Some New Developments of Urban Cartography in Japan

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Urbanization is still proceeding very rapidly in Japan. Right after World War II, the proportion of gainfully employed workers in primary industries was about 50%, but as of 1981, it was 10%. Today, the proportion seems to be somewhat lower than in 1981. More than 70% of the total population of Japan (as of Oct. 1, 1980, it was 117,057,000) now live in *shi* (cities) which count 647 including Tokyo's Ku-area. For the area size of the country (378,000 km^2), the total number of urban population is very large, since 90% of the total population can be regarded as urban in occupation, although many live in *machi* (towns) and *mura* (villages). In absolute number, it is about 105 million. In other words, more than 100 million urban population is distributed throughout Japan. Furthermore, this large urban population lives in a very limited space. Because of the the mountainous nature, only 2% of the national land is devoted to all sorts of urban uses, and 15%, this again is not much, to agricultural uses, totaling 17%. The remaining 83% is under forest, marsh and others.

Although the ratio of population increase in Japan is very low (0.7%), it is estimated to reach a peak of 130,360,000 in 2008, of which more than 90% will live cities and towns. Self-sufficiency in food production is decreasing rapidly, despite food production in Japan is increasing. And now, Japan faces the following two very serious problems: 1) urban population is still increasing in absolute number, and 2) rising living standards demand more spacious urban habitat.

Any country has its own problems concerning urbanization. To solve them, reclamation of shallow sea areas has taken place vigorously in Japan, especially in bay areas near great cities. But this is not enough to provide the ever-increasing urban population with enough space. In many cases, such reclaimed lands have been used largely by industries and transportation. Some mountain and hill slopes have been converted to urban lands as in the case of Kobe, a million city on the Seto Inland Sea. But this again cannot be a fundamental measure for absorbing large urban population. Consequently, the following 2 types of measures have been adopted nation-widely: 1) urbanizing densely inhabited farmland, and 2) more intensive use of urban land, both requiring more rational planning.

Japan's super-size urbanization is to be seen around the three greatest urban agglomerations: Tokyo-Yokohama, Kyoto-Osaka-Kobe and Nagoya. In the Tokyo Metropolitan Region, there are more than 100 *shi* (cities) each having more than 30,000 population. Within the first 10km concentric zone centering on downtown Tokyo, 3,752,000 people live, and 10—20km zone, 7,860,000; 2—30km zone, 5,377,000; 30—40km zone, 5,754,000; 40—50km zone, 3,596,000; totaling 26,339,000 as of Oct. 1, 1980. It is considered that the Tokyo Metropolitan Region is expanding further outward, and so not very few people commute to Tokyo from cities located some 100km away. In other words, its total population could be nearly 30 million. And this greatest urbanization is proceeding in such a densely populated farmlands, where the average farm size is less than 1 ha. Just around Tokyo, it is about 0.5 ha. For many of the farmers

there, income from agriculture is not much generally, and income from other sources is conspicuous, especially income from selling the land, which often is astronomical. Sprawling urbanization is a result of the loosely zoned land uses too. Mapping of this kind of urbanization is very difficult.

Megalopolitanization is another phenomenon to be noted. From southern Kanto District around Tokyo to the Kyoto-Osaka-Kobe Metropolitan Region in central Kinki District through the Nagoya Metropolitan Region in between, there is a great urbanized belt zone stretching at least 700km east-west and up to 100km, generally 10—50km, wide. Total population in this To-

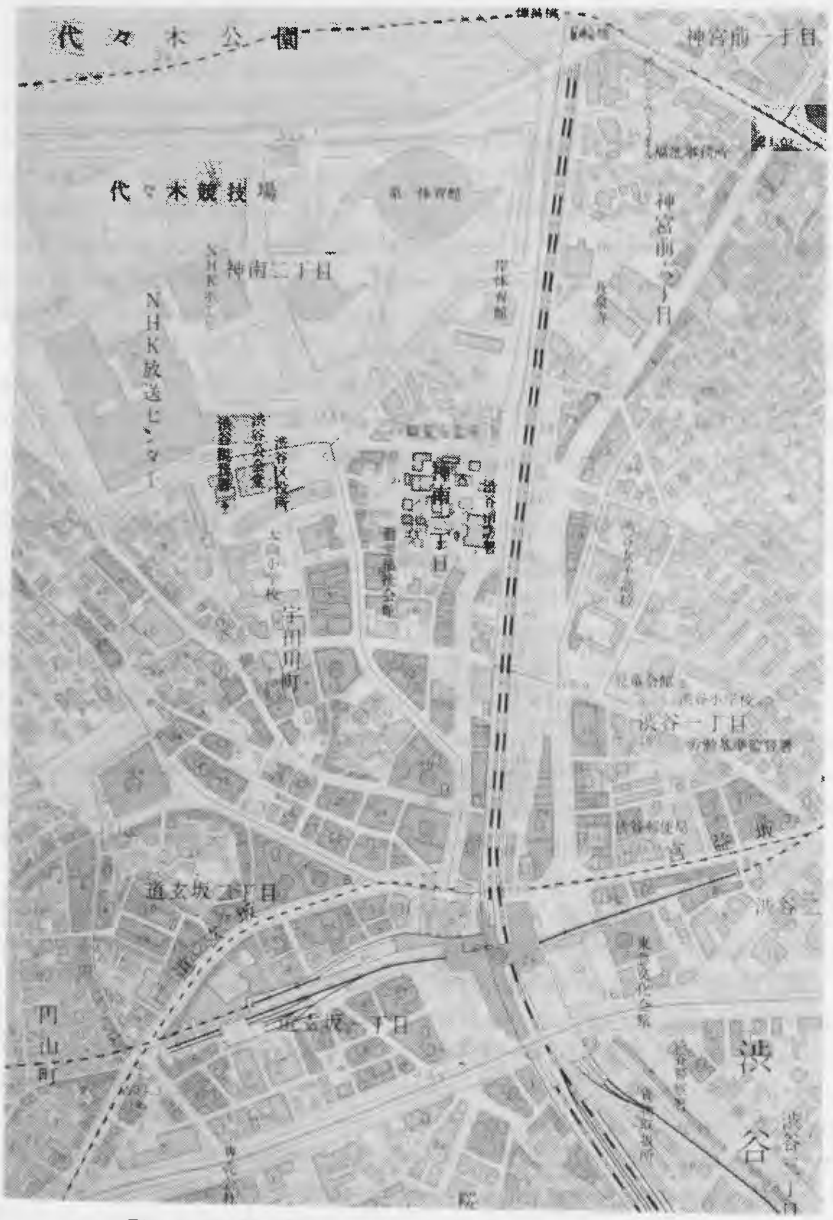

Fig. 1 1 : 10,000 topo. map for Tokyo(G.S.I.) (in color)

kaido Megalopolis is nearly 60 million, about 50% of Japan's total.

Cartographic works have been conducted for these kinds of urbanization which are both large-scale and ever-changing. Frequently urbanization is confronted sharply with slopes of mountains and hills, which in turn requires detailed surveys and mapping of land conditions. Frequent earthquakes, typhoons, floods, land slides and other natural disasters accelerate the need of making "land condition maps."

At the national government level, the Geographical Survey Institute (GSI) now located at Tsukuba Science City has been taking the initiative in producing maps. Completion of 1 : 25,000 topographical maps in 1983 for the entire land of Japan (except very few uninhabited remote islands) is considered to be able to show the overall geographical pattern of Japan's present urban landscape. GSI and its predecessors have produced 1 : 10,000 topographcal maps for major urban centers of Japan from time to time in the past 100 years of modernization. Before the

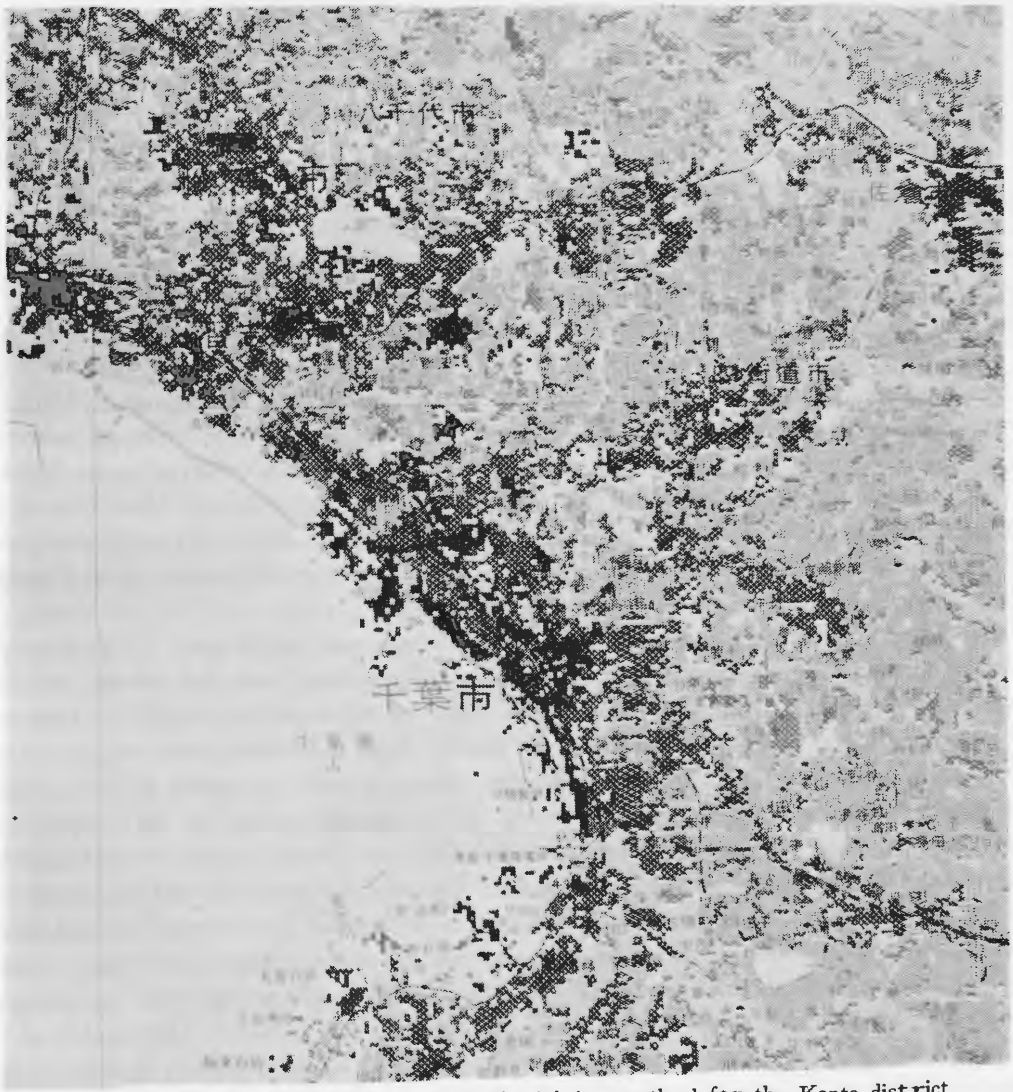

Fig. 2 1 : 200,000 land use map made by ink-jet method for the Kanto district (G.S.I.)(in color)

Meiji Restoration of 1868, the then feudal government (Tokugawa shogunate) produced some detailed urban maps but the coverage was very limited. After the Meiji Restoration, various types of modern and detailed urban maps including topographical maps were produced systematically for major urban areas. In some cases, 1 : 5,000 urban maps were made. Nevertheless, it seems proper to say that the 4-color 1 : 10,000 topographical maps produced after World War II, around 1960, were accepted by scientists and planners as the most impressive and useful urban maps in the topographical map series.

GSI is now going to produce a new series of 1 : 10,000 topographical maps. This new series is intended to cover all major urban agglomerations and prefectural capitals of Japan within the 10-year period. Revision is expected to be made every 5 or less years. Different from the previous 1 : 10,000 topographical maps, the new ones are largely based on "1 : 2,500 fundamental maps (*kokudo kihonzu*)" produced largely by local governments in cooperation with GSI. Accordingly, field surveys could be minimized. Generalized representation of houses was quite common in the old series especially for congested built-up areas, whereas the new series is characterized by the minimum use of generalized representation. Thus, it represents all the houses and structures, and also all the roads and lanes, as they are within the limit of the scale 1 : 10,000. In essence, however, this map can be equal to 1 : 2,500 in preciseness. This fact is to be highly appraised because of the compactness, irregularity and smallness of Japanese cities ... reality is shown well. In addition, the new series shows most of the commercial districts and establishments in such a meticulously mixed land uses. Research for urban land use, townscape and planning is expected to follow subsequently.

GSI has made other urban maps. One example is 1 : 100,000 Map of Tokyo and Environs, which was distributed to the participants of ICA Tokyo Conference in 1980. For train and car commuters and recreationists, this scale covering most of the Tokyo Metropolitan Region is very useful together with map makers who wish to renew their maps. Attempts have been made to produce a computer-assisted urbanization map in GSI, and other government organizations also are making various similar urban maps. An example is 1 : 200,000 Land Use Map of Kanto District centering on Tokyo made by GSI in March 1983. This small-scale urban land use map shows 4 types of urban land use : densely built-up area, sparsely built-up area, green open space, and other (factories, warehouses, airports, etc.).

At the local government level, production of urban maps and atlases is slowly becoming fashionable. There seems to be no standards for producing these maps and atlases, but in some cases, standardization is recognizable as in the case of urban land use maps. In some cities, a series of urban maps has been made and the binded form is an urban atlas. In order to lessen mutual similarities between townscapes and urban forms of cities in Japan; in other words, in order to promote individual identities of cities, it is urgently needed to make various plans which in turn require all sorts of urban maps. This new trend of amenity-seeking measures should be juxtaposed with those for ordinary city planning and environmental protection.

In the private sector, mapping business is now fashionable. Generally speaking, more luxurious, more artistic, more detailed and more variegated maps have been made in order to cope with rapidly increasing and multiple demands. Luxurious and artistic maps are purchased by people for decoration and hobby. Urban maps and atlases for travellers, sightseers and recreationists are just abundant.

One of the most fashionable urban maps today is the so-called town map. The town map is heavily used by young people who wish to loiter along town streets or sightseeing areas. Since

Fig. 3 An example of color town maps for Yokohama (by N. Morishita) (in color)

many shops, especially tourist-oriented ones, change their occupation and names frequently, and also new shops appear and others disappear, up-to-dated maps are of a great use for those people. This is especially true to the areas where things are mixed and the land use is three-dimentional. Standardization of map symbols among different makers does not exist theoretically, but there is a tendency to resemble each other among newer town maps.

Another new tendency appearing here and there is the bird's eye view urban maps. Many of the sightseeing maps have employed this technique for many years. Even in the feudal period, some of the artists made such maps (eg : Hiroshige's and Hokusai's woodblock prints). At present, the bird's eye view urban maps are being drawn by many artist-cartographers. Skyward expansion of cities attracts these people and they make various types of urban maps more or less along the line. H. Susaki's bird's eye view isometric maps of present-day Tokyo (axonometric projection) is a good example. In such a case, contrasts between large and small structures or wide and narrow roads are too large to show them in the "balanced" form.

Subterranean (underground) urban maps are needed urgently in Japanese cities. Subway network maps are abundant, some showing detailed information about stations (type of platform, exits, etc.). But subterranean or underground shopping streets or areas, often associated with subway systems, are quite difficult to show in map form, especially in the case that several grades or floors exist in entangled form. Users tend to demand detailed information of underground geographical patterns together with above-ground ones in the same map.

Reproduction of early maps or rare maps is another mode of today. Although many of such maps were destroyed and lost during and after the war, still a considerable number of early and

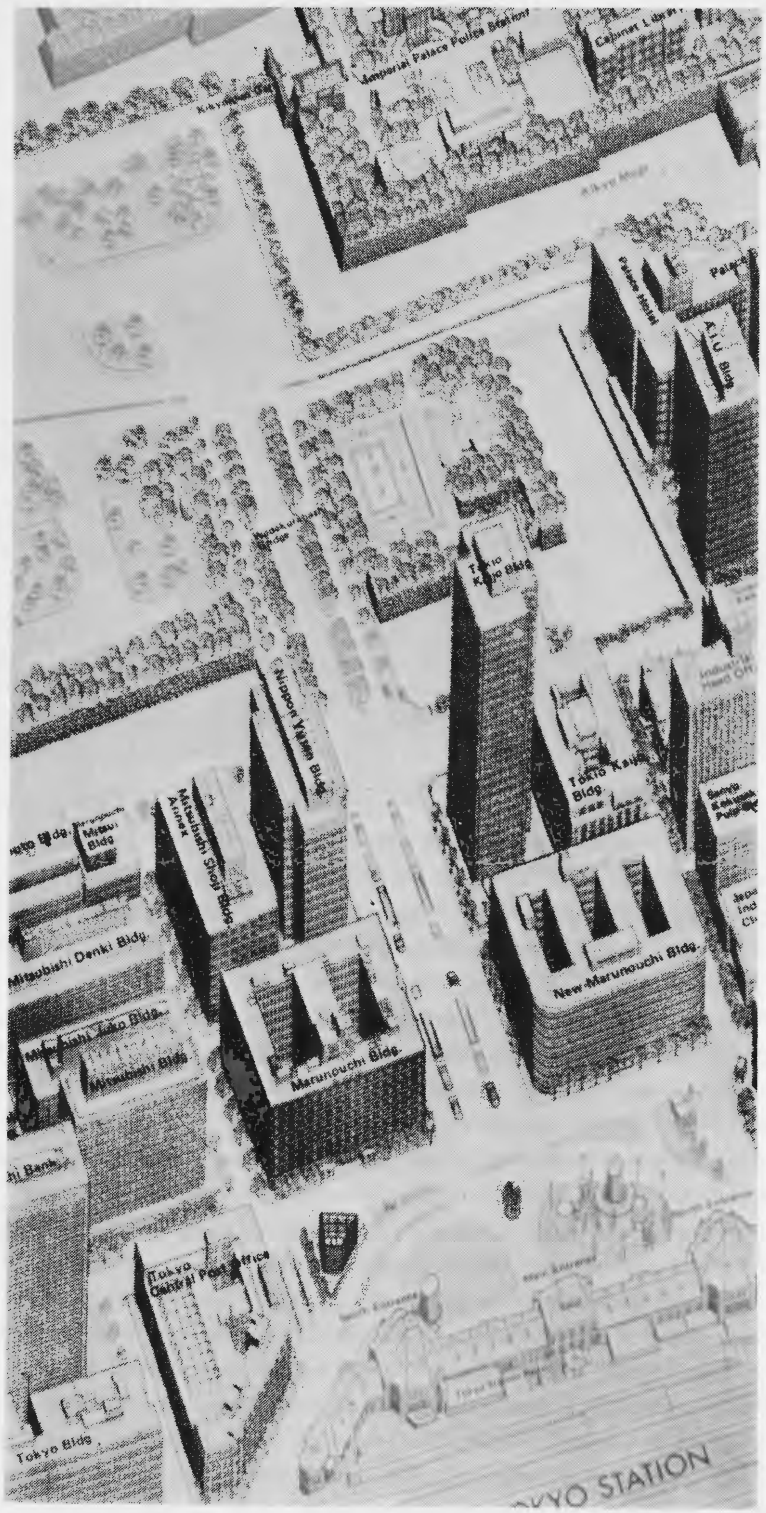

Fig. 4 Part of the bird's eye view color isometric map for Central Tokyo (by H. Susaki)

rare maps exist in Japan. These are now being reproduced by many private companies. And some are urban maps as such. The author's reconstructed map of Edo (Tokyo in feudal times) is going to be printed as the third edition. Some endeavor to reconstruct old urban centers in map form, but in most cases, these are restricted to very limited areas or sections of old towns.

The Japan Cartographers Association (JCA), Japan's authoritative scientific organization for ICA, established the Committee for Urban Cartography within its framework. Y. MASAI was nominated Chairman. This committee has the following tasks : 1) information exchange among Japanese urban cartographers, 2) close cooperation with ICA's Commission on Urban Cartography, and 3) coordination with the National Committee for Cartography of the Science Council of Japan (Chairman : Masayoshi TAKASAKI). From time to time, this committee holds meetings. In August 1981 and again in August 1983, JCA held a symposium on urban cartography at the time of their annual meetings.

It is necessary to make international comparisons of urban mapping. Generally speaking, cartographic works conducted in Europe and North America are relatively known among themselves and perhaps throughout the world. But other parts of the world are less known, and sometimes almost nothing is known to outside people. Even in Asia, information concerning urban cartography is very restricted. Diversity of culture and less interest in urban mapping in Asia seem to hamper international cooperation and comparison.