# Seoul, Republic of Korea Disaster Risk Management Profile

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# 1 Introduction

#### Demographic, economic, social and cultural characteristics

The Republic of Korea, otherwise known as South Korea, is located on a mountainous peninsula extending from mainland China. The population of South Korea, as of July 2006, is 48,846,823.<sup>1</sup> A census conducted in 2000 revealed that 88.3 % of the national population of South Korea resides in cities. In comparison, in 1960 38 % of the population lived in South Korea's cities, which shows the population shift. This growth is from industrialization resulting in urbanization. Due to this rapid growth and to help lighten the housing issues for Seoul, in 1989 the government built five satellite cities: Ilsan, Bundang, Sanbon, Pyeongchon, and Jungdong. Modern day Seoul acts as a metropolitan center for more than 20 million people.<sup>2</sup>

In mythology Korea was founded in 2333 BC by the god-king Tangunwho, who embodies the "homogeneity and self-sufficiency" as valued by the Korean people. The Chosun Dynasty lasted from 1392 to 1910.<sup>3</sup> For more than 500 years Seoul held the residence of the royal family and its ancestral shrine of Jongmyo.

<sup>&</sup>lt;sup>1</sup> CIA World Fact Book. www.cia.gov/cia/

<sup>&</sup>lt;sup>2</sup> Government of Korea. www.korea.net/korea

<sup>&</sup>lt;sup>3</sup> Bureau of East Asia and Pacific Affairs, U.S. Department of State, April 2006. www.state.gov

For over half a century South Korea faced a difficult time of foreign rule, wars, and unstable leadership. After much hardship South Korea evolved into a democratic state. In 1987 a former general was elected president. In 1992 a pro-democracy activist was elected, Kim Young-sam. In 1997 another democracy and human rights activist, Kim Dae-jung, was elected. Once again in 2002, Roh Moo-hyun, a self educated-human rights lawyer, won with the intentions of creating a "participatory government."<sup>4</sup>

#### Governance style

The Government of South Korea has an executive, legislative, and judicial branch. A president is elected for a single five-year term by popular vote through secret ballot and the elected candidate acts as chief of state. The Prime Minister acts as head of government. Administration divisions represent the nine provinces.<sup>5</sup>

The power and duties of the President are defined in the following six areas:

- "The President, as head of state, symbolizes and represents the whole nation in both the governmental system and foreign relations. Upon inauguration, he is to take the oath of his duties to safeguard the independence, territorial integrity, and continuity of the state, as well as to protect the Constitution."
- As chief executive, "enforces all laws passed by the legislature and issues orders and decrees for the enforcement of these laws. He is authorized to appoint public officials, including the Prime Minister and heads of executive agencies."
- As commander-in-chief of the armed forces "has extensive authority over military policy, including the power to declare war."
- As chief policy maker and chief lawmaker, the president "may propose legislative bills to the National Assembly or express his views to the legislature in person or in writing. The President cannot dissolve the National Assembly; rather, it is the National Assembly that may hold the President accountable under the Constitution by means of the impeachment process."
- "The President has extensive emergency powers. In case of internal turmoil, external menace, natural disaster, or severe financial or economic crisis, the President can take emergency financial and economic actions or issue orders that have effect of law. The President can exercise these powers only when there is insufficient time to convene the National Assembly, and the actions or orders are absolutely essential to maintaining national security or public order."
- "The President is also empowered to declare a state of martial law in accordance with the provisions of the law in time of war, armed rebellion, or similar national

<sup>&</sup>lt;sup>4</sup> Bureau of East Asia and Pacific Affairs, U.S. Department of State, April 2006. www.state.gov

<sup>&</sup>lt;sup>5</sup> CIA World Factbook. www.cia.gov/cia/

emergency. The exercise of such emergency power is, however, subject to subsequent approval of the National Assembly."<sup>6</sup>



Figure 1. Government structure for the Republic of Korea.<sup>7</sup>

#### National hazardscape

South Korea experiences typhoons, floods, droughts, landslides, snowstorms, tsunami, and earthquakes. Natural disasters result in damages adding up to an annual amount of USD 700 million, which was determined from a statistical study by Ministry of Government Administration and Home Affairs (MOGAHA). Also, these natural

<sup>&</sup>lt;sup>6</sup> Government of Korea. www.korea.net/korea

<sup>&</sup>lt;sup>7</sup> Government of Korea. www.korea.net/korea

disasters result in a yearly average of 160,600 acres (64,992 hectares) of flooded land and 165 deaths.



Figure 2. Relief Map of the Korean Peninsula and the location and Magnitude of Earthquake epicenters from 1978-2000.<sup>15</sup>

The most frequent and destructive natural hazards are heavy rainfalls and typhoons. Two thirds of these natural disasters occur between June and September each year. Summer brings monsoon season heavy rainfall averaging 383 millimeters (about 24 inches), which causes flooding and landslides due to South Korea's mountainous landscape. In July and August typhoons originating in the east Philippines travel towards the peninsula. Heavy rainfall takes place between June and August, which leads to flooding. The Korean government has been in the process of improving the meteorological observation systems. This would give authorities the ability to warn the residents at risk and initiate evacuations if necessary.<sup>8</sup>

Korea is also susceptible to earthquakes to a lesser extent. Although Korea is located in the interior of the Eurasian plate and not along a tectonic boundary, Korean

human history has recorded earthquakes and tsunami. In 779 AD the Gyeongju earthquake destroyed homes and killed at least 100 people. In 7 October 1978, the Hongseong earthquake, which had a Magnitude 5.0, did not cause any loss of life, but damaged 1,120 buildings.<sup>9</sup> Southwest Korea experiences low-level seismic activity.<sup>10</sup> The west half of the Korean Peninsula has shown stronger seismicity than the eastern half. The faults responsible for these earthquakes can be seen in map view by observing river courses and the trend direction of mountain ranges.<sup>11</sup>

Tsunami are of concern due to Korea's close vicinity to Japan, where earthquakes occur frequently, and because Korea is located on a peninsula, which is surrounded on

<sup>&</sup>lt;sup>8</sup> Industry Canada. strategis.ic.gc.ca

<sup>&</sup>lt;sup>9</sup> K. Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, 2002, The Third International Workshop on Earthquakes and Megacities, "Reducing Vulnerability-Increasing Sustainability of the World's Megacities."

<sup>&</sup>lt;sup>10</sup> Industry Canada. strategis.ic.gc.ca

<sup>&</sup>lt;sup>11</sup> Government of Korea. www.korea.net/korea

three sides by water. The eastern coast of Korea has been hit by two recently documented tsunami in 1983 and 1993.<sup>12</sup>

#### National disaster management structure and relevant legislation

The National Emergency Management Agency (NEMA), which is under the Ministry of Government Administration and Home Affairs (MOGAHA), are in charge of all natural disasters and is composed of four Bureaus (Planning and Management Bureau, Mitigation and Planning Bureau, Response and Management Bureau, and Recovery and Support Bureau). While NEMA takes care of the "practical affairs for a regular period," when a disaster happens, The Central Disaster and Safety Countermeasures Headquarters (CDSCH) has the task "of prevention and status control of natural disasters, as well as recovery planning, and executing the necessary measures related to such disasters."<sup>13</sup>

In the late 1990's, the Korean government began disaster management improvement dealing with response to natural and man-made disasters, and improving related programs such as its' disaster management information systems and flood insurance programs. This is head by the National Disaster Prevention and Countermeasures Headquarters (NDPCH) and is under the Ministry of Government Administration and Home Affairs (MOGAHA), which manages and operates the Central Civil Defense Council and the Disaster Countermeasures Committee. Twenty-one central government agencies and 16 regional governments are also involved with disaster management and prevention sectors.<sup>14</sup>

The central and regional governments have emplaced long-term land use planning techniques to promote flood mitigation practices. The goal is to establish a nationwide disaster preparedness plan and disaster recovery procedures for its citizens and the The government of South Korea is developing a national flood infrastructure. insurance program due to the increasing amount of property damage caused by floods.

Korea's disaster management and prevention plans are implemented by each ministry and regional government, and the government-invested organizations, such as the Korea Water Resources Corporation, Korea Highway Corporation, Korea Environmental Management Corporation, and Korea Electric Power Corporation. The Korea Water Resources Corporation (KOWACO), which is under the jurisdiction of the Ministry of Construction and Transportation, focuses on effective utilization of the existing water resource facilities, the construction of new dams, expansion of water supply facilities, and the improvement of embankment works to prevent flood damage based on the long-term water resources plan (2001-2020) and the long-term dam construction plan

<sup>&</sup>lt;sup>12</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance:

Adaptation of Seoul Earthquake Management System after the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea.

<sup>&</sup>lt;sup>13</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR. <sup>14</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World

Conference on Disaster Reduction, UN-ISDR.

(2001-2011). The three main goals of the Korean government's five-year disaster management and prevention plan are to:

1. "Establish a comprehensive response system against natural disasters, focusing on preventive countermeasures;"

2. "Establish a disaster prevention information system and science-based disaster prevention strategies and policies;"

3. "Promote international cooperation and prepare for the unification of Korea."

The Korean government has long-term disaster preparedness plans and the following projects have the most potential in the Korean disaster prevention-mitigation sector:

- <u>National Safety Management Information System</u>: "This involves an emergency communication network linking the central government, 24 government-affiliated organizations, and 16 regional governments. Since 1996, MOGAHA has implemented of the National Safety Management Information System, which is part of it's' disaster prevention and mitigation projects. The purpose of this project is to integrate each ministry's safety management operations with the 16 regional governments to establish a scientific and systematic national disaster management system. This will be communicated via wireless and satellite network, utilize GPS (Global Positioning System), GIS (Geospatial Information System), GMS (Geostationary Meteorological Satellite), GEOS (Geostationary Operational Environmental Satellite), and other advanced systems. The result will be forecasting and analyzing applications, wireless vehicle management, satellite and radio telecommunications, and expansion of information system links between the government's disaster-related organizations and communities."
- 2. <u>Flood Insurance Program</u>: "The national flood insurance program produces flood insurance map production and flood plane management. The new national flood insurance program will enable the government to provide flood insurance to regional entities across the nation. The Korean government will develop a community rating system to encourage regional entities to adopt floatplane management standards set by a national flood insurance program."
- 3. <u>Countermeasures to Mitigate Natural Disasters</u>: "Methodology is applied to estimate disaster damage, techniques for slope failure mitigation, a rainfall runoff reduction system, and disaster mitigation concepts for land use and development planning."<sup>15</sup>

The government of South Korea provides for displaced citizens after a disaster as well as the recovery cost for damaged homes and land used for agriculture. They have identified 537 sites in South Korea that are at risk of typhoons and floods, and have

<sup>&</sup>lt;sup>15</sup> Industry Canada. strategis.ic.gc.ca

labeled these areas as "Disaster Prone Areas." These structures were invested in between 1998 and 2004 for improvements.<sup>16</sup>

On the national government level, earthquake management is addressed by the Disaster Prevention and Preparedness Bureau (DPPB) in the Ministry of Home Affairs. In May 1999, the DPPB merged with the Civil Defense and Disaster Management Bureau to become the Civil Defense and Disaster Prevention Bureau (CDDMB). This was the result of government structural changes of the national government organizations. In the CDDPB, only 38 staff members manage the natural disasters. They are working in three key divisions: the Disaster Planning Division, the Disaster Preparedness Division, and the Rehabilitation Division<sup>17</sup>.

The MOGAHA (Ministry of Government Administration and Home Affairs), in May 1995, began the National Disaster Management System (NDMS) project as under the Cyber Korea 21st Century and the National Administration Reform 100 Projects. "The project includes the interconnection of safety management operations distributed among management agencies, 24 affiliated organizations, and local autonomies, to link the safety management systems. The objectives of the project are to protect the lives and property of citizens and to improve the living quality of the people by preventing disasters threatening the safety of the people and nation. This can be accomplished by quick response and recovery of damaged area by disasters and implementing a scientific and systematic national disaster management information system." <sup>18</sup>

In phase one of a two phase project, ~\$43.3 million was allotted for the central and local governments, as well as \$24.5 million for emergency rescue-related. This includes telecommunications technology for wireless networks, which was chosen due to the possible failure of a wire network in a natural disaster, on-site disaster management system which applies the C4I (Command, Control, Communication, Computer Integration) concept, data mining using disaster cases and statistics data bases, on-site analysis using GIS/GPS information, and various disaster detection sensor applications. The Pilot System was tested from 1995 to 1997 to see if the disaster-related operations could be digitalized using this technology. In 1998 the information system became the responsibility of three bureaus (civil defense and disaster prevention bureau, provincial local autonomies, and basic local autonomies) and 24 related agencies'. Also, international analysis on the disaster prevention systems was undertaken. In 2003, 3,364 applications for disaster prevention, preparedness, response, and recovery was developed and completed.

The second phase, which is 2004-2008, links the system in the related agencies and 24 affiliated organizations. "The database will be designed so that even if the communication network is cut off, systems in city/county/district can still operate, and

<sup>&</sup>lt;sup>16</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

<sup>&</sup>lt;sup>17</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea.

 <sup>&</sup>lt;sup>18</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

has adopted the automatic replication function to maintain the data consistency even after network restoration. The facility information system is being designed to use the approval and authentication system of the Ministry of Construction and Transportation, traffic information on the national roads and highway, local autonomies construction records and information on dangerous facilities for co-use of information related to safety management."<sup>19</sup>

#### National land use management system and relevant legislation

Land use planning, as well as water resources, is managed by the Ministry of Construction and Transportation.<sup>20</sup> Under the Republic of Korea's Constitution, Article 35 (Environment, Housing):

(1) "All citizens have the right to a healthy and pleasant environment. The State and all citizens shall endeavor to protect the environment."

(2) "The substance of the environmental right is determined by law."

(3) "The State endeavors to ensure comfortable housing for all citizens through housing development policies and the like."<sup>21</sup>

In South Korea, "planning activities are performed on three scales: the national, the local, and the individual building," and acts as a "centralized and top-down plan." Plans are restricted to the national level by Land Use Management Law, the City Planning Law for urban areas, and the Building Law for individual buildings. The City Planning Law requires limitations regarding zoning, building plans, and implementation plans. Also, "a District Unit Plan is used for comprehensive and systematic improvements to buildings and infrastructure in specially designated districts." The central government reviews and awards approval to local plans.

In regards to natural disaster preparedness and reducing loss of life, property damage, and monetary loss, the Korean government has implemented a construction monitoring system. Several government officials monitor large scale construction sites and ensure that Disaster Preparedness Plans are in place and maintained. On an annual basis, before the rainy season, plans are implemented for repairing disaster prevention facilities, which includes retaining walls, embankments, and reservoirs. This also includes inspection and repairs for the facilities to be completed.<sup>23</sup>

<sup>&</sup>lt;sup>19</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

<sup>&</sup>lt;sup>20</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

<sup>&</sup>lt;sup>21</sup> Constitution of South Korea.

<sup>&</sup>lt;sup>22</sup> Da-Mi Maeng and Zorica Nedovic-Budic, (2004), Chicago and Seoul: A Comparative Study of the Impact of Information and Communications Technologies on Urban Land Use and Regulation, Journal of Urban Technology, Volume 11, Number 2, pages 61–92.

<sup>&</sup>lt;sup>23</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

### Significance of the city to the nation

Seoul, the capital of South Korea, is the political, economic, industrial, and cultural center of the nation. The city of Seoul is has the same status as a province. Seoul was separated from Gyeonggi Province in 1946, and officially became the capital of the Republic of Korea on 15 August 1948.<sup>24</sup> In 15 years (1970-1985) Seoul's population grew to over 4 million.<sup>25</sup> Currently, 21 million people live in Seoul and its surrounding five satellite cities of Ilsan, Bundang, Sanbon, Pyeongchon, and Jungdong. This is 47 % of the nation's total population. The metropolitan area around Seoul houses 84 % of government bodies and institutions, 88 % of Korea's 30 largest companies, and 65 % of the 20 most popular universities in the nation. Unfortunately, due to the population concentration of Seoul several urban problems have developed, including housing, transportation, and environmental degradation.<sup>26</sup>

### Geographical setting of the City

Seoul has a total area of 605.52 square kilometers, which is bisected by the Hangang River. This divides the city of Seoul into two parts: the northern part of Gangbuk and southern part known as Gangnam. The Gangbuk area totals 297.97 square kilometers, while Gangnam is 307.55 square kilometers. Within the city are four mountains; Mt. Bukaksan to the north, Mt. Naksan to the east, Mt. Inwangsan to the west, and Mt. Namsan to the south.

City expansion has been halted since the last administrative reorganization in 1973. Since the 1970's, satellite cities began growing rapidly around the capital area and are the homes of the citizens of Seoul.<sup>27</sup>

# 2 Inter-City LinkagesInternal division of the City

Seoul has a three-tier administrative system: 'si (city),' 'gu (district),' and 'dong (village).' Seoul is divided into 25 self-governing "Gu" districts, who execute both administrative functions and those delegated by the city by a local administration. Each 'gu' is composed of bureaus, offices, and divisions, and operates a community medical center under one mayor and vice-mayor. The mayors of a 'gu' have been elected by the citizens since June 1995. Each 'gu' has a number of 'dong,' which provides services related to the residents' daily life. There are a total of 522 administrative sub-units of "Dong."<sup>28</sup>



<sup>&</sup>lt;sup>24</sup> Government of Korea. www.korea.net/korea

<sup>&</sup>lt;sup>25</sup> Columbia University Press. www.columbiagazetteer.org

<sup>&</sup>lt;sup>26</sup> Government of Korea. www.korea.net/korea

<sup>&</sup>lt;sup>27</sup> City of Seoul. <u>e-seoul.go.kr/</u>

<sup>&</sup>lt;sup>28</sup> City of Seoul. <u>e-seoul.go.kr/</u>

#### Governance/management style

The administrative organization of the City of Seoul is divided into the Seoul Metropolitan Government, which acts as the executive branch, and the Seoul Metropolitan Council, which acts as the legislative body. The Seoul Metropolitan Council has 104 members serving a four-year term in office and represents about 10.3 million citizens. The Council is led by one chairman and two vice chairmen. It consists of Standing Committees, Special Committees, and a Secretariat.

The Seoul Metropolitan Government has one mayor, three vice mayors, and four policy advisors, who are experts in the fields of women-rights, welfare, environment, and urban management. In the city government there is one office, 19 bureaus, 63 divisions, and 45 affiliate offices. There are also three project offices, which are Waterworks, Infrastructure Management, and Subway Construction, and six citysupported public work corporations (Seoul Metropolitan Subway Corporation, Seoul Metropolitan Installation Management Corporation, Gangnam Hospital, Seoul Agricultural and Marine Products Wholesale Market Management Corporation, Seoul Metropolitan Development Corporation, and Seoul Metropolitan Rapid Transit There are 29 organizations under the direct control of the Seoul Corporation). Metropolitan Government: University of Seoul, Seoul City Official Training Institute, Research Institute of Public Health and Environment, Seoul Emergency Operations Center, Fire Academy, Cheongwadae Fire Brigade, Fire Aviation Corps, and 21 fire stations.29



Figure 3. Seoul city government infrastructure.<sup>30</sup>

<sup>&</sup>lt;sup>29</sup> City of Seoul. <u>e-seoul.go.kr/</u>

<sup>&</sup>lt;sup>30</sup> City of Seoul. <u>e-seoul.go.kr/</u>

#### Formal arrangements

The Seoul Metropolitan Council is composed of the Safety Management Bureau, Facilities Management Bureau, and Cheonggyecheon (stream) Restoration Engineering Works Bureau. The 2001 Seoul Comprehensive Earthquake Response Plan contains an action plan involving the Seoul Red Cross, which incorporates a public-private partnership for its local earthquake management plan. However, there is no networking among various types of voluntary organizations other than the Red Cross.

After the 1995 Kobe earthquake, an earthquake governance system was established to initiate public policies focused on prompt, efficient, and effective management of unexpected earthquakes. This national level policy is also enacted on the city level. These earthquake management policy initiatives can be grouped according to the four management phases:

- a. "Pre-disaster mitigation/ prevention: Policy Initiatives taken to alleviate the impact of or prevent a disastrous event. Examples include land use management, building codes, disaster insurance, risk mapping, safety codes, and tax incentives and disincentives."
- b. "Pre-disaster preparedness: Measures adopted in advance of a disaster to aid in its management. Examples are emergency operations plan, warning system, emergency operating center, emergency communication, emergency public information, mutual aid agreement, resources management plan, training and exercise."
- c. "Disaster response: Activities that occur during and immediately after a disaster strikes. Examples are emergency system activation, search and rescue operations, and the provision of food, shelter, and clothing."
- d. "Post-disaster recovery: The long-term reconstruction of a community affected by disasters. This stage can last up to 10 years. Examples are debris clearance and contamination control."<sup>31</sup>

#### Relevant legislation/regulations

The national level of laws is applied to the city level of Seoul. Laws related with natural disasters include the Natural Disaster Countermeasures Act, Disaster Relief Act, etc. The Natural Disaster Countermeasures Act, 1995, includes methods for disaster reduction and reaction of natural disasters, as well as rehabilitation costs among many others. The Disaster Relief Act, 1962, provides relief for natural disaster victims. On 1 June 2004 the Disaster and Safety Management Basic Law enacted disaster management organizations and established a Central Safety Management Committee,

<sup>&</sup>lt;sup>31</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea

which has the job of implementing a rapid information system and improving disaster research.<sup>32</sup>

In Korea, earthquake-resistant design standards for buildings in specific areas have been included into building codes and laws in the following years: nuclear power plants in 1960, hydroelectric and thermoelectric power plants in 1960, multipurpose dams in 1979, water reservoirs in 1982, and tunnels in 1985. The 1978 Hongseong earthquake initiated the development of earthquake-resistant design regulations in general buildings in 1988. The Ministry of Construction set up standards in the Building Code Enforcement Ordinance and in Building Structure Standards, requiring all buildings to be designed to withstand an earthquake of magnitude 7. Buildings over six stories are required to use the earthquake-resistant design. This also applies to general hospitals, theaters, and marketing facilities. Earthquake-resistant designs require thicker walls, more steel reinforcement, and deeper base foundations. The construction cost for earthquake-resistant structures is estimated to be 10-30% greater than standard construction costs.<sup>33</sup>

# 3 Land Use Management

### Relevant legislation

The national level applies to the city level, where the Land Use Law is used to determine how land is utilized. In Seoul there are many regulations and orders following the national law.<sup>34</sup>

#### Responsible agents and their relationship

To be completed

#### Effectiveness of current arrangements

The rapid urbanization of Seoul resulted in many urban dilemmas including lack of housing. In the history of Seoul, migrants from rural areas formed squatter settlements in city areas. During the 1960's and 1970's in Korea one third of the population lived in these squatter settlements. Since then squatter settlements have been demolished over time by urban renewal.<sup>35</sup> Until the 1980's there was no middle class, and with this uprising middle class society has become democratized since 1987 when citizens'

 <sup>&</sup>lt;sup>32</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.
<sup>33</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance:

<sup>&</sup>lt;sup>33</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea

<sup>&</sup>lt;sup>34</sup> Ha, Kyoo-Man, Ph.D., personal comment, June 2006.

<sup>&</sup>lt;sup>35</sup> Jong Youl Lee, The Practice of Urban Renewal in Seoul, Korea: Mode, Governance, and Sustainability, The 2nd International Critical Geography Conference, August 9-13, 2000, Taegu, Korea.

power changed the political system. Citizens now play a role in the communities and organize groups to deal with such issues as the environment, education, consumer rights, economy justice, transportation, reunification, and urban poverty.<sup>36</sup>

Urban development is dictated by the urban renewal law created by the Seoul government. This policy allows the current mayor to determine and enact new policies. This includes local government's leadership, local development agencies, land developers and speculators, future middle class tenants of new housing, and the squatters. The Seoul development agencies determine the location and plan policies, which are to remove and relocated slums, as to beatify the city. The residents in these slum locations play an active role with the construction firm and community.<sup>37</sup>

# 4 Vulnerability Issues

Seoul is vulnerable to typhoons, not the storm itself, but from the intense rain and flooding. Although Seoul is not located along a major tectonic boundary, it is susceptible to earthquakes.

#### At-risk groups

Seoul has different localities of the urban poor, such as Bongcheon-dong in Gwanak-gu, which is a poor town. They are currently in the process of redevelopment by the government. In Guryongtown in Gangnam-gu the residents are living in green houses because they do not have a home or apartment to live in.<sup>38</sup>

#### At-risk locations

With the example of the Kobe 1995 earthquake, the Seoul Metropolitan Government has been focusing on developing earthquake plans; pre-disaster management, fast relief, and recovery plans. The city of Seoul has many high-rise buildings over 30 stories that are home to over 10,000 residences. These building are connected to underground infrastructures such as subways. If an earthquake were to occur the tall buildings and underground transportation would be at risk of great damage and loss of life. The underground system would be difficult to access.<sup>39</sup>

<sup>&</sup>lt;sup>36</sup> Hyunsoo Park, Environmentally Friendly Land Use Planning, Property Rights, and Public Participation in South Korea: A Case Study of Greenbelt Policy Reform. Master of Urban and Regional Planning, Virginia Polytechnic Institute and State University, May 2001.

<sup>&</sup>lt;sup>37</sup> Jong Youl Lee, The Practice of Urban Renewal in Seoul, Korea: Mode, Governance, and Sustainability, The 2nd International Critical Geography Conference, August 9-13, 2000, Taegu, Korea.

<sup>&</sup>lt;sup>38</sup> Ha, Kyoo-Man, Ph.D., personal comment, June 2006.

<sup>&</sup>lt;sup>39</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance:

Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea

#### Non-engineered dwellings

Most buildings constructed after 1988 have an earthquake-resistant design, however they may not have been built soundly. High-rise buildings constructed before 1988 can be assumed to have no earthquake-resistant design.<sup>40</sup> A high magnitude seismic event would damage the above listed buildings.

#### City policies on vulnerability alleviation

According to the 2001 annual Comprehensive Earthquake Prevention Plan of Seoul Metropolitan Government, every existing building of any type is required to be examined. The building's condition is tested against seismic activity based on earthquake-resistant design standards from 1999 to 2005. The buildings are to be reinforced by an annual management plan from 2001.<sup>41</sup>

The rapid population growth in urban areas led to a housing shortage and increasing land prices in cities. In order to solve the housing shortage problem the government has taken the initiative to address housing costs by increasing the supply of land available for residential construction and building small housing units. The government enacted for the years of 1988 to 1992 the "Two Million Housing Units Construction Plan" to stabilize housing prices. The government has supplied an average of 500,000 to 600,000 housing units per year from 1993 to 1997. <sup>42</sup>

#### **Disaster Risk Management Arrangements** 5

#### Functional arrangements

Within the Seoul Metropolitan Government, the lead agency for earthquake disaster mitigation is the Disaster Prevention and Planning Division within the Fire and Disaster Management Bureau. They are also in charge of preventing and managing man-made disasters. Their responsibilities include mobilizing, training, providing available resources, and reserving materials in case of disasters. The number of staff of the division is only 35, and only one staff member is exclusively working for earthquake disaster management.<sup>43</sup>

The Seoul Metropolitan Government provided research funds and facility to the Earthquake and Disaster Prevention Research Institute, established at the City University of Seoul in 2001. This Institute has been conducting research projects on

<sup>&</sup>lt;sup>40</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea

<sup>&</sup>lt;sup>41</sup> City of Seoul. <u>e-seoul.go.kr/</u>

<sup>&</sup>lt;sup>42</sup> City of Seoul. <u>e-seoul.go.kr/</u>

<sup>&</sup>lt;sup>43</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea

disaster countermeasures and programs, focusing on the local circumstances of Seoul. Before 1995, there were no seismic research centers funded and managed by the government except for the KIGAM (Korea Institute of Geo-science And Mineral Resources) and small laboratories run by Universities. After the 1995 Kobe earthquake, it was agreed that a professional research institute was needed. In 1997, the central government established the National Institute for Disaster Prevention (NIPD), which has three research groups. One of research groups, the Earthquake, Coastal, and Structural Disaster Prevention Team, which is composed of highly competent five researchers, has been actively conducting research projects related to earthquake prevention and mitigation measures.<sup>44</sup>

#### **Risk Assessment**

The Urban Safety and Security Research Institute were founded in 2000, and was improved from the Disaster Prevention Engineering Center that had been operating since 1996. Research areas range from urban fire to disaster prevention, which includes research on ground and earthquake resistance techniques. The institute is also responsible for establishing a "risk-based emergency management program of disaster phases, emergency systems for various urban disasters, and applying a disaster information database". Research and activities include:

- "Research in metropolitan fire prevention systems."
- "Management and maintenance of Fire Prevention Information System BPR/ISP."
- "Evaluation of disaster prevention capabilities for architectural structures and complexes."
- "Research in urban risk management policies, earthquake resistance technologies, disaster prevention systems, emergency action systems, and fire investigation qualifications."
- "Urban disaster prevention training and development of training techniques."
- "Development of disaster information system, emergency simulation programs, and community training programs."

The Institute of Urban Sciences conducts research projects that deal with metropolitan issues such as urban planning, natural disasters, environmental degradation, and traffic. It is composed of the Institute of Metropolitan Studies, Center for Environmental Engineering, Center for Environmental Design, Center for Design of Street Facilities, Center for GIS Research, Center for Transportation Research, and Center for Global Urban Research. Their research and activities includes:

• "Urban and environmental policy research for public and private sectors."

<sup>&</sup>lt;sup>44</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea.

- Management and research related to GIS and data collection and analysis related to the urban sciences."
- Domestic and international conferences and publication of scientific papers."
- Educational cooperation with the College of Urban Sciences and related graduate schools including post-doctoral training and short-term training workshops."
- Exchange and cooperation with local and international urban research centers."
- Monitoring and analysis of environmental pollutants including dioxin and other micro elements."
- Evaluation of Food Waste Disposal Technical Center."
- Development of new environmental technologies and recycling methods."<sup>45</sup>

#### **Risk Communication**

In Seoul every official has internet accessible cellular phones for effective on the spot communication. However, during emergencies this method is not always effective.<sup>46</sup> Throughout South Korea automatic voice warning facilities, which provide disaster status to the citizens by phone and town speakers, have been installed in 232 municipals with an investment of \$8.6 million.<sup>47</sup>

The Korean government is active in creating various disaster prevention plans. One, the Basic Disaster Prevention plan is a long-term plan that is formulated every five years and includes disaster prevention systems and countermeasures. In 2002, the sixth basic disaster prevention plan was implemented. Disaster prevention training and education programs are provided to working-level government employees in charge of disaster prevention in each province, city, county, and district from February to April of each year. From "March to the end of May designated as the period of preparedness against possible disasters, disaster prevention facilities are inspected and repaired at the level of each administrative unit including province, city, county and district in a precautionary measure against disasters." This includes mapping and computerized exercises, training based on regional characteristics, and civil defense drills based on a hypothetical massive natural disaster.

#### <u>Funds</u>

"Annual regular budget for NEMA is about \$190 million. The central budget is about \$55 million and local supportive budget is about \$135 million. In addition to this, emergency funds, i.e., disaster recovery budget, are about \$880 million per year."

<sup>&</sup>lt;sup>45</sup> Urban Safety and Security Research Institute, The University of Seoul, July 2006. www.uos.ac.kr/ceng/eresins

<sup>&</sup>lt;sup>46</sup> Ha, Kyoo-Man, Ph.D., personal comment, June 2006.

 <sup>&</sup>lt;sup>47</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.
<sup>48</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World

<sup>&</sup>lt;sup>48</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

Materials, relief resources, medicine, equipment, and shelter are readily available in the case of an emergency. The quantity of flood response materials is based on the Epidemics Management Project Regulation by the Korea Center for Disease Control and Prevention (KCDC). This includes sandbags, water mat, plastic bags, vinyl covers, sewage pipe, tools, and etc. Emergency equipment such as cranes, excavators, dump trucks, loaders, tow trucks, and garbage trucks are designated for emergency situations. Shelters are also designated in schools, churches, public buildings, etc. For research and development in disaster risk mitigation area \$50 million was invested in six projects such as establishment for the National Disaster Management System, operation of Earthquake Research Center, and modernization of meteorological observation.<sup>49</sup>

# 6 Disaster Risk Management Vision

The Rapid Response plan, which was adopted by Seoul in 2001, is for fast and effective post-earthquake assistance. The response plan has been improved by many trial and error exercises in advanced earthquake management countries such as the U.S., Japan, and Taiwan. The rapid response system consists of an accelerometer network, a real-time observation network, an earthquake damage scenario database, and a response scenario database. Other tasks include building a network of seismographs in the government and public at a low cost. The city of Seoul utilizes the data from seismographs operated by KMA and other institutions. However, the Seoul Metropolitan Government needs to make future improvements on adequate hardware, software, and networking devices. The Seoul Metropolitan Government plans to make more detailed seismic disaster mapping by the year 2010.<sup>50</sup>

On the national level, which would also affect Seoul, recent programs use GIS technology for hazard mapping, assessment of landslide monitoring and warning system, and analysis of landslide susceptibility. As of now the Korea Water Resources Corporation of Gangneung City in Gangwon Province has landslide hazard mapping and flood hazard mapping and is currently developing new methods. The same techniques will be applied to other areas in the future.<sup>51</sup>

<sup>&</sup>lt;sup>49</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

 <sup>&</sup>lt;sup>50</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance:
Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea.
<sup>51</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World

<sup>&</sup>lt;sup>51</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

# 7 Issues

The Republic of Korea has been taking steps to enact disaster preparedness in the sense of relief and building standards after the Kobe 1995 earthquake. However the disaster preparedness does not seem to address enlightening and promoting the citizens with the knowledge of what to do or devising a family plan. There is no official program within the schools to educate the youth on disaster preparedness, and the only source for this type of education is college lectures at the National Institute for Disaster Prevention.<sup>52</sup>

Although the Government is taking actions by contracting disaster management, Keun Namkoong states:

"Although the revised Natural Disasters Countermeasures Act designated the lead agency for earthquake disasters in both national and local governments, the agency showed extreme organizational fragility. They are seriously understaffed, and it is very difficult to arrange multi-organizational coordination in actual disaster events. So it is necessary to authorize the required number of personnel immediately in order to effectively perform multi-organizational coordination. Furthermore, it is strongly recommended that Korea should establish a FEMA-like institution in the national government. This agency should assist local governments in mitigating and responding to earthquake disasters."

On the other hand the citizens of Korea can enact the custom of "Phom-A-Si," which is the custom of working in turn for one another and exchanging service and practiced since Yi Dynasty (1392 to 1910), is used as an example for today's volunteers' participation in disaster relief activities. The Republic of Korea uses this heritage to promote disaster prevention and recovery to cover for inabilities of national level disaster risk policies as in the following:

- "It is required to strengthening close cooperation in the region. It is desirable to have several practical cooperation programs and training that can yield ready-touse outputs. Programs provided by ADPC, ADRC and other international or regional organizations need to be more actively developed and publicized."
- 2) "Even when the government prepares perfect policies or organizations to reduce disaster losses, the government cannot do it alone without active participation of citizens. More public education and participation are desired. Programs to increase public awareness should be discussed as one of the top priorities in the WCDR."

<sup>&</sup>lt;sup>52</sup> Dugkeun Park, Republic of Korea, National Reporting and Information on Disaster Reduction for the World Conference on Disaster Reduction, UN-ISDR.

<sup>&</sup>lt;sup>53</sup> Keun Namkoong, Ph.D, How to Advance Risk Mitigation and Risk Management in Local Governance: Adaptation of Seoul Earthquake Management System After the 1995 Kobe Earthquake, Seoul National University of Technology, Seoul, Korea.

 "Budget for disaster reduction project is sometimes considered as a simple cost, not an investment. Methodology or strategy that can change the concept and increase disaster reduction budget needs to be addressed."<sup>54</sup>

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