The First Pacific Regional Workshop on Multi-Hazard Risk Assessment and Early Warning Systems by Using Space and GIS Applications

Disaster Early Warning Services in the Republic of Korea

Nadi, Fiji, 13-15 September 2016

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대한민국 폭염경보!

전국 40% 관측소에서 최고기온 기록 경신

2012~2013년 여름
전국 47개 기상관측소 중
19개 지점에서
일 최고기온 기록 경신
Cell Broadcasting Service

https://youtu.be/vfWDQfvIR8A

[MOPSS]

Disaster Alarm Sound

http://www.safekorea.go.kr/idsiSFK/53/menuMap.do?w2xPath=/idsiSFK/wq/sfk/cs/content/civil_defense/SDIJKM1301.xml
Korean Government Structure

President: www.president.go.kr

Prime Minister

Ministry of Public Safety and Security: www.mpss.go.kr
National Emergency Management Agency

Ministry of Land, Infrastructure and Transport (MOLIT): www.molit.go.kr

National Research Council for Economics, Humanities, and Social Sciences: www.nracs.re.kr

Ministry of Public Safety and Security

Ministry of Land, Infrastructure and Transport (MOLIT)

Korea Research Institute for Human Settlements: http://www.krihs.re.kr

Ministry
Ministry of Public Safety and Security

“Safe KOREA, Happy People”

http://www.mpss.go.kr/intro/intro_mi.html

Aims to protect the people by disseminating correct disaster information as soon as possible through the variety of IT technologies
Disasters

http://www.mpss.go.kr/home/safetys/disasterTypeInfo/disasterTypeInfo1/0010/

Natural Disaster

- Heavy rain, Heavy snow, Lightning, Earthquake, Typhoon, Yellow dust, Flood, Drought, Strong wind, High wind, Heat wave, Thaw, Cold wave

Artificial Disaster

- Traffic Accident, Collapse, Explosion, Fire, Bushfire, Cyber terror, Infectious disease

Living Safety

- Water Accident, Hiking accident, Electric accident, Gas accident
Disasters

- **Spring**
  - Yellow dust, Thaw, Traffic Accident, Lightning, Earthquake,

- **Summer**
  - Heat wave, Heavy rain, Water Accident, Collapse, High seas, Typhoon, Flood, Drought, Strong wind, Infectious disease

- **Fall**
  - Hiking accident, Electric accident,
  - Bushfire,

- **Winter**
  - Electric accident, Gas accident
  - Heavy snow, Cold wave, Falling accident
1. Cell Broadcasting System (CBS)

<table>
<thead>
<tr>
<th>Equipment/System</th>
<th>Installation set</th>
<th>Target for info.</th>
<th>Alert method</th>
<th>Management host</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBS Mobile-Phone Disaster Notification</td>
<td>37.5 Million</td>
<td>CBS User 23 Million</td>
<td>Message broadcasting (Mobile Phone)</td>
<td>Central</td>
</tr>
<tr>
<td>Message Broadcasting System</td>
<td>Users</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[국민안전처] 메르스 예방수칙 1. 자주 손 씻기 2. 기침·채가기시 입과 코 가리기 3. 발생·확산까지 증상자 접촉 피하기 등. 
오전 11:53

[소방방재청] 폭염경보 발령중! 아의활동 차제와 주변의 노약자 를 보살피시다. 가축, 작물, 어장관리에도 유의하시기 바랍니다.
오전 10:39

[소방방재청] 8월 20일(수) 14시 민방위훈련 전국 실시, 민방공 정보발령, 15분간 주민대피, 차량통제 (02-2100-5297)
오전 9:03
1. Cell Broadcasting System (CBS)

Korean Government

Telecom Companies

Citizens

Request to transmit CBS messages at disaster area

CBS system at telecom companies

CBS message on mobile within the disaster area
2. Automatic Verbal(Text) Notification System

<table>
<thead>
<tr>
<th>Equipment/System</th>
<th>Installation set</th>
<th>Target for info.</th>
<th>Alert method</th>
<th>Management host</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Verbal (Text) Notification System</td>
<td>234 set nation wide</td>
<td>Civil official, head of government offices and specific regional residents – about 550,000 people</td>
<td>Guidance-information broadcasting (wire and mobile phones, etc)</td>
<td>Central, Regional</td>
</tr>
</tbody>
</table>

![Image of TALK application](image_url)

![Image of notification message](image_url)
2. Automatic Verbal(Text) Notification System
2. Automatic Verbal Notification System

1. Collection and analysis of disaster information
   - Rain, river level or any emergency situation

2. Choose person to inform
   - Call related officers using emergency communication network.
   - Notification to disaster related institutes.
   - Notification to residents located at disaster area.

3. Tool for notification
   - village broadcast amplifier
   - automatic answer telephone
   - wire phone, mobile phone, etc

4. Activities for disaster prevention such as resident evacuation.
### 3. TV Broadcasting - Disaster Warning Broadcasting System

<table>
<thead>
<tr>
<th>Equipment/System</th>
<th>Installation set</th>
<th>Target for info</th>
<th>Alert method</th>
<th>Management host</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Disaster Warning Broadcasting System</td>
<td>3997 set nation wide</td>
<td>Disaster Prevention &amp; Countermeasures Headquarters at each local provinces and each regional administrative offices and its related institutes.</td>
<td>Auto TV Power-On, Volume-Up, broadcasting the situation</td>
<td>Central</td>
</tr>
</tbody>
</table>

![Diagram showing the flow of TV Broadcasting and Disaster Warning System](image_url)
3. TV Broadcasting Disaster Information Transform System
4. DMB

Disaster Occurrence

Request

Disaster Broadcasting System

Notice DITS Automatically

Korea Communications Commission

National Emergency Management Agency

Korea Meteorological Administration

Cable TVs, Local TVs, IPTV, DMB, ...

DMB
5. APP for Disaster Warning (‘Aan-jeon di-dim-dol’)

Provided by MOPSS
5. APP for Disaster Warning (‘Aan-jeon di-dim-dol’)

https://www.youtube.com/watch?v=_zyT46Xp0dk

0:38 -
Report Disaster 

Action Guide 

GPS ON, SMS ON, Notice ON, ...
Searching Nearest Shelter

https://www.youtube.com/watch?v=bjs30KcA3i4
Shelter on Roadview Geospatial Data
Weather News
Air Pollution (Weather)
Transportation (accident on the roads, ... )
Disaster Reporting
Report Disaster Sign
6. Civil Defense Warning Service

• Civil defense aims to **protect the lives and property of residents** by themselves under the guidance of the government.

• It supports all the activities of self-defense to air defense, disaster prevention, humanitarian activities, rescue and recovery efforts and military operations, etc.

Behind of the disaster
early-warning services
Collaborative Governance for Comprehensive Disaster Management

13 Ministries

11 Systems

Safe information System

GIS+Statistics+Attribute(Text)

Safety Information DBMS

Safety Assessment
Safety Policy Decision Support System
Governance Portal
Sharing Platform
SafeMap (facility)
Local Govs
Citizens

<Safety Information System Architecture>
SafeMap
SafeMap

http://www.safemap.go.kr/main/smap.do?viewnum=0#
Korean Government Structure

President

Prime Minister

Ministry of Land, Infrastructure and Transport (MOLIT)

Ministry

National Research Council for Economics, Humanities and Social Sciences

National Geographic Information Institute

Ministry of Public Safety and Security

Ministry of Land, Infrastructure and Transport (MOLIT)

Korea Research Institute for Human Settlements


http://english.molit.go.kr/intro.do

https://www.nrcs.re.kr/english/main/

http://www.krihs.re.kr
Sharing Geospatial Data between MPSS and MOLIT

Ministry of Public Safety and Security

SafeMap
http://www.safemap.go.kr

Ministry of Land, Infrastructure and Transport (GI Policy Authority)

Vworld
(3D Geospatial Platform)
SafeMap

http://www.safemap.go.kr/main/smap.do?viewnum=0#
‘Vworld’: 3D Geospatial Data Platform

http://map.vworld.kr/map/maps.do#
Services of Safe Map
Disaster → Disaster&Safety → Interest → Landslides

Provided by ForestGIS via Vworld of MOLIT
Sharing Geospatial Data **between MOPSS and MOLIT**

- Ministry of Public Safety and Security
  - SafeMap
    - [http://www.safemap.go.kr](http://www.safemap.go.kr)

- Ministry of Land, Infrastructure and Transport (GI Policy Authority)
  - Vworld
    - (3D Geospatial Platform)

- Forest Agency under MOLIT
  - ForestGIS
    - [http://www.forest.go.kr](http://www.forest.go.kr)

- Call for Service of Landslide Hazard Map
Landslides
Services of Safe Map

Disaster → Disaster & Safety → Hazard Record → Collapse

Provided by MOPSS
Collaborative Governance for Comprehensive Disaster Management

Behind of the disaster early-warning services
Disaster Analysis

<Map for impermeability of Seoul>

impermeability

- <10%
- 10% - 30%
- 30% - 50%
- 50% - 70%
- 70% - 90%
- >90%

<Map for impermeability of Seoul>
Location Analysis of old buildings

Architect built in
- before 1990
- 1990-1994
- 1995-2009
- after 2010

<Map for deterioration of buildings in Seoul>
Ref: Tax Collection Department of Seoul City hall. 2012
Analysing Landslide

<Map for Landslide in Seoul (2011)>
Ref : Department of Landslide Prevention, Seoul City hall. 2012
Monitoring Flooded Area

Flooded Area in 2001
Flooded Area in 2010
Flooded Area in 2011
Analyze slope of Mountain Area

Concerned area (110 areas)
Analyze slope around a road

Concerned area (2,470 spots)
Analyze slope around a house

Concerned area (667 houses)
Allocation analysis of emergency resources

Water pump
Sand bag
Analyse safety levels against fire disaster, etcs
Behind of the disaster early-warning services

Disaster Analysis
for Comprehensive Disaster Management

AND

Regulations
Organization
Budgets
System
Lessons and suggestions: Disaster early warning service for Sustainable Development
Sustainable Development

Pandemic Disease Events

news.sbs.co.kr
Sustainable Development

Extreme Weather / Climate Change

Oxfam East Africa at http://flickr.com/photos/46434833@N05/5933226731

hcis.kma.go.kr
17 SDGs and 169 targets
Geospatial capacity for sustainable development can be defined as an ability of planning, building, managing, servicing/providing geospatial information to 17 SDGs and 169 targets.
GIS can be used

✓ to show current status of features related to disaster.
✓ to forecast a disaster area.
✓ to allocate resource efficiently to a damaged area.
✓ to share/interact disaster information with all.
✓ to analyze current capacity of disaster prevention.
✓ to hear citizen’s voice.
✓ ...

...
It may need to build

**Safety Information Sharing Platform**

13 Ministries

11 Systems

- GIS + Statistics + Attribute (Text)
- Safety Information DBMS

**<Safety Information System Architecture>**
MAGO3D: Live 3D Geoportal

0:30 3D
1:13 Indoor
5:30 UAV
It may need to

- Establish a safety plan and regulations
- **Build governance** among ministries, agencies and local governments
- Share GIS data among agencies
- ... 

to provide the GIS-based safety services.
Thank you.

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