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Flood Risk Management Scheme and Risk Communication in Korea

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Synopsis

Flood risks are rising in many parts of the world. Recently, due to typhoons and localized torrential downpours, the scale of economic loss over the Korean Peninsula is increasing. The damage caused by the heavy rain and the typhoon is 80% of total in Korea. Korea's disaster management and prevention plans are implemented by each ministry and regional government, and the government-invested organizations. But It flooded annually at about the same time of year and make the casualties. The most important point is making a collaborative system for disaster prevention.

Keywords: Korea, flood disaster, Typhoon RUSA, Typhoon MAEMI

1. Introduction

South Korea(hereafter Korea) experiences typhoons every year. And The strength of the typhoons which affect the Korean Peninsula is becoming stronger and this tendency is gradually increasing lately because of global abnormal climate changes. The scale of economic loss is increasing rapidly due to industrialization and urbanization in Korea. In the last decade, the damage caused by typhoon disasters accounted for 60% of the total amount of damages. A total of 324 typhoons affected the Korean Peninsula from 1904 to 2009, averaging to about 3.1 typhoons per year(See Table.1). Floods in Korea that occur every year are also caused by heavy rains and typhoons. Most of the typhoons occurred in July, August and September. Although the annual trend of typhoon frequency affecting the Korean Peninsula has not changed during the last 30 years, the damage from typhoon and heavy rainstorm is recently increasing.

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 disasters result in a yearly average of 160,600 acres (64,992 hectares) of flooded land and 165 deaths. The damage caused by the heavy rain and the typhoon is 80% of total in Korea. The life and property damage are continued. Life damage is decreasing, the property damage becomes larger.

The most frequent and destructive natural hazards are heavy rainfalls and typhoons. Summer monsoon season brings heavy rainfall averaging 383 millimeters(about 24 inches), which causes flooding and landslides due to Korea’s mountainous landscape. In July and August typhoons originating in the east Philippines travel towards the peninsula. Heavy rainfall takes lace between June and August, hich leads to flooding. (Seoul, Republic of Korea Disaster Risk Management Profile, 2006).

This study examined disaster by recent great Typhoons and risk management governance in Korea.

Table 1 The number of typhoon which affected the Korean Peninsula (1904~2009)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total	Annual average
Number	-	-	-	-	2	20	93	121	80	8	-	-	324	3.1

(Source: Korea Meteorological Administration, 2010)

Table 2 Cause of disaster(1916-2001)

	Number	Percent
Rain	435	47
Typhoon	183	19
Storm	157	17
Etc	156	17
Total	932	100

(Source: MOCT, 2001)

2. Recent Great Flood Disaster in Korea-Typhoon RUSA and MAEMI

2.1 Typhoon RUSA

In the case of the 2002 typhoon RUSA, loss of life totaled 128 people, and the economic loss amounted to US $1.66 billion. the central government of Korea provided special funds to these zones to alleviate the financial burden. While levees have been constructed throughout Korea to minimize potential flood damages, flood risks have not decreased(Chung et al., 2009).

Typhoon RUSA formed in the west Pacific Ocean on 22 August 2002 and strengthened into a typhoon on 24 August while tracking northwest. The cyclone tracked northwest toward Okinawa for approximately 8 days before turning toward the Korean Peninsula and subsequently made landfall at approximately 0630Z 31 August near the city of at Goheung, Korea, with maximum sustained winds of 65 knots, gusting to 80 knots. RUSA reached a peak intensity of 115 knots on 26 August 2002 near Bonin Islands and maintained this intensity for 24 hours before beginning e a slow weakening trend until in Korea. During the RUSA, atmospheric pressure maintained at 950hPa and RUSA poured 1.7 times of maximum heavy storms across Korean peninsula. Typhoon RUSA caused the death of around 246 people and generated more than USD 5,000 million damage losses with more than 60,000 people.

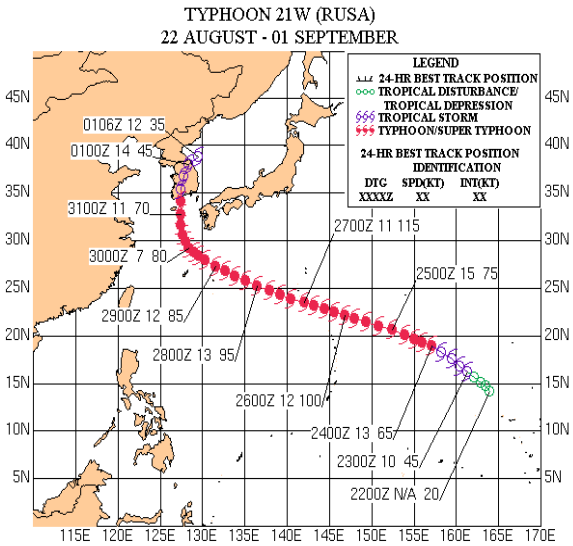

Figure 1 Path of Typhoon RUSA (Source: Ye,2004)

Figure 2 A bridge destroyed during Typhoon RUSA

2.2 Super Typhoon MAEMI

On 13 September typhoon MAEMI passed through the southern areas of the Republic of Korea. MAEMI's exceptionally powerful winds, which reached speeds as high as 216 kilometers per hour, left a wake of destruction. There are a reported 87 people dead and 28 missing. The southern Province of Gyeongsang has been among the worst affected, reporting 41 of the country's total of 87 deaths. MAEMI is being

described as the most powerful typhoon to hit the Republic of Korea on record. According to the National Disaster Prevention and Countermeasures Headquarters (NDPCH), the typhoon has left about 8,938 people homeless (or 3,323 households). It also destroyed communication's systems, disabling 2,218 communication centers nationwide. Additionally, high waves brought on by the typhoon destroyed ships and many seaside areas. Rain falling at over 30 millimeters per hour in the country's southern cities has left large areas of farmland under water and triggered landslides in the provinces.

Heavy flooding has forced residents to evacuate their homes for nearby schools and public facilities.The government mobilized 5,000 soldiers to carry out relief work, and has plans to declare typhoon-hit areas as a special disaster zone to ensure a quick recovery by supporting rehabilitation and relief works(Information Bulletin, 2003).

Super Typhoon MAEMI caused the death of around 120 people and generated more than USD500 million in insurance-related losses. The typhoon also left more than 25,000 people homeless. According to Munich Re, the total economic loss amounted to USD 4.8 billion (Munich Re Group, 2003).

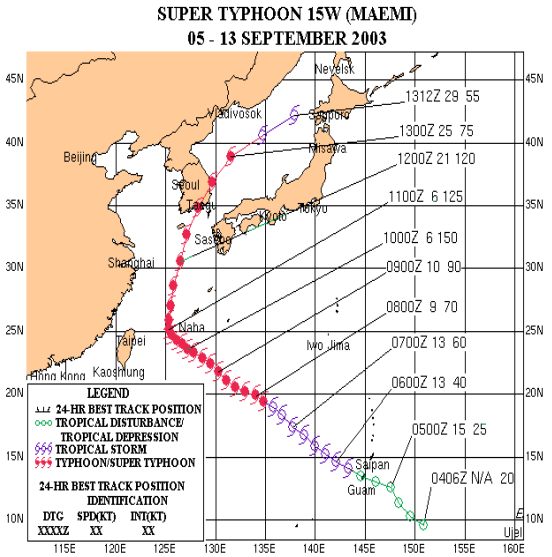

Figure 3 Path of Typhoon MAEMI (Source: Ye, 2004)

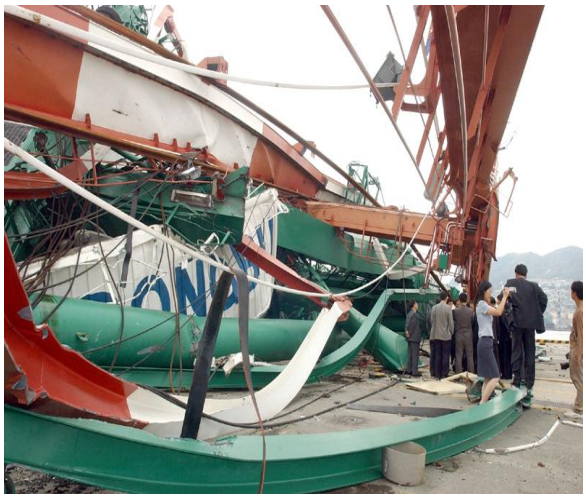

Figure 4 Container cranes in Pusan port destroyed by strong wind during Typhoon MAEMI

3. Flood risk management In Korea

3.1 National disaster management scheme

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) in Korea. 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. 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. 21 central government agencies and 16 regional governments are also involved with disaster management and prevention sectors.

3.2 Flood risk management scheme in Korea

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 (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 government of Korea is developing a national flood insurance program due to the increasing amount of property damage caused by floods.

The national flood insurance program produces flood insurance map production and flood plan 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. (Seoul, Republic of Korea Disaster Risk Management Profile, 2006)

3.3 Flood Risk Management Measures

When flood is expect by heavy rain or typhoon, dam operation authority is given to the Flood Contral Center on the subject basin. There are currently five Flood Control Centers on the five big river basin, Han River, Nakdong River, Ghum River, SeomJin River and Youngsan River basin. Among those, Flood Control Center of Han River works as the headquarters of the other control center. Flood control center need to report the control situation to ministry of Construction and Transportation.(Kim at al,2007)

By 2007, completing the Basinwide Integrated Flood Management Plans for the 13 river basins in the nation to defend the flood from the extreme rainfall;

1. Upgrade the flood management paradigm for the abnormal climate change
2. Overcome the deficiency of flood control capacities due to the limitation of dam construction and river flood protection facilities
3. Raise the storage capacities of flood in the basin
4. Establish the measures for the urban population and properties in the flood prone areas
5. Establish the integrated optimal operation system of dams and f lood control facilities in each basin

The main contents is distributing flood control functions into both river channel and basin for the present and future flood flow by changing the flood control policy. Increasing the flood storage capacities in upstream areas by the construction of riverside detention reservoirs or by using floodplain areas, and accordingly, increasing the safety level of flood management in whole rive r basin and river decreasing the flood control volume in downstream channel reach. Spatial and master planning for the flood control including storages, rainwater capture systems, levees, pumping stations and landuse plan for their construction and share of flood flow. (Lee, 2007).

4. Propose of improving risk communication in Korea

Risk communication system in Korea is not enough. While structural management is more common than nonstructural management around the world, the paradigm is changing in response to expected climate changes, as well as higher environmental standards in some developed countries. In Korea, flood risks were mainly mitigated through the construction of dikes and multi-purpose dams along major rivers. It is

uncertain whether or not these structural management practices have effectively alleviated flood damages. In order to investigate the dynamics of flood risks in Korea, a comprehensive, integrative approach is needed. (Chung et al., 2009)

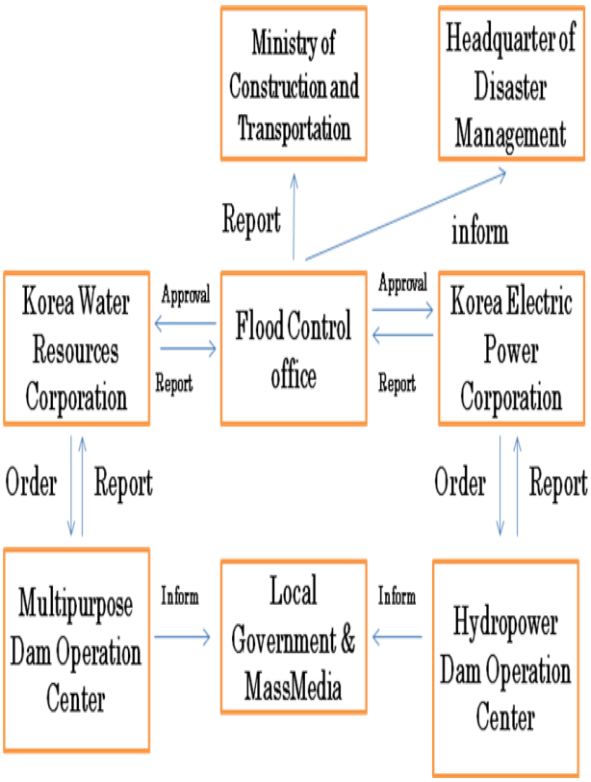

Figure 5 Dam operation ordering system on a flood-fighting situation

The most important point is making a collaborative system for disaster prevention. Like past typhoons, RUSA, brought with it copious amounts of rain that resulted in extensive flooding. Mass deforestation and unplanned urbanization contributed to the spreading of rainwater and made many areas more prone to flood damage.(Chae et al, 2005)

For making a collaborative system, we need social capital. Seeing that social capital is a key factor to strengthen society's resilience against disaster, it is perhaps reasonable to analyze the relationship between disaster recovery and resilience by focusing on a society's "trust " and "network".

'Trust' means general trust. If a society's trust level is high, the society can easily pursue various collective actions and facilitate a high- level of citizenship. Thereby, it further improves the efficiency and legitimacy of public policies.

'Network' means relational ties between society's members. It can be divided into bonding, bridging and linking. These networks help make relief and recovery more effective and responsive in disasters. High levels of social capital in a society produce high levels of general trust; accordingly, it helps resolve various issues through collective actions

In general, Korean networks are homogeneous, i.e. likeminded people with common backgrounds tend to bond. Korean society, the bonding network is strong whereas bridging networks are rather weak.

The strong homogeneity of Korean social networks (based on close ties such of blood, region, school etc.) is inclined to be micro- group focused, thereby forming a fragmented society. Institutional trust, which means public confidence in political and public institutions, has either remained the same or declined over the last 10 years.

This lack of public trust in intermediary agencies has led to a 'crisis of social capital" in Korea. In addition to the collaboration of civic organizations, it is important to promote the participation of private companies that aspire to fulfill social responsibility, help in disaster mitigation, recovery, and to further active involvement in a wider disaster risk management network(The Korea Institute of Public Administration, 2009).

5. Conclusions

Korea's disaster management and prevention plans are implemented by each ministry and regional government, and the government-invested organizations. But there are not enough disaster prevention system in Korea. Although technological system is high level, it flooded annually at about the same time of year and make the casualties. The government of Korea present the measure every year. But These are temporary expedients. It requires the long term measure for flood prevention.

And even though the central and local governments are committed to reducing disaster losses, the government cannot do it alone. More public education and participation are desired.

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韓国における水害のリスクマネジメント概要とリスクコミュニケーション

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要　旨

洪水リスクが世界的に高まっている。最近では韓国においても台風と局地的な大雨による経済的な損失が大きくなっている。韓国の災害に関する損害の80%が水害によるものである。韓国では災害マネジメントと防災計画を, 政府機関, 地方政府や政府投資機関ごとに行っているが, 毎年同じ時期に水害によって犠牲者が発生している。したがって, 防災に関する協力システムを構成することが重要である。

キーワード: 韓国, 水害, 台風RUSA, 台風MAEMI