

Paper:

Pre-Disaster Restoration Measure of Preparedness for Post-Disaster Restoration in Tokyo

Itsuki Nakabayashi, Shin Aiba, and Taro Ichiko

Department of Urban System Science, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University

1-1 Minami-Osawa, Hachioji City, Tokyo 192-0397, Japan

E-mail: nakabasi@comp.metro-u.ac.jp

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Learning from the 1995 Hanshin-Awaji Earthquake, Tokyo Metropolitan Government has been preparing the restoration and reconstruction measures from a huge amount of damages caused by next Tokyo Earthquake. We are developing the methodology of earthquake restoration exercise with local government and residents according to TMG's restoration measures. In this paper, such unique trials of pre-disaster restoration measures in Tokyo are introduced and evaluated.

Keywords: urban reconstruction, earthquake disaster, restoration measure, pre-disaster restoration measure, restoration exercise, Tokyo

1. Introduction

Since the 1995 Great Hanshin-Awaji Earthquake in Kobe, various efforts have been made in Japan in earthquake recovery & restoration to deal with the following issues:

- How to restore city, community and houses
- How to make restoration plan and to consent it through citizen's participation
- How to be spent for city governments and citizens to decide on optimum restoration, building consensus, and
- How to implement urban restoration and recovery of citizen's livelihoods in the shortest time possible

The main issues of Regional Disaster Management Plan have been the preparedness of disaster response activities involving disaster drills in extinguishing fires and implementing rescue, evacuation, and temporary housing. Not only Town planning for disaster mitigation, but also Restoration measures have seldom been included in such plans, but some municipalities think that it is important to prepare restoration measures and that procedures for community-based restoration are also needed. The revised Basic Disaster Management Plan (1998) emphasized the need to improve restoration measures, which and some progressive municipalities have begun to implement as predisaster restoration.

We begin by reviewing predisaster restoration concepts, then focus on Tokyo as an example of municipalities introducing predisaster restoration. Under

conclusions, we include remarks on projected predisaster restoration efforts.

2. Process of Recovery and Restoration from Disaster

We start by reviewing theoretical models of Restoration from disaster, community-based restoration and development.

Restoration becomes necessary due to damage in disasters. How is such damage conceptualized? Kawata (2001) defines disaster damage D for event probability p , nature's force F , and resistance (societal disaster prevention) R as follows:

$$D = p(F - R)$$

Kawata Based on considers measures to decrease event probability and to increase societal disaster prevention to cope with tsunami occurrence.

Wisner et al. (1994) defines disaster damage D for nature's force (Hazard) H and vulnerability V as follows:

$$D = H \times V$$

Vulnerability V is defined as the characteristic of individuals or groups that affects their ability to fight against and recover from disasters by imagining natural disasters beforehand.

Nakabayashi (2005) defines also disaster damage D for nature's force (Trigger factor) F and damaged assets (suffered subject) A that involve both Vulnerability V and Resistant power R as follows:

$$D = F \times A(V - R)$$

Wisner and others' concepts of vulnerability (The Pressure and Release (PAR) model) include societal disaster prevention. Kawata's, Weiser's and Nakabayashi's models both include concerns with societal factors, emphasizing societal aspects of community-based restoration and development such as housing, job, human relationships, and welfare. Given that the foundation of postdisaster restoration is disaster victims' ability to strive for recovery from disaster, Kawata's and Weisner's models are thought-provoking. Local communities with high disaster-prevention capacity rank high in robustness. It is indicated that such communities also have potential "power" to recover from disaster damage.

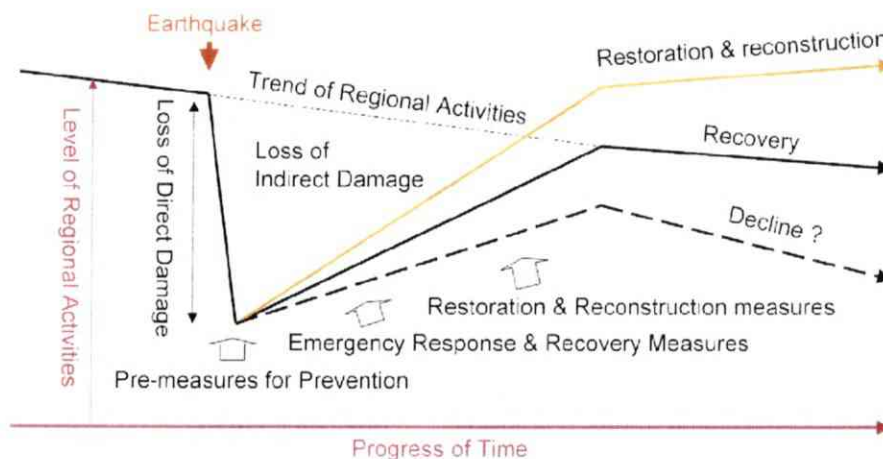


Fig. 1. What is recovery nor restoration?

Restoration from disaster damage can be conceptualized as recovery of disaster damage D over time. Kawata (2001) conceptualizes postdisaster recovery process in reducing peak disaster damage. Hayashi (2001) analyzed 120 kinds of social statistics, pointing out that restoration can be categorized into six patterns. Also, he points out that in case of economic recovery and recovery of living, the patterns of restoration process are different depending on the subject to be recovered. That is to say, different strategies for restoration are needed depending on the subject to be recovered.

Restoration goals in this paper are the community-based development (*machizukuri*), including houses rebuilding, recovery of livelihoods and urban reconstruction. In this view, our model (**Fig. 1**) is useful.

The restoration process model covers the decades following earthquake disaster after the case of the 1995 Hanshin-Awaji earthquake disaster in Kobe. In some aspects such as infrastructure, restoration has reached the pre-earthquake level (Recovery course; in **Fig. 1**). Some small and medium enterprises, however, remain in debt and have been lagging since the earthquake (Decline Course; in **Fig. 1**). On the other hand, in some aspects such as residential redevelopment through land readjustment projects, restoration has surpassed the pre-earthquake level (Restoration course; in **Fig. 1**).

Pointing out that the gap between the recovery line and the restoration line widens, we propose that the restoration course indicating “restoring to trend level in early stage of the recovery as soon as possible using public fund” in **Fig. 1** is needed in a restoration strategy. In reverse, the decline course indicating “being unable to restore to trend level in the period of using public fund of recovery aid” in **Fig. 1** is an important issue.

A similar proposition is made by Yasuyoshi Hayashi, a practitioner and researcher of disaster-prevention community development (Hayashi 1999), who first emphasizes the recovery of people's housing, lives, human relationship, job to stabilize the victims' mental

condition, followed by expanding the scope of restoration beyond the recovery to predisaster standard to better lives and towns. Hayashi's two-step restoration thus first concentrates on putting people's lives back together, followed over time by citizens and local governments working together to reconstruct their community.

Restoration strategy must be considered both in the short term, when the priority is quick "temporary" repair to get victims' lives back on track, and in the long term, when effort focuses on the restoration of residential areas. As stated later, Tokyo's postdisaster restoration plan is based on both short- and long-term restoration.

3. Predisaster Restoration Concepts

Urban disaster restoration must be designed rationally and proceed smoothly. To ensure this, municipalities and citizens must share restoration visions, conceptual planning of community-based restoration, process of restoration projects and development strengthening their capability to create their own community-based restoration managements. Based on restoration strategy model (**Fig. 1**) and our experience of pre-restoration work shop exercises in Tokyo, pre-disaster restoration measures are summarized in **Fig. 2** as follows:

1. Estimating disaster damage scenarios of present urban condition, beforehand.
2. Preparing restoration measures including concepts and concrete methods for formulating urban and community-based restoration projects, according to damage estimation.
3. Sharing restoration measures including concepts, planning and concrete methods between municipalities and citizens beforehand, and strengthening the community's capability of working together with municipalities on urban and community-based restoration.

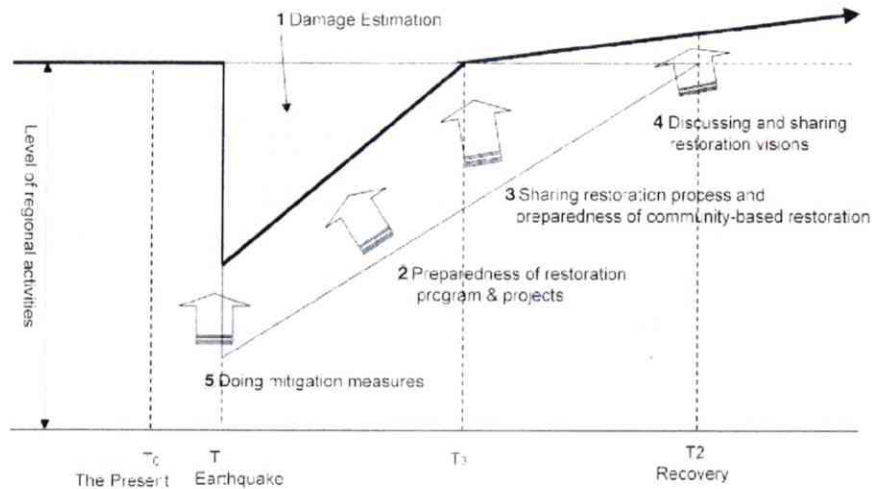


Fig. 2. Mitigation strategy based on preparedness of urban restoration.

4. Discussing and sharing the vision of restored and redeveloped town beforehand.
5. Implementing community-based disaster-prevention development, called “Bosai Machizukuri” in Japanese, beforehand to minimize restoration requirements.

Pre-disaster measures can be prepared according to estimated damage scenarios beforehand. However, since nobody knows real damages from the next disaster, the detailed on-site restoration policy and plans cannot be formulated beforehand. Therefore, the pre-disaster restoration measures should include the following 5 elements:

- a) Making disaster damage scenarios as accurate and detailed as possible (for examples, see Figs. 3-5).
- b) Making earthquake disaster restoration manuals that summarize the concepts of restoration and the processes of the concrete post-disaster restoration planning and its implementations processes,
- c) Conducting community-based exercises according to “Restoration manual,” and enabling local communities and governments to simulate restoration processes.
- d) Discussing “the community-based restoration plan” through such pre-disaster community exercises.
- e) Feeding back cooperative relationships between municipalities and citizens formed through the four elements above to ensure disaster-prevention community development.

In other words, the concept of pre-disaster restoration involves preparing plans and manuals, having people share them, and empowerment of disaster-prevention community developments. It has to be enabling municipalities and citizens to respond and work together for the restoration, regardless of when and where a disaster occurs and how big it is.

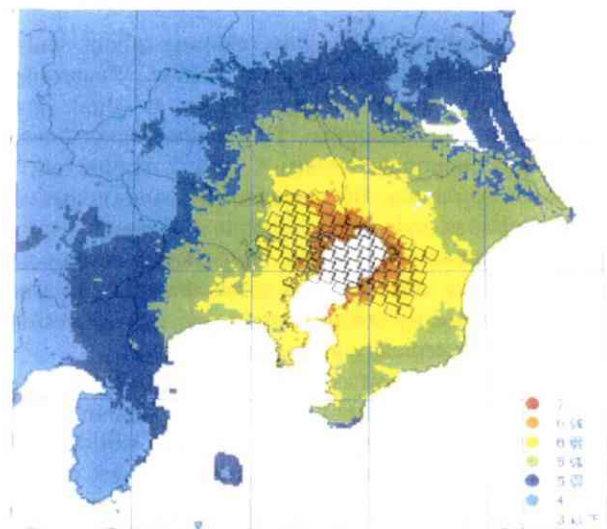


Fig. 3. Seismic Intensity of the Northern Tokyo Bay Earthquake (M7.3), after National Cabinet (2005).

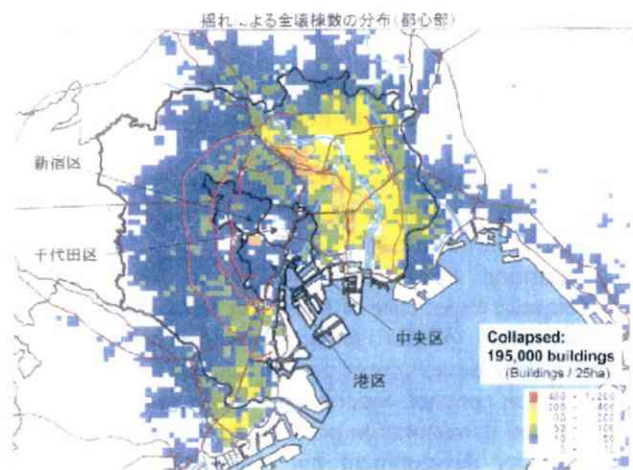


Fig. 4. Damage intensity of houses collapsed by the Northern Tokyo Bay Earthquake, after National Cabinet (2005).

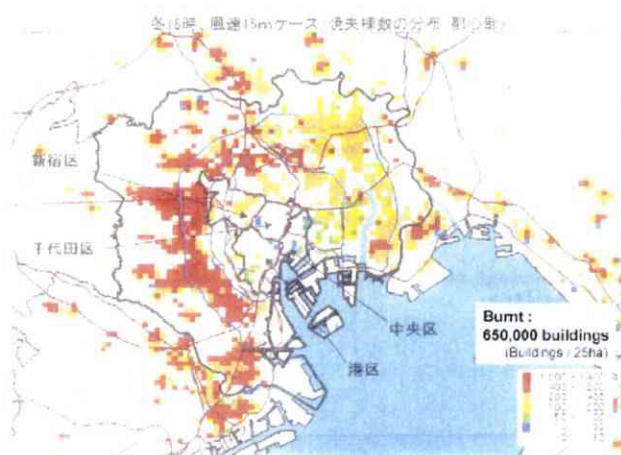


Fig. 5. Damage intensity of houses burnt down by fire in Northern Tokyo Bay EQ with window of 15m/s., after National Cabinet (2005).

Municipalities tend to be cautious about making detailed disaster scenarios such as 1, above. Regarding 4, above, some people simply refuse to think about postdisaster reconstruction. This makes points 2 and 3 especially important. Points 1 and 2 should not be imposed top-down, but required cooperation between municipalities and citizens implement through points 2 and 3. Awareness of issues and role sharing developed in point 5, above, affects efforts in this direction. Measures 1 to 5 are mutually complementary and, as such, must be combined strategically and systematically.

Seen in terms of a time line (**Fig. 2**), recovery involves local community well-being, meaning that a community's recovery derives from the well-being of individual members. Quantifying such recovery remains, at best, conceptual, but a local community's capability of recovering from disaster damage is actually used in community-based restoration. Just because a concept cannot be quantified does not mean the concept is meaningless.

4. Predisaster Measures by Tokyo Metropolitan Government

Tokyo is used as a case to see how the pre-disaster restoration measures of the above 1. - 5. are actually put into practice (**Table 1**).

Learning from the 1995 Great Hanshin-Awaji Earthquake experience of Kobe, the Tokyo metropolitan government (TMG) revised its disaster-prevention community development policy, adopting a predisaster restoration concept. Since then, Tokyo has strategically developed its restoration policies. In disaster-prevention community development not involving disasters, the Disaster-Resistant City Development Promotion Plan (Bureau of Urban Planning, TMG, 2003) was used to develop areas with high concentrations of wooden structures. Damage Estimates of an Earthquake with an

Table 1. Tokyo has prepared the Post-Quake Recovery & Reconstruction Measures in the pre-earthquake period.

1995	Hanshin-Awaji Earthquake Disaster
1997	Promotional Plan for Earthquake-proofing Urban Improvement, as a revised Conceptual Plan of 1981, (in not only Central Tokyo but also Inner Suburban Tokyo)
1997	Preparedness for Urban Reconstruction measures after the Next Tokyo Earthquake. * "Post-quake Urban restoration Manual" * "Post-quake Livelihood Recovery Manual"
2000	Legalization of New Ordinance for Earthquake Measures
2001	Announce of "Grand Design for Post-quake Urban Reconstruction"
2003	Revision of Manuals for Earthquake Restoration * "Post-quake Restoration Manual" (Process Edition for collaboration with the citizen) * "Post-quake Restoration Manual" (Management Edition for Officers)
2003	Implementation of Exercise of Community Recovery & restoration
2004~06	"Civic Restoration Organization Promotion Project" by TMG
2007~	* Implemented Exercises in more than 30 communities.

Epicenter in the Tokyo Metropolitan Area (Disaster Prevention Division, TMG, 2006), a TMG Earthquake Disaster Recovery Manual (TEDRM) (Bureau of General Affairs, TMG, 2003), and a Grand Design for Post-Quake Urban Reconstruction (GDPUR) (Bureau of Urban Planning, TMG, 2001) were also made and published. wards, cities, towns, and villages. Urban recovery role-playing simulation exercise has been held annually since 1988 for town-planning staff members of wards and cities, and the simulation exercise for "community-based restoration" in collaboration between citizens and municipalities to experience the recovery process together (2004-2006, Civic Restoration Organization Promotion Project).

Damage Estimates of an Earthquake with an Epicenter in the Tokyo Metropolitan Area is equivalent to recovery item 1, above, and is the basis for municipal actions against earthquakes. The TEDRM corresponds to item 2, and urban recovery role-playing simulation and a simulation training for "community-collaborative" recovery correspond to item 3. Urban recovery role-playing simulation is for local officials and simulation training for "community-collaborative" recovery is for citizens. These programs have been conducted since the TEDRM was made and revised. What officials and citizens do in simulation drills is basically follow recovery processes shown in the recovery manual, and the drills are closely connected. The GDPUR is equivalent to item 4, presenting a postdisaster "image" of Tokyo, 4 and the Disaster-Resistant City Development Promotion Plan to item 5, presenting a predisaster vision of urban space. Together, they are the goals of urban development. The GDPUR only shows a large-scale abstract TMG vision unrelated site-specifically to the development promotion program.

Present predisaster measures taken in Tokyo are, except for simulation training for "community-collaborative" recovery and the Disaster-Resistant City Development Promotion Plan, assisted by cities and wards, too rough to be applied at the local level, and coordination and continuity among measures are weak.



Fig. 6. Preparedness for restoration from earthquake of TMG.

Smooth coordination of officials and citizens only becomes possible when damage estimates, recovery manuals, drills, and grand designs are put into practice at ward and city levels. Collaborative relationships between municipalities and citizens are also built this way.

Among Tokyo's predisaster restoration measures, we take a look at the TEDRM, simulation training for "community-collaborative" recovery, urban recovery role-playing simulation, and the GDPUR in the sections that follow.

5. TMG Earthquake Restoration Manual

(1) Historical Background

The TEDRM was revised once, and four kinds of manuals have been made until now. The first, the Planning Manual for Post-Disaster Urban Restoration Planning (1997), concerned physical reconstruction, and the second, the Administrative Manual for Post-Disaster Recovery Measures for public Livelihood (1998), concerned putting people's lives back on track. Meant for governmental officials' use alone, they were integrated into the new TEDRM (2003) that consists of recovery processes for citizens and recovery measures for officials (Fig. 6). The former is TEDRM of Process Version that is opened on web-site of TMG and to be sold for the public. The latter is TEDRM of Official Version that is not opened for the public and edited as a book of addition & subtraction style to be easy to be revised according to transformation of organization in TMG and revisions of related institutions (Fig. 7).

In this historical background of pre-disaster restoration measures, it is very important that we, as experts, develop the methodology of earthquake restoration exercise. Today, following the TMG's manuals, their own disaster recovery manuals have been made by more than 13 special wards, including Adachi, Nerima, Sumida, Setagaya and so on.

TERDM (Process Version)	TERDM (For Officers)
<p>Introduction</p> <p>1 Viewpoints and Basic Aim of Restoration</p> <p>2 General View of Restoration</p> <p>1. Sufferer's thoughts and five principles</p> <p>2. General view of restoration</p> <p>3 Aid for Community-based restoration Association</p> <p>4. Process of temporary town</p> <p>3. Restoration Process of every field by Community Activities.</p> <p>4. Forward the promotion of Community based Restoration</p>	<p>Prologue</p> <p>1. Establishment of Restoration Affairs</p> <p>2. Urban Restoration</p> <p>3. Rebuilding of Houses</p> <p>4. Recovery of Livelihood</p> <p>5. Restoration of Industries and Economic Activities</p>

Fig. 7. Contents of TERDM.

(2) TMG Earthquake Restoration Manual of Recovery Process Revised in 2003

TMG's Earthquake Restoration Manual of Recovery Process consists of basic goals and views of restoration, overall restoration, restoration process in every fields using local community's power, and promoting "community-collaborative" recovery.

In the chapter1 of this manual, basic goals and views of restoration include the citizen-centered restoration based on self- and Community-collaborative supports which will be supported by the public support, the responses acting on diverse restoration processes based on individual's situation, the producing temporary residential areas as called "Temporary Town" to sustain a community relationship until full-scale restoration, and the Post-disaster restoration planning reflected by pre-disaster comprehensive community-development activities and urban reconstruction proposals based on GDPUR. It is noted that the TMG's view has gone beyond conventional government organizations by, for example, emphasizing the importance of community's power for urban restoration. In the chapter 2, the restoration process overview is the core of the manual as mentioned in next section. Following the overall process, the detailed measures are also explained centering on urban reconstruction, house rebuilding, recovery processes of industry and every-day life in the chapter 3.

(3) "Earthquake Recovery Process" Proposed by TMG

Based on the second chapter of disaster recovery manual of recovery process, TMG assumes the process of community-based city restoration and its development as following (Fig. 8). The first important point is that the restoration process time line is divided into three phases evacuation, temporary restoration, and full-scale restoration. The second important point is the two local level restoration scenarios – whether a civic organization for restoration is formed or whether it is not in temporary restoration. Based on the restoration process summarized

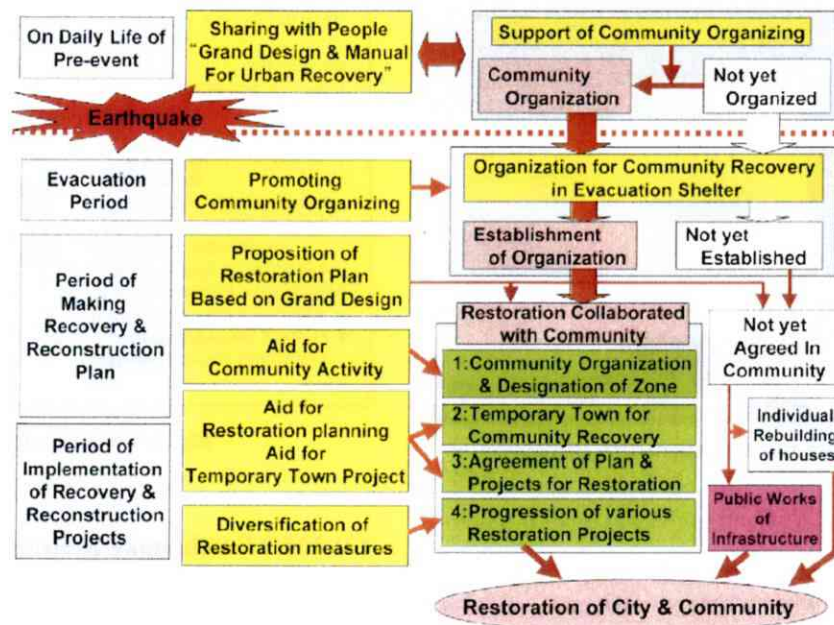


Fig. 8. Concept of process of community-based restoration according to TERDM.

in the manual Based on, three steps exist between temporary and full-scale restoration. The first involves formation of community restoration associations and designation of collaborative restoration areas. The second involves the formation of temporary city districts and in-depth discussion of community development and consensus building. The third involves full-scale restoration and development. In sum, the process is collaborative restoration of a community by mobilizing the community's power.

The manual holds that collaboration between municipalities and citizens is important for recovering from immense quake damage, so community restoration associations are the key to restoration. These citizen-centered organizations work in collaborative restoration, being officially authorized by wards, cities, towns, and villages during restoration. Temporary town districts are the temporary residential areas in earthquake-stricken areas whose victims continue living in or near where they lived before the quake. In the Great Hanshin-Awaji Earthquake, some community-based temporary districts were built during restoration of each community. The TMG decided to introduce community-based temporary residence system, called as a "temporary town," on a large scale. The residents could continue to live in the temporary town of each community to hold. It is able to hold the in-depth discussion of community-based urban reconstruction and to build the consensus for community restoration smoothly. The consensus building means that restoration plan making is led and decided by citizens.

The concept of restoration process through the temporary town system is shown in Figs. 9 and 10. In Fig. 9, the first step of temporary town system is shown as a stage of living recovery from shelter to temporary

housing in each community, and in Fig. 10 the second step of temporary town system is shown as a stage of community-based restoration through the re-development from temporary town to restored town.

In sum, the TMG assumes that citizens remain in their communities. At evacuation sites or in temporary housing, citizens remain near their original neighborhoods. They then form community restoration associations to lead in restoration planning and restore their community as part of community development – what the TMG calls collaborative restoration of a community in its disaster recovery manual.

Tokyo's community-based collaborative restoration is based on experience in the 1995 Great Hanshin-Awaji Earthquake in Kobe in its progressive community-based development (machizukuri) association. In addition to consensus-building associations for urban planning projects, Tokyo's community restoration association is expected to work on housing, daily living, mental health, and industry issues. It is considered more comprehensive than Kobe's community-based development associations.

6. Implementation of Community-Based Restoration Exercise

(1) Outline of Community-Based Restoration Exercise Projects

Earthquake restoration and town development are simulated based the earthquake recovery manual, which helps people deepen their understanding. Training also helps build relationships among trainees to enable them to discuss visions and make plans for restoration. Such "community capability" includes those both inside and

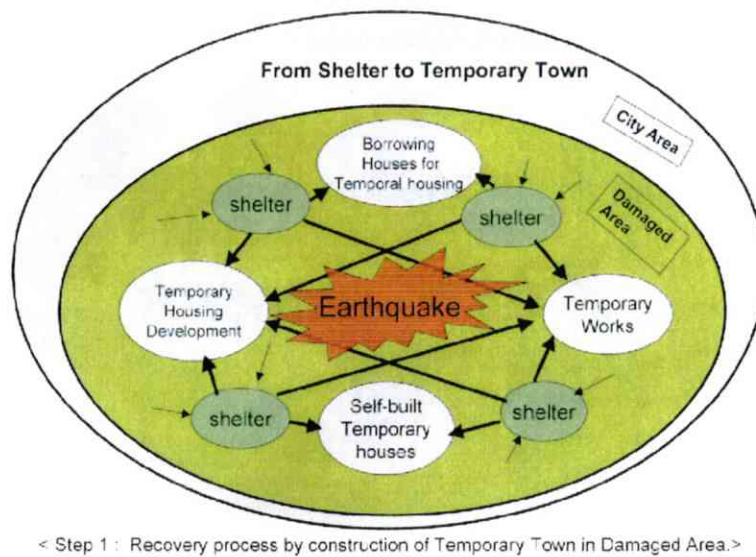


Fig. 9. Image of restoration system through temporary town according to TERDM (First Step).

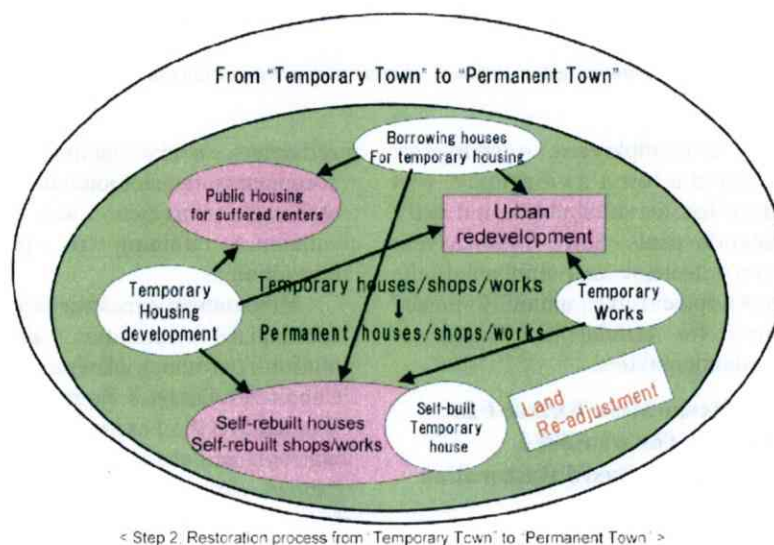


Fig. 10. Image of restoration system through temporary town according to TERDM (Second Step).

outside the community and involves developing and sharing awareness of restoration issues, fostering awareness of individuals' roles within the community, and discussing and building consensus. People's well-being during restoration depends largely on the amount of time they have. Simulation shortens the time they must spend in decision-making during real restoration. Training is also a good chance to check whether the manual gives citizens realistic choices and criteria for restoration.

As stated, the TMG earthquake recovery manual has versions for both community and officials.

The community-based earthquake restoration exercise to simulate the manual of process version started with as small-scale restoration as community development. The first exercise was conducted in 2001 gropingly in Setagaya ward. In 2003, when the TMG

earthquake recovery manual was revised, two exercises based on new TERDM were implemented in Sumida and Nerima wards. Such community-based restoration exercise was implemented by collaboration with local government (ward) and community, which was sponsored by TMG. From 2004 to 2006, a Civic Restoration Organization Promotion Project was begun to conduct community-based restoration exercises. As a three-year project, it has been conducted many places, mainly in wards with high concentrations of wooden structures (**Fig. 11**), e.g., Sumida's Mukojima (twice), Nerima's Nukii and Sakuradaai, Shinjuku Honshio-cho, Adachi's Nishi-Arai, Kita's Akabane-Nishi, Katsushika's Shinkoiwa, Setagaya's Kitazawa, and Hachioji's Asahigaoka. In 2007, several exercises are implemented in spite of expiration of TMG's projects.

In urban recovery role-playing simulation, training

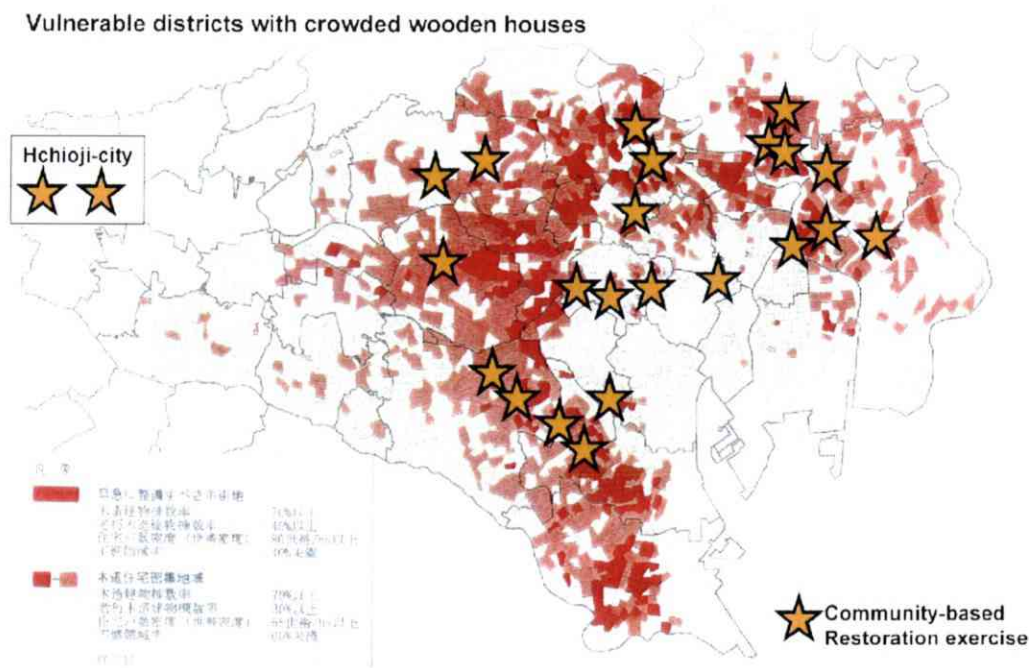


Fig. 11. Distribution of community-based restoration exercises and zones concentrated by high dense wooden houses.

for municipal officials and employees in charge of disaster prevention gather and select a case study, visit the area on foot, conduct disaster simulations, and make simulated urban restoration plans. Since 1998, a year after the urban recovery manual was published, the Bureau of Urban Development has annually hosted role-playing simulations for officials in charge of restoration of Tokyo's municipalities.

(2) Community-Based Restoration Exercise for Citizens in Shinkoiwa Town in 2004

1) Participants of Community-Based Restoration Exercise

Local governments – wards and cities – and citizens organize the community-based restoration exercise as manual simulation training for earthquake restoration, then TMG and experts support community-based exercise. These exercises are not for citizens only, since municipality officials may take part.

Citizens' town development associations, neighborhood associations, voluntary disaster prevention organizations, and local merchants' associations are invited, together with municipality officials in urban planning/development and disaster prevention. No sections in charge of predisaster restoration take part, since these usually belong to different bureaus with little personnel exchange. Cooperation of governmental official beyond administrative functions is an important function of training. Urban planning experts take part in framing training. Once a disaster occurs, help from local experts is usually the only expert help people can expect, so some local experts are specifically invited. Disaster restoration and development support organization consisting of lawyers, judicial and administrative

scriveners, social insurance labor consultants, tax accountants, redevelopment coordinators, architects, and real-estate surveyors also send experts to local simulation training to provide simulated legal consultation.

A movement exists for linking local training sites via "earthquake restoration and development support platform" at which platform urban planning, TMG, and Center for Disaster Prevention Machizukuri of Tokyo (Foundation Inc.) experts meet from all over Tokyo. This platform and the disaster restoration and development support organization" are Tokyo counterparts of restoration groups from the Hanshin earthquake disaster/supporter's network for community development and the Hanshin-Awaji community development support organization. For field experts, these organizations provide simulation training for earthquake restoration manual.

As stated, community restoration drills are organized either via networks to cover and link local drills throughout Tokyo or via local partnerships formed by citizens and municipalities at individual training sites.

2) Program of Community-Based Restoration Exercise

Community-based Restoration Exercise enables citizens to simulate part or all of collaborative community restoration process. Although details differ, training has no manuals and generally consists of 1- to 2-day trial-and-error programs based on through discussions among experts, citizens, and the municipal government. Efforts have been made to integrate programs via the earthquake restoration and development support platform, which was written about

by the center for disaster prevention community development "machizukuri" of Tokyo's journal "Cityscape" (Center for Disaster Prevention Machizukuri of Tokyo, 2005) as a provisional guide in simulation exercise.

The 5 major steps for community-based restoration Exercises corresponding to the time line of community-based restoration and development assumed in the disaster restoration manual consist of as follows; 1) Guidance and lecture of TMG's disaster restoration measures and the concept of community-based restoration project, 2) Walking around and seeing the town, and finding vulnerable factors and resources for community restoration, 3) Considering the problems for community restoration and houses rebuilding in the emergency evacuation bases like schools, 4) Considering temporary houses and temporary town for continuing to live in community in order to implementation of community-based restoration projects, and 5) Considering and making the basic principles and ideas for community-based restoration project.

In actual restoration exercises, taking various localities into account, steps required for the exercise are chosen, and menus are composed. It takes into account how experiences the local organization has and what problems the area has.

3) Case Study of Community-Based Restoration Exercise in Shinkoiwa Town, Katsushika Ward, Tokyo

We were involved in program planning for exercises conducted in Shinkoiwa, located in southern Katsushika ward on the boundary between Katsushika and Edogawa Wards. JR Shinkoiwa Station is in the center of the 166 ha area, whose two active local organizations – the neighborhood association and the Shinkoiwa community development association – were invited to the drill. The neighborhood association had had community-based disaster-fighting drills but not conducted drills for evacuation site managements. The community development association was formed in response to intermittent development in the 1990s and was well known among local citizens.

The earthquake restoration exercise was divided into five sessions. Not counting the last symposium for announcement of lessons from the exercise to local residents, there were four drills of exercise, each consisting of groups of 5 to 6 residents, with experts as facilitators training assistants, conducting simulated legal consultations to answer questions.

In the first drill – walking town and checking town –, participants formed groups on damage to the town, evacuation and evacuation sites, and temporary housing. Each group checked areas for high risk, evacuation routes and evacuation sites, and suitable sites for temporary housing. Results were illustrated on a simulation map. This training enabled citizens to share these restoration processes by the community.

The second drill – considering restoration as

Table 2. Participant's mind of participation with community-based restoration projects.

Questionnaire	Very much	A little	No decided	No answer
I would like to participate Community-based restoration project as a member of association positively regardless difficulty of community-based recovery and restoration activities, if I can contribute anything for the community.	49%	49%	---	2%
I would like to participate Community-based Restoration Association, which works on community restoration and empowerment project.	55%	36%	6%	3%

Table 3. Residents' evaluation of participation in community-based restoration exercise.

	Very much	A little	No decided	Correct	No answer
Widening neighborhood relationship	45%	43%	9%	2%	2%
I find there are various experts for implementation of disaster restoration, such as lawyer, architect, surveyor and so on.	57%	36%	2%	2%	2%
It is essential to consult with the experts and to get knowledge on implementation of community disaster management and restoration from disaster.	81%	15%	---	---	4%
I can find efforts to be done beforehand by community for preparing disaster such as management of evacuation base by community and so on.	57%	34%	4%	2%	2%
I can find efforts to be done beforehand by myself for mitigation such as retrofitting of houses, fireproofing of wall and so on.	55%	32%	4%	2%	7%

evacuees –, focused on one or two postquake weeks considering how to get housing and restore daily living to prepare for full-scale restoration. Participants assigned to roles as shoppers, one-house dwellers, apartment landlords, apartment renters, and apartment owners' dwellers discussed individual problems and actions.

The third drill – considering ideal temporary towns, houses, and shops, made plans for building temporary housing in affected areas –, divided into town, housing, and shop groups. The town group simulated finding suitable sites for temporary housing, then simulated deciding policies for constructing temporary community dwellings. The house group used 1/100-scale models to simulate locating temporary housing and communal facilities in three locations. The shop group simulated construction of temporary shopping areas with 1/100-scale models.

The fourth drill – considering community-based restoration and development –, had participants consider the town's future. Before this drill, volunteers from the Shinkoiwa community development association and the municipal government had met separately for a month to make municipality and association versions of community-based restoration and development drafts. In the fourth drill, participants were divided up in two groups to discuss restoration policies of the community (restoration policy group) and spatial vision of community restoration (restoration vision group) to discuss community-based restoration and development drafts.

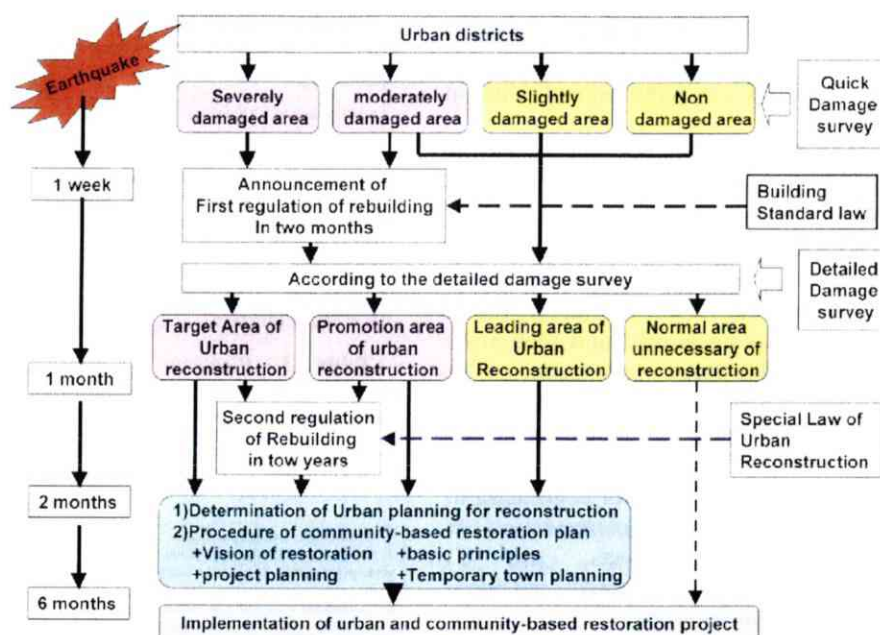


Fig. 12. Framework and guideline of urban reconstruction planning process according to TERDM.

4) Evaluation by Participants

Based on questionnaires after the drill, we found that half of local participants anticipated hard work but were willing to cooperate. Another 50% were willing to take part in organizations working on local reconstruction and restoration (Table 2). Participants thus anticipated the potential of loosely connected networks and local self-governance organizations as the basis for discussing community-based restoration and development. In participants' evaluation of knowledge acquired during exercise (Table 3), 81% felt it was indispensable to ask for advice and information from experts in restoration, probably due to facilitators and experts joining group discussions and consultations. About 60% strongly felt that local activities needed to be done beforehand and measures should be taken beforehand. Exercise thus made participants aware of issues in earthquake disaster preparation measures both of soft and hard.

(3) Urban Reconstruction Planning Exercise for Local Officers in TMG

Since 1998, the urban reconstruction planning exercises has been carried out in order to learn the manual of urban restoration measures, especially of urban reconstruction planning. We, belong to Tokyo Metropolitan University, have supported this exercises by making suggestions on improving training program since 2005. The exercise in 2006 is introduced as a case study of Sakuradai community, Nerima ward, Tokyo.

1) Urban Reconstruction Planning Exercise

The urban reconstruction planning exercise helped administrative officials in charge of urban recovery plans

to understand restoration processes and plans. The purpose was first to understand the process of making urban reconstruction plans, planning documents for building restrictions, reconstruction zoning maps, and community-based recovery plans based on damage estimation maps prepared for the drill. Second, the purpose was to understand community-based recovery plans – the importance of the community-based reconstruction plan that is a spontaneous plan and the knowledge about recovery & restoration measures involving four programs (Fig. 12).

In the first program – “walking around town for finding vulnerability and resources for earthquake disaster recovery and restoration” –, the participants broke into small groups and walked around the target area in the viewpoint of reconstruction. Specifically, they checked areas vulnerable in earthquakes (damage to the town), things and areas to be saved or improved during reconstruction (reconstruction resource accounting), and areas suitable for temporary housing (examination of temporary city district sites). After organizing results on maps, they presented postearthquake visions and local recovery and restoration issues.

In the second program – “learning the process of rebuilding houses and urban reconstruction” –, based on the TGM earthquake disaster recovery manual, participants produced building restriction and reconstruction zoning maps based on damage estimated map (Fig. 13) which follows the first program's result. Then, based on given postdisaster scenarios, participants, playing a part of officials of urban reconstruction, discussed measures for major problems in each stage of map making.

In the third program – “making urban reconstruction

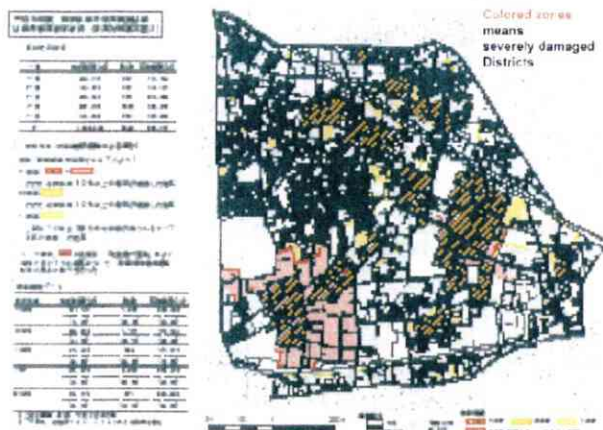


Fig. 13. Sample of damage map estimated for urban reconstruction planning exercise in Shinkoiwa Town.



Fig. 14. Sample of urban reconstruction planning in Shinkoiwa Town as a result of exercise.

plan” – although having no legal basis, participants’ work in making urban reconstruction plans had three advantages in planning – firstly, locating urban reconstruction planning in the local municipality. This is expanding the part of article 5 of the Special Act for Urban Reconstruction Measures, “principle of maintenance and improvement of city districts for urgent and balanced reconstruction.” Under this law, the areas covered are limited to high-priority disaster-stricken districts, so urban reconstruction plans expand the scope of reconstruction planning. Illustrating urban reconstruction plans on maps made it is easier to understand and visually compare the realities of participants’ areas with maintenance and improvement policies. The third advantage can be seen in the case when building limitations based on article 7 of the Special Act for Urban Reconstruction Measures are not made. In this case, urban planning projects are based only on building limitations based on article 84 of the

Table 4. Participant’s lessons from exercises.

I can find what is the important issue for urban reconstruction planning and projects	Number of answers
Implementation of Long term project for disaster prevention to reduce damages.	13
Planning and project is implemented through the collaboration between municipality and residents.	11
Negotiation and agreement with landlords and owner-occupiers	8
Governmental system and officer’s capability of coordination	7
Capability of project-proposal from viewpoint of regional planning	7
Capability of deliberate coordination just from occurrence of disaster	6
Consistency with and reflection of community development before disaster	5
Consistency and relationships with existing master plan of urban planning and comprehensive plan.	4
How understandable to announce the official information	3
Expenditure of restoration project and its limitation	1

Building Standard Law, i.e., the reconstruction process is conducted without any maintenance and improvement policy. Even in that case, designated areas are reconstructed in parallel with other areas under urban reconstruction plans. This means urban reconstruction plans make municipality-scale reconstruction planning possible with or without legal designation. Understand the importance of urban reconstruction planning and the scope of urban reconstruction projects covered in plans are thus emphasized.

Most of the 70 officials participating each time belonged to the urban development or community development sections. Some participants also came from disaster prevention sections. In a questionnaire during the drill, in answer to whether they had visited the Hanshin (Kobe) area to study reconstruction projects and community-based restoration, only 6% (three persons) had, indicating that Tokyo’s officials still have much to learn from the Hanshin experience.

The draft planning produced in the urban reconstruction planning exercise (Fig. 14) indicated that legally designated projects are integrated in municipality-level planning, measures other than legal ones are incorporated in community-based post-disaster restoration and pre-disaster development plans, and regional conception shown in the urban planning master plan become the basis for drill participants’ vision.

2) Evaluation by Participants

When participants were asked to evaluate their own proficiency on a scale of one to ten, their answers were in descending order from the first program to the third. The felt the second program was more difficult than the first and the third more difficult than the second. The third program scored highest in the sense of fulfillment, followed by the second, the first. Participants mainly evaluated programs as difficult but stimulating.

In answer to an open-response question in the 2005 drill on what participants thought was important in “creative” restoration actions compared to emergency and recovery actions, they responded that stabilizing

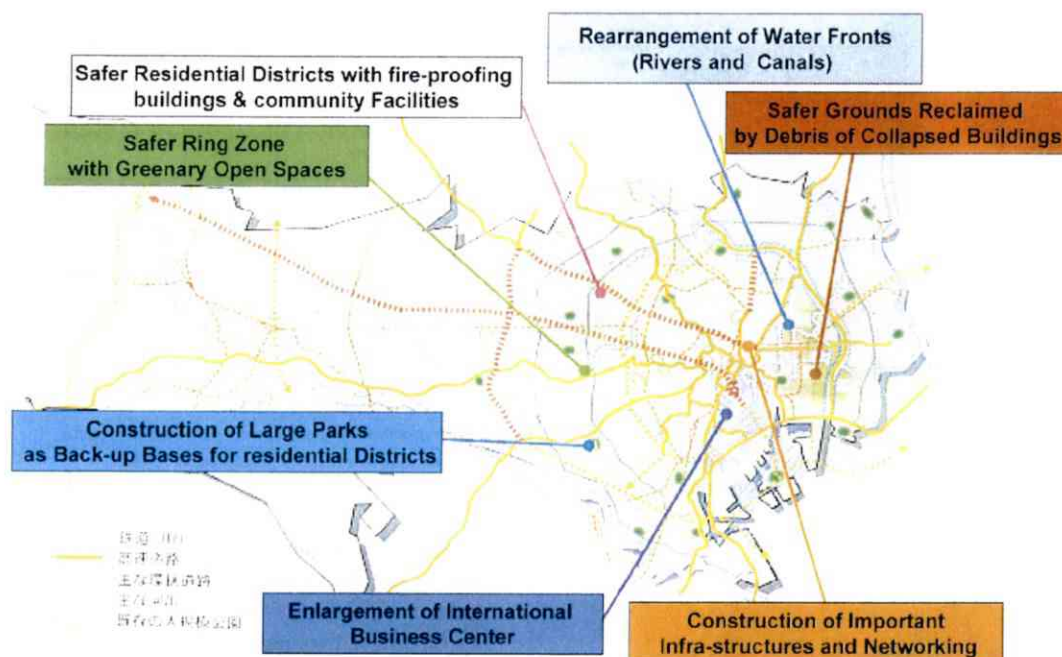


Fig. 15. Strategic projects of urban reconstruction after TMG "Grand Design for Earthquake Reconstruction."

victims' lives was the first priority (Table 4). They also thought that during the creative restoration period it was important to mobilize human and material resources – "power of community activities" – accumulated at normal times.

3) Exercise Results and Further Lessons

As stated, few officials taking part in drills had on-site knowledge of community-based Hanshin restoration and development, and many officials learned technical terms in the TMG manual for the first time during drills – facts suggesting that repeating urban reconstruction planning drills could prove useful. Planning drills helped officials better understand governmental roles in urban reconstruction planning. The manual itself was also revised thanks to lessons learned from drills.

As stated, Community Restoration Drill has been conducted since 2004, preparing citizens and communities for postdisaster restoration. Urban reconstruction planning drills have reached a turning point, and the key to Tokyo's disaster preparedness is the community restoration association model having communities, citizens, municipalities, businesses, and experts work together on restoration. To develop the potential of such community-based restoration, the government must take responsibility for studying concrete methods for formulating such restoration and development (Section 3, discussion of predisaster restoration concepts). The government must also do more to share the restoration planning process between municipalities and their citizens to strengthen their ability to work together in restoration and development (Section 3).

7. TMG Grand Design for Post-Quake Urban Reconstruction

The Grand Design for Post-Quake Urban Reconstruction in 2001 provides rough sketches of spatial visions and policies for improving the use of space in postearthquake restoration but before the TMG restoration manual was revised or developments in simulation training occurred. The argument was made when the urban recovery manual was formulated in 1997 that to prepare predisaster restoration plans involved considering issues such as how to conduct restoration and in visions of "restored" metropolis and city districts, what sort of Tokyo should be set as the goal of restoration. Making a restoration manual includes examining processes and procedures required for restoration. Before this, we need visions as goals so that we can decide the measures to take, assess cost, and prepare for restoration.

The GDPUR prepared in response to this argument for restoration visions of New Tokyo was very rough and lacking in concrete city-scale and district-scale plans (Figs. 15 and 16). It also did not include citizens' input. Citizen participation in actual disaster restoration relies on the TMG earthquake restoration manual.

Drawing district-scale spatial visions for restoration visions maps is the work of wards, cities, towns, and villages, so visions in the GDPUR remain at most conceptual diagrams. Citizens in individual areas should discuss visions of restoration through earthquake restoration and town development simulation training. Issues in connecting such local- and city-scale visions of restoration require more discussion. Based on what has been achieved through earthquake restoration and town development simulation training and urban

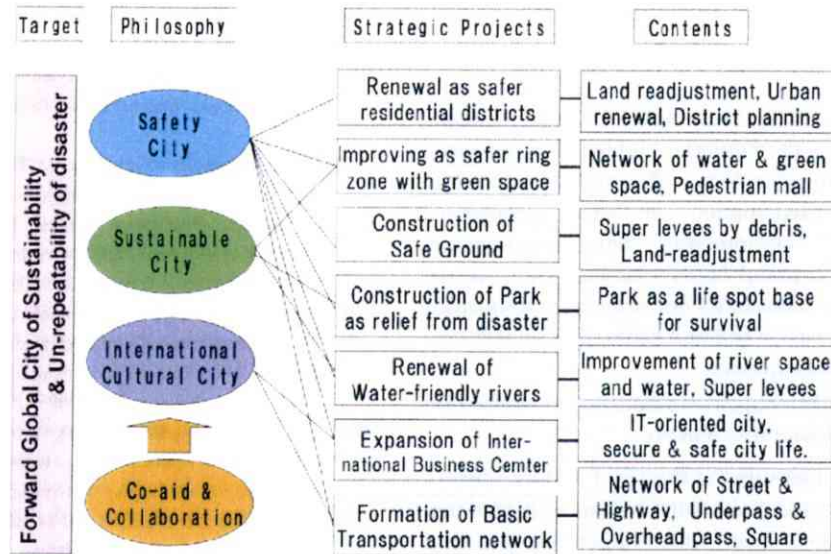


Fig. 16. Composition of "Grand Design for Post-quake Urban Reconstruction."

reconstruction planning drills, the "grand design of urban restoration from earthquake disasters" may need review, since it is still quite experimental in developing predisaster restoration.

Tokyo is the only area not only in Japan but also in the world that has done more than prepare restoration manuals by taking predisaster measures for postdisaster restoration. No other prefectures have prepared specific restoration planning maps or studied recovery project beforehand. If the concept of restoration means more than repair only includes overcoming vulnerabilities at the moment of disaster, designing a postearthquake visions of the city as a restoration goal may have some meaning. We must see how the "grand design of urban restoration from earthquake disasters" is redrawn as simulation training develops.

8. Establishment of TMG Earthquake Restoration Committee

Based on the TMG earthquake disaster recovery manual, the TMG earthquake restoration and coordination bureau headed by the governor of Tokyo serves as an advisory body, the TMG earthquake restoration committee Composed of non-TMG experts who advise to chief of the Bureau. Conventionally, after an earthquake, urban restoration becomes necessary, requiring that earthquake disaster restoration headquarters be set up – understandably a difficult task in the panic and confusion following a large earthquake. Setup of such a group after the fact may also slow efforts to implement restoration. It was thus decided to "pre-establish" the earthquake restoration committee. Committee members serve two years, during which they are called upon as soon as an earthquake requiring restoration occurs. In response to the Bureau chief's request, the committee discusses the situation and gives

advice on restoration issues. This system is already at work.

Ordinarily, this committee provides opinions on predisaster restoration activities such as revising the TMG earthquake disaster recovery manual.

9. Conclusions

Concerning the predisaster restoration, there are activities that "actions taken assuming that your community has been damaged or destroyed by a major quake or actions to encounter earthquakes in the strongest condition" by Mr. Ikuo Kobayashi, a planner in Kobe, Architectural Institute of Japan, 2001; Masuteru Murozaki, director, National Research Institute of Fire and Disaster. Including these activities or criticism, predisaster restoration planning tends to be controversial. Criticism raises such issues as if we have energy to spend on considering restoration beforehand, we should spend such energy on disaster prevention in community development, especially improving infrastructural disaster resistance. It remains, however, a fact that we cannot know where a disaster will strike or how severe damage will be. Under such circumstance, we must mobilize limited resources for community development to minimize damage – not an easily solved problem, however. Based on such TMG publications as "District-Based Vulnerability to Earthquakes" and "Damage Estimates of an Earthquake with an Epicenter in the Tokyo Metropolitan Area," Tokyo has formulated a disaster-prevention city development promotion program. Based on disaster prevention ordinances, Tokyo has designated "development" areas and "special development" areas to promote disaster prevention in city development. It may be reasonable to mobilize resources in such areas to strengthen disaster resistance, and conducting simulation training for earthquake

restoration and town development at different sites to "cultivate" community power may effectively reduce risk.

Japan's many earthquakes make them an ongoing concern in Tokyo's communities, which has increased the importance and acceptance of simulation training. Despite citizen participation in such simulation, however, not all communities have participated. Compared to conventional heavily orchestrated, formal disaster-prevention community development, predisaster restoration may be easier and more effective in reducing the risk of earthquake disaster.

We close by mentioning two issues to be worked on before a big earthquake hits Tokyo:

1. Integration of measures at the ward and city level

The five predisaster restoration measures mentioned earlier have not been fully integrated yet and limitations exist in integration efforts at the TMG level. Starting from urban reconstruction planning drills, individual wards and cities should make their own disaster estimations, restoration manuals, and grand designs for community restoration. Ongoing disaster prevention development at the community level should also be integrated into ward and city efforts in comprehensive predisaster restoration.

2. GDPUR's future

Planning will involved how to plan a grand design and how to build dynamic planning linking such design and community development. Many plans and proposals have been made regarding Tokyo, and information sharing shedding light on the planning context, and promoting discussion based on wider ranges of alternatives.

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Name:

Itsuki Nakabayashi

Affiliation:

Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University (TMU)

Address:

1-1 Minami Osawa, Hachioji City, Tokyo 192-0397, Japan

Brief Career:

1987 Doctor of Engineering
1975-1987 Research Fellow in Dept. of Geography, TMU
1987-1993 Associate Professor in Dept. of Geography, TMU
1993-2000 Professor in Center for Urban Studies, TMU
2000-2005 Professor in Graduate School of Urban Science, TMU
2005-2007 Visiting Professor in Disaster Prevention Institute of Kyoto University
2005- Visiting Professor in Urban Earthquake Disaster Reduction Engineering Center of Tokyo Institute of Technology
2005- Professor in Graduate School of Urban Environmental Sciences, TMU

Selected Publications:

- I. Nakabayashi, "Concentration and deconcentration in the Context of Tokyo Capital Region Plan and Recent Cross-border Networking Concept," *CITIES, AUTONOMY, AND DECENTRALIZATION IN JAPAN*, Routledge, London, pp. 55-80, 2006.
- I. Nakabayashi, "THE NEXT METROPOLITAN EARTHQUAKE DISASTER (Tokyo Dai-Shinsai)," Tokuma-syoten Ltd., Tokyo, 2005.
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Academic Societies & Scientific Organizations:

- Professional Member of Central Disaster Management Council, and Local Disaster Council of Tokyo Metropolitan Government
- Architectural Institute of Japan
- City Planning Institute of Japan
- Japanese Association of Geographers
- Association of Social Security and Safety
- Vice president of Japan Society of Disaster Recovery and Revitalization



Name:

Shin Aiba, Dr. of Eng.

Affiliation:

Associate Professor, Graduate School of
Urban Environmental Science, Tokyo
Metropolitan University (TMU)

Address:

1-1 Minami Osawa, Hachioji City, Tokyo 192-0397, Japan

Brief Career:

1998- Research Associate of Waseda University

2000- Assistant Professor of Tokyo Metropolitan University

2007- Associate Professor of Tokyo Metropolitan University

Selected Publications:

- "Science of local partnerships," Seibundo Publishing Co., 2005 (in Japanese).
- "City Planning for beginners," Ichigaya Publishing Co., 2008 (in Japanese).

Academic Societies & Scientific Organizations:

- Institute of Social Safety Science (ISSS)
 - The City Planning Institute of Japan (CPIJ)
 - Architectural Institute of Japan (AIJ)
-



Name:

Taro Ichiko, Dr. of Urban Science

Affiliation:

Assistant Professor, Graduate School of Urban
Environmental Science, Tokyo Metropolitan
University (TMU)

Address:

1-1 Minami Osawa, Hachioji City, Tokyo 192-0397, Japan

Brief Career:

1996- a staff member at Yokohama City

1999- Research Associate of Nihon University

2001- Tokyo Metropolitan University

Selected Publications:

- "The Neighborhood Community-training Program for Post-disaster Recovery: Toward Preparing Community-based Recovery Management," Journal of Natural Disaster Science, Vol.27, No.2, pp. 25-39, 2005.

Academic Societies & Scientific Organizations:

- Institute of Social Safety Science (ISSS)
 - The City Planning Institute of Japan (CPIJ)
 - Architectural Institute of Japan (AIJ)
-