1970; Japan, Bureau of Statistics, Statistical Maps on a Grid Square Basis, Capital Region, Series 1:300,000, Sheet No. 1, Population, 1970.

<sup>20</sup>Statistical Maps, Ibid.

<sup>21</sup>Japan Times, Feb. 11, 1976, p. 2.

<sup>22</sup>Wall Street Journal, Sept. 15, 1976, p. 1.

<sup>23</sup>Japan Times, April 2, 1973, p. 2.

<sup>24</sup>Ibid., Nov. 25, 1974, p. 2; Nov. 30, 1974, p. 2.

<sup>25</sup>Outline of National Capital Region Development, op. cit., p. 16.

<sup>26</sup>Tokyo Fights Pollution, op. cit., p. 135.

<sup>27</sup>Christopher Lewis, ed., Asia 1975 Yearbook (Hong Kong: Far Eastern Economic Review, 1975), p. 205.

<sup>28</sup>Tokyo Bureau of General Affairs, Tokyo Fights Pollution, rev. ed., TMG Municipal Library No. 13 (Tokyo: Tokyo Metropolitan Government, 1977), p. 97.

<sup>29</sup>Tokyo, Tokyo Metropolitan Government Research Institute for Environmental Protection, Outline of Plan to Protect Citizens, 1972 (Tokyo: Tokyo Metropolitan Government, 1972), pp. 59, 60.

<sup>30</sup>Tokyo, Bureau of General Affairs, Administrative Perspective of Tokyo, TMG Municipal Library No. 1, (Tokyo: Tokyo Metropolitan Government, 1976), p. 90.

<sup>31</sup>Outline of Plan to Protect Citizens, op. cit., p. 60.

<sup>32</sup>Computed from: Tokyo, Statistics Division, Tokyo Statistical Yearbook: 1966, XXVII, 4; 1975, XXVII, 2.

<sup>33</sup>Tokyo Municipal News, op. cit., XXIV, Jan. 1974, 1.

## CHAPTER V

### THE SUBCENTER PLAN

The NCR plan to relieve congestion in Tokyo emphasises two aspects: Relocation and reorganization. Previous chapters have outlined the plans to relocate distribution organizations to suburban locations and to relocate manufacturing, educational, and research organizations to peripheral locations. The present chapter highlights the plan to reorganize Tokyo's central area by building major subcenters near three railroad stations located six-eight kilometers from Tokyo's center (Figure 10). Shinjuku, as the only project actually underway as of the mid-seventies, is the focal point of the chapter. The central question is: What will be the Shinjuku subcenter's effect on transportation congestion in Tokyo as a whole, in the CBD, and in Shinjuku?

### SHINJUKU SUBCENTER

Shinjuku is the site of the first of three large-scale subcenters to be developed within Tokyo as part of the planned decentralization of the city center.

Plans for the Shinjuku Subcenter call for construction of a business area that will accommodate

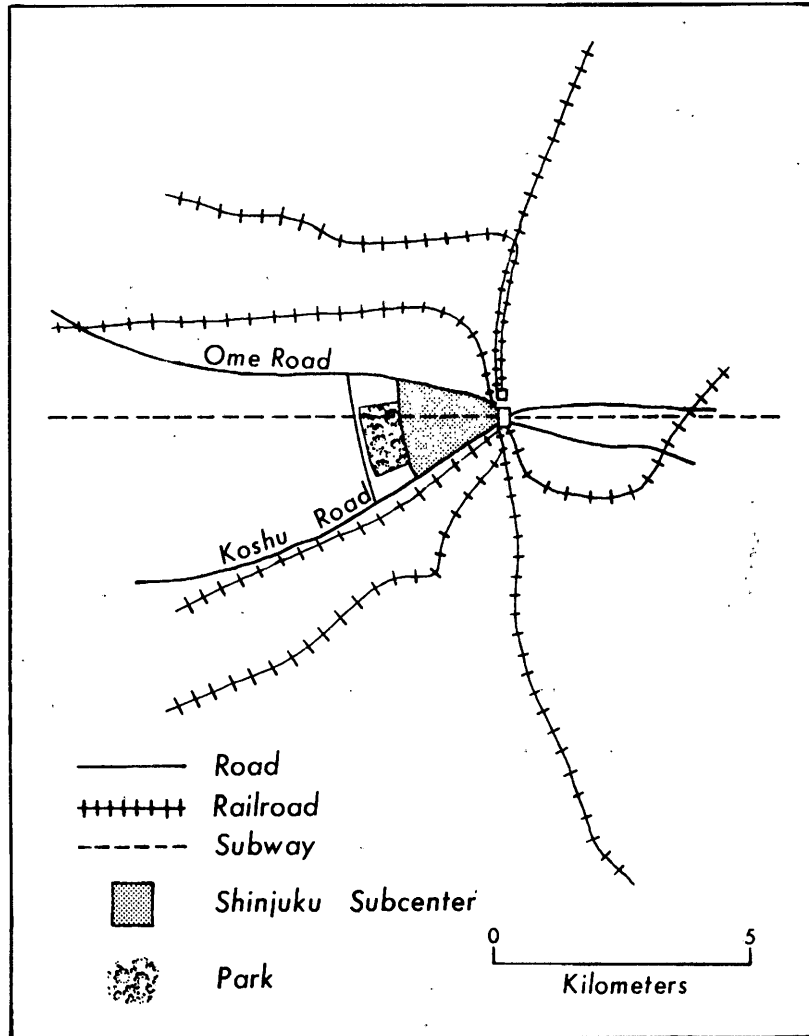


Figure 16. Principal access routes to and from Shinjuku Subcenter. (Drawn from: Teikoku's Complete Atlas of Japan [Tokyo: Teikoku-Shoin, 1969], p. end paper.)



a daytime population of 300,000 in a fan-shaped area of approximately 96 hectares ... between the two trunk roads, Koshu Kaido and Ome Kaido, converging on Shinjuku Station (Figure 16).<sup>1</sup>

A 7.5 hectare park will provide a buffer between the subcenter and a third road that will border it on the west. Design of the internal transportation system calls for a separation of automobile and pedestrian traffic. An unusual feature is an incineration plant that will serve as the waste disposal facility for the entire ward of Shinjuku and also furnish heat and air conditioning to all subcenter buildings. The target date for completion of the subcenter project is 1978.<sup>2</sup>

The basic purpose of the Shinjuku Subcenter is to "alleviate the excessive concentration of (daytime) population and business activities in the (Tokyo) city center,"<sup>3</sup> and thus reduce the critical problem of peak-hour subway passenger and vehicular traffic concentrations. Reduced automobile congestion in the Tokyo CBD would, of course, have significance for air pollution control. However, from an air quality perspective, of greatest importance is the question: Will the development of the Shinjuku Subcenter help relieve transportation congestion in the city as a whole?

## IMPACT OF THE SHINJUKU SUBCENTER ON TRANSPORTATION CONGESTION

Although studies indicate that it is possible to reduce the total amount of air pollution caused by automobiles through the creation of subareas,<sup>4</sup> it is doubtful that this will occur through the development of the Shinjuku business center. First and most important, no high density residential facilities have been created to accommodate the 300,000 employees who will work in the subcenter. Consequently, dependence on public and private transportation will not be reduced, and less crowding downtown will mean more congestion in Shinjuku. Second, although the Shinjuku site has the advantage of being a focus of highway and railway transportation routes, the existing facilities are over-burdened. Shinjuku Station, for example, is the city's busiest station, daily handling (as of 1972) about 2,200,000 passengers<sup>5</sup> -- more than ten times as many as use New York's Grand Central Station.<sup>6</sup> In rush hour, the six mass transit lines that either originate in or pass through Shinjuku Station carry approximately 316,500 passengers.<sup>7</sup> This represents 270% of normal capacity on all lines.<sup>8</sup> Since 300% equals maximum capacity,<sup>9</sup> with no increase in existing facilities, 35,200 would seem to be the maximum number of new passengers that can be accommodated during the peak hour.

At current rates of transit usage (58.7% of all passenger trips made within 50 kilometers of central Tokyo were made on railroads or subways in 1972),<sup>10</sup> the 300,000 subcenter employees would create an additional peak demand of roughly 176,100 people. However, this estimate must be revised downward by an appropriate amount, since many employees of firms relocating to the subcenter presently pass through Shinjuku Station enroute to the CBD. This should approximately equal 176,100 reduced by Shinjuku's share (about 30%) of the total passengers handled daily by all Tokyo stations or roughly 52,800 people.<sup>11</sup> This gives a revised estimate of 123,300 train commuters generated by the subcenter. If these figures are correct, (35,200 supply vs. 123,300 demand) Shinjuku's existing rail facilities are inadequate to accommodate the increase in peak demand generated by the subcenter.

The road system is also heavily overcrowded. As indicated above, the main roads leading to the Shinjuku district are the two trunk roads Koshu Kaido and Ome Kaido. Traffic statistics indicate that the Koshu Kaido was Tokyo's most congested road in 1971, as measured in hours of congestion at intersections,<sup>12</sup> and that the Ome Kaido was the third most congested road in 1972.<sup>13</sup>

Although regional and Tokyo Metropolitan Government authorities have moved to expand road and railroad facilities to meet the needs of urban activities, including business activities in

Shinjuku, the analysis in 1972 of the Teito Mass Transit Authority (the primary builder and operator of subway lines in Tokyo) and the Road Planning Bureau of the Ministry of Construction was that none of the facilities that could be expected to be available in the future would be adequate to cope with increasing railroad and vehicular traffic.<sup>14</sup>

These circumstances would seem to eliminate the possibility that the Shinjuku project will reduce auto congestion and exhaust pollution by increasing opportunities for mass transit use, or by increasing the operating efficiency of cars diverted to the subcenter.

In summary, because of the absence of housing and the presence of existing transportation congestion, the net effect of the Shinjuku Subcenter will probably not be significant with regard to the total vehicular pollutant concentrations in the city as a whole. Because of similar transportation conditions, the future development of subcenters without housing in Shibuya and Ikebukuro, as proposed in the NCRDP, would likewise not appear to offer any advantage in terms of aggregate congestion and pollution levels.

#### IMPACT OF THE SHINJUKU SUBCENTER ON ROAD CONGESTION AND AIR POLLUTION

Next comes the question of the effect of the Shinkuku Subcenter on local road and air pollution conditions.

As of the early seventies, there appeared to be no published data regarding the exact traffic and air quality implications of the subcenter for the CBD and Shinjuku districts. However, it seems reasonable to assume that the relative impact of the subcenter on automobile traffic volumes in the two districts would be a function of its impact on the daytime population of each district. In the CBD, extrapolating from a projected daytime population of roughly three million in the late seventies,<sup>15</sup> the proportion of automobile traffic diverted to the subcenter would represent about 10% of the traffic that would have been experienced had the subcenter not been built. For the Shinjuku District, based on its smaller daytime population, the subcenter induced increase in automobile traffic would be considerably larger than 10%.

However, it is not possible realistically to carry this to the further step of correlating estimated changes in traffic volumes with changes in available air quality measurements. The reason is that Tokyo's air surveillance network included only one station each in the central and Shinkuku districts. Because concentrations of air pollutants for which the automobile is the major contributor vary significantly according to location, monitoring at only one point in these districts cannot provide data that adequately represent the concentrations at different points in the districts. Since it is more than thirty square kilometers in area, this is particularly true

in the case of the Tokyo CBD. The Shinjuku station has the added disadvantage of being on the third story of a building situated in a residential area, rather than at street-level near a major traffic route.<sup>16</sup>

In any case, it can be conjectured that by itself the potential advantage offered by the diversion of traffic from the central area may be only temporary. As is well known, without complementary measures to reduce automotive use, traffic flow improvements tend to induce the entrance of corresponding amounts of new traffic. In the case of Tokyo, several important traffic controls were implemented in 1975 under the National Police Agency's two-year Traffic Reduction Plan. These included enforcing stricter no-parking regulations, reducing the number of taxis driving without passengers, improving bus services, and rationalizing physical distribution practices.<sup>17</sup> But no special controls have been adopted in connection with the Shinjuku subcenter, and there is no guarantee that the reduction in CBD traffic will be comparable to the reduction of CBD employment resulting from the relocation and diversion of employment to the subcenter.

Further doubt as to the subcenter's permanent value in reducing air pollution in the CBD is created by the fact that no reference is made to the assumed benefits of the Shinjuku Subcenter in the comprehensive air quality implementation plan formulated

by the TMG Environment Agency and published in 1972.<sup>18</sup>

## EMPLOYEE HOUSING

Assuming a desire to reduce vehicle-caused air pollution, the policy implication of the conclusion that (1) the Shinjuku sub-center without housing will not reduce Tokyo's total traffic volume and (2) that the diversion of traffic from the central area may be negated in time by induced traffic volume increases, is that local housing should be provided.

Regarding the siting of such housing, with the construction of all subcenter facilities nearing completion, it is unfortunate that it is now too late to modify the existing site plan in order to provide some building space on the present municipally owned site. The exorbitant cost and fragmented ownership of adjacent land were important factors that would have favored on-site construction of some portion of employee housing. The major disadvantage, of course, would have been that fewer lots would have been available for office buildings. Second best, and now the only option, is to construct high-density employee housing as close as possible to the Shinjuku site. If this must be beyond walking distance, a monorail connecting the housing facilities and the subcenter, as one method of reducing the need for road and subway travel, would be worth considering.

Similarly, housing facilities should also be provided for the

employees of the proposed Shibuya and Ikebukuro subcenters. Since as of 1976, the actual site of neither of these subcenters had been officially decided upon, another option is that one, or both, could be built at a site away from the ward area - such as in one of the Urbanization Areas, or near one of the several existing or planned large-scale public housing estates located in the Suburban Development District. Among the latter, because of its size and plans for rail and highway access to the Shinjuku business center, the 410,000-person Tama New Town Development Project, located thirty kilometers west of central Tokyo, would appear to be an especially suitable site (Figure 11). This and one other proposal for relocating urban activities to the Tama project are discussed in Chapter VI.

Two other suitable suburban sites for subcenter development may be the 250,000-person Kohoku housing project and the 340,000-person Kitachiba housing project (Figure 11). Plans for the Kohoku project include the extension of rail service.<sup>19</sup> The project's target date of 1985<sup>20</sup> would appear to allow sufficient lead time for the implementation of a plan giving preferential treatment to the employees of businesses that would be willing to move their offices to a Kohoku-based business center. The Kitachiba project was originally scheduled for completion in 1977.<sup>21</sup> It is not known if plans for the project include provision of rail service. The three specific sites named above are all future housing estates. Theoretically, however, even



without housing, a Suburban Development District or Urbanization Area location would help minimize automobile emissions by creating opportunities for reverse commuting.

Which site might be selected, one of the difficulties confronting any attempt to locate a business center outside Tokyo is the long-standing policy of NCR authorities against restricting the location and expansion of offices in the CBD. As indicated in Chapter III, this policy is based on the presumption that most offices need to concentrate there. However, in the judgment of W. Robson, based on his 1969 study of the major organizational, planning, and administrative problems of Tokyo, many office firms could conveniently relocate all or large parts of their operations to suitable suburban or peripheral sites; and, according to a 1962 TMG survey, about 50% of the business firms in Tokyo would in fact be willing to relocate their offices to subcenters outside Tokyo.<sup>22</sup>

To this end, the adoption of various positive inducements by prefectural and NCR authorities similar in character to the range of government measures and incentives currently provided to promote the relocation of industrial plants, may provide the impetus needed to attract offices to outlying areas. Along with positive inducements, Robson also sees the need for strong negative measures, and such measures would undoubtedly be desirable; but as of 1977, it appeared that there was almost no possibility of the introduction of strong

restrictions on commercial activities in Tokyo in the near future.

## SUMMARY

Summing up, the main point regarding the Shinjuku Subcenter is that, although it may temporarily reduce traffic congestion in the CBD, it will in no way lessen overall congestion. This is because only office buildings have been constructed there--thereby leaving unchanged the need for commuting--and also because the mass transit lines and roads leading to Shinjuku are already heavily overcrowded.

From the perspective of endeavoring to reduce air pollution, this leads to the conclusion that housing should be provided for subcenter employees. The same is true regarding the proposed Shibuya and Ikebukuro subcenters. Building these subcenters at suburban or peripheral sites would go even further toward relieving road congestion.

The policy recommended by the TMG of building more public housing in the city in general for those who work there is the subject of the next chapter.

## FOOTNOTES

<sup>1</sup> Tokyo, Official Report of the World's Great Cities (Tokyo: Tokyo Metropolitan Government, 1972), p. 215.

<sup>2</sup>Ibid.

<sup>3</sup> Tokyo, Bureau of Capital City Development, Planning of Tokyo 1972 (Tokyo, Tokyo Metropolitan Government, 1973), p. 18.

<sup>4</sup> Alan M. Voorhees and Associates, and Rychman, Edgerley, Tomlison and Associates, A Guide for Reducing Air Pollution Through Urban Planning (Washington: U. S. Government Printing Office, 1971), pp. 2-9.

<sup>5</sup> Official Report, op. cit., p. 224.

<sup>6</sup> New York Times, Jan. 18, 1976, p. 30.

<sup>7</sup> Computed from: Official Report, op. cit., p. 224.

<sup>8</sup>Ibid.

<sup>9</sup> Kakuei Tanaka, Building a New Japan, trans. Simul International (Tokyo: Simul Press, 1973), p. 36.

<sup>10</sup> "Transport in Tokyo," the wheel extended, IV, Summer 1974, 5.

<sup>11</sup> Estimated from: Japan, Bureau of Statistics, Workers and Students Commuting to Large Cities, 1968, p. 1.

<sup>12</sup> Official Report, op. cit., p. 221.

<sup>13</sup> Japan Times, Feb. 7, 1973, p. 2.

<sup>14</sup> Interview with the Public Relations Officer, Teito Mass Transit Authority, August 15, 1972; Interview with Kazuhiro Matsuno, Chief of Road Planning, Road Bureau, Ministry of Construction, August 28, 1972.

<sup>15</sup>Tokyo, Bureau of General Affairs, Tokyo for the People: Concepts for Urban Renewal, TMG Municipal Library No. 6 (Tokyo: Tokyo Metropolitan Government, 1972), p. 26.

<sup>16</sup>Interview with Toshiichi Okita, Department of Community Environmental Sciences, Institute of Public Health, August 6, 1972.

<sup>17</sup>Seimi Tominaga, "Reducing Traffic Volumes in Urban Japan," the wheel extended, V, Autumn 1975, 16.

<sup>18</sup>Tokyo, Tokyo Metropolitan Government Research Institute for Environmental Protection, Outline of Plan to Protect Citizens, 1972 (Tokyo: Tokyo Metropolitan Government, 1972), p. 40.

<sup>19</sup>William A. Robson, Second Report on Tokyo Metropolitan Government (Tokyo: Tokyo Metropolitan Government, 1969), p. 79.

<sup>20</sup>Japan Economic Yearbook: 1970 (Tokyo: Oriental Economist, 1970), p. 176.

<sup>21</sup>Japan, Japan Housing Corporation, "The Largest Twenty Projects of New Residential Development" (Tokyo, 1971), n. p.

<sup>22</sup>Robson, op. cit., p. 69.

## CHAPTER VI

### REGIONAL HOUSING

This chapter focuses on the plan to build eighteen very large public housing apartment projects in the Suburban Redevelopment District and the feasibility of alternatives to this plan. Also discussed are what should be done to improve the Tama New Town project, and the impact on transportation congestion of the Tsukuba New Town project.

#### IMPROVING THE NCRDP HOUSING POLICY

Figure 17 shows the location of public housing projects built in South Kanto between 1960 and 1970. Since 1960, public-sector housing, the great majority of which has been built by the national Japan Housing Agency, has represented about 20% of all new housing.<sup>1</sup> Many have noted that the overwhelming concentration of this housing in the suburbs surrounding Tokyo has greatly contributed to increased demands for transportation to and from the CBD.<sup>2</sup> On the private side, the Japan Housing Corporation's policy of making loans "available exclusively for new construction, (has) further encourage(d) people to move from their place of work and also effectively

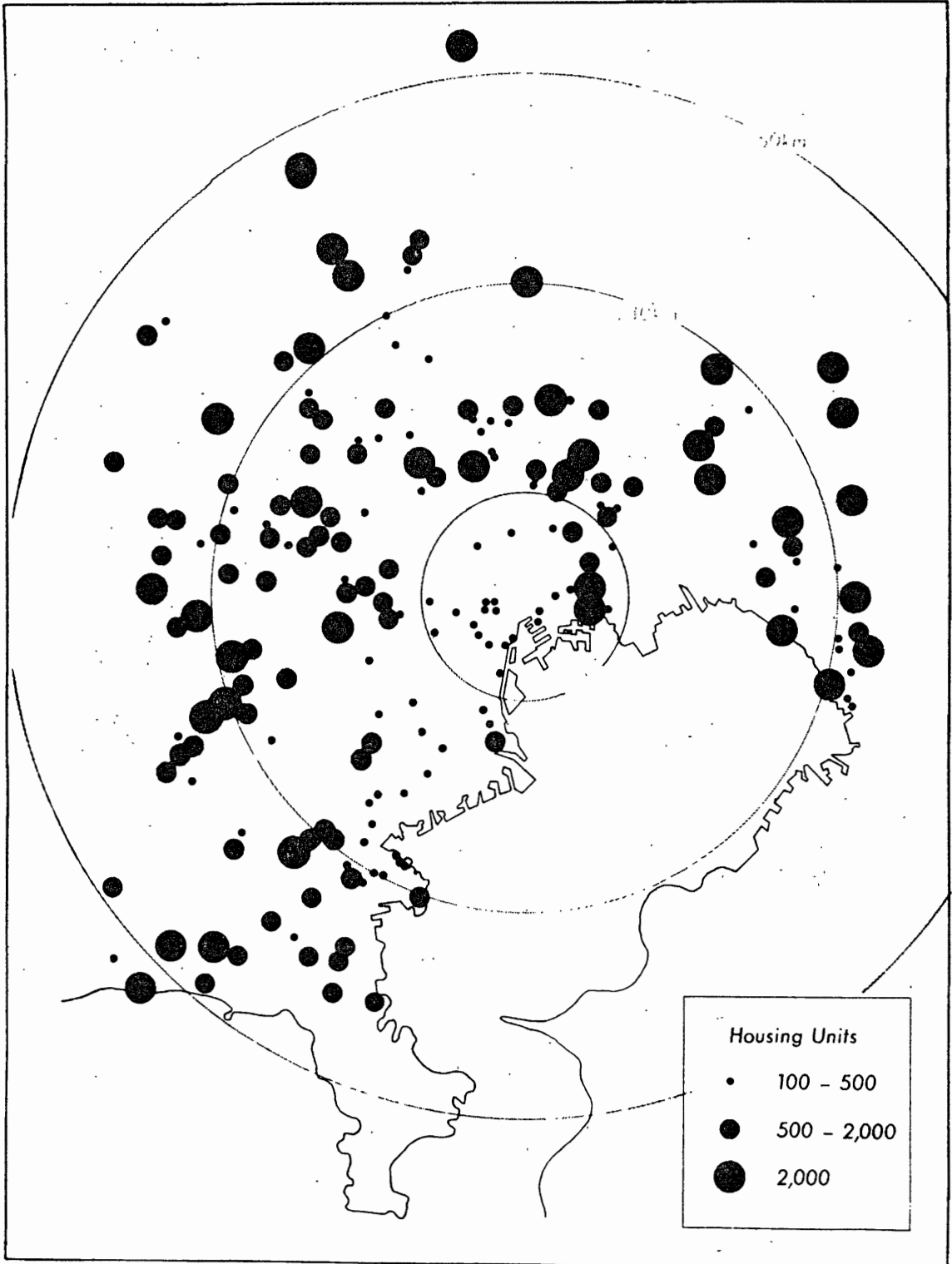


Figure 17. Housing projects built in South Kanto by the Japan Housing Corporation between 1960 and 1970. (Drawn from: Tokyo, Bureau of Capital City Development, Planning of Tokyo, 1972 [Tokyo: Tokyo Metropolitan Government, 1973], p. 39.)

discourage(d) the rehabilitation of older structures in the city."<sup>3</sup>

The creation of the Suburban Redevelopment Zone, and the plan to site the great bulk of future public (and private) housing there, may be seen in this light as a continuation of the practice of siting public housing in outlying suburban areas.

Very clearly great scope for relieving transportation congestion in the longer term would lie in siting some considerable part of public housing in the Built-Up District where jobs are rather than in the Suburban Development District. A major proponent of revising regional housing policy along these lines is the Tokyo Metropolitan Government. The Tokyo Metropolitan Government estimates that by building large-scale housing estates on the land of former factory sites and by tearing down older city areas and replacing them with municipal dwellings, an additional 2,540,000 people could be accommodated in the ku district.<sup>4</sup> Providing housing for half this number of new people by 1985 would cut by one-fourth the amount of suburbs-to-CBD commuting estimated in Chapter II for that year, with the benefits in terms of reduced automobile air pollution presumably falling in the same range.

#### THE PROBLEM OF HIGH LAND PRICES

To be sure, there are obstacles to modifying the housing portion of the NCRDP. As discussed in the case of Shinjuku

Subcenter, first is high and rising land prices. In Japan's six largest cities, including of course Tokyo, during the period 1955-1971, land prices rose at an average compound rate of 21.4% per year.<sup>5</sup> This was more than twice as fast as housing construction costs rose during the same period.<sup>6</sup> In Tokyo Prefecture, land prices rose at particularly high rates in 1972 (33.9%) and 1973 (32.5%).<sup>7</sup>

However, in 1974 the situation changed. Under the impact of new central government price controls and, most important, the recession into which Japan fell, land prices in the Tokyo Metropolitan Area recorded a sharp decline of 11.4%.<sup>8</sup> In 1975 they rose by only 0.5%<sup>9</sup> and in 1976 by 1.4%.<sup>10</sup>

Although the National Land Agency predicted that land prices would also hold steady through 1977,<sup>11</sup> it is difficult to know if this leveling is a trend which will continue. According to a Tokyo Metropolitan Government report published in March 1976, because of the influence of speculative forces it probably will not continue.<sup>12</sup> However, in light of official predictions of the long-run stabilization of economic growth at a slower rate than the trend to 1974,<sup>13</sup> an abrupt shift to the steep land price increases of the past seems fairly unlikely. Another factor favoring greater stability in the long run is the 1974 land-price law noted above. This national law empowers prefectural governors to designate control areas within which all



land transfer transactions are subject to governmentally established price ceilings.<sup>14</sup> Along with controlling land prices, the 1974 law also features a government subsidy that goes part way toward solving the problem of financing the higher cost of land in the inner area. (Land prices five kilometers from Tokyo's center are nine times higher than land thirty to forty kilometers away).<sup>15</sup> The subsidy covers two-thirds of the interest on prefectural bonds issued for the purpose of purchasing land.<sup>16</sup> In the twelve-month period ending in March 1975, partly as a result of the subsidy, local governments in the country as a whole were able to purchase 2.8 times more land than in the year-before period.<sup>17</sup> It is also relevant to note that in view of the increased importance attached by the national government to housing production, the prospect of substantial additional support for public housing as of 1976 was bright.<sup>18</sup>

Although not a complete solution, the leveling-off of land prices and the introduction of a new subsidy for the purchase of land would seem to increase the economic feasibility of shifting some portion of the housing planned for the Suburban Development District to the Built-Up District.

#### THE PROBLEM OF LAND ASSEMBLAGE

As also discussed in the case of Shinjuku Subcenter, a second obstacle to construction of housing in the Built-Up District is the

problem of land assemblage. The dominance of small ownership in Tokyo, and the fact that voluntary purchase has been the prevailing method used for the acquisition of land, have made it extremely difficult to assemble large lots for public purposes, as exemplified by the failure to acquire sufficient land for the development of subcenters in Shibuya and Ikebukuro. The continued leveling-off of land prices would discourage speculative withholding, and this would help to a degree. But what would be mainly needed in connection with the development of housing in or near Tokyo's center would be greater determination to use the legal power which exists on paper to acquire the land needed for such development.

### THE PROBLEM OF LOCAL OPPOSITION

A third major obstacle is local opposition to tall buildings that shut off sunlight from residences in adjacent areas. The reason for this opposition is not only that direct sunlight is valued as an amenity, but also that, with less than 3% of the dwellings in Tokyo having central heating, most people rely on the sun to aid in heating their houses in winter.<sup>19</sup>

Disputes as to the right to sunlight have made it increasingly difficult to construct high-rise apartment buildings in Tokyo. A March 1973 survey of its 132 member companies by the Japan High-Rise Housing Association is illustrative. The survey disclosed that

76% (97 companies) of those responding to the survey said they were or had been involved in disputes over the sunshine right.<sup>20</sup> Also to be noted is a 1975 survey which found that work on 32 public housing projects in Tokyo had been halted and work on another ten projects had been unable to begin due to disputes over loss of this amenity.<sup>21</sup>

Given the low-rise and extremely crowded character of residential areas in Tokyo, and the fact that public housing must be built in a multi-storied form to use high-priced land efficiently, it is unavoidable that revising the NCRDP to emphasize development of housing in the Built-Up District would result in a substantial decrease in residential sunlight access. This would probably be true even if the planning for such development avoided shade in every case as much as possible as, for example, by siting the characteristic slab apartment building in a north-south direction and by concentrating buildings in the central parts of a site rather than at its periphery. However, it is also true that the general public welfare would be enhanced by the reduced regional transportation needs and vehicular emissions that would result from the development of public housing in or near the center of Tokyo where most jobs exist.

#### TAMA NEW TOWN

In addition to siting new public housing the ku district, it would also be desirable to take steps to reduce the impact on

congestion of the Suburban Redevelopment District housing developments that have been or are in process of being built. As of 1977 the largest of these was the Tama New Town project mentioned earlier (Figure 18). The remainder of this chapter deals with the Tama development and another new town project, Tsukuba (Figure 1).

Begun in 1965 and located thirty kilometers west of Tokyo's center, the Tama project will accommodate a population of 410,000 in eight main groupings of five- to eleven-story apartment houses in a 2,570-hectare tract. A large town center containing the main shopping and social facilities will occupy the center of the new town. Of the project's total area, 292 hectares or 11.4%, will be set aside for parks and recreational areas. Education and health facilities are also included in the project as well as sites for modern incineration and sewage treatment plants.<sup>22</sup>

A major effort has been made to provide adequate public transportation. Two railroad branch lines will be constructed to connect the new town with Shinjuku and, when completed, the commuting time will be thirty minutes. Bus routes within the project area will be organized around the new town's two mass transit stations. The new town will also feature grade separation of vehicular and pedestrian traffic. Final completion of all new town facilities is scheduled for 1980.<sup>23</sup>

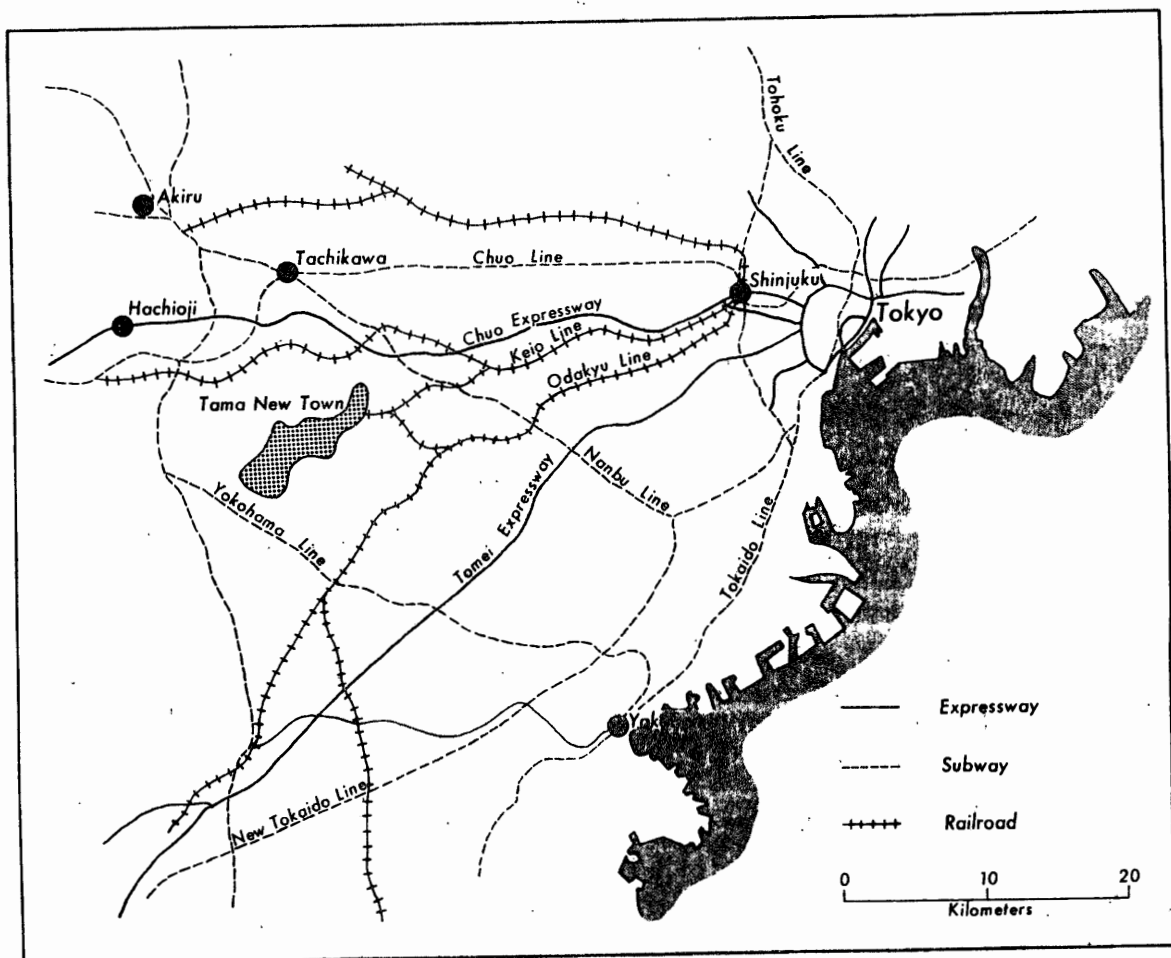


Figure 18. Location of Tama New Town. (Drawn from: Tokyo, Tokyo Metropolitan Government, Tama New Town, n. d., p. 9.)

## EFFECT OF TAMA NEW TOWN ON TRANSPORTATION CONGESTION

From an environmental standpoint, a major disadvantage of the Tama New Town plan is that its only objective is to increase the supply of housing. With few local or nearby jobs available, most of the working population of the new town will of necessity work in Tokyo and particularly in and near the CBD. Since many of the residents of the new town will move from Tokyo,<sup>24</sup> Tama's development will have the effect of increasing commuting. In terms of air quality, it is of course important that electric railroads, rather than automobiles, will be the major means of reaching the CBD. But because of the probability of congestion on connecting lines, the railroad facilities proposed in connection with the new town may not be effective in completely solving Tama's transportation needs. With the completion of all new town facilities, planning authorities estimate that the peak hour congestion rate on the two branch lines from Tama will be a comparatively low 200% of normal capacity.<sup>25</sup> But these lines feed into the Keio and Odakyu passenger lines which operate at much higher rates of congestion during rush hour; and it can probably be assumed that the additional demand generated by the Tama project will seriously aggravate their congestion problems. Moreover, due to an absence of green-belt zoning of nearby land, it can be

anticipated that the new town will also increase transportation needs by stimulating urbanization on the area around it.<sup>26</sup>

### PROPOSED MODIFICATIONS TO THE TAMA PLAN

The problem of the increase in commuting generated by the Tama project has not gone unrecognized. In response to already heavily congested transportation conditions, the Tokyo Metropolitan Government in the 1970s was studying a proposal to reduce the transportation needs of the new town and of the western suburbs, generally, by making Tama part of a four-city satellite town complex to include the established towns of Hachioji and Tachikawa and another new dormitory town, Akiru, proposed for construction at an unspecified time in the future (Figure 18). The Tokyo Metropolitan Government plan was for Hachioji to become an industrial center, Tachikawa a business and commercial center, and for Akiru and Tama to become centers of education and dwelling. Under this plan, Tama would still be a dormitory town but not for Tokyo. By providing employment in the nearby towns of Hachioji and Tachikawa, the residents would be able to work locally and thus avoid the need for long-distance commuting to Tokyo.<sup>27</sup>

In another approach, Robson has suggested that the Tama project could be modified to achieve an even closer location of residents and employment by using a golf course contiguous to the

new town area for the town center and developing the site allocated for the town center as a large-scale office area.<sup>28</sup> Although the construction of the town center on the original site was well under-way in 1977, thus eliminating it as a possible site for a business center, it would still be possible to modify the new town project in a manner similar to that suggested by Robson by acquiring the golf course or other nearby land for a business center. As discussed earlier, this proposal has particular relevance to the unrealized plans for business centers at Shibuya and Ikebukuro.

#### OBSTACLES TO MODIFYING THE TAMA PLAN

A major obstacle to both the Tokyo Metropolitan Government and Robson proposals and any other possible proposal for self-containment is the problem of timing. Since a substantial part of the Tama project was completed and occupied in 1977, an effort at providing jobs would come too late to enforce a requirement of having employment in the new town or nearby before a family is allowed an apartment. The obvious problem this creates is that many residents, possibly many thousands in view of the tradition of lifetime employment with one company, would continue to work in Tokyo after the creation of local jobs.

The only practical way of dealing with this problem would probably be through the gradual attrition of those residents with jobs



in Tokyo and their replacement by nonresidents with jobs in Tama. This process could perhaps be speeded up by giving priority in the allocation of new public housing built in Tokyo to Tama New Town residents who continued to work in Tokyo. The efficacy of this solution would depend not only on the timely provision of sufficient new housing in Tokyo, but also on a change in the practice of the allocation of public housing by lottery.

A further obstacle to the Tokyo Metropolitan and Robson proposals relates to the location of the Tama project. Because it is within commuting range of Tokyo, there is reason to doubt that it could maintain a self-contained labor market. According to Alonso, the experience of the European new towns has been that, "In spite of a numerical equivalence between the number of workers and the number of jobs . . . there is a tremendous amount of cross-hauling."<sup>29</sup> This he attributes to the wider range of economic choices offered by the larger urban area.<sup>30</sup> For the same reason, if an attempt were made to achieve a balance between the working population and employment in the case of Tama, it seems a safe inference that considerable cross-movement would still continue regardless of the particular plan adopted.

All in all, the problems of timing and nearness to Tokyo will undoubtedly make it impossible to develop the Tama project as either a fully independent new town, or as part of a completely autonomous

"satellite town complex." Nevertheless, a greater degree of autonomy could be realized by encouraging as much local employment as possible. Consequently, from the standpoint of environmental impact, either the Tokyo Metropolitan or Robson proposals would be preferable to the new town plan in its present form. Since the transfer of industry from Tokyo is in line with existing trends, and since the relocation of existing educational institutions and building of new ones could be accomplished largely by governmental fiat, the Tokyo Metropolitan Government plan encompassing the towns of Hachioji, Tachikawa, Akiru, and Tama might be somewhat less difficult to implement than the Robson plan based exclusively on the dispersal of large office organizations. On the other hand, since the main centers of employment in the Tokyo Metropolitan plan -- Hachioji and Tachikawa -- are both sited about seven kilometers from Tama, this plan would involve commuting to working places outside the project area.

These points underscore the need for much more analysis of the relative merits of these two proposals and of other possible lines of approach, such as the development of quaternary industry in reducing the transportation needs of the Tama project and of the western suburbs in general.

## TSUKUBA NEW TOWN

As noted, the capital plan also provides for the construction of a new town at Tsukuba in Ibaragi Prefecture, sixty kilometers north-east of Tokyo. Tsukuba New Town has many of the same design features as Tama New Town such as medium and high-rise apartment housing, pedestrian-ways, and city-wide space heating, but differs importantly from the Tama project by featuring a program of phasing the growth of population to the provision of new jobs. Employment will mainly be provided by various educational and research institutions. Most of these are governmental institutes which will be relocated from Tokyo. Another important feature that sets Tsukuba New Town apart is a 25,200 hectare "zone of limited urbanization" encircling the new town in which development is to be carefully planned to prevent urban sprawl.<sup>31</sup> When completed in 1979, Tsukuba is to have a population of 100,000 and eventual plans call for a population of 200,000.<sup>32</sup>

One of the main purposes of Tsukuba New Town is to help relieve traffic congestion by reducing the concentration of employment in the center of Tokyo. Since the project is sited some distance away from Tokyo, the amount of cross-movement should be minimal and the new town should have the intended effect. However, accepting the growth assumptions presented in Chapter II, the Tsukuba project

will not have a large numerical impact on the transportation problem. In fact, the volume of long-distance commuting eliminated by the Tsukuba project could amount to as little as one-fourth the increase in commuting generated by the Tama New Town project in its original form.

### SUMMARY

In summary, the policy of siting public housing in outlying, suburban areas has greatly contributed to the region's dispersed pattern of urban growth and, consequently, to its transportation and air pollution problems. A reduction in transportation needs could be achieved by siting a substantial portion of new public housing in the Built-Up District. Measures adopted in the early 1970s for the control of land prices and public assistance for land assemblage may help overcome the problem of high and rising land prices, which has hitherto been the greatest obstacle to the development of housing within the city. Although such a policy may result in reduced sunlight in areas adjacent to such housing, the welfare of the general public would be enhanced. Parallel efforts to encourage private housing development in Tokyo also warrant consideration. Steps are also needed to lessen the impact of the Tama mass-housing project by providing on-site, or nearby employment opportunities. Although the Tsukuba New Town project contains the employment

for its own residents and is sited some distance away from Tokyo, its small size will keep it from having a significant impact on congestion.

## FOOTNOTES

<sup>1</sup>Computed from: Tokyo, Bureau of General Affairs, Tokyo's Housing Problem, TMG Municipal Library No. 5 (Tokyo: Tokyo Metropolitan Government, 1972), pp. 62, 63. (The 20% figure cited is for Tokyo Prefecture, but is believed to be roughly the same for the subregion as a whole.)

<sup>2</sup>Edwin Mills and Katsutoshi Ohta, "Urbanization and Urban Problems," Asia's New Giant: How the Japanese Economy Works, eds. Hugh Patrick and Henry Rosovsky (Washington, D.C.: Brookings Institute, 1976), p. 717.

<sup>3</sup>Peter M. Grilli, "Summary, Colloquia on the City, A Comparison of Tokyo and New York," Fourth Session, Japan Society, New York, November 24, 1975, p. 3.

<sup>4</sup>Tokyo, Bureau of General Affairs, Tokyo for the People: Concepts for Urban Renewal, TMG Municipal Library No. 6 (Tokyo: Tokyo Metropolitan Government, 1972), p. 87.

<sup>5</sup>Computed from: Tokyo, Bureau of General Affairs, Land in Tokyo Metropolis in 1974, TMG Municipal Library No. 12 (Tokyo: Tokyo Metropolitan Government, 1976), p. 58.

<sup>6</sup>Mills, op. cit., p. 700.

<sup>7</sup>Land in Tokyo, op. cit., p. 60.

<sup>8</sup>Charles A. Fisher and John Sargent, "Japan's Ecological Crisis," The Geographical Journal, 141, July 1975, 173.

<sup>9</sup>Japan Times, January 31, 1976, p. 2.

<sup>10</sup>Japan Times Weekly, February 12, 1977, p. 5.

<sup>11</sup>Japan Times, October 31, p. 2.

<sup>12</sup>Land in Tokyo, op. cit., p. 66.

<sup>13</sup>"Second Half of EPA White Paper Maps Transition to Stable Growth Economy," Japan Report, New York, Japan Information Service, XXII, January 16, 1976, 1.

<sup>14</sup>"New Plan for Land Use Designed to Curb Price Spiral, Aid Development," Japan Report, XX, Sept. 1, 1974, 7.

<sup>15</sup>Computed from: Land Value Atlas of Tokyo Region, Tokyu Real Estate Company (Tokyo), 1972, p. 2.

<sup>16</sup>Ibid., p. 7.

<sup>17</sup>Japan Times, June 26, 1975, p. 2.

<sup>18</sup>"Review of Economic Policies Reveals Optimism, Emphasis on Public Works and Housing," Japan Report, XXII, April 1, 1976, 1.

<sup>19</sup>"Citizens Have the Right to Sunshine," Tokyo Municipal News, XXIII, May-June 1973, 7; CBS Morning News, Jan. 23, 1976.

<sup>20</sup>Japan Economic Yearbook: 1973 (Tokyo: Oriental Economist, 1973), p. 206.

<sup>21</sup>Toshiaki Kaminogo, "Glory and Misery of Local Autonomies under Progressive Control," Japan Echo, II, Summer 1975, p. 22.

<sup>22</sup>Tokyo, Official Report of the World's Great Cities (Tokyo: Tokyo Metropolitan Government), pp. 221-23; Tokyo, Tokyo Metropolitan Government, Tama New Town, n. d., pp. 1-9.

<sup>23</sup>Ibid.

<sup>24</sup>William A. Robson, Second Report on Tokyo Metropolitan Government (Tokyo: Tokyo Metropolitan Government, 1969), p. 34.

<sup>25</sup>Robson, op. cit., p. 35.

<sup>26</sup>Interview with the head of the Tama New Town Planning Section, Bureau of Capital City Development, Tokyo Metropolitan Government, August 20, 1972.

<sup>27</sup>Ibid.; Tokyo for the People, op. cit., pp. 105, 107.

<sup>28</sup>Robson, op. cit., p. 35.

<sup>29</sup>William Alsonso, "What are New Towns for," Urban Studies, VII, February 1970, 45.

<sup>30</sup>Ibid.

<sup>31</sup>Hyo Shiina, "Transport Planning for Tsukuba New Town," the wheel extended, V, Spring 1976, 14.

<sup>32</sup>Tsukuba Academic City under Construction, Future Home of 43 Educational Institutes," Japan Report, XX, Feb. 16, 1974, 1.



## CHAPTER VII

### SUMMARY AND CONCLUSION

This study has been concerned with Japan's National Capital Region Development Plan. How to modify the capital plan and some of the correlative land policies of the Tokyo Metropolitan Government to more fully protect regional air and water quality has been the problem dealt with in the study.

It was shown that the significant population trends in the region in the sixties and seventies have been as follows: Decline of population in the ku district of Tokyo Prefecture; rapid growth in the population of suburban areas, including Tokyo Prefecture's shi district and the prefectures of Kanagawa, Saitama, and Chiba; slow growth of population in the peripheral prefectures. Another significant trend has been a steady increase in the daytime population of Tokyo's central area. Forecasts to 1985 indicate overall continuations of these trends.

Transportation congestion and the deterioration of water quality in areas where urban development is occurring were mentioned as environmental problems that have resulted from these trends. Problems affecting air and water quality that may arise

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in the future were found to include: In 1985 a projected increase of 928,500, or 52% in the rate of commuting between the suburbs and the Tokyo CBD above 1970; a daytime population in central Tokyo that will significantly exceed the projected capacity of sewerage treatment facilities; an expected shortage of water supplies in South Kanto amounting to 2.0 to 4.1 billion cubic meters in 1985; and the near total urbanization of farmland in Tokyo Prefecture by that year.

In evaluating the success of the NCRDP, it was found that some limited success has been achieved in decentralizing industry to Urbanization Areas. As just suggested, this success has not been matched by a similar degree of success in decentralizing population to these areas. Moreover, many of the industrial moves ended in destinations within the Suburban Redevelopment District. Also, as in many other countries, failure to control the major sectors of new employment growth (the tertiary and quaternary sectors) has meant that the reduction of industrial employment in the center has been more than offset by acceleration in growth of overall employment there. Another problem, closely related, is that NCRDP and prefectural zoning regulations had only a limited effect in controlling land use in areas outside the Built-Up District.

In attempting to relate the capital plan more closely to water quality, it was recommended that steps be taken to control the location of development within watersheds. In particular, it was

proposed that restricting development near streams should be made a goal in both the NCRDP to triple the amount of open space designated by capital region authorities and the TMG proposal to double the amount of prefecturally designated open space. Correlatively, for the purpose of protecting the headwaters of streams it was proposed that the provisions of the 1975 law regulating development in Japan's national parks be applied by regional authorities to the parts of the hill and mountain area that lie outside the five national parks located along the NCR's northern, western, and southwestern boundaries. Another recommended planning measure concerned the type and design of development within watersheds with emphasis on limiting the construction of impervious areas and designing sewerage facilities to provide temporary storage of storm runoff.

Regarding the improvement of air quality, it was speculated that the development of a subcenter at Shinjuku would roughly provide a 10% reduction in the amount of CBD traffic that would have been experienced had the subcenter not been built, but that the achievement of this reduction would encourage additional automobiles to enter the CBD. It was also speculated that the subcenter's effect on Shinjuku would be to greatly increase traffic congestion. To reduce this effect on Shinjuku, it was recommended that on-site or nearby housing be built for the employees of the subcenter. It was further recommended that sites for the two other proposed

subcenters be moved to suburban or peripheral area locations, especially near one of the large-scale housing projects in the Suburban Redevelopment District. One of these, the Tama New Town project, was found to be a particularly suitable site.

In this regard, strong efforts would be necessary to promote the transfer of large office organizations away from the existing CBD. The tax adopted in late 1974 for restricting the construction of new office buildings in the core area would appear to fall short of the strong negative controls suggested by Robson as necessary to encourage firms to relocate. However, some survey evidence suggests that positive incentives may be sufficient to attract firms to outlying sites in the specific case of subcenters.

It was also noted that the policies of siting public housing in outlying suburban areas, and of making loans available exclusively for new construction have contributed to the commuter problem, and, consequently, to the problem of vehicular emissions. To reduce commuting in the long run, it was recommended that a substantial portion of new public housing be sited in or near the core area of Tokyo in closer proximity to jobs. Regarding the obstacles to modifying the NCRDP housing scheme in this way, it was observed that the 1974 land price law may help overcome the problems of the higher cost of urban land; that the vigorous implementation of regulations pertaining to land acquisition would be needed to overcome

the problem of land assemblage; and, similarly, that, after first carefully selecting and designing sites for public housing to minimize the loss of sunlight available to other buildings in the immediate vicinity, a firm willingness to move forward with plans to locate more housing closer to jobs would be needed in dealing with the problem of local opposition to high buildings that reduce access of direct sunlight.

In evaluating the impact on congestion of the two new town projects, it was found that Tama New Town is sited too close to Tokyo to allow the development of a truly independent new town, but that the provision of jobs on land within or near the Tama project would make possible a greater degree of independence to be realized than at present. It was noted that Tsukuba New Town contains the employment for its own residents and is sited some distance away from Tokyo; but because of its small size in proportional terms, it will have little impact on Tokyo's transportation problem.

Summing up, the revision of the NCRDP would provide a substantial opportunity to plan and build in a manner calculated to contribute to the solution of the air and water pollution problems facing the region. It is clear that major changes in the capital plan are needed to accomplish this aim. In this regard, many of the proposals discussed in this study, such as those for decentralization of offices, the siting of more housing in the ku area, and for the

provision of local employment for Tama New Town residents, are in line with the planning efforts and policy recommendations of the Tokyo Metropolitan Government. In general, the conclusion is reached that the capital plan should follow on present Tokyo Metropolitan Government planning policies.

Regarding the more detailed aspects of planning for environmental quality, it is apparent that there is a need for better information regarding the relationship between land use and local environmental conditions to provide a factual basis for land planning. For example, it was noted that studies are required to aid in planning the location and size of future open space parcels to provide the greatest benefit for water and air quality preservation. Similarly, little is known about the environmental effect of the changing spatial distribution of industry and more research on this subject is needed.

Finally, there is the problem of enforcement. It was pointed out that there has been only limited implementation of NCRDP decentralization and land use policies. This has been due, most importantly, to a lack of enforcement authority, and also due to the speed of the region's growth, high land prices, failure to give proper attention to office development, the vagueness of many policies, and too great a reliance on positive inducements. To accomplish the restructuring of the region in the manner described in this study would call for a new attempt at the effective enforcement of NCRDP policies.

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