

日本城市避灾公园体系概述

Disaster Refuge and Relief Urban Park System in Japan

摘要 ……

本论文概述了日本公园避灾体系的建立历程，以及避灾体系发展的现状和今后的展望。基于1923年东京关东大地震的教训，城市公园在避灾方面的重要性得以被广泛认识，从而设立了由广域避难场所和避难通道构成的防灾公园体系。1995年阪神淡路大地震发生后，城市公园作为灾害时重建、复兴据点、物资中转基地和城市街区火灾的避难点，进一步促进了日本现代的避灾公园体系形成，本文同时阐述了将避灾公园与周边的城市街区进行一体化规划建设的必要性。最后，本文提出了对日本公园避灾体系的展望，指出仅针对避灾公园硬件性设施的改善具有一定的局限性，需要从景观设计学的观点出发，寻找综合性解决途径。包括对公园绿地平时的利用管理、对地区社区居民防灾意识的培养、“共助性”社会的形成，以及对于城市其他防灾设施的建设等。

关键词 ……

灾害；城市；避灾公园；日本

Abstract ...

This paper provides an overview of the establishment and history of the Japanese disaster refuge park system, the current state of the system, and planned future developments. Urban parks, as places of disaster refuge, have been significantly important, and recognized as such, since the Great Kanto Earthquake of Tokyo in 1923. In response to this earthquake, a system of shelters and escape route were established. The modern Japanese disaster refuge system is tied to the period following the Osaka-Kobe Earthquake in 1995. During this period, urban parks became the center of disaster reconstruction and renovation, transfer stations for rescue materials, and shelter from fire of urban blocks. Additionally, this paper elaborates on the necessity for integrated planning and construction of disaster refuge spaces in urban design, and speculates on future park developments. Finally, the paper offers a critique on the limitations of urban green spaces to also function as disaster refuge areas. Landscape Architecture can play an important role in disaster-prevention and response, daily park use, park management, and increased community awareness and social resiliency.

Key words ...

Disaster; Urban; Disaster Refuge and Relief Park; Japan

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引言

从木造、密集型建成区形成以来，日本的城市几度经历了大灾难。特别是1923年发生在东京的关东大地震和1995年发生在神户的阪神淡路大地震，在这种城市型地震灾害重建以及复兴的过程中，基于防灾和减灾功能的公园绿地的避灾体系得以建立。本文概述了日本公园绿地的避灾体系的形成历程，并叙述了其现状和对今后的展望。

1 关东大地震的经验教训

1923年9月1日日本神奈川县相模湾北发生了里氏7.9级地震，死伤及失踪者约为10.5万人，东京市

43%的土地成为焦土。同时，约157万人在公园绿地中避难，由此公园绿地在城市防灾方面的作用和重要性得以被广泛认识。灾后，日本政府成立了以恢复及振兴为目标的“帝都复兴审议会”，提出在东京市内建设三座大型公园、52座小型公园的计划，并且规定至1931年为止，所有公园必须全部竣工。其中小型公园包括设有避险功能的小学（在废墟地上对小学校园进行扩建，兼做儿童游园之用）。“帝都复兴规划”关于城市公园绿地的规划和建设，可以视作日本公园绿地避灾体系建立的起点。

1956年日本颁布实施了城市公园管理方面的重要法律——《城市公园法》，其中提出了市、町、

Preface

Japanese cities have periodically experienced major disaster because of the historic emphasis on wooden architecture, such as the Great Kanto Earthquake of Tokyo in 1923 and the Osaka-Kobe Earthquake in 1995. During reconstruction after each of these earthquakes a system of urban parks that could double as disaster refuge centers were established. This paper provides an overview of the establishment and history of the Japanese disaster refuge park and green space system, the current state of the system, and planned future developments.

1 Impact of the Great Kanto Earthquake

On September 1, 1923 a 7.9 magnitude earthquake struck just north of the Sagami Bay of Kanagawa Prefecture. As a result, approximately 105,000 people were dead, injured, or missing, and forty three percent of Tokyo was in flames. Out of necessity, about 1.57 million people took shelter in urban green spaces, and for the first time, the significance of urban green spaces as disaster refuge areas was widely recognized. In response, the government established a revitalization plan for the sake of recovery and revitalization. The government initiated Imperial Capital Rehabilitation allocated three new large-scale parks and 52 new small-scale parks within the City of Tokyo. The small-scale park included primary school campuses that could expand into disaster refuge spaces. “The Imperial Capital Rehabilitation Plan” can be deemed as the inception of the construction of Japanese disaster prevention and refuge system of urban green spaces.

In 1956 Japan passed an *Urban Parks Law* that directed how urban parks should be administered and distributed between national, regional, and local scales, as well as their more general role in disaster refuge. It was clearly stated for the first time that urban parks should have additional functions, such as disaster prevention and refuge. However, Japan made very little progress in terms of implementation during the first 20 years of the *Urban Parks Law*. In 1978, disaster refuge parks were proposed again as part of the second *Five-Year Plan for Urban Park Construction*. This created a formal system for planning and construction of disaster

refuge parks. Disaster refuge parks refer to urban parks that, as part of their design, can function as staging grounds for reconstruction and renovation, transfer stations for materials and supplies, or temporary shelters.

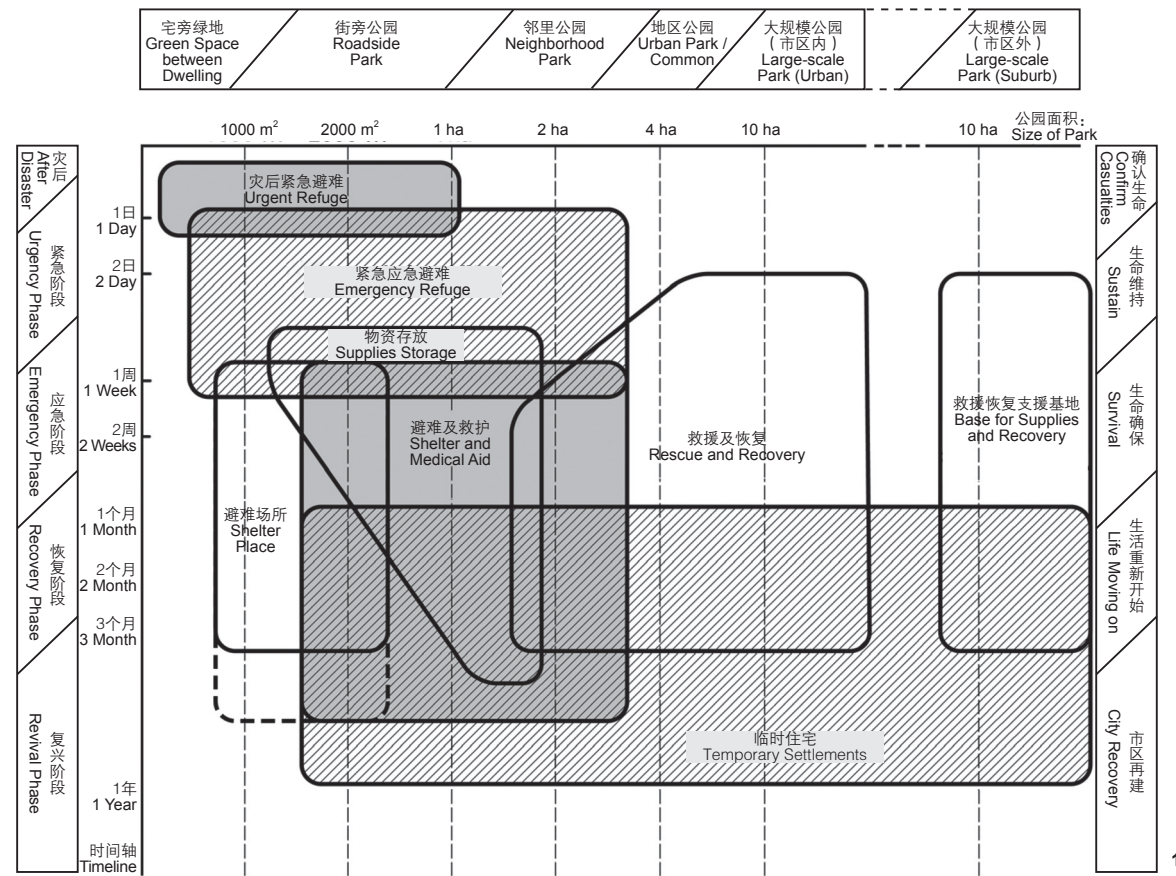
2 Impact of Osaka-Kobe Earthquake

On January 17, 1995, a 7.3 magnitude earthquake shook the Awaji Island of Japan. Approximately 6,400 people died, 7,500 buildings completely disappeared into the ground, and 171,500 buildings collapsed. Unlike the Great Kanto Earthquake, which experienced massive destruction due to fires started after the earthquake, most of the destruction from the Osaka-Kobe Earthquake was due to collapsed structures and building damage.

In response to the Osaka-Kobe Earthquake, the Japanese Institute of Landscape Architecture formed a Special Investigation Committee on the Osaka-Kobe Earthquake. The report of this committee showed that most urban parks not only served as shelters during the disaster, but also played an important role in blocking the spread of fire. During post-earthquake rescue and reconstruction urban parks also provided meeting spaces for rescue workers and volunteers, and provided temporary housing for those made homeless by the earthquake. Urban parks, as open spaces, play a variety of spatial functions during disaster events, in terms of rescue and reconstruction (Fig.1).

In response to initial findings the planning and construction of disaster refuge parks were modified. On the basis of serving as large-scale refuge and evacuation route, the function of urban parks was expanded to include emergency and large-scale refuge and relief space. Niigata Chuetsu-Oki Earthquake on July 16, 2007 state parks and other large parks were used as emergency storage and supply distribution locations, and emergency command post. The system of disaster refuge parks was improved.

However, the Osaka-Kobe Earthquake is a unique precedent because it was a largely urban earthquake, and reflects the vulnerability of contemporary cities. It also showed that planning for additional urban parks was not enough to provide disaster prevention in urban



1. 不同规模的城市公园在灾后不同时段的功能变化。
2. 作为广域避难场所的城市公园配置

1. Urban parks play a variety of spatial functions in different periods during disaster event.
2. The configuration of large-scale disaster refuge and relief parks

村各级公园必须分布均衡，并且具有防火避难等功能，由此城市公园需具备防灾避险功能被明确提出。在《城市公园法》施行后的20年间，日本的公园防灾体系相关内容没有较大变动，直至在1978年颁布的日本第二次《城市公园建设五年计划》中，创设了避灾公园规划建设制度，日本第一次正式提出了避灾公园这一概念。避灾公园是指地震发生时可作为恢复和复兴据点、物资中转站的据点，或可作为收容其周边市区避难者和保护火灾避难者生命的避难场所的城市公园。在该制度成立初期，避灾公园的主要目的在于确保城市公园作为广域避难场所和避难通道的功能，具有很强的限制性。

2 阪神淡路大地震的经验教训

1995年1月17日，日本淡路岛发生里氏7.3级地震，造成约6 400人伤亡，建筑倒塌7 500栋、损坏171 500栋。与关东大地震不同，此次震灾的二次灾害不是城市内火而是由房屋倒塌引起的。

针对此次震灾，日本造园学会设立了阪神大地

震调查特别委员会，该委员会的调查报告显示：大多数的城市公园不仅作为灾害发生时的避难场所，还具有阻隔火灾延烧的重要作用。在震后救援与重建阶段，城市公园是救援部队、救援志愿者的活动地点，同时也可以作为临时住宅用地使用。城市公园是非限定功能性的开放空间，从灾害发生的短暂瞬间至紧急的避难阶段、救援和重建阶段，直至灾后全面复兴阶段这一系列过程中，不同的空间容量，其发挥的作用也处于时时变化中（图1）。

根据以上调查结果，避灾公园规划建设制度被修改，在最初设定的城市公园可以作为广域避难场所和避难通道的基础上，增加了作为紧急避难场所和广域避灾场所的作用。2007年7月16日新泻县中越地震发生，国营公园和广域公园等大型城市公园在该次震灾发生时充当起了生活物资的集散和配送场所，在避灾公园规划建设制度中加入了城市公园的广域避灾据点功能，使得避灾公园体系进一步完善。

除此之外，阪神淡路大地震属于城市直下型

environments. An integrated planning and construction system that combines disaster refuge and relief parks with their surrounding urban neighborhoods is needed.

3. The Current Urban Park Disaster Refuge and Relief System

3.1 Disaster Refuge Parks System

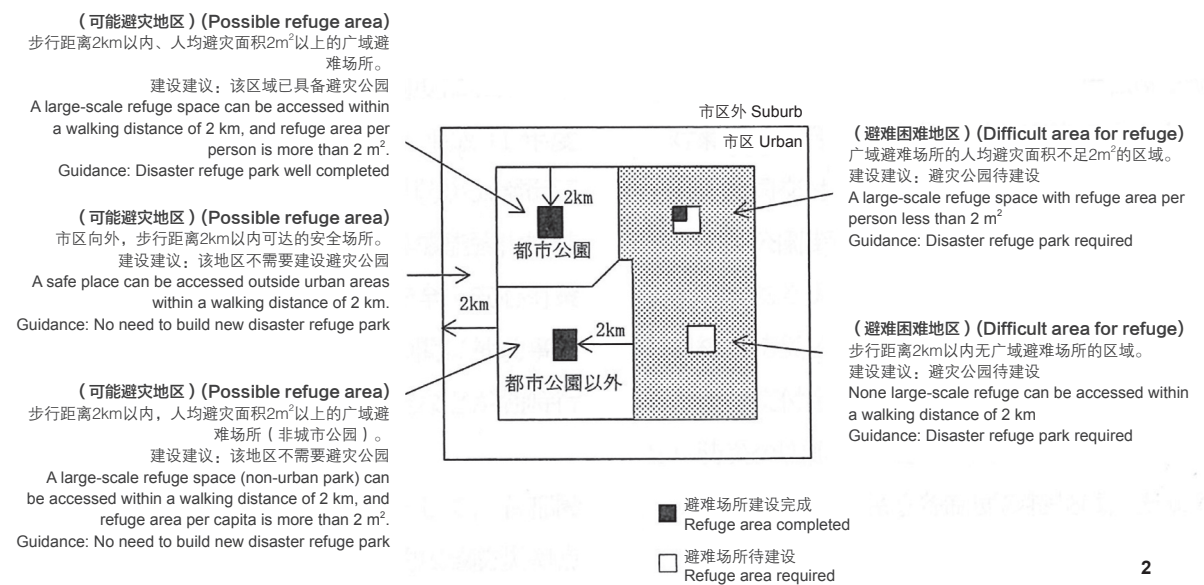
Table 1 shows the planning and construction of disaster refuge parks as conceived by the Ministry of Land, Infrastructure, Transport and Tourism of Japan. The function is divided into two categories: function as command posts, and function as shelter. Emergency command posts include regional command post, urban command post, and neighborhood command post that set up respectively in state parks, large-scale parks, and major urban parks. Shelter functionality is divided into large-scale refuge and emergency refuge, and includes both major urban parks and neighborhood parks. In addition, greenways also can become evacuation routes as needed. Tables 1 elaborates on disaster refuge functions, their needs, and their required acreage. The configuration of large-scale disaster refuge and relief parks is displayed in Figure 2. Refuge areas should be available every two kilometers and cover an average area of two square meters per person. An example of disaster refuge construction of urban park is seen in Figure 3. Emergency equipment should include

a warehouse, earthquake-proof water tank, radio broadcasting facilities, helicopter pad, and fire fighting facilities. In addition, small-scale emergency refuge should be equipped with basic supplies, such as a warehouse and earthquake-proof water tank.

According to disaster refuge parks system conceived by the Ministry of Land, Infrastructure, Transport and Tourism of Japan, Japan published the *Guideline on Planning and Design Disaster Refuge Parks* in 1999, which include the green buffers acting as strips obstructing built-up area away from petrochemical plants, and adjacent small-scale urban park acting as emergency command post (Fig.4).

3.2 Integrating Park and Neighborhood

To strengthen disaster response in disaster prone urban areas, planning and construction guidelines that integrated park and neighborhood were established in 1999. Reconstruction was based on local disaster refuge plans, and included specifications for refuge and parks within one-hectare areas. Fire prevention strategies were also incorporated. For example, in the Momoi Sancho neighborhood of Sugunami Tokyo the new plan in filled wooden houses and factories with shelters that included emergency lavatories and a large urban park (Fig.5). Overall, this approach improved the disaster response facilities for medium high-rise buildings and



地震，反映了现今城市的脆弱性。为了提高城市的防灾能力，不能仅仅局限于只针对城市公园进行规划，还需要将避灾公园和周边城市街区进行一体化规划的建设制度，这一点将在后文中予以说明。

3 城市公园构成的避灾体系现状

3.1 避灾公园体系

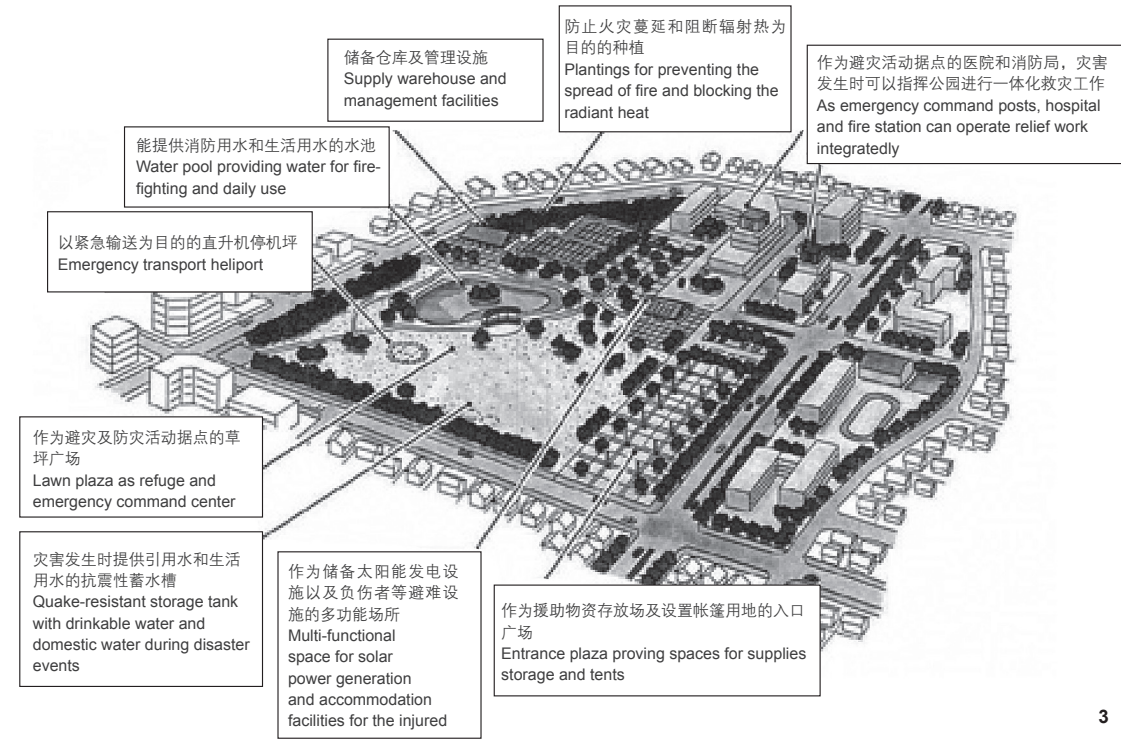
日本国土交通省关于避灾公园规划与建设的构想如表1所示，其避灾功能分为据点功能和避难场所功能两大类。其中，据点功能又包括核心广域避灾据点、广域避灾据点和地区避灾据点。担负上述功能的城市公园类型依次为国营公园、广域公园、城市骨干公园等。另一方面，避难场所功能分为广域避难场所和紧急避难场所，其对应的公园类别依

次为广域公园（以及城市骨干公园等）和地区公园（以及邻里公园等）。此外，避难通道功能可以由绿道承担。表1详细说明了上述不同的公园类型具备的避灾功能和相应的面积要求。作为广域避灾场所的城市公园的配置如图2所示，避难者可在2km以内找到避难场所，同时确保人均避灾面积大于2m²。图3为避灾公园的建设意向图，展示了避灾公园应该具备的应急设施，包括：储蓄仓库、耐震性蓄水槽、无线电广播设施、通信设施、直升飞机停机坪和防止火灾蔓延的消防设施。此外，对于较小规模的紧急避难场所，也应该具备储备仓库和耐震蓄水槽等基本设施。

在上述国土交通省设定的避灾公园体系上，日本于1999年发布《避灾公园规划与设计指导方针》

表1 避灾公园规划与建设
Table 1 Planning and Construction of Disaster Refuge and Relief Parks

功能划分 Function	公园类型 Park Category	所需面积及其他必要条件 Required Acreage and other Necessary Condition	
据点功能 Command post	核心广域避灾据点 Regional command post	广域避灾的指挥本部 Headquarters for large-scale disaster refuge 广域避灾支援部队的驻地 Encampment of aid troops 灾害医疗的支援基地 Support base for medical aid	国营公园 State park
	广域避灾据点 Urban command post	救援与急救部队、生命线恢复部队等的活动支援据点 Support for rescue and first aid teams, lifeline recovery teams 物资中转站 Transfer station for supplies	大规模城市公园等 Large-scale park
	地区避灾据点 Neighborhood command post	救援与急救基地 Base for rescue and first aid 救援物资输送的中转站 Transfer station for rescue supplies	城市主要公园等 Major urban park
避灾场所功能 Shelter area	广域避灾场所 Large-scale shelter	主要作为区域内居民的广域避灾场所 Shelter for residents of the region	城市主要公园、大面积城市公园等 Major urban park, large-scale park
	紧急避灾场所 Emergency Shelter	主要用作邻里居民的临时避灾点 Temporary shelter for neighborhood residents	邻里公园 Neighborhood park
避灾通道 Evacuation Route	绿道 Greenway	宽度10m以上 Greater than 10 m wide	



3

traditional neighborhood blocks.

4 Future Planning

On March 11, 2011 a 9.0 magnitude earthquake struck Japan's northeastern sea. The large earthquake raised the seawater level by as much as nine meters and caused a Tsunami with a wave height of 40.5 meters in some areas. The flooded area was 560 km². The earthquake caused 24,000-recorded deaths and destroyed approximately 280,000 buildings. Considering the destructive magnitude of this quake, urban parks and green belts were again proposed as a future line of defense against major disaster events. Tsunami response and defense requires mitigation, capture, and multi-functional defense system integrated with other infrastructure. In addition, future planning must consider the elevation of evacuation passages, refuge and warehouses. In the next 30 years, the probability of large earthquakes in the south Pacific remains high, and Tsunami defense has already become one of the most important research topics in Japan.

Furthermore, traditional wooden architecture in

cities such as Tokyo, Osaka, and Nagoya is becoming more of an issue as cities grow denser and denser. These buildings are at a greater risk for collapse and fire following an earthquake. Improving building quality in the urban downtowns will be essential for future disaster planning. Integrated planning and construction of disaster prevention landscapes will only become more important. However, the complexity of land ownership in Japan is an equally important and unresolved issue.

Improved disaster response and refuge centers in urban areas are also critical for overall improvement of park and green spaces. Community involvement and support is essential to the planning process. When earthquakes struck Osaka and Kobe, help from local communities and national volunteers played an important role in reconstruction. More importantly, it is critical that residents understand the local disaster-prevention plans in place and can independently operate refuge and rescue centers. Again, these facilities also improve overall urban quality and it is important that local residents understand their everyday use as well.

3. 避灾公园建设意向
3. A disaster refuge park

(图4)。该体系除了包含上述的避灾公园外,还包括了阻隔市区与石油化工厂等危险地带之间的缓冲绿地,以及担负邻里近旁避灾活动据点的街区公园等小规模的城市公园。

3.2 避灾公园街区一体化规划建设

为了加强易发生灾害的大都市市区避灾功能,日本在1999年创立了避灾公园街区建设规划。日本城市再生机构在尊重地方公共团体请求的基础上,利用工厂旧址,并且基于地方自治制定的避灾相关规划,对作为避难场所或者避灾活动据点的面积1hm²以上的避灾公园进行规划建设,使之与其周边的市区不可燃化策略共同实施,进行避灾一体化的规划。例如2000年实施的东京都杉并区桃井三丁目的建设规划(图5),该地区以木造住宅和工厂居多,为避难场所不足的避难困难地区。因此对该地区进行规划时,设置了储备仓库和应急厕所,建设了灾害发生时可以作为活动据点的面积为4hm²的避灾公园,同时提升了中高层住宅的防灾功能,使其向防灾功能强化型的城市街区转变。

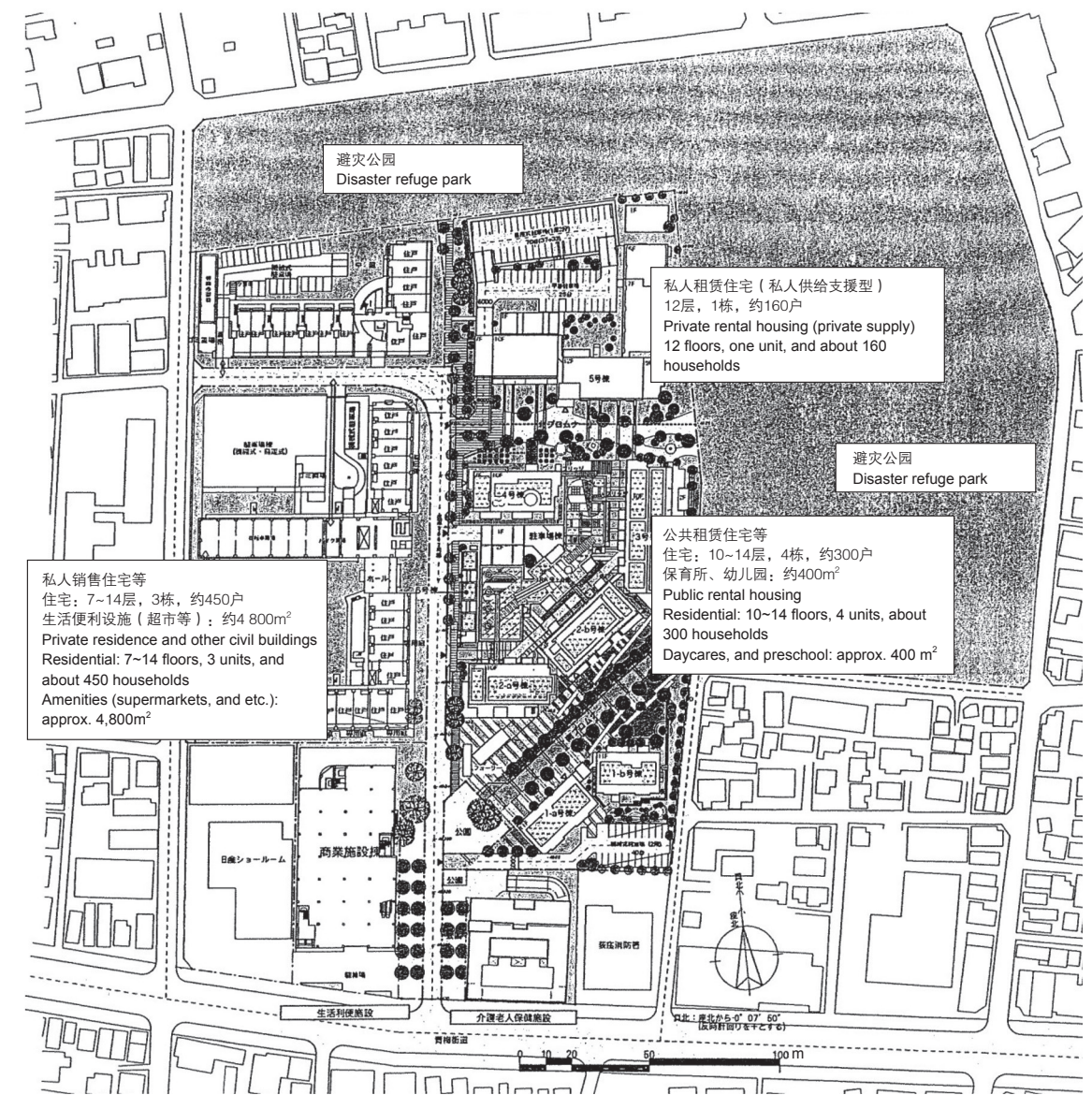
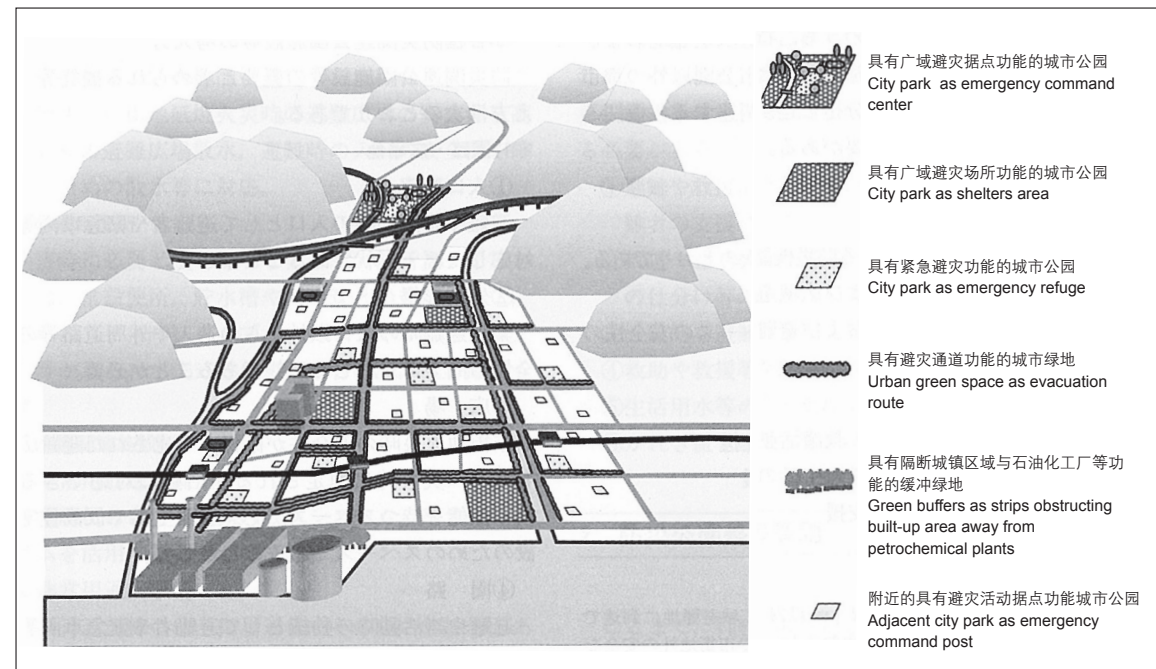
4 今后的课题与展望

2011年3月11日,日本东北部海域发生里氏9.0级地震。此次“东日本大地震”引发了最高潮位

9.3m、最大波高达40.5m的海啸,袭击了东日本环太平洋沿岸地带,浸水地区面积达560km²,伤亡与失踪人员约2.4万人,被毁坏建筑约达28万栋,是一场惨重的灾难。鉴于此次大地震的教训,公园绿地针对海啸的防灾功能被首次提出,包括其对于海啸的减退、对于漂流物的截获,以及具有与其他设施等相协作的多重海啸防御功能。其次,对于目前现存的避难通道、避难场所、物质放置场所等区域,必须考虑到其地势标高。未来30年间,太平洋南海海槽发生巨大地震的概率还很高,海啸防灾已经成为日本迫在眉睫的课题之一。

另一方面,在日本东京首都圈、大阪或名古屋大都市圈,在中心市区带状的木造建筑密集区约达7 000hm²。对于这种带状市区,对其防灾功能的强化迫在眉睫。虽然避灾公园和城市街区的一体化规划建设对今后城市防灾的意义越来越重要,但是由于日本土地所有权的复杂性,这是一体化建设推进尚待解决的重大课题。

综上所述,避灾公园体系的建立以及与周边城市街区的一体化规划建设等,对于城市市区的物理环境的改善是不可欠缺的。但仅采取针对物质环境改善的“硬件”措施是不够的,居民个人防灾意识提高的“自助”行为和地区社区的帮助与支持的“共助”行为也是十分必要的。阪神大地震发生



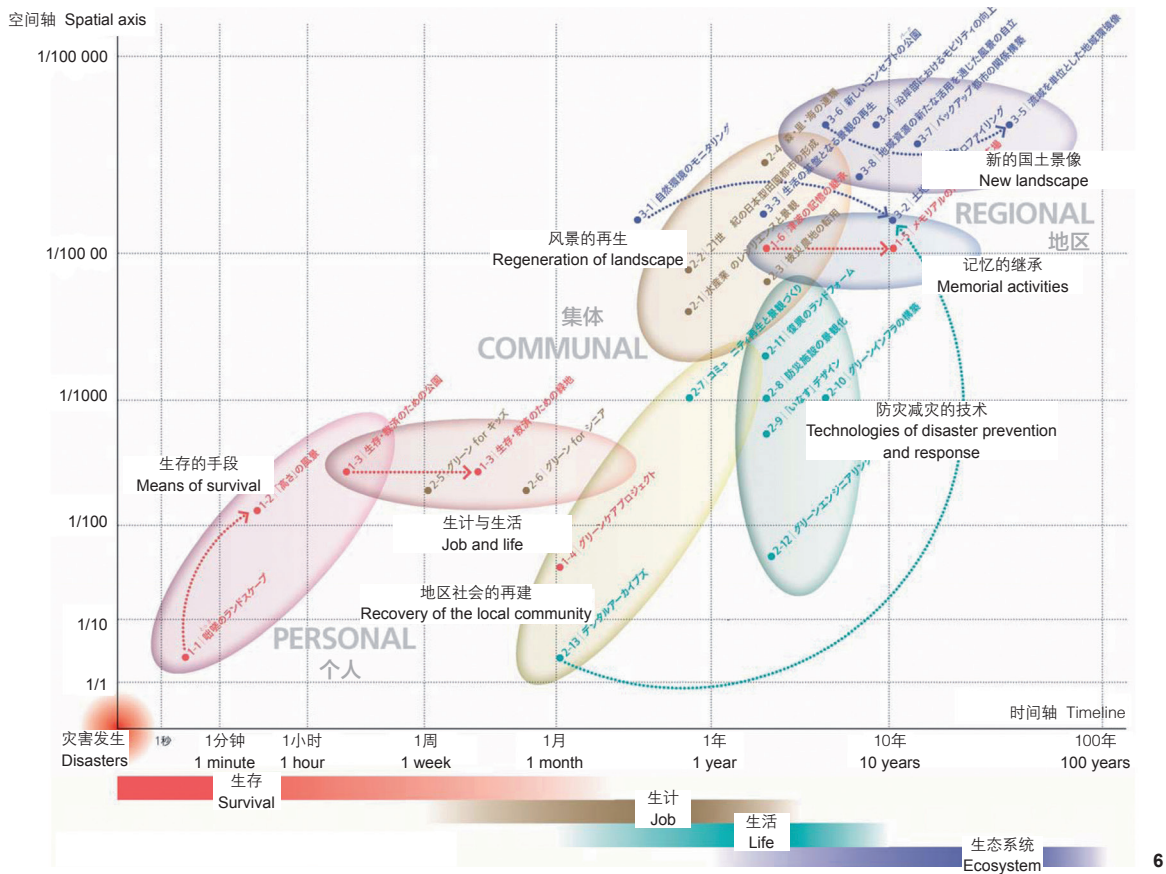
5 Conclusion

After the recent East Japan Earthquake that caused widespread damage, despite previous planning for disaster response, Japanese landscape architects established a commission for regeneration, support, and investigation. During their initial inquiry period the commission considered ideas such as “Post-disaster Recovery Based Landscape Regeneration”, “Landscape Regeneration with A New Territorial Development”, “Urban Revitalization with the Coordination of Mountain, Land and Sea” and “The Function of Green Space in Residential Area and Park in the Perspective of Urban Disaster Prevention

and Sustainable Development”. The commission’s findings were published in the book, *Revitalization Ideas Based on Landscape Regeneration*, published in May 2012. The book explores technologies and ideas for constructing new cities around ideas of survival, community regeneration, employment and life, landscape regeneration, and cultural memory.

To improve and expand urban disaster facilities and plans, new urban parkland should be infrastructural and multi-functional; they should be used as a daily part of urban life while maintaining the mechanisms needed to support local community and to respond to natural or unexpected disasters. LAF

4. 日本避灾公园体系
5. 东京都山并区桃井三丁目避灾建设规划
4. The disaster refuge and relief park system in Japan
5. The disaster refuge construction plan of Momoi Sancho neighborhood of Sugunami Tokyo



6. 灾后景观再生
6. Post-disaster landscape regeneration

时，地区社区的“共助”与全国志愿者的“共助”（被称为“日本志愿者元年”）发挥了重要的作用，并在“东日本大地震”中也给予了大力支援。此外，为了使避灾公园在灾害时有效发挥作用，地区居民对避灾公园设施的熟悉与熟练利用程度也是至关重要的一方面。鼓励地区社区居民平时利用防灾公园进行交流活动因而也非常必要。

5 结论

“东日本大地震”发生之后，日本造园学会设置了复兴支援调查委员会，在对实地进行调查的同时，对今后的灾后复兴计划进行了反复讨论，总结提出了“基于景观再生的灾后复兴”、“实现新的国土开发的景观再生”、“统筹里山、里地与里海的城市复兴”以及“以城市防灾减灾与可持续发展为视角的住宅区和公园绿地功能的探讨”议案。2012年5月出版了《基于景观再生的复兴支援理念》一书。书中描述了灾后复兴的时间轴与空间轴，提

出从灾后初期的生存手段相关的景观建设开始，经过地区社区的再生以及就业与生活的复兴，最后通过景观的再生和记忆的传承，构建新城市的景观技术和理念（图6）。

为了改善城市的防灾功能，对于城市公园绿地等“硬件”设施的建设，以及对于公园绿地平时利用与管理的“软件”措施都是必不可少的。此外，寻求当地社区发展以及包含其他城市设施在内的综合的解决途径亦十分关键。LAF