

# National Report of The Republic of Korea

Prepared for the IDNDR Mid-Term Review and the 1994 World Conference  
on Natural Disaster Reduction

## I. OVERVIEW AND EXECUTIVE SUMMARY

### - Executive Summary

#### <Institutional Framework>

The IDNDR Korean Committee are composed of and 7 specialists form academic and research institutions and 16 vice ministers from sixteen ministries. And the National Disaster Prevention and Countermeasures Headquarters(NDPCH) is functioning as a working level organization for the committee. NDPCH is the central organization tasked for nation-wide natural disaster prevention and preparedness. The headquarters has responsibilities for government-level natural disaster reduction plans and activities and for international cooperations.

#### • Represented Ministries(16) :

Ministry of Home Affairs; Economic Planning Board; Finance; National Defence; Education; Culture and Sports; Agriculture, Forestry and Fisheries; Trade, Industry and Energy; Construction; Health and Social Affairs; Labor; Transportation; Communications; Government Administration; Science and Technology;

### < Executive Summary >

- During the last decade, there were two hundred and eighty two human casualties annually in the country and the annual property damage was estimated 475 million U.S. dollars. About five billion U.S. dollars were spent the disaster relief activities and recovery works in the same period. In recent years, the number of life losses has decreased significantly, while the amount of property damage is in an increasing trend.
- The IDNDR Korean Committee set up ambitious goals for the IDNDR decade. The principal goals of the national plan during the IDNDR years are;
  - to reduce life losses to two in every million from seven in the 1980's,
  - to keep the level of property damages in the 1980's throughout the IDNDR years.
- In order to meet the national goals, the government has planned to invest more than 9 billion U.S. dollars for various structural and non-structural measures. Some of the measures have already completed.
- The major ongoing projects are introduced in the 「Mitigation Activities」 in this report.

## - Country Specific Issues

- In the country the greatest concentration of population and national wealth is on flood-labile areas, notwithstanding that such floodplains represent only a small fraction of the total land area. In spite of the flood threat, pressure to occupy

flood plains will continue because they are generally the most attractive and easily developed of the available land areas. The magnitude of the flooding problem and its consequence will therefore continue to be a matter of grave concern.

- Another big problem the country has is the reductions of the river conveyance section in many cities due to covering of streams and to construction of various structures in or along mainstreams or tributaries.

- As solutions to those problems, we are now considering several measures such as construction of diversion channels. New dams may be an alternative. But all of the these measures depend largely on the amount of money available.

The imposition of the runoff charges on development projects and the flood induction charges on occupation and use of flood prone areas is under serious investigation. For large scale projects, introduction of disaster impact assessment program can be an alternative.

We, also, could force developers to build ponds or underground tanks to store excessive runoff volumes using the provisions of the Construction Codes or by enacting a law.

## II. RISK ASSESSMENT

In order to direct attention and resources to the range of natural disasters that confront the various areas in your country, it is essential that the nature and character of these hazards be understood. Similarly, the vulnerability of the population, the infrastructure and facilities, and the short- and long-term economic and social consequences of these events must also be assessed.

### - Hazard Assessment

(Overall identification of natural hazards, their geographic distribution, and estimates of recurrence interval and impacts.)

Floods and typhoon strikes are the most serious natural disasters in Korea. Most of the natural disaster casualties in the country are caused by floods and typhoons. Earthquakes, high tides, windstorms and snowstorms are also seen in the country, but those are not serious.

### - Meteorological Hazards(tropical storms, cyclones, typhoons, tornados, floods)

The characteristics of the meteorological hazards in the Republic of Korea can be summerized as follows.

- The annual average precipitation is 1,274 mm(50.2 inches).
- About two-thirds of the annual precipitation occurs during the summer (June, July and August) because of monsoonal climate.
- Regional flash floods frequently occur in recent years.
- Rain storms rush into rivers due to the geographical characteristics of the peninsula, and subsequent floods often occur in low areas.
- Typhoons also strike the peninsula usually two or three times a year and cause severe damages.
- The portions of the damage in the country in recent 10 years due to each prevailing hazards are as follows.

Flood : 67 %,            Typhoon : 27 %  
Windstorm : 3.5 %,    Snowstorm : 1.5 %  
Other meteorological hazards : 1.0 %

The casualties in recent 10 years are summerized as follows.

Year	Person dead or missing	Population affected	Inundated farmlands (in hectares)	Direct property damage (in million U.S. dollars)
1983	91	13,550	24,851	28.6
1984	265	3,642,360	140,199	355.8
1985	249	722,570	126,292	196.2
1986	155	991,140	86,701	342.4
1987	1,071	2,722,770	300,452	1,508.1
1988	143	50,530	17,987	159.9
1989	307	925,930	121,060	766.4
1990	257	2,033,140	124,276	868.4
1991	240	295,730	61,173	494.2
1992	40	9,650	13,968	30.0
Total	2,818	11,407,370	1,016,960	4,750.0
Average	282	1,140,740	101,696	475.0

- Geological Hazards(earthquakes, volcanic eruptions,landslides,tsumamis)

- Weak earthquakes occur sometimes in the country, but the damages are not serious.

- Wildfire

- Wildfires are also seen in the country during the dry season(from December to April). But the damages are usually not serious.

- Drought(desertification, locust infestations)

- Desertification and locust infestations were not seen in the Republic of Korea in this century.

## - Vulnerability Assessment

(Of the most important concentrations of population and resources.)

### - Population

The Republic of Korea has about one hundred thousand square kilometers in area. But about two-thirds of the area is made of mountainous areas. Forty-four million people live in the small fractions of the remaining flat area. Moreover, about seventy-two percent of the people live in the cities. Over-population is one of the most serious problems in the country in carrying out disaster prevention and preparedness programs. Because of rapid urbanization on flood-labile lands and steep hillsides in cities, the potential for natural disaster losses has greatly increased. In spite of the disaster threat, pressure to occupy floodplains and steep hillsides will continue.

### - Social/Cultural

During the last decade, more than one million people were affected and two hundred and eight-two lives were annually lost by natural disasters. Rural communities in Korea are scattered across narrow valleys between steep mountains. The dwellers in the communities are, proportionally, old and poor, and are apt to be a victim in a disaster. They are unlikely to be relocated or to have insurance or access to credit and can quickly become destitute.

### - Facilities/infrastructure

About seventy-two percent of Korean people live in cities. In many cities, schools, hospitals, emergency facilities and major infrastructural elements like water pumping stations, electrical power transformers and telephone exchanges, public or private, are concentrated and, proportionally, located on low lands or steep hillsides. That is particularly true in many satellite cities which came into being as the result of rapid urbanization. Of course, those facilities/infrastructures are at risk.

### - Economic/financial

Every year natural disasters —mostly brought by flood and typhoon strikes— cause considerable economic losses in Korea. Authorities estimate annual average direct damage at 475 million U.S. dollars in the last ten years, which is about 0.17 percent of the annual gross national product. In addition, the country also suffers from various kinds of indirect damage such as losses of agricultural production, losses of sales and production for commercial systems, loss of health and risk to life.

The National Disaster Prevention and Countermeasures Headquarters has the nationwide responsibility to recover public structures/facilities and to provide assistance to people affected. The form of assistance of the victims covers economic and welfare services. Financial assistance to defray funeral expenses, to purchase lost crop and animals, to build new houses, and to recover farm lands is provided.

During the last decade, about 5 billion U.S. dollars in the country were spent for disaster relief and recovery activities. The assistance enables the victims to withstand losses and improve their ability to recover after loss and helps the country alleviate its secondary economical shocks.

### III. MITIGATION ACTIVITIES

The compelling challenge for the Decade is to undertake activities that result in the reduction of the impact of natural disasters in terms of human suffering and the destruction of public and private property. After reviewing the status of current mitigation efforts in your country, a statement of the salient issues surrounding mitigation initiatives is presented.

#### - Status of mitigation Strategies and Measures including :

##### <Mitigation Activities in the Past>

- Since the dawn of the history of Korea, continuous efforts have been done by the forebears. For example our ancestors invented a rainfall gauge about five hundred years ago. But the measures, as a whole, were remain in a premodern level.

The people met a big flood in 1925. The experience of the flood provided an occasion to start modern hydrological and meteorological observation and to initiate anti-flood countermeasures such as levee construction.

- At of 1989, the principal accomplishments can be summerized as follows.
  - The ratio of forested area over the total mountainous area which covers about two-thirds of the total land area was raised up to 98 percent.
  - Total flood capacity has raised up to 1.8 billion cubic meters by building many dams.
  - Floodway improvement works and levee construction of over sixty percent in length of the total river length required for those works were completed.
  - As much as 569 water pumping stations were completed for flood-labile communities.

##### <Major Activites planned or completed during the decade>

- As continuous efforts to the outcomes of the activities in the past, many structural or nonstructural measures incorporated in the national and local government plans for the IDNDR Decade. Some of the measures have already completed. Major ongoing projects are introduced as follows.

(cost : in million U.S. dollars)

classification	project title	participating institutions	cost of projects	sources of funding	implementing agencies
hazard zoning/ assessment	Designation and Management for hazard areas	national/local governments	7.5	national government revenue	Ministry of Home Affairs
	Publication of Disaster Year-book	"	1	"	The National Prevention and Countermeasures Hqs.
		sub-total	8.5		
Monitoring	Special Monitoring program for disaster vulnerable areas/structures	national and local governments	7.5	national and local government revenue	National and Local Disaster Prevention and Countermeasures Hqs
	Flood Forecasting	Ministry of Construction	6.25	national revenue	5 major river Flood Control Offices
Preparedness	Online System for Meteorological Observation	national/local governments	6.4	national and local government revenue	Ministry of Home Affairs
		sub-total	20.15		
	Flood-fighter corps	"	2	local government revenue	"
	Programs securing emergency supplies/equipments	"	10	"	"
	sub-total	12			

(cost : in million U.S. dollars)

classification	project title	participating institutions	cost of projects	sources of funding	implementing agencies
short-term measures	Improvement/Removal of Hazard Areas	Ministry of Home Affairs	361	national/local gov't revenue	Ministry of Home Affairs
	Repair/Improvement of disaster vulnerable structures	local governments	3,363	local government revenue	local governments
	Computer Network for disaster Management	national and local governments	63	national and local governments revenue	National and local Disaster Prevention and Countermeasures Hqs.
	Program for improvement of flood forecasting equipments	Ministry of Construction	23	national government revenue	5 major river Flood Control Office
	Improvement plan for meteorological equipments	Korea Meteorological Administration	60	"	Korea Meteorological Administration
		sub-total	3,870		
long-term measures	5 new dam projects	Ministry of Construction	1,062	national government revenue	Korea Water Resources Development Co.
	Floodway Improvement program	"	2,088	"	local governments
	River bed Improvement	"	250	"	"
	Improvement of drainage facilities	Ministry of Agriculture and Fisheries	506	"	local governments



(cost : in million U.S. dollars)

classification	project title	participating institutions	cost of projects	sources of funding	implementing agencies
	New Breakwater project	Korea Port Administration ( K P A )	344	national government revenue	KPA
	Mountain slope protection	Korea Forestry Administration	346	"	KFA
	Port Improvement program	Korea Fishery Administration ( K F A ) Korea Port Administration	603	"	KFA and KPA
	Designation and Management Rules for hazard area	National Disaster Prevention Countermeasures Hqs.	7.5	local governments revenue	local disaster prevention countermeasures hqs.
		sub-total	5,206.5		
Public education /Information	Education of staffs in charge	Ministry of Home Affairs	2	nation government revenue	National Civil Defence School
	Program securing information materials	"	15	local government revenue	local governments
	National Month for Disaster Preparedness	Many schools, hospitals,...	Unknown	public sectors	National and Local Disaster Prevention and Countermeasures Hqs.
		sub-total	17	"	
		total	9,134.15		

## IV. WARNING

Warning system play a prominent role in strategies to protect life and property. After presenting an overview of the existing systems , the capacity and limitations of these systems are considered and evaluated.

### Systems for Observing, Forecasting and Warning

#### - Meteorological

The Korea Meteorological Administration(KMA) which has, at present, 328 automatic weather stations across the country has responsibilities for meteorological observation and forecasting. The results of KMA's observation and forecasting are hourly disseminated to the national and local natural disaster prevention and countermeasures headquarters and to the mass media through hotlines. The image of the Global Meteorological Satellite (GMS-4) is also available in the national and local headquarters.

In addition, five Flood Control Centers under the Ministry of Construction are also operating 316 rainfall and 302 river stage gauge stations for the major river basins.

Flood routing for downstream and issuing of flood warning are the centers' responsibility. But for an impending event, the disaster prevention and preparedness headquarters also do various relevant emergency activities including;

- observing rainfalls and snowfalls all across the country,
- alerting emergency personnel- water fighters, fire fighters, etc.,
- disseminating necessary information to the relevant people using cables, civil defence sirens,etc.
- asking TV companies to do TV warnings and live coverage.

At present, Korea uses following means for early dissemination.

- Media coverage
- TV warnings and live coverage for an impending event
- Education & training
- Flood forecasting for five major river basins.
- Broad dissemination of warnings using civil defence equipments(sirens, cables, cableless phones, etc.)

- Geological

The Korea Meteorological Administration, which has 12 seismological stations, is also observing seismic movements. If an unusual observation records, the results are immediately noticed to the headquarters.

- Drought

Due to slow onset in its characteristics, the Ministry of Agriculture and Fisheries is responsible for preventive activities and countermeasures for drought.

- Wildfire

During the dry season, local governments temporarily employ wildfire watchmen. They usually work at lofty places and communicate with the governments using wireless phones.

- Locust Infestation

Locust Infestation was not seen anywhere in our country in the latter half of this century.

- **Issues**

- Dissemination/Communication

- At present, it takes about an hour for the relevant authorities to get field data where telemetric measuring systems or automatic weather stations are available.

But it takes more for other areas. The country is building a new system which will be completed in a few years. Then, real-time field data (rainfall records, water levels . . . )gathering across the nation will be available in twenty minutes.

The main contents of the system are to;

- Equip with electronic rain gauge and display system at 1,560 county offices,
- systemize the network all across the nation using computer networks,
- Route and predict water levels and possible danger, and to
- make broad dissemination of warning possible using various means.

But the most effective and fastest way of dissemination for an impending event in the country is live coverages of TV and radio networks because TV sets and radios are available in most Korean homes/individuals.

But cableless phones are the only urgent communication/dissemination means between the authorities and disaster affected villages when all the cables are disconnected.

- Interpretation/Education

Public education for disaster preparedness in Korea is usually done in school and universities and done by newsletters, stickers and bulletins as well as mass media. There's no special issues on the interpretation/education in Korea.

- Individual and Institutional Response

Institutional Response in Korea is promptly done by effective and systematic way by the provisions of the Act on Disaster Prevention and Preparedness. But individuals often refuse to follow the instructions of the authorities by various reasons, even though the authorities can force the people to do or not to do some actions by law.

<Limilations>

- Is it can be justified for the authorities to force individual to do or not to do some actions ?
- Everybody at risk cannot be noticed.
- Social/economical burden.
- Shortage of facilities/equipments/personnel etc.

## V. INTERNATIONAL COOPERATION

The status of international cooperative efforts in fulfilling the Decade goals will be reviewed: cooperation with other National ID-NDR Committees, projects implemented and assistance (technical, financial, training) provided to other countries. Also, issues such as the ability of national agencies to provide assistance to other countries as called for in the U.N. declaration will be discussed.

### - Status

<Publication on IDNDR-related subject>

Manual and Guidelines for Comprehensive Flood Loss Prevention and Management

- Original author : ESCAP/UNDP
- Translated into Korean and printed in Seoul, Korea on December, 1991 by the National Disaster Prevention and Countermeasures Headquarters.

Disaster Mitigation Techniques

- Institution : the National Disaster Prevention and Countermeasures Hqs.
- 800 Volume, printed in Seoul, Korea on April, 1993

<Host of Meeting on IDNDR-related subject>

The 23rd Session of the ESCAP/WMO Typhoon Committee

- November 13-19, 1990
- Seoul Tower Hotel, Seoul
- hosted by the National Disaster Prevention and Countermeasures Headquarters.
- participated by the representatives of the ESCAP, WMO, UNDP, China, Hong Kong, the Philippines, Thailand and Viet-Nam and by the observers from the USA, Germany, USSR and the Commission for Atmospheric Science.

<Current cooperation related to other countries>

- Membership of the Typhoon Committee, a regional typhoon warning body

## - Issues

### <On the International Day>

As a matter of fact, there were no special events/activities in Korea on the IDNDR Days, because only few people in the country is interested in those activities at that time of the year.

Instead of the International Day,

- The country designated May as the " National Month for Disaster Preparedness" in 1970 and has been observing the Month every year because most of natural disaster occurs in the country during the rainy months from June to Sep.
- During the month, there are various meetings, education programs, intensive media coverages and clean-up programs for rivers and drainage structures/facilities all across the country.
- In addition to public authorities, most of schools, hospitals, churches,... voluntarily participate.

### <Availability of possible assistance to other countries>

- Some specialists (hydrologists, meteorologists, doctors and nurses)
- Technology for structural measures
  - Modern technique on building of dams, diversion canals, pumping stations, etc.

### <International assistance required>

- Flood routing technique(2-D or 3-D mathematical model)  
for a large basin with many reservoirs.
- Public information materials(VTRs, booklets, books . . . )
- International training for governmental or non-governmental staffs  
who are responsible for disaster mitigation in the country.

## VI. OVERALL EVALUATION AND FUTURE PROGRAMME OF IDNDR ACTIVITIES

### - Goals and Achievements

The compelling challenge for the Decade is to undertake activities that result in the reduction of the impact of natural disaster in terms of human suffering and the destruction of public and private property.

Nothing is more important on the earth than human beings and their welfare. The importance of the goals of IDNDR cannot be overestimated.

### - National Goals for the Decade

<Comprehensive national assessments of risks from natural hazards, with these assessments taken into account in development plans;>

- Annual average casualties and damage due to natural disasters in the country in the last 10 years are summed up;
  - Casualties : 282 people (seven in every million)
  - Property damage : about 475 million U. S. dollars (about 0.17 percent of the annual GNP)
  - Affected population : 1,141,400 people, annually
- Prevailing hazards : heavy rain(67%), Typhoon (27%), windstorms(3.5%), snowstorms(1.5%), others(1%)

<Mitigation plans at national and/or local levels, involving longterm prevention and preparedness and community awareness ; and>

- The national government and all of the local governments have the their Basic Plans (every 5 year plan)and Annual Plans for natural disaster prevention and preparedness.
- The main goals of the national plan during the IDNDR years are ;
  - to reduce life losses to two in every million people from seven in the 1980's, and
  - to keep the level of property damages in the 1980's throughout the years.

- During last four years, tremendous efforts were done in the country in order to meet the goal. As the result, there was certainly some achievement in the country.

Annual Casualties and damage in 1980's		Annual Casualties and damage in 1990's(91-93)	
casualties	property damage (in million dollars)	casualties	property damage (in million dollars)
273 (seven in every million people)	336	151 (3.5 in every million people)	393

- In addition, the Committee prepared so-called the "New Disaster Preparedness Plan" in 1993. The basic idea of the plan is to do preventive activities one step earlier than before during the onsets of typhoons, floods and others. The new plan had brought some inconvenience for the people. But many people, we believe, could be saved by the plan.

<Ready access to global, regional, national, and local warning systems and broad dissemination of warnings.>

The system for meteorological and geological observing, forecasting and warning in Korea is working relatively well. At present, all necessary steps can be done in a few hours in the country. In addition, the National Disaster Prevention and Counter-measures Headquarters is planning new meteorological communication network which enables meteorological observation and communication among the relevant institutions/organizations in twenty minutes. It will be completed in a couple of years.

#### - Expectations and Plans for the Second Half of the Decade

In order to meet national goals, Korean governments at all levels will do their best in doing their ambitious projects. More than 9 billion dollars will be invested during the decade.

Then,

- Field data all across the country will be available in 20 minutes.
- Casualties will be reduced to two in every million people which is the level of developed countries from seven in the 1980's.
- The increasing trend of property losses will be ceased and remain at the level of the 1980's.