Land Use Planning and Conservation Policy in the Tokyo Metropolitan Area

Ruiyi Zhang, Wanglin Yan, and Rajib Shaw

Abstract Tokyo has witnessed rapid growth and dramatic socio-economic transformation in the last half-century. The most remarkable changes in land use have taken place in suburban municipalities, where agricultural and natural land continue to be converted to residential and industrial uses, often without comprehensive planning. This chapter qualitatively explores land use changes in the Tokyo Metropolitan Area (TMA) by analyzing policies, discussing the institutional features, including flexibility and possible loopholes, and socio-economic context behind changes of land use. And, this chapter calls for an evolution of land use planning and land resource conservation system geared more toward adaptive and sustainable urbanization.

Keywords Land use planning · Zoning · Urban transformation · Conservation and development

1 Introduction

Overall, since 2010, more people in the world are living in urban than rural areas, and by 2020, 56.2% of the world population was living in cities. In the coming decades, ongoing urbanization will be still the most significant socio-economic and spatial driving forces, especially in developing countries. Land use will keep changing in the internal parts of mature metropolitan areas of developed countries while

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more extensively outward in emerging metropolitan areas of developing countries. In either case, land use changes are likely to be dramatic, with magnitudes and impacts far greater than any other region on Earth. A variety of land use planning and conservation systems exist in different metropolitan areas, all intent on efficiently utilizing regional resources, developing sufficiently and orderly toward environmental sustainability.

There are many socio-economic factors and temporal uncertainties intertwined with competing land use relationships in metropolitan areas, between residential, industrial, and cultivated lands. How cities in metropolitan areas should manage land use systems and policies remains challengeable. The answers are often ambiguous.

The objective of this chapter is to sort out the institutional origins and changes in land use planning and land conservation systems in the TMA and through basic investigation of industrial and farmland land use change. The question is whether land use changes in the TMA have responded to the characteristics of regional planning in different time periods, and whether they are in conflict with institutional intentions at the regional scale. The resilience and flexibility of the land use systems are discussed from the perspective of its adaptability and planning.

Tokyo Metropolitan Area (TMA) has experienced drastic land use change in last 50 years. For instance, the manufacturing shipping value and numbers of employees continued to decrease since the 1980s, while the industrial land stocks remained unchanged in some places and increased at a slower pace in others (Aiba 2021). Up to now, metropolitan peripheries have typically not been a main focus of research on sustainable land use planning and conservation systems besides context-specific and solution-oriented case studies (Geneletti et al. 2017).

In-depth study on the interrelationships between land use policy and land use change in metropolitan areas could lead us to a better understanding of the missing piece for sustainable urbanization. It could again nurture the scientific integrity of regional development and local administration and provide lessons about land use change from a regional perspective.

2 System of Land Use Planning and Conservation in Tokyo

2.1 Land Use Planning in Japan

2.1.1 The Urban Land Use Planning System

Among all policies regulating the relations between land uses, the most notable ones are regulatory and economic measures taken under the planning law (Tsubota 2006). Planning systems, including development guidance and land resource protection, vary from country to country, because of differences in socio-economic contexts and institutional characteristics, such as governance and ownership structures. Meanwhile, systems in one country or region can evolve to adapt to the different contexts of different stages as developing, so they could not remain static. Urbanization and

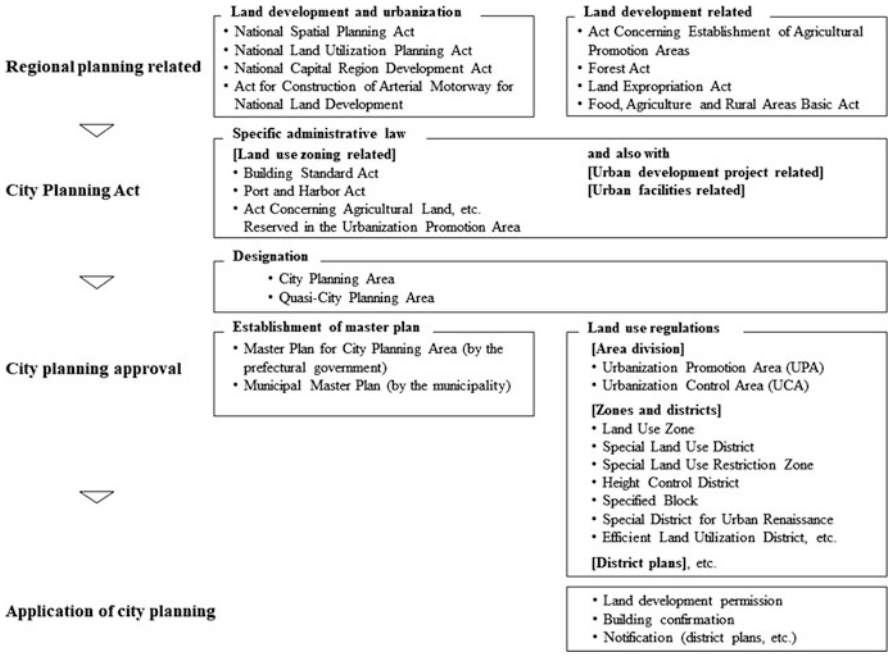

Fig. 1 Land use planning and conservation system within the City Planning Act and relevant institutions. (Based on report by MLIT 2003)

land use change in the TMA at the regional scale could be seen as a consequence of the interaction, or conflict, between two factors: socio-economic demands and the urban land use planning system.

Figure 1 shows the Japanese urban land use planning system in terms of both the development and conservation of land. The City Planning Area and delineation of other policy zones, as the meeting point of policy and implementation for the promotion and control of land development, are designated by the prefectural governments. A Quasi-City Planning Area is an area outside the City Planning Area, commonly seen in areas next to expressway interchanges, where orderly land use or preservation of the environment is required. These lands can be designated as a Land Use Zone, Special Land use District, Special Land use Restriction Zone, etc., while excluded are a District Plan, Urban Facilities, and Urban Development Projects. Outside the City Planning Area, there are special plans for other land uses related to the national land use plan, such as the agricultural promotion area plan.

Prefectures issue the Master Plan for the City Planning Area and municipalities issue their Municipal Master Plan. The land use plan for the City Planning Area includes guidelines for the assignment of each urban function and the formation of urban centers at all levels. The planning system at the national and regional levels in Japan has gradually evolved from being “state-led” and “development-oriented”

from the early post-war period onward, toward a system of "state-local cooperation" for national land development and conservation. Planning systems at the municipal level are gradually moving toward "local autonomy without breaking the existing framework." The ideal is for prefectural and municipal plans for land use to be coordinated and mutually compatible, but not unified.

Specifically, the municipalities decide on the areas for land development and land conservation, respectively, based largely on local socio-economic factors such as industrial development, population change, and land supply and demand. Distinctions in land use efficiency are widely recognized in the group of Japanese planners and researchers. Local implementation in the context of differences in local understanding of regional policy has shaped the landscape of land resource utilization in Japan.

2.1.2 Area Division System and Farmland Conservation System

The basic context of land resource regulation and conservation in the process of urbanization in Japan is mainly determined by the City Planning Act and the Agricultural Promotion Act. A City Planning Area (CPA), based on the City Planning Act, is divided into Urbanization Promotion Area (UPA), Urbanization Control Area (UCA), and non-delineated area, aiming to encourage, guide, or control urban development. Meanwhile, the Agricultural Promotion Area (APA), based on the Agricultural Promotion Area Act, aims to encourage farmland conservation and agricultural development. The two areas overlap with each other in zoning (Fig. 2), while paddy field and other farmland mainly exist in the (1) UPA, (2) APA inside the UCA, (3) non-APA inside the UCA, (4) APA outside the CPA, and (5) non-APA outside the CPA. The priority of farmland conservation is in the areas of (2) and (4), which have the highest hierarchy in the policy and regulations, while the areas of (3) and (5) should be protected against land use conversion due to urbanization because of their location outside the UPA or even the CPA. However, controversies have occurred between administrative ministries in identifying the priority between urbanization promotion and farmland protection in Japan (Moreno-Penaranda 2011). In many cases, even the farmland inside the APA could be converted for urban development.

Institutionally, in the UCA, a development approval system including land development permission and building confirmation is applied; not that development is prohibited but that "in principle" all development needs to be permitted before construction (as opposed to "no construction without permits within the urbanization area and no permits outside the urbanization area"). There are also cases in which construction is not subject to the development approval system, depending on the scale, even though the types of permittable development and construction are restricted. Meanwhile in the APA, a system of permission for the conversion of agricultural land is adopted, in which only the conversion of agricultural land in special agricultural land areas is not permitted, and the conditions of agricultural land in general agricultural promotion areas range from "no permission in principle" for

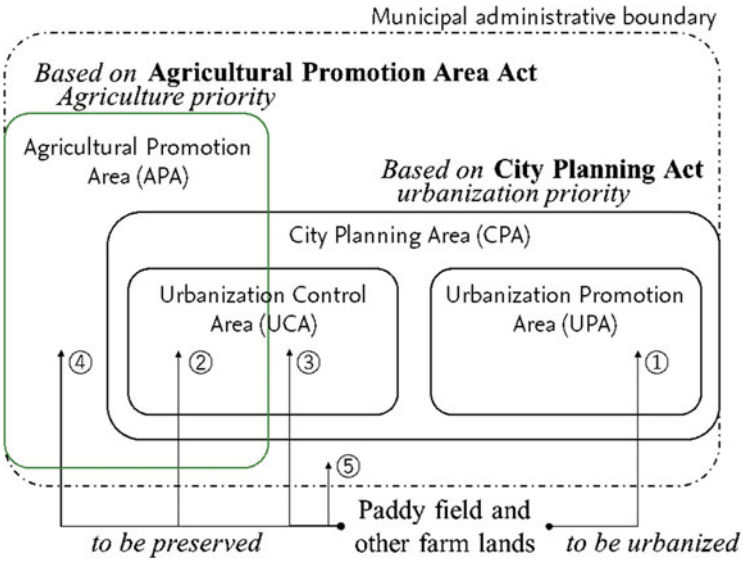

Fig. 2 Conflict between farmland conservation and urban development (APA can be furtherly divided into special agricultural land and general agricultural promotion areas)

large agricultural land with improvement plans, to "permittable" for small agricultural land without improvement plans.

2.1.3 Features of Japan's Conservation Policy from an International Perspective

In general, Japan's land use planning and conservation system has some commonalities with other developed countries, such as Germany and the USA. At the same time, Japan's system is seen as being relatively flexible due to cultural factors in Japan (Sorensen 2000). Table 1 shows an international comparison of land use regulation, from which we can recognize there is no obvious difference in land use planning and conservation systems between Japan and other developed countries, at least before designation and implementation. So, the questions have been framed as: (1) What is the result of land use policy in Japan under such a planning and conservation system? (2) Whether or not the land use change corresponded to the institutional intention, and why?

Table 1 Comparison of land use regulations across developed countries

Type	Land use regulation			Conservation area (urbanized area)	Method of implementation
	General regulation	Control over use	Project implementation		
Japan	Zoning	Common criteria all over Japan	Redevelopment promotion district plan	Urbanization Control Area (UCA)	Building confirmation
	District plan			Area of agriculture land	Land development permission
France	Plan Local d'Urbanisme (PLU)	Different criteria	Zone d'Aménagement Concerté (ZAC)	Zone Agricole	Construction permission
		Common criteria if located in joint city planning area		Zone Naturelle	Review for consistency with PLU
Germany	Bebauungs-plan (B-plan)	Different criteria. Construction possible in an area without B-plan if located in connected built-up area	–	AuBenbereich (external area)	Baugenehmigung (building code)
					Review for constancy with B-plan
England	No clear zoning	Development individually reviewed within the framework of the plan approval system	Action area plan	Green Belt	Development permission
USA	Zoning	Different criteria	Planned unit development (PUD)	Subdivision control	Subdivision regulation and building code
			Transfer of development rights (TDR)	Building control	

Source: JICA (2007)

2.2 Basic Land Use Policy in the TMA

Meanwhile, this land use planning and conservation system has an additional layer of patchwork in major metropolitan areas like Tokyo and adjacent cities in response to specific demands, such as housing, industrial development, and natural resource protection. Due to the heterogeneity within different parts of the metropolitan area, principles for land use planning are basically determined by the distance from the metropolitan center, which is further summarized as a regional governance agenda:

Main intensively urbanized core of the TMA From the perspective of strengthening the international competitiveness of the city, effective and advanced land use is promoted, as well as improvement of the urban environment and safety.

Suburbs of the TMA There are municipalities facing population decline and increasing cost of urban infrastructure. Urban functions such as administration, medical and nursing care, welfare, and commerce, as well as residences, are to be centralized in fewer municipal central areas around railway station. Urban sprawl in suburban areas is to be controlled.

Periphery and hinterlands of the TMA With regard to agricultural and forest land use, prime farmland is legislatively protected in this area, which is indispensable for the stable supply of food and other services. The occurrence of underused farmland is prevented, and land use efficiency is to be enhanced through promoting the accumulation of the lands of farmers. As well, the development and conservation of forests will be promoted, which play an important role in preserving the land resource and recharging water sources.

In the 1950s, the deterioration of the environment in existing urban areas and the problem of overcrowding became a serious issue in the TMA, due to the concentration of industries and the accompanying rapid population influx from rural areas during the post-war period of high economic growth. For this reason, the Tokyo Metropolitan Area Development Act was enacted in 1956 in order to prevent excessive concentration of industries and population in existing urban areas of the TMA, to prevent disorderly sprawl, and to promote planned infrastructure development. According to the Act, the areas that have already been urbanized are considered part of the Existing Urban Area (further EUA, Fig. 3). It is an area where the infrastructure necessary for the capital is maintained or promoted while suppressing extreme concentration of industry and population.

The Suburban Development Zone (further SDZ, Fig. 3) is an area in the suburbs of the EUA where green spaces are preserved, and planned urban development is promoted. The SDZ was to preserve the environment in urban areas and to function as a buffer zone between existing urban areas and the natural environment (Akita 2017). The area outside the SDZ is partially planned for urban development outside the TMA as Urban Development Area (further UDA, area colored beige in Fig. 3). It is designated as an area that eases the concentration of industry and population and promotes development for the purpose of proper allocation of industry and

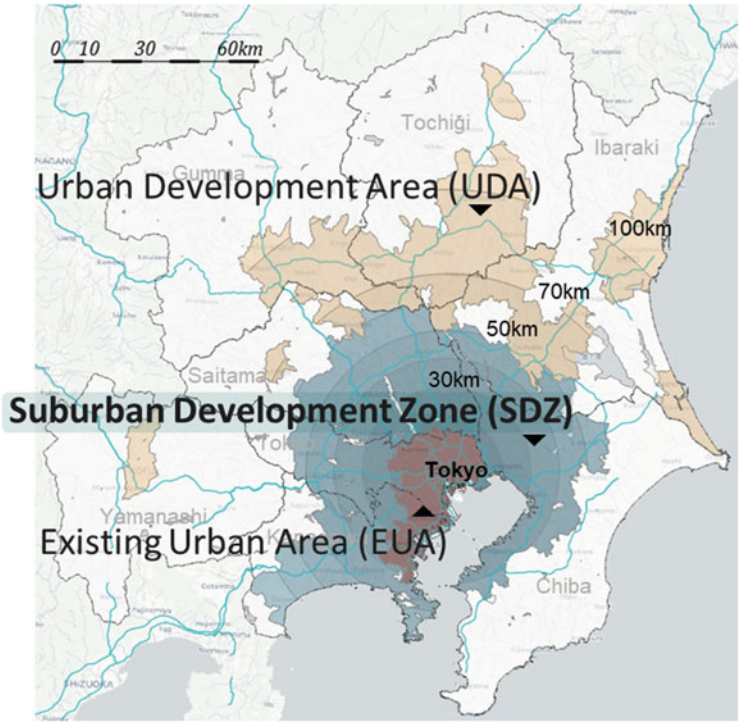

Fig. 3 Three governance areas based on the TMA Development Act. (Based on: data from MLIT 1956)

population throughout the metropolitan. Since the UDA is above 60 km away from the center of the TMA, and it is identified as a destination of industrial transfer from the national perspective, in this chapter, we survey land use change in both the SDZ and the EUA.

2.3 History and Trends of Land Use Policy in the Tokyo Metropolitan Area (TMA)

Based on the National Capital Region Development Act, enacted in 1956, the "1st Basic Plan for the Capital Region" was established in 1958 for comprehensive development and resource management in the TMA. Followed by four updates afterward until 2000s, an institutional reform for Capital Region Development Plan in 2006 and an important amendment in 2016, the policy and socio-economics have continuously interacted each other and formed the structure of TMA. Those are "recorded" in the urban landscape and land use, chronicling the mutual effects of different backgrounds and local contexts. Thus, the spatial features of land resource

development and conservation vary through time periods and geographic locations in particular by distance from the city center.

Table 2 shows the policy and environmental changes of the TMA after the Second World War. Demographic conditions and land use development were the key factors in the changes. Analysis reveals the flexibility of regional policies that keep updated to adapt to the social transition.

During the rapid economic growth accompanied with fast urbanization in the 1960s, it was difficult for city planners and policy makers to predict the frontier boundaries in advance (Usui 2019). The 1st Basic Plan to some extent pictured a blueprint of a "dart board" structure across the whole TMA. That was rejected by public especially urban developers and municipalities soon. The 2nd Basic Plan accepted the reality and opened door to urban sprawl. To avoid the confusions caused by the second version, the 3rd Basic Plan demarcated the Existing Urban Area (EUA) as the center of the metropolitan, the Suburban Development Zone, and the Urban Development Area with specific development visions. Policy goals were set to foster polycentric urban complex and to reduce dependency on the metropolitan center by thriving social and cultural functions in peripheries.

When entering to the 1980s, natural population growth became shrinking, and social growth diminished to a low level. The 4th Basic Plan lowered the projected population in year 2000 to 40.9 million, and the 5th Basic Plan kept to a lower scenario of urban growth at 41.9 million for 2011 and 41.8 million for 2015. Instead of figureprint structure along commuting railways, the "great ring linkage axis of the TMA" in the northern, eastern, and western inland areas of the Kanto region was emphasized then and preserving orderly land use and promoting regional cooperation in a circular direction were highlighted.

In the beginning of this century, the New National Capital Region Development Plan was issued with some institutional integration and legislative amendment for a new era of depopulation and aging. A megalopolitan structure was proposed, containing a unipolar dependency structure with multiple functions concentrated in the metropolitan center, clusters of self-sufficient suburban cities, and regional business core cities in the metropolitan fringe. The current version of the Plan was issued in 2016, based on amendment of the Plan 2006. The population was expected to peak off at 43.6 million in 2015 and then decline to 42.4 million in 2025. Three basic consensual principles were proposed for future development of the TMA:

- To selectively disperse the functions of the EUA while consolidating and improving local functions.
- To compact the built-up areas and preserve green areas in the SDZ.
- To promote clustering of various functions in the UDA and nurture regional business cores.

Table 2 Plans for national capital region development

Capital region plan	Planned period	Background	Expected population size	Main emphases
1st Basic Plan	1958–1975	Concentration of population and industry	26.6 million	Green belt
		Needs for a metropolitan area with a functional center		Satellite cities
				Curbing expansion
2nd Basic Plan	1968–1975	Railway network and highway development	33.1 million	Governance Area (Fig. 3)
		Urban sprawl		Harmonious coexistence between built-up areas and green space in the SDZ
		Green belt action failed		Satellite town promotion in the UDA
3rd Basic Plan	1976–1985	Oil shock in 1973	38.0 million	Multi-polar metropolitan area
		Growth of peripheral areas		Regional business core city
				Self-sufficient suburban cities
4th Basic Plan	1986–2000	Low stationary phase of demographic transition	40.9 million	Reverse unipolar dependence on the metropolitan center
		Emergence of aging issue		Multi-core and multi-ring regional structure
		Technology innovation and information society		Self-sufficient suburban cities
5th Basic Plan	1999–2011	From age of growth to age of maturity	41.9 million	Redevelopment of living environment in the EUA
		Safe metropolitan area with symbiotic environment		"Ring of hub cities" in the SDZ
				"Great ring linkage axis of the TMA" in fringes of the metropolitan area
New National Capital Region Development Plan	2006–2015	Value of diversity	41.8 million	Global city of Tokyo in the EUA
		Saturation phase of urbanization		Cluster of suburban cities to share functions of the center
		Stabilized regional urban system		Regional business core city

(continued)

Table 2 (continued)

Capital region plan	Planned period	Background	Expected population size	Main emphases
Plan amendment (current version)	2016–2025	Aging population issue speeding up	42.4 million	Urban renaissance in the EUA
		Global competition		Consolidate built-up areas and preserve green space in the SDZ
		Risk of huge disaster		Promote clustering of multi-functions in the UDA
		Deteriorating infrastructure		
		Global environment issue		

Source: Based on MLIT report, 2016. https://www.mlit.go.jp/common/001116833.pdf and https://www.mlit.go.jp/common/001128802.pdf

Table 3 Population changes in the Tokyo Metropolitan Area (TMA)

	Population size (millions)			Proportion of TMA (%)	
Time period	Nationwide	Capital region	TMA	To nationwide	To capital region
1950	83.20	19.05	13.05	15.7	68.5
1960	93.42	23.79	17.86	19.1	75.1
1970	103.72	30.26	24.11	23.3	79.7
1980	117.06	35.70	28.70	24.5	80.4
1990	123.61	39.40	31.80	25.7	80.7
2000	126.93	41.32	33.42	26.3	80.9
2010	128.06	43.47	35.62	27.8	81.9
2020	126.15	44.34	36.91	29.3	83.2

Source: based on data from e-Stat, Japan, 1950–2020. (The statistics range for TMA is decided as Tokyo prefecture, Saitama prefecture, Chiba prefecture, and Kanagawa prefecture)

3 Problems Addressed, and Problems Left Behind Rapid Urbanization Period

The policy of the TMA has been reviewed and issued approximately every 10 years since the 1950s, as it has adapted to rapid growth in the region. Table 3 shows the growth of population size in the TMA, the Capital Region, and Japan nationwide. The national population kept growing until 2010 while the growth rate has been low since the 1990s. The population of the Capital Region and the TMA saw nearly the same rapid and slow growth profile as the nation did, but it outran the nation after the 1980s and has not yet met its peak. All incremental growth in the Capital Region went to the TMA after the 2000s, which means the start of a decline in the rest. Still,

the TMA is growing slower and slower, and it is believed that it will meet its peak around 2030. In accordance with these waves of growth and shrinkage, the intense of land use between development and conservation has been kept challenging.

3.1 *Possible Shortcomings in Land Management and Conservation*

Figure 4 illustrates the transition of land use in TMA from the late 1970s to the 1990s. At the end of the rapid growth period, a conversion of 400 sq km of non-urban land out of the approximately 6600 sq km area of the Suburban Development Zone in the TMA went to urban development, of which 200 sq km were carved out of forest or "wasteland" and another 200 were agricultural land, including paddy fields and other agricultural lands. According to the matrix of land use change (Table 4), a huge amount of natural and cultivated lands were converted to urban land use. While residential land was more often converted from agricultural land other than paddy fields, the vast majority of urban land was converted from forest and wasteland. Paddy fields represent the smallest type of land converted to urban use compared to other natural and cultivated lands. In addition, vacant land accounts for about one-third of all urban land conversions from natural and cultivated land, which exceeds new residential land. This shows the characteristics of land conversion in the suburbs of the TMA, and there is the issue of less efficiency in land use, which laterally supports the widely seen problem of urban sprawl. This also indicates possible shortcomings in the management of land use and the conservation of land resources in the TMA during the late part of the last century.

Therefore, as of 2016, the urbanization intensity of land use within 30 km of the TMA had peaked, while beyond 50 km there still existed a large amount of natural and cultivated land. Figure 5 shows the land use classification of the current land use status in 2016 according to the spatial distance to the metropolitan center. There is an obvious difference of land use structure in different spheres. In the TMA, more than 75% of the land in the 10 km radius is built-up land. Of that, 70% of the land in the 30 km radius is built-up land, with only a small amount of farmland and forests.

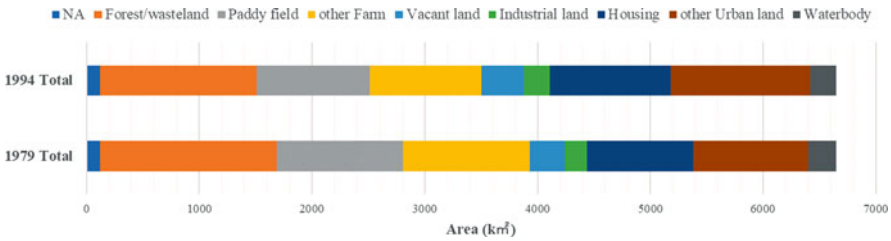

Fig. 4 Land use changes in the SDZ of the TMA (1979–1994)

Table 4 Matrix of land use changes in the SDZ of the TMA (1979–1994) unit: ha

Land use area (ha)		1994								1979 Total
		A	B	C	D	E	F	G	H	
1979	NA									12,106
	A	136,488	215	1240	5844	856	2825	8879	210	156,557
	B	488	97,839	1475	4384	556	1736	5463	359	112,298
	C	737	819	93,751	4965	822	4920	6016	139	112,170
	D	477	611	1318	15,810	1490	5245	6000	156	31,107
	E	45	19	43	502	17,620	400	1087	5	19,720
	F	90	48	281	1993	385	88,840	2312	33	93,982
	G	460	333	479	4164	942	3212	92,472	178	102,241
	H	80	108	355	588	98	60	1384	22,078	24,750
1994 Total		138,865	99,991	98,942	38,249	22,768	107,239	123,611	23,158	664,930

Notes: (1) A: Forest and wasteland; B: Paddy field; C: Other farmland; D: Vacant land; E: Industrial land; F: Housing; G: Other urban land use; H: Waterbody. (2) NA: Data not available (12,106 ha) in both years.

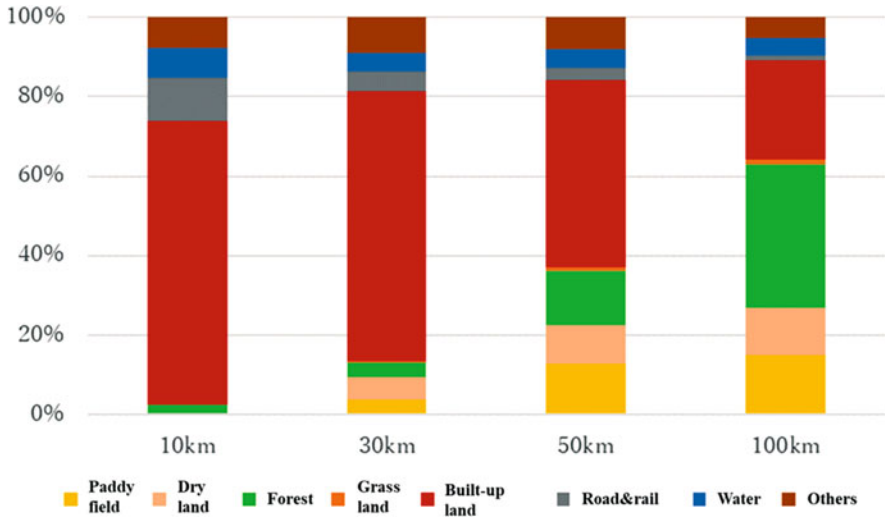

Fig. 5 Land use composition of circle areas in Tokyo, 2016. (Made by ECO-GIS Lab, Keio University)

While 50% of the land in the 50 km radius is built-up land and 50% is natural land, 20% of the land in the 100 km radius is built-up land.

The land use conversion and urbanization that occurs in the context of rapid regional growth is justified, but evaluation of whether the relevant land management system and planning have worked, and whether they have achieved their original institutional intent needs to be considered in the context of specific land use changes. Here, we use changes in industrial land use and changes in farmland d to explain the gains and losses as a result of land management policies on development regulation and resource conservation in the TMA.

3.2 Industrial Land Use Change

Industrial land transitions from the metropolitan center to the north and east part of the TMA. Figure 6a, b shows the spatial feature of macro-industrial land transition in both absolute quantity and relative proportion. Specifically, industrial land has been significantly reduced in the core of the metropolitan area, the EUA, except for the areas from the eastern part of Kanagawa Prefecture: Yokohama and Kawasaki and other coastal industrial zones. Tokyo's overall industrial land area is decreasing and in the central part of Kanagawa Prefecture and the southern part of Saitama Prefecture near the metropolitan core in a 20 km area, industrial land has also been significantly reduced. Conversely, other areas in the TMA have seen a significant increase in industrial land. Specifically, there has been a significant increase in industrial land in the northern area along the Kenodo Expressway in a 40- to

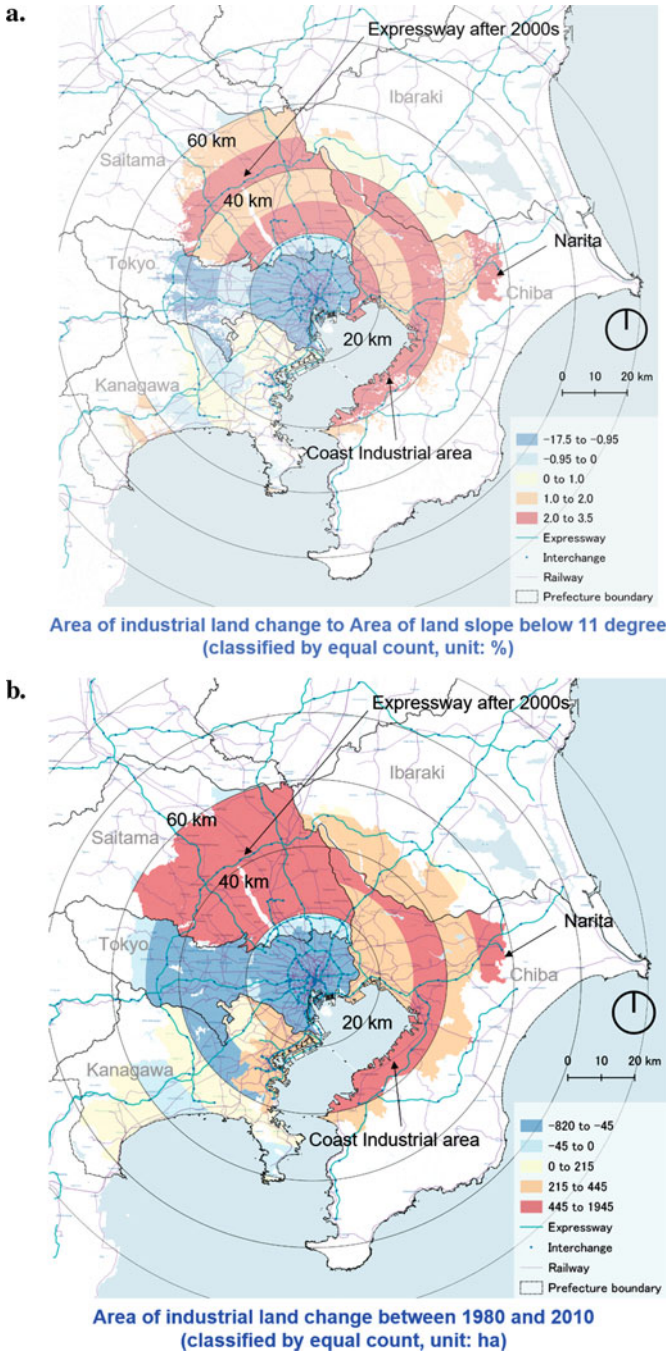

Fig. 6 (**a**) Industrial land use increase in the TMA by area (Data: 1980–2010). (**b**) Industrial land use change in the TMA by proportion (Data: 1980–2010)

50-km area, the northern area of the Gaikando Expressway in 20- to 30-km area, the eastern part near the metropolitan core in a 20-km area, the Chiba Harbor industrial zone in a 30- to 40-km area, and the area around Narita Airport in a 50- to 60-km area.

This shows that the industrial land in the EUA is shifting into the SDZ and other areas, except for the traditional harbor industrial zone. The main destinations are along highways, important seaports and airports. However, the suburban areas of Tokyo and the central and western areas of Kanagawa Prefecture, which are also part of the SDZ, are facing industrial land use decrease during the regional industrial transition.

3.3 Farmland d Decrease

A rapid decrease in farmland area has been a major long-term issue nationwide and even worse in the TMA.

According to our calculation based on the historical data from the Ministry of Agriculture, Forestry and Fisheries (MAFF), total amount of cultivated land in Japan has decreased every year since the late 1960s, and even after the national population peaked in 2008, the tendency is not changing. The country's cultivated land area decreased from 6 million to 4.6 million hectares at an average annual decrease rate of about 0.6% from 1965 to 2010 and decreased another 0.2 million hectares at an average annual decrease rate of about 0.5% from 2010 to 2018, resulting in a total stock of 4.4 million hectares by 2019.

In terms of the detail of the overall reduction in farmland d, there are two competing trends: increasing and decreasing. The majority of the decrease is due to the abandonment of cultivated land and the "de-agriculturalization" of farmers (when they leave farming). For example, from 1993 to 2015, farmland area gained 90,000 new hectares because of land regeneration and other reasons, but also lost 760,000 ha, of which 45.6% was abandoned, 34.9% was converted for urban development, 6.2% was converted for infrastructure such as roads and railways, and 4.1% was lost in natural disasters. In 2019, counting the increase in farmland due to the regeneration of abandoned farmland, the total amount of farmland decreased by 23,000 ha, while abandoned farmland was 280,000 ha, the same as the previous year. So, the amount of abandonment was about to catch up with the amount of regeneration or reuse.

According to 2009 data, the average area of farmland of Japanese agricultural households was only 1.83 ha, which was only one-tenth of the average in EU countries at the time and only one-hundredth the U.S. average. According to 2015 data, the average area of farmland of Japanese agricultural households was 2.09 ha, which works out to only about 350 m^2 per capita for the entire nation.

The TMA, as the biggest of the three major metropolitan areas in Japan, along with its hinterlands, has seen the most significant reduction in farmland d in the context of rapid urbanization. Farmland d in the Capital Region has decreased from

about 1.16 million hectares in 1965 to 750,000 ha in 2010, an average annual decrease of about 1.0%, and then a further decrease to 715,000 ha in 2018, an average annual decrease of 0.6%. The speed of farmland loss in the region has been consistently greater than the national average; the proportion of farmland in this region decreased from 19.3% in 1965 to approximately 16% by 2019. With 29.3% of the national population, the TMA had only about 5.4% of the nation's farmland , and it decreased faster than the average of the whole Capital Region.

4 Adaptive Planning in Response to Socio-economic Change

4.1 Historical Adaptability of the Land Use Planning and Conservation System

An evaluation of the adaptability of TMA land management to socio-economic change cannot be separated from an observation of the adaptation process of Japan's land use planning and conservation system. Table 5 shows the evolution of regional and urban land use policy.

4.1.1 During the Rapid Growth Era

The City Planning Act, enacted in 1968, introduced the current zoning and development permit systems, as key instruments in the development and conservation of land resources in Japan (Nakai 1988). In 1980, the district planning system was established, mainly for urbanized areas. In 1982, Temporary Inverse Area Division System were established within the UCA, which allows changes in delineation of the Urbanization Promotion Area (UPA) in accordance with the maturity of Land Readjustment projects without having to wait for the periodic review of zoning every five years. These institutional adjustments to the UCA responded to the rapid urbanization demands of the time, but also made it easier to convert land resources that had been protected.

The end of the 1980s brought another series of changes, with the support of the redevelopment district planning system, the deregulation of specific town areas, the introduction of comprehensive design, and the designation of intensive use districts, etc.

4.1.2 After the Collapse of Bubble Economy

During the bubble economy, the farmland inside the UPA in specified cities of the three major metropolitan areas, including the TMA, was encouraged to convert for

Table 5 Evolution of regional and urban land use policy (based on Asano et al. 2017)

Year	Event in urbanization	Land use planning related legislation	Institutional change
1968		New City Planning Act	UPA/UCA Area Division, development permission
1970	Osaka Expo	Building Standards Act, amendment	8 Land Use Zones, FAR regulation
1971	Junior baby boom		
1972	Club of Rome report, Limits to Growth		
1974	Total fertility rate falls below the replacement fertility level (2.14). First oil shock	City Planning Act, amendment	Deregulation in UCA (urbanized area)
	Compact city by G. Dantzig and T. L. Saaty in 1973	Productive Green Space Act	
1977	The Third National Comprehensive Development Plan (Settlement Area Concept)		
1979	Second oil shock		
1980		City Planning Act, Building Standards Act, amendments	District planning
			Inverse Area Division in the UPA
1982		Productive Green Space Act, amendment	Temporary Inverse Area Division System in the UCA
			Tax rate of farmland inside the UPA of specified cities within the three major metropolitan areas at the same level as residential land use in the neighborhoods
1987	Forth National Comprehensive Development Plan (multipolar distributed land use)		Expected 40 people per hectare for UPA designation
1989	Total fertility rate falls to 1.57		
1992		City Planning Act, Building Standards Act, amendments	Municipal Master Plan
			12 Land Use Zones, and District Plan in the UCA
1998	Fifth National Comprehensive Development Plan (twenty-first century grand design for national land)	City Planning Act, amendment	Regulatory Liberalization for Special Land Use District
		Revitalization of City Center Act	Revitalization of City Center Basic Plan
			Compact City into Municipal Master Plan

(continued)

Table 5 (continued)

Year	Event in urbanization	Land use planning related legislation	Institutional change
2000	Decentralization of planning authority	City Planning Act amendment	City Planning Area Master Plan
			Selectivity of Area Division
			Quasi-City Planning Area
			Land Development Permission
			Specified Land Use Restriction Zone
2002		Act on Special Measures concerning Urban Reconstruction	Urban Reconstruction Urgent Development Area
2003	Basic Act for Birthrate Declining Society		
2005	Population growth rate was negative for the first time. Total fertility rate falls to 1.26		
2006		City Planning Act, amendment	Land Development Permission on public facilities
		Revitalization of City Center Act, amendment	Designation liberalization for Quasi-City Planning Area
			Restriction on large-scale tourist facilities
			Revitalization of City Center Basic Plan Certification
2011	Great East Japan Earthquake		
	Era of depopulation		
2013	2020 Tokyo Olympics decided		
2014	Act on Creation of City, People and Jobs	Act on Special Measures Concerning Urban Reconstruction, amendment	Location Optimization Plan
2015	Basic Act on Promotion of Urban Agriculture	Act on Special Measures Concerning Vacant Houses	Vacant House Measures Plan
			Specified vacant house
2017		Productive Green Space Act, amendment	
2018		City Planning Act, Building Standards Act, amendments	13 Land Use Zones (Garden City Residential Zone)

urbanization. The tax rate of those farmland was implemented on a par with the residential land use in the neighborhoods in order to keep the supply of buildable land in the metropolitan areas.

In 1992, the master plan for city planning system was introduced at municipal level. It was a palliative measure to the socio-economic downturn after the bursting of the bubble economy. It gave local governments and developers more flexibility in urban development, while, as to the central government and the prefectural administration, it weakened their coordination responsibility and constraints on land management and conservation for long-term regional development and land use planning.

4.1.3 Era of Urban Shrinkage

In 2011, right after the national population peaked, authority in the three major metropolitan areas to decide on area division of UPA/UCA and urban facilities was transferred to local municipalities, with the exception of urban planning decided by prefectures. Due to the changes, local planning does not require the consent of the national government unless it has a significant bearing on national interests, and urban planning decided by municipalities does not require the consent of prefectures. This is one of the institutional measures to cope with the declining population and the aging issue occurring in varying degrees in each municipality. In 2014, the Act on Special Measures concerning Urban Reconstruction was amended to promote compact urban development in order to more seriously address the declining birthrate and aging issue. It does not deal much, however, with land use strategies for areas outside the promotion areas, such as the areas where exactly urban sprawl had occurred.

4.2 New Opportunities for the Land Use Planning and Conservation System?

At the end of the 2010s and in current times, regarding land use planning and conservation, the most important adaptation to the socio-economic situation is the Location Optimization Plan (LOP), based on the Act on Special Measures concerning Urban Reconstruction.

This program aims to concentrate urban services and residential functions around high-capacity public transportation nodes such as railway stations in the suburbs of the TMA. At the local scale, centralization-promotion areas are designated in each suburban municipality, and these are then divided into urban service function-promotion areas and residential function-promotion areas. In these areas, the city will be revitalized and land use will be improved more efficient through the effective use of underused land and vacant houses. Conversely, outside of these areas, public services will be readjusted in response to the increasing low density, and new land uses, such as the development of parks, farmland, and forests, and the restoration of the natural environment will be taken into consideration. In cases where it is difficult

for a single region to provide sufficient services, efforts will be made to provide the necessary functions by linking the regions in a network.

Therefore, the concept of LOP follows the traditional urban structure theory of "decentralized concentration." It could be a new opportunity to rebuild the land use planning and conservation system in the peripheries of the metropolitan.

5 Discussion

5.1 At the Regional Scale: Institutional Resilience and Flexibility in the TMA

The evolution of land use policy and regional planning in the TMA shows that, in general, the institutional authority of land use planning and the conservation system has gradually evolved from state control to local decentralization, the emphases of the system have gradually evolved from regional integration and cooperation to local autonomy including deregulation of private investments as well as embracing diversity, and the value orientation of the system has gradually evolved from expansive growth guidance to inclusive stock enhancement.

During this process, Japan and the TMA have experienced explosive population growth, rapid industrialization and urbanization, suburbanization and the widespread use of private cars, slowing population growth, economic bubbles, and aging, among other things, as it evolved from a youthful to a mature society.

Among the several regional plans for the TMA, except for the first one that misjudged the boundary control of the metropolitan area development, several subsequent plans have adhered to some key topics regarding land use planning and conservation over decades, such as suburban new town development, land use guidance for circling of the metropolitan area, industrial and population evacuation, and polycentric urban structure.

In addition, in order to build disaster-resistant and flexible national land use, the government can comprehensively enhance the safety of the national lands from the perspective of a land use planning and conservation system through efforts at each stage, from the regional to the local level; for example, by preventing urban sprawl, securing open spaces for recovery and reconstruction, such as temporary storage areas, conserving and managing farmland , and improving the land conservation functions of forests and other ecosystems.

5.2 *Institutional Loophole? Avoiding Excessive Flexibility in the System*

From the perspective of agricultural land conversion management, there is a possible loophole in the system, which might be a consequence of interaction between the special institutional structure (see Fig. 2 in "Land Use Planning in Japan" section of this chapter) with its permission system and the land ownership structure in the TMA.

As mentioned above, with the evidence of it seen in the amount of abandoned, formerly cultivated land that has increased at an alarming rate, from 150,000 ha a year in 1985 to 400,000 ha a year in 2010. Comparing the total amount of farmland, it is conceivable that a large amount of farmland in Japan is being regenerated and restored to cultivation every year, while at the same time a large amount of farmland is being abandoned. The central government and local administration, however, have little control over the abandonment of farmland caused by multiple factors, such as aging of farmers, shortage in labor, and difficulties in land recovery. Although operations are guided by institutional and economic measures, such as subsidies, tax reduction, support for agricultural labor training, and encouragement of market-oriented intensive agricultural production, it has been always easy for large amount of abandoned farmland to be converted to urban development.

One of the most important reasons for the lack of strict regulations to control the loss of farmland could be the possible institutional loophole. The conditions of use of agricultural land in general agricultural promotion areas range from "no permission in principle" for large agricultural land with improvement plans to "permission" for small agricultural land without improvement plans. In addition, due to the context of "local municipal autonomy" in Japan, permission for development in the UCA and permission for farmland conversion in the APA is granted by the governor of the prefecture and the mayor of the ordinance-designated city (20 cities nationwide, e.g., Yokohama City, Kawasaki City, and Saitama City). Thus, in terms of implementation and management, development in the UCA and the conversion of non-urban land use in the APA have put a lot of pressure on farmland, even some of the areas that are given the highest protection status in policy and regulation.

One of the fundamental contexts for the widespread abandonment of farming is probably the structural characteristics of land ownership in Japan. The proportion of privately owned land is especially high in the three major metropolitan areas, with 60% of the land in the TMA being privately owned, including urban development and farmland. The high proportion of privately owned land in the TMA has largely determined land use in the suburbs of Tokyo, where agricultural production is dominated by small farmers and market-oriented operations. This makes it difficult to achieve strategic control and guidance in agricultural policies and mandatory regulations in agricultural planning, which have negative impacts on land conservation. Although there is the need to supply infrastructure and other municipal services in the villages or in the urban area inside the UPA according to legislation, uncertainties about landowners' intention for land use transition (Sorensen 2001) therefore

make the delineation of zoning a challenge over time. And inappropriate zoning could lead to inappropriate institutional implementation, which harms the land use planning and conservation system itself.

Abandonment of farmland is backing the unplanned land use conversion to urban land use, while the loss of agricultural labor and aging of farmers are contributing to the abandonment. Meanwhile, unregulated urbanization due to flexible local implementation of zoning could be a key cause for land use transition and commonly occurs in the area zoned as UCA (Saizen et al. 2006). So, the TMA can and must do more on land resource conservation, and intensive or large-scale farmland land use should be a long-term priority for consideration of planning.

5.3 *At the Local Scale: Adapting to Demographic Transformation*

According to an urbanization conceptual model of Mulligan in 2013, the TMA today is in its saturation or terminal stage of urbanization with an urbanization degree above 90%. And it will be facing a population peaking in the near future and continuing to decline, as shown in the projections in Fig. 7. However, according to the national 5-year survey in 2020, the actual population of the TMA in 2020 was 36.91 million, which is 1.54% higher than projections. This may have been a message for policy makers fearing depopulation, but the down-sizing demographic transformation remains a long-term challenge.

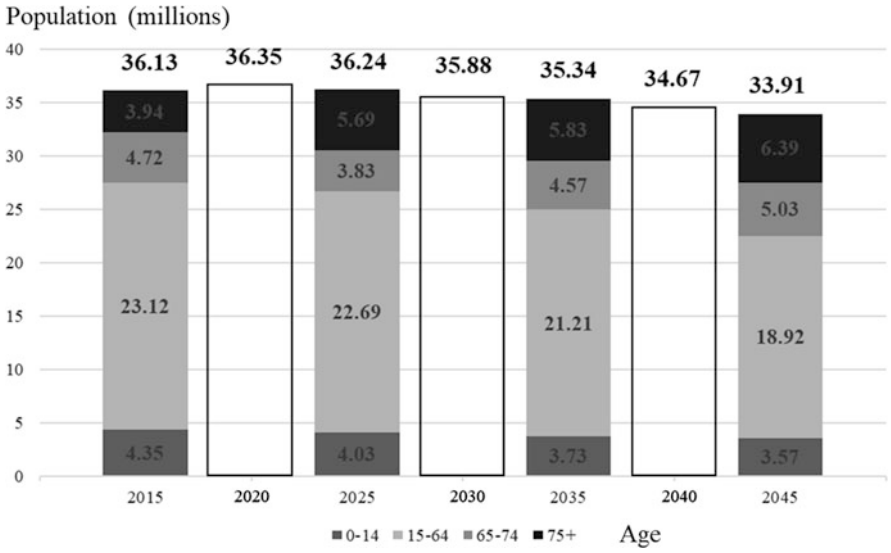

Fig. 7 Population projection in the TMA. (Source: based on data from NIP&SSR, 2018)

In the TMA, the further away from the metropolitan center or local central station, the faster the population is decreasing. According to estimates of the National Institute of Population and Social Security Research (NIPSSR), the population of the TMA will decline by approximately 6% until 2045, compared to the 16.3% decline for Japan nationwide. Since the Existing Urban Area (EUA) of the TMA is expected to increase by nearly 4.6%, the Suburban Development Zone (SDZ) and other periphery areas of the TMA can be expected to decrease by 10–15% or more.

Within the SDZ, the degree of population decline is likely to be severe in some areas but insignificant in others. This may bring many new challenges for the land use planning and conservation system from a regional scale down to a local one. First, there could be a dilution of urban area. Although the number of residents in some areas decreases, the already built-up environment, including housing, cannot be easily changed back to non-urban land use in response to the population decrease. Second, urban public services might have to be re-allocated. The issue of vacant facilities and community center relocation are expected to be more significant. Because of these two concerns, the land use planning and conservation system will have to evolve in response to a new era.

Some latest statistics and forecasts show that the population is returning to the metropolitan center. The residents who moved to the metropolitan suburbs during the period of rapid economic development gradually aged and now rely on well-supplied urban services. Conversely, the urban renewal projects in the metropolitan center encourage the mixing of commercial and residential land use, which increases housing supply. Therefore, the elderly and high-income groups have gave up their real estate in the suburbs and moved back to the center of the TMA. Therefore, the demand and supply of land in the SDZ or peripheries of the TMA could change more dramatic than before, in terms of both quality and quantity of land use. As we can see, changes in the overall demographics of the TMA and local population preferences for where to live are forcing the land use planning and conservation system to continue evolving. How this works out in terms of ensuring a better natural and living environment in the TMA is something to watch in the coming years.

6 Conclusion

This chapter summarized the institutional context of the land use planning and conservation system for the Tokyo Metropolitan Area (TMA) in multiple perspectives from nation and region to local municipality. It revealed how regional strategies based on the planning system have adapted to changes in the socio-economic context of the TMA. The features and key issues of the system were qualitatively discussed through the lens of changes in industrial land, farmland, and regional population.

Regarding limitations of this chapter, first, it did not mention interactions between transport development and the system for a more evidential judgment on such a huge and inclusive metropolitan area. Second, it did not provide direct evidence of the

quantity and efficiency of land use changes corresponding to every policy change in the TMA. Those limitations are to be addressed in some follow-up studies.

As a summary, the resilience and adaptation of the land use planning and conservation system were highlighted by examining its historical changes while also noting its excessive flexibility. In an era of slowing and even negative population growth and an aging society, the system is expected to play a crucial role in ensuring a better natural and living environment for residents of the TMA in the future.

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