

# DEVELOPMENT OF A COMPREHENSIVE EVALUATION METHOD ON POST-DISASTER RECONSTRUCTION

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**Abstract:** Reconstruction process of Hanshin-Awaji region has been almost finalized after more than ten years efforts by many stakeholders such as Hyogo prefecture, Kobe city and the Urban Renaissance Agency (hereafter referred to as UR). In addition, many community based organizations (CBO) have played roles to coordinate and contribute to the recovery process from the view-points of residents' perspective and community rehabilitation. The United Nations Centre for Regional Development (UNCRD), Asian Disaster Reduction Centre (ADRC), International Recovery Platform (IRP), and Disaster Reduction and Human Innovation Institute (DRI) jointly started a research on a comprehensive evaluation method on post-disaster redevelopment in 2008. The actual projects executed by the public bodies such as Hyogo prefecture and Kobe municipality and NGOs will be evaluated using a comprehensive method including social, economic and physical (environmental) aspects in the evaluation criteria.

There are several evaluation criteria on development or sustainable development such as the UN "Millennium Development Goals (MDG)" and "Human Development Index (HDI)" in recent years. Therefore, a comprehensive evaluation method with community based perspective and incorporating the ideas of MDG and HDI, is being proposed to evaluate actual post-disaster reconstruction processes. This evaluation method may be utilized to assess a plan for safer new development as well as an evaluation of reconstruction. UNCRD, ADRC, IRP, DRI and some Kobe-based CBO will also prepare a comprehensive data on reconstruction processes of the Great Hanshin-Awaji Earthquake in English and present at the 2008 EAROPH conference in Awaji to introduce the efforts of stakeholders since 1995 up to now.

**Keywords:** evaluation criteria, MDG, Human Development Index (HDI), UNCRD, Kobe city recovery plan, The Great Hanshin-Awaji Earthquake, sustainable development, CBO

## 1. Introduction

On January 17, 1995 the Great Hanshin-Awaji Earthquake occurred. The earthquake came suddenly 5:46 AM very early in the morning. Old wooden houses got fired in downtown area. The Kobe City office was also damaged. Several photographs of the aftermath of that day are shown here. The right photograph shows Kobe City Hall building that was damaged. The building had 8 stories, however, the 6th floor collapsed. The 6th floor was occupied by the headquarter office of the water supply bureau. This matter provided a factor which became big hindrance with the recovery afterwards.



(left)

**Photo 1: Fires on  
17 January 1995  
(Kobe city)**

(right)

**Photo 2: Kobe  
City Hall (6<sup>th</sup>  
floor collapsed)**

In addition to the damages of buildings and houses, many infrastructures such as express ways, ports, railways and bridges and lifeline facilities including water supply, electricity and gases were also damaged. Because of the collapse of buildings along the streets, the roads were closed and heavy traffic congestion was seen in many places in Kobe city. The collapse of buildings hindered the rescue and emergency transportation activities. Some buildings even collapsed on the next day of the earthquake.



(left)  
**Photo 3: Collapsed Express way**

(right)  
**Photo 4: Railway in Kobe city (Hanshin Railway)**

Aftermath of the Great Hanshin-Awaji Earthquake was so large that fire-engine, ambulance cars were not of use because number of cars was insignificant if compared to the number of the victims. A researcher said that 80 - 90% of victims were rescued by neighboring people. Which means community or neighborhood will play an important role. As for the temporary housing of Kobe city, 32,346 units were constructed in a very short period (3-5 months). They were equipped with toilet, bathroom and small kitchen in each unit. Parks and school yards had turned to temporary housing village. However they were all closed by December 1999. They had been used for minimum two years and maximum four and a half years. People were moved to newly constructed houses and newly completed apartments.

**Table 1**

**Damages of Kobe Earthquake (Total, Hyogo and Kobe)**

Damages		Total (incl. Osaka)	Hyogo pref.	Kobe city
Human (person)	Dead	6,434	6,401	4,571
	Missing	3	3	2
	Injured	43,792	40,092	14,678
	Evacuees (peak)	320,000	316,678	236,899
Houses (building)	Totally collapsed (families)	111,123 (191,617)	104,906 (186,175)	67,421 ( - )
	Partially collapsed	144,274	137,289	55,145
Emergency Response (building)	Publicly Dismantled Houses	108,672 (Total 136,730)	87,289	61,392
	Temporary Houses	49,800	48,300	32,346

Source : 2008.1.1 (Kobe city) <http://www.city.kobe.jp/cityoffice/06/013/report/index-e.html>  
2006.5.19 (Total) [http://www.bousai.go.jp/1info/kyoukun/hanshin\\_awaji/earthquake/index.html](http://www.bousai.go.jp/1info/kyoukun/hanshin_awaji/earthquake/index.html)

## 2. Recovery Plan of Kobe City

### 2 - 1 Background of Recovery Plan

When the Committee for Kobe Recovery Planning was firstly held, most residential buildings were damaged. Even remaining buildings had lost their roof tiles and were covered with blue plastic sheets. Evacuation center was filled with evacuees, and means of transportation was blocked off. Committee members who attended the first meeting finally met together despite lack of transportation. Some used boats, and some came from Nishinomiya on foot.

There was a crucial need to formulate Kobe city Recovery Plan as soon as possible. Because it was quite important to present citizens with a vision for the recovery process as early as possible and moreover there was a need to meet the national budget appropriations deadline. (Essential to obtain financial support from the government since the damage was so extensive for the city to handle on its own financial background.) The deadline was the end of June 1995.

## 2 - 2 Process to form the Plan

The Kobe municipality was facing to obtain an accurate understanding of the situation. There were vast numbers and amounts of victims, collapsed buildings, and damaged urban infrastructures, and the chaos even at the formulation of the recovery plan. And the municipality also faced to gain an accurate understanding of the situation of the city. Since Kobe city had the population of 1.5 million, and various sectors suffered from damages, including urban infrastructure and lifelines, residential buildings, industry, and citizens' livelihood.

A two-stage recovery plan was formulated in Kobe city. The first stage included indication of a direction for recovery in a form of guidelines, and discussion was held with a limited number of experts in order that a high-level proposal was issued as quickly as possible. The second stage contained the following issues; a) based on the guidelines, details of the plan were discussed; b) discussion members were selected from a wider range of fields (100-member committee); and c) the plan selected a set of symbol projects which provided a framework of recovery.

## 2 - 3 Contents of the Recovery Plan

### 1) Concept and Goals

The damage wrought by the earthquake touched almost every aspect of the daily life. For this reason, in the process of recovery, the Community Recovery Plan must strive to build a) a city where people can live, work, and study in safety, b) a city that is bursting with creative energy, and c) a city that is individualistic and attractive. Therefore, Kobe city set the target in order to pursue these 3 themes while promoting close coordination among the city's residents, businesses, and the government.

Comprehensive Recovery Plan consisted of various aspects such as; reconstruction of urban infrastructures (roads, lifeline, railway etc.), reconstruction of residential buildings, urban area redevelopment programs, land relocation programs, industrial recovery, civic life recovery, and port recovery, and others.

The Recovery Plan Guideline included the following issues;

1. Provide primary to Kobe's recovery and regeneration as an advanced disaster prevention model city.
2. Set recovery goal year of 2005.
3. Set recovery goal of "safety, vitality, attraction, and cooperation," and develop measures for each goal.
4. Indicated a concept of safe city standards in order to set a guideline for disaster-proof communities.
5. Analyzed the structure of Kobe City, and proposed a distinct plan for each district.

### 2) Basic View Points and Themes

There were three **basic viewpoints** of recovery

1. Urban Conveniences Well-balanced with Safety precautions: The earthquake revealed the vulnerable points of a modern city when faced with a major natural disaster. In the recovery process, emphasis should be placed not only on restoring urban functions but also on maintaining a balance between functionality and comfortable living.
2. Awareness of both Benefits and Hazards of Nature: Although Kobe nestled between the mountains and the sea, it has also suffered from nature's occasional outbursts, the earthquake being the most recent example. Therefore, Kobe municipality should create a city that permits sustainable development by paying careful attention to the urban environment and fully recognizing nature's threats as well as its benefits.

3. **Human-to-human Contact and Interchange:** The city's residents overcame innumerable trials and tribulations by helping and encouraging each other after the earthquake. The support extended by an unexpectedly large number of volunteers was also deeply appreciated. Therefore, learning from this experience, Kobe municipality should encourage more interpersonal exchange.

**Basic themes** of recovery included the following 11 issues;

1. Return the local people's daily lives and the city's infrastructure back to normal as soon as possible to facilitate fuller-scale recovery work.
2. Make the best of the lessons learned from the recent earthquake in order to build a disaster-proof city.
3. Build a welfare society that ensures secure and comfortable lives for all who live in it.
4. Revitalize the Kobe culture characterized by diversity and open-mindedness.
5. Create a city that ensures environmentally-friendly, sustainable development.
6. Revive and rebuild a cosmopolitan city that leads the world in the 21st century.
7. Rebuild the Port of Kobe quickly so that it can function as a "Mother Port" in Asia.
8. Build a society where information networks play an important role.
9. Work together to create the communities in Kobe city.
10. Support volunteer activities and facilitate the network of cooperation among volunteer groups over broad area.
11. Hand down for posterity the lessons learned from the natural disasters that hit Kobe and contribute the know-how to global disaster prevention efforts.

### 3) Specific Goals and Objectives

3-1) **Specific goals** of the recovery plan were as follows;

**Recover "Citizens' Livelihood":** a) securing high-quality housing, b) developing a living environment compatible with the local area's character, c) upgrading health/medical care and welfare services, and d) preparing a good nurturing atmosphere for the children;

**Recover the "Vitality of the City":** a) revitalizing regional industry, b) recovery of Kobe port, and c) development of transportation networks;

**Recover the "Appeal of Kobe":** a) campaigns to advertise Kobe's recovery, b) promoting cultural activities and sports that provide recreation for citizens, c) a more international city, d) creating a more communication-oriented community, and e) creating an environmentally friendly city abundant in water and greenery; and

**Promote "Community Creation by Working Together":** a) kind and gentle communities through close cooperating among its people, b) creating a unique and attractive community, and c) promoting creative volunteer activities

3-2) **Creating a Safe City:** Important aspects in creating a safe city are as follows;

**Create an independent living zone:** Living areas are positioned in a multi structure from the daily life level to the ward level, aiming at creating living areas where the residents play an independent, active role in promoting safety while maintaining close ties with neighboring areas in the event of a disaster.

**Secure safety in case of disaster** while providing for normal daily life: Many things that are useful solely in the event of a disaster are useless in daily life while many things that are used in daily life may also prove useful during a disaster. Therefore Kobe municipality should aim to integrate daily life and emergency preparedness in such a way that Kobe city can take advantage of those things that afford comfort and convenience in daily life even during times of disaster.

**Divide up work tasks and foster close cooperation among citizens, businesses, and city government:** To create a city that is able to withstand disasters, Kobe needs to maintain close ties between the municipal government and the private sector, while clearly defining what role each party is to play.

### 3-3) Systems for Providing a Safe City

**Disaster-preventive Living Zone:** Kobe city will promote the building of a safe city of three living zones, according to the spheres of life.

**Disaster-preventive city infrastructure:** Kobe city will construct a disaster-resistant infrastructure and build a city that can exercise disaster-preventive operations over extensive areas.

**Disaster-preventive management:** Kobe city will be well prepared for disasters, and provide adequate systems that function appropriately in case of emergency.

## 4) Schedule

**Table 2: Kobe City Recovery Plan Formulation Process**

Jan. 17, 1995	Great Hanshin-Awaji Earthquake occurred	
Jan. 26, 1995	Earthquake Recovery Head Office established	
Feb. 7, 1995	First meeting of the Committee for Recovery Planning	
	Subcommittees	Urban Infrastructure Subcommittee Citizens' Affairs Subcommittee Safe City Standards Subcommittee
Mar. 27, 1995	Kobe City Recovery Plan Guidelines published	
April 22, 1995	First meeting of the Kobe Council for Recovery Planning (100 members)	
	Subcommittees	Citizens' Affairs Subcommittee Urban Revitalization Subcommittee Safe City Subcommittee
June 30, 1995	Recovery Plan formulated	

### Step to Formulate the Recovery Plan Guidelines

Specialized and high-level discussion (civil engineering, architecture, economics, medicine, social welfare, psychology, disaster prevention, environment, etc.) was held among 27 experts in subcommittees;

- 1) Urban Infrastructure Subcommittee (7 members) (Feb. 10-Mar. 7; 4 times): Urban structure, transportation network, urban foundation for disaster prevention, housing/living environment, industrial foundation, and urban landscape, etc.
- 2) Citizens' Affairs Subcommittee (7 members) (Feb. 9-Mar. 9; 4 times): Emergency response system, information network, extensive cooperation among cities, strengthening of lifelines, community, and volunteers, etc.
- 3) Safe City Standards Subcommittee (7 members) (Mar. 5 and March 14; 2 times): Structure of Recovery Plan Guideline, conception of safe city standard, details of safe city standard (disaster-proof living zone, disaster-proof urban foundation, and disaster prevention management)

## 5) Symbolic Projects

Symbolic projects are as follows (in total 17 projects);

1. Quality of life recovery plan.
2. Creating a safe and pleasant urban area.
3. Creating a welfare-minded city for the 21st century.
4. Safety network.
5. New eastern city center (HAT Kobe): Land readjustment project (120 ha).
6. Kobe entrepreneurial zone concept.
7. China & Asia exchange zone concept.
8. Creating a Mother Port in Asia for the 21st century.
9. Promoting Kobe's culture by making the best of its cosmopolitan and modern nature.
10. Creating transportation.

11. Implementing an infrastructure for studies on next-generation information & communications.
12. Forming regional disaster-preparedness bases.
13. Creating a city rich in water and greenery resources.
14. Creating a commemorative area within the city center.
15. Implementing disaster-resistant utility lines.
16. Recording the earthquake experience for posterity Inheritance of the “Disaster Culture”.
17. Promoting the concept of the Natural Disaster Science Museum and the 20th Century Museum Cluster.

### 3. Outline of the Recovery Programs

#### 3 - 1 Infrastructure and Urban recovery

Kobe Emergency Earthquake Reconstruction Ordinance (February 16, 1995) was established in order to carry out the emergency recovery provision of streets and houses and construction of a disaster-resistant and vibrant city and good quality housing.

District designation was implemented in case of the districts subject to city recovery measures (Disaster Recovery Promotion Districts): ca. in total 5,900 ha and districts (Priority Recovery Districts) subject to immediate comprehensive measures for the recovery of city functions, housing reconstruction and urban infrastructure renewal: in total 24 districts (1,225 ha). City planning project zones were also designated as land readjustment projects, urban renewal projects, etc.

Voluntary project schemes to support improvement and reconstruction of the residential environment were as follows;

#### Procedures for community development in view of seismic disaster recovery: “2-Stage City Planning” Method

##### 1st Stage of city planning:

Government defines regions and urban facilities to be improved

##### 2nd Stage of city planning:

- (1) Residents have talks and determine roads and parks necessary for improvement of the region by themselves.
- (2) Government draws up city planning and recovery project plan according to proposal submitted by residents

For moving to the second stage: community development with residents participation, the following issues are the key;

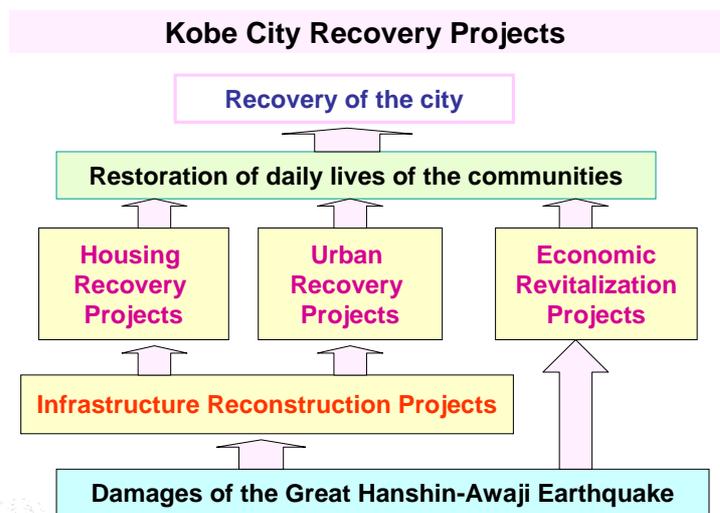
- a) Desire of victimized residents, b) Restoring community that ensures safe and comfortable living, c) Improving urban infrastructure (roads and parks), d) Constructing durable houses, e) Drawing up plan with residents, and f) Equal burdens on residents and landowners

As the consequences, community development in view of recovery is realized as below;

##### (1) Reconstructive **land readjustment projects** (5 districts, ca.143.2 hectares)

- 1) Integrated improvement of (a) roads, parks and other urban infrastructure, (b) essential services (water supply, sewage, gas, power, etc.) and (c) housing lots
- 2) District-wide comprehensive improvement is possible, instead of sporadic or linear direct acquisition of public facilities (road widening, etc.)

Fig. 1: Kobe city Recovery Plan



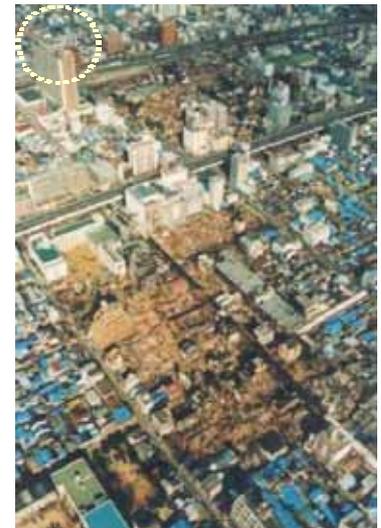
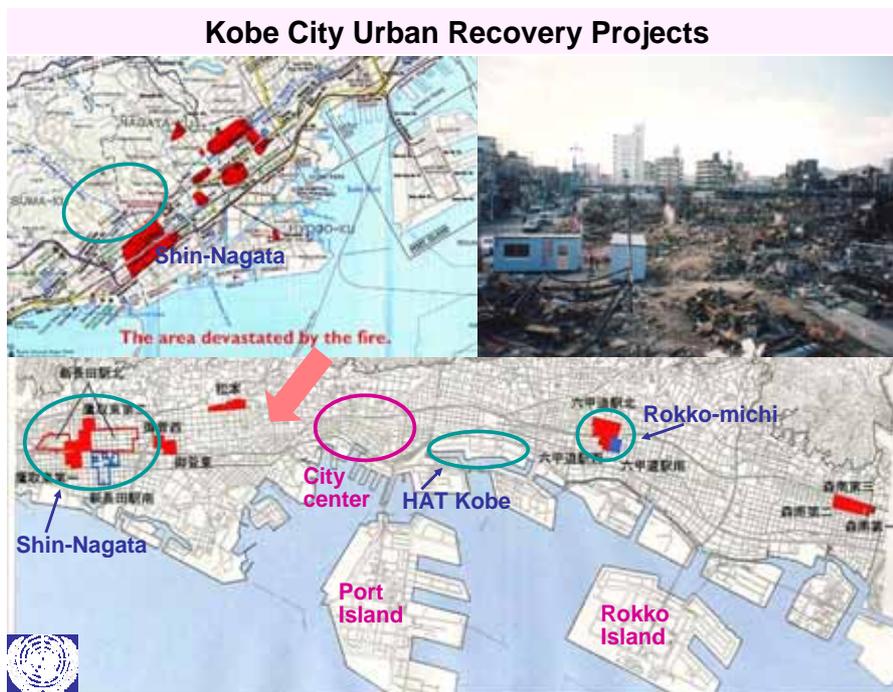
- 3) Flexible implementation including combination with other project schemes
- (2) Reconstructive **urban renewal projects** (2 districts, 26.96 hectares)
  - 1) City centers on the east and west (Rokko-michi district, Shin-Nagata district)
  - 2) Land use segmentation, ownership convergence
  - 3) Disaster evacuation spaces, disaster prevention bases
- (3) **“HAT Kobe”** (New Eastern City Center) (120 hectares)
 

Symbolic project of city recovery after the earthquake

Use of the former site of a large manufacturing plant

Fig. 2: Location of Urban Recovery Projects

Photo 5-6: Shin-Nagata



### 3 - 2 Housing recovery

#### 1. Kobe City Emergency Three-Year Plan for Housing Reconstruction (1995-1997)

Number of units planned: 82,000 (Empty house and starting construction are included 10,000, new construction 72,000 including 10,000 public rental housing)

#### 2. Kobe Housing Recovery Plan (1996-1997)

The elderly and low-income earners accounted for a large proportion of the disaster victims. The number of public housing units was increased to 16,000.

#### 3. Kobe City Three-Year Housing Plan (1998-2000)

The plan aims at smooth transition from temporary housing to permanent housing and provision of public housing and support for daily living for the disaster victims, and housing and urban development towards the coming 21st century. Cooperation with the welfare division, housing and urban development based on the regional characteristics and utilization of the resources of Kobe was established. Various methods for the rapid provision of housing including public houses constructed by Kobe City itself, purchased by Kobe City from the Urban Renaissance Agency (UR), and leased by Kobe City from the UR or private operators.

Housing should be suitable for tenants (disaster victim i.e. small households for the elderly or singles who made up

most of the disaster victims). Consideration for the elderly such as brier-free (elimination of differences in the levels of the floors, provision of handrails and emergency buttons), silver housing (municipal housing for the elderly), and collective housing that can create a community through communal living. For the purpose of stabilizing the living of low-income earners, the rent is to be reduced according to the amount of their income or other factors.



**Photo 7-8: Houses in HAT Kobe**

### **3 - 3 Economic recovery**

Industrial measures were taken such as; measures for SMEs (small and medium-size enterprises), measures for commercial promotion including provision of block grants, measures for tourism revival, measures for new industries' creation, measures for industrial location (Enterprise zones), measures for employment (community business/ social enterprises), and measures for agriculture and forestry.

For example, industrial location measure for recovery of the devastated area (Enterprise zones) was proposed as below;

- March 1995 Hyogo Revitalization Study Group (private)
- May 1995 Kobe Enterprise Zone Study Group (Kobe City)
- June 1995 Proposal of enterprise zone was included in the Recovery Plan of Kobe City and Hyogo Prefecture
- December 1995 Research on infrastructure for new industries (on establishment of an enterprise zone) (MITI): The national government of the time persisted in the policy, "one country, one system". Enterprise zones initially planned turned out difficult to establish. Hyogo Prefecture and Kobe City partially established enterprise zones.
- Jan. 1997 Kobe Enterprise Zone Ordinance (Kobe City), Industrial Recovery Ordinance (Hyogo Prefecture)
- Apr. 2002 Hyogo Industrial Accumulation Ordinance (Hyogo Prefecture)

### **3 - 4 Social recovery**

#### **1) Support for volunteers**

A volunteer center (Ward Volunteer Center) was established for each Ward Council of Social Welfare (WCSW) since 1995 to support volunteer activities. Subsidies for community volunteer activities were established. In 1996, the Hanshin-Awaji Earthquake Reconstruction Fund started to provide subsidies to volunteers who assisted the victims.

A computer network (Volunteer Information System) was formed in 1996 to connect the city volunteer centers of the City Council of Social Welfare and ward volunteer centers of the WCSW to reinforce coordination work. Volunteer

insurance was also created (February - March, 1995). Registered volunteers were covered by this insurance scheme.

## **2) Support for communities**

### **2-1) Construction of temporary housing**

- Temporary housing was constructed on reclaimed land and in new towns in the suburbs, based on the Disaster Relief Law. Housing for 29,178 households was constructed.

### **2-2) Establishment of the *Fureai* (Interaction) Center**

- *Fureai* (Interaction) centers were established at 236 places, supported by the central government. The purpose was to help form communities in the temporary housing areas and to use the centers as bases for volunteer activities.

### **2-3) Community Watching Over System**

- Advisors to support people's daily lives were appointed. They went around visiting the victims and held consultations with them.

## **4. Existing Evaluation of Recovery Programs**

### **4 - 1 Review and Examination in the 5th year from the earthquake**

**Purpose:** Analysis of the state of completion of each project and remaining issues as well as the study of effective measures taken over the previous five years

**Overview:** The urban infrastructure, such as the port and roads, had been recovered over two or three years. The material basis for the daily lives of the citizens had almost been recovered over the five years since the earthquake. For example, the construction of public housing had been completed to replace the temporary housing.

**Remaining issues and Challenges:** a) recovery of the daily lives of the citizens, b) economic recovery, and c) creation of safe housing and communities.

Drawing up a promotion program for the rehabilitation plan, development of policies based on communities and activities including a) development of policies based on people, b) development of comprehensive policies through partnerships, c) development of policies from a wide-area and medium- and long-term viewpoints, and d) promotion of improvements in the administration and finances.

### **4 - 2 Review and Examination in the 10th year from the earthquake**

Purposes of the review and examination are 1) Understanding the level of rehabilitation reached, analysis of the remaining issues, and reflecting these in the completion of the rehabilitation, 2) Passing on and further developing new efforts and systems created in the process of coping with the earthquake disaster for the future creation of Kobe, and 3) Passing on the experience and lessons obtained through the earthquake disaster and the rehabilitation process to the next generation and disseminating information on these both inside and outside Japan as the responsibility of the victims in order to utilize their experience to minimize damage in future disasters.

### **4 - 3 Lessons from the earthquake disaster**

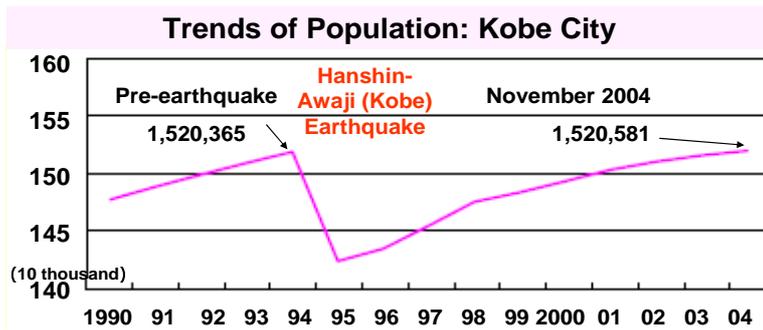
The concept of reduction of disasters needs to be added to the concept of the urban and regional development as below;

- 1) Earthquake disaster reminded the citizens of the severity of nature. Natural disasters inevitably occur at some time.
- 2) Communities protect the lives of their own. Taking preventive measures should begin in fields close to the citizens.
- 3) It is impossible to do in a devastated situation what the citizens do not do on a daily basis. It is necessary to develop community creation activities on a daily basis.
- 4) The meaning of rehabilitation has been changing as the time passes. In addition based on the concept of autonomy and partnership;
- 5) Cross-sectional and flexible rehabilitation is required,
- 6) Communities are created by the autonomous efforts of individuals,
- 7) Communities are developed through daily partnerships and participation, and
- 8) Rehabilitation is an attempt to form a new system.

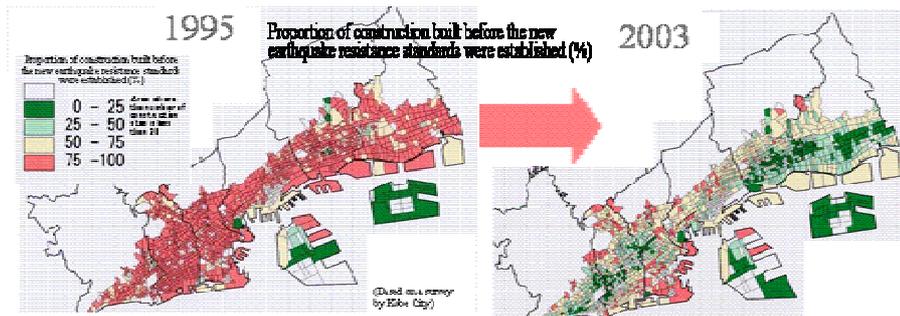
### 5. Proposal on Criteria for Recovery

Based on the studies on the recovery plan and the projects in Kobe city, UNCRD and other research bodies in Kobe such as ADRC, IRP and DRI will propose a set of criteria for recovery projects. It will be economic, social and physical criteria that can be adaptable to all over the world, similar to the MDG and HDI of the UN. Recovery of the population (Comparison between the population before the earthquake and the current population) might be the social criteria and GDP and/or land prices will be the economic indicators while the number of houses/buildings may represent physical aspect, as indicated below in case of the Kobe city recovery. Detailed study will be finalized in 2009.

**Fig. 3 Trends of Population**  
(as a criteria of social aspect)



**Fig. 4 Proportion of construction built before the new earthquake-resistance standards were established (%)**  
(Kobe city 1995-2003)  
(as a physical criteria)



### 6. Conclusion

Based on the recovery plan and projects in Kobe city in the aftermath of 1995 Great Hanshin-Awaji Earthquake, a comprehensive evaluation method with community based perspective and incorporating the ideas of MDG and HDI, is being proposed to evaluate actual post-disaster reconstruction processes. UNCRD proposes a set of economic, social and physical criteria to evaluate the recovery programs and projects that will be applicable to the world. The trends of population, land price and/or GDP, and number of housing starts may be the candidates of the criteria. This evaluation method may be utilized to assess a plan for safer new development as well as an evaluation of reconstruction.

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