

The Second UN-GGIM-AP Plenary Meeting

# **Roles of NGII in successful disaster management**

*Republic of Korea*

Teheran Iran  
28 October 2013

*Sanghoon Lee, Ph.D.*  
*NGII*



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## **Outline**

- Type of Disasters Occur in Korea
- Practical examples for type of disasters
- Mandate given to NGII for disaster management
- Practical Examples of Measures Taken for Disaster Management by NGII
- Type of data developed and provided
- Equipment or technical methods used by NGII for disaster management.
- Factors contributing to effective disaster preparedness by NGII
- Users of NGII's data and services
- Cooperation with related communities for disaster management
- Kinds of data/services NGIAs should deliver to the communities
- Role of UN-GGIM-AP in Disaster Management



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## Type of Disasters Occur in Korea

- Flood
- Landslide
- Heavy Rain
- Typhoon
- Heavy Snow
- Drought
- Forest Fire
- Volcano Eruption...



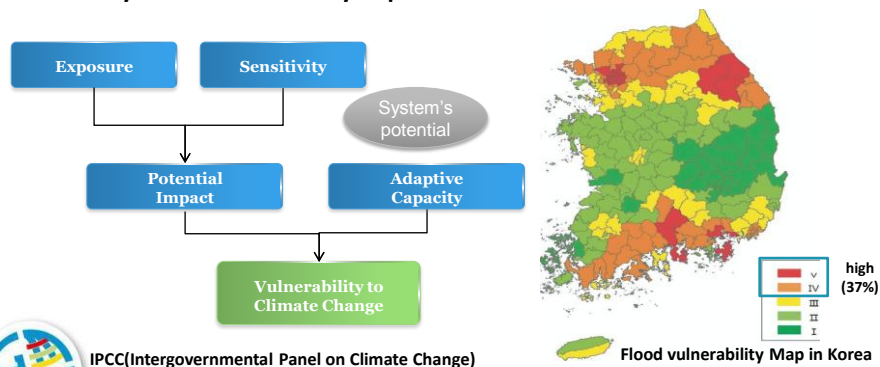
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## Type of Disasters Occur in Korea

- The Vulnerability to climate change is defined by IPCC(2007)
- Conduct spatial analysis of Flood Vulnerable Regions through climate expose and potential flooding vulnerability
- High flood vulnerable municipalities : 92 no. / 232 total , 37%
- Caused by low level and many impervious areas of urban



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## Mandate Given to NGII for Disaster Management

- **Act on Countermeasures against National Disasters**
  - To protect land and property of the public and national infrastructure against natural disasters and operate necessary activities for prevention, recovery and other responses
- **Emergency Mapping Team**
  - Collaboration with National Emergency Management Agency in support of local government, research, academia and industry



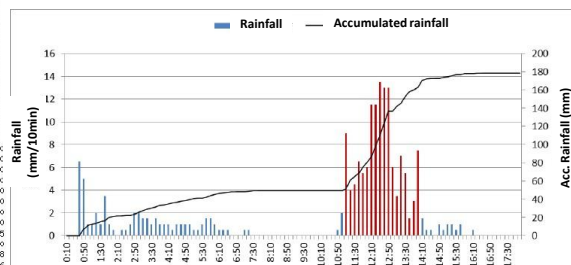
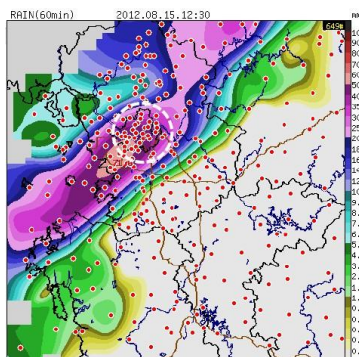
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## Practical Example for Heavy Rain & Landslide

### - Heavy Rain

- Heavy rainfalls occurred at Southern areas of Seoul, 2011. 7. 25
- Observed 178.5mm as accumulated rainfalls (55.5mm in max. rainfall per hrs)
- Concentrate on Gang-nam district as 73.9% of total rainfall during 3 hours



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## Practical Example for Heavy Rain & Landslide - Flooding & Umyeon-san(Mt.) landslide in July 2011

### • Report

- 76 Landslides including Umyeon-san Landslide(7.27) into Gangnam district
- Main road trunked road flooding

### • Damage

- 69 people dead
- 51,250 m<sup>2</sup> area damaged
- 10,038 houses, 1,097 stores, 978 ha land flooding



► Unprecedented but,

**Weak Urban Structure**



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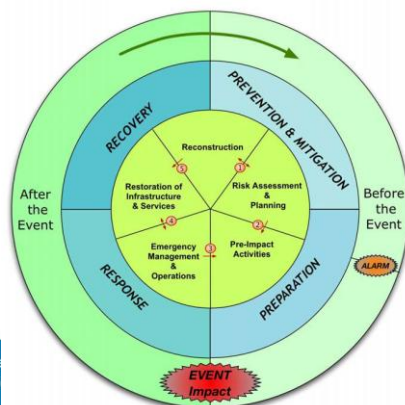
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## Practical Examples of Measures taken for Disaster Management by NGII

- NGII supports acquisition and provision of timely geospatial data in Emergency Response Phase by Task Force

- Preparation – prediction & warning
- Response – supporting datasets & platform
- Recovery – spatial analysis
- Prevention – spatial analysis



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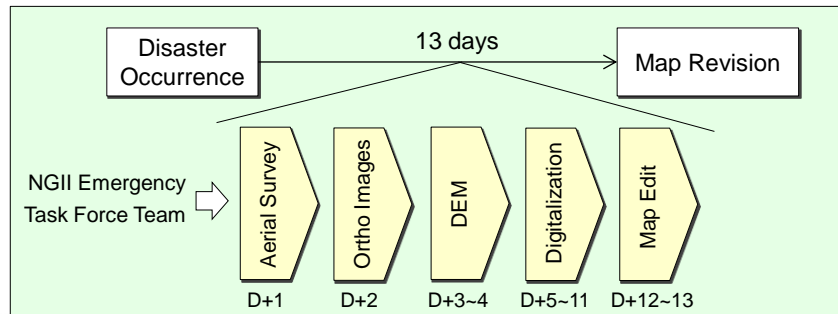
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## Practical Examples of Measures taken for Disaster Management by NGII

- **NGII support at Umyeon-san Landslide**

- (D+1~11) Developed and provided geospatial information



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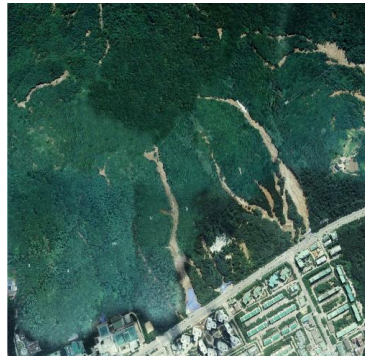
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## Type of Data Developed and Provided

- **Aerial Ortho Photos(Pre- and Post-disaster, 10cm)**



Pre-disaster (Aug 2010)



Post-disaster (Aug 2011)



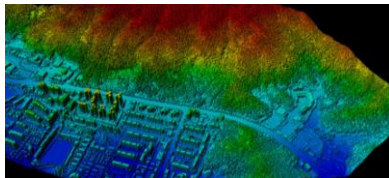
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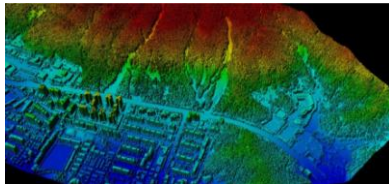
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## Type of Data Developed and Provided

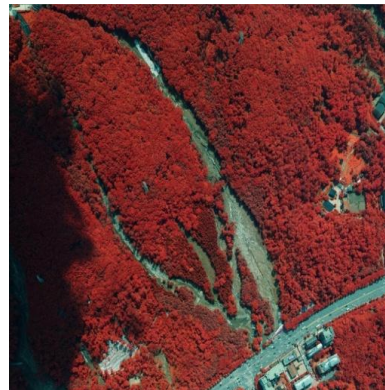
- Airborne Laser Images(Pre- and Post-disaster, 1m)



Pre-disaster (Aug 2009)



Post-disaster (Aug 2011)



Near-Infrared Image



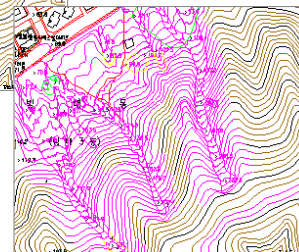
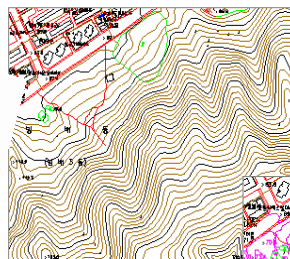
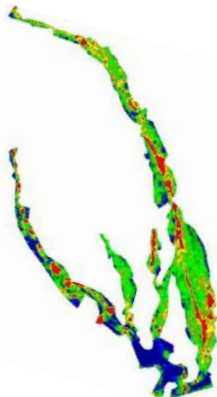
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## Type of Data Developed and Provided

- Debris Flow Analysis
- Revision of National Base-map



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## Type of Data Developed and Provided

### International Charters for Space and Major Disasters

**KOREA SEOUL AREA**  
Landslide Post- Disaster  
Charter Call 367

**Location Diagrams**

**Legend**

Landslide damaged area

**Cartographic Information**

Local projection : UTM Zone 52N  
Datum : WGS84  
Geographic projection : Lat/Long (Datum)

**Data Sources**

SPOT-5 (20m) acquired the 5<sup>th</sup> of May 2011  
© CNES 2011 distribution ASTER/SPOT IMAGE 2011  
Formosat-2 (5m) acquired the 5<sup>th</sup> of Aug. 2011  
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Vector data : © Google Earth 2011

**Framework**

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Map produced the 17<sup>th</sup> Aug. 2011 by KARI

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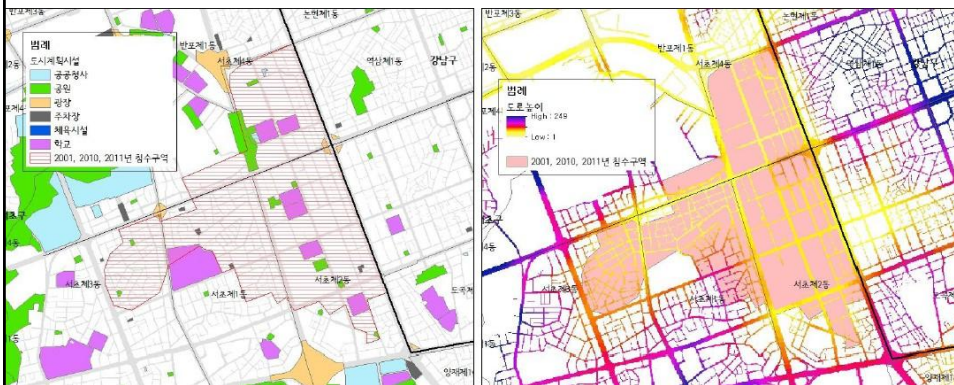
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## Type of Data Developed and Provided (operations)

- Collaboration with National Urban Disaster Research Lab.
  - Topographic analysis
  - Land-use analysis
  - Facility location analysis

Where is Drain way or Reservoirs or Capacity ???



Urban Infrastructure in Gang-nam, Seoul

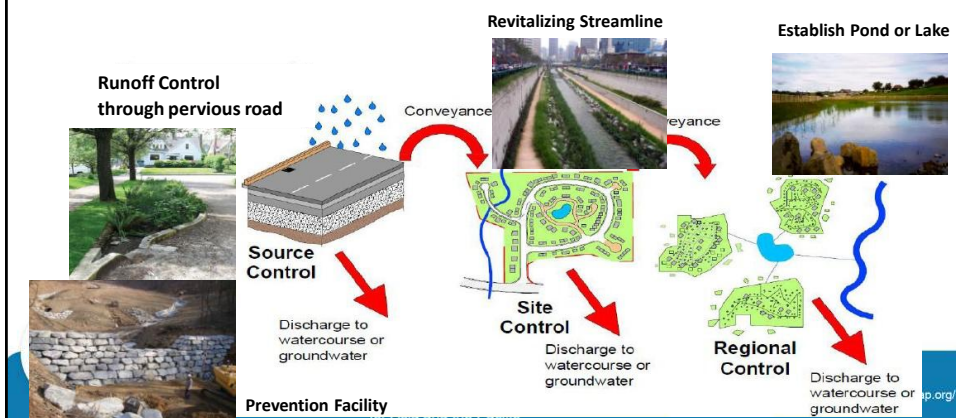
Elevation of nearby road in Gang-nam, Seoul



## Type of Data Developed and Provided (operations)

- Alternative urban design with flooding simulations by GI in cooperative manner
- Control Source – Site – Region through hydro-geospatial analysis
- Multi-layered urban stream-line design for run-off's delay

**Master plan for urban design included in disaster prevention action-plan**



## Equipment or Technical Methods Used by NGII for Disaster Management

- **Data Acquisition and Map Update were used**
  - Aerial Survey (Aerial Photographs, Ortho Images)
  - Airborne Laser (DEM and Near-Infrared Ray Images)
  - Continuous Map Revision
  - Satellite images with international collaboration
- **Spatial analysis for preventing & mitigation**
  - Urban vulnerability analysis
  - Debris flow analysis
  - Topographic, Land-use analysis



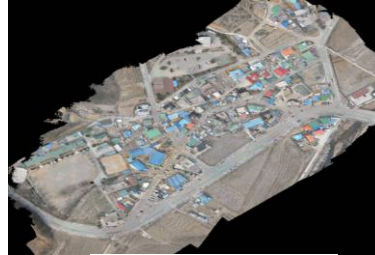
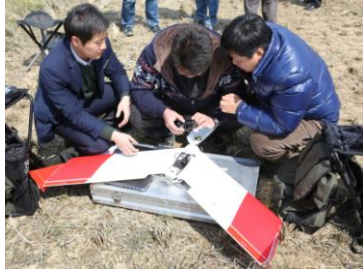
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## Equipment or Technical Methods Used by NGII for Disaster Management



Aerial photo (500 m \* 300m)



Glider/Helicopter type UAVs (150-300m, 20cm)



DEM

## Equipment or Technical Methods Using by NGII for Disaster Management

- Mobile Mapping System using Vehicle & Streetview



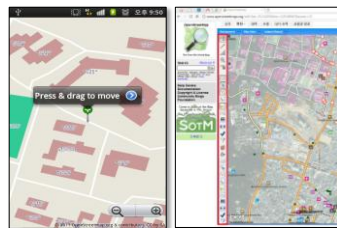
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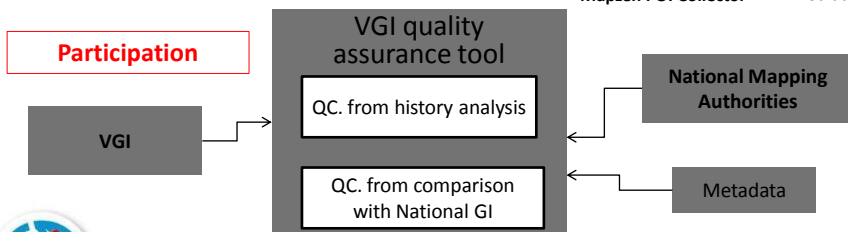
## Equipment or Technical Methods Using by NGII for Disaster Management

### CrowdSourcing



Mapzen POI Collector

PotLatch



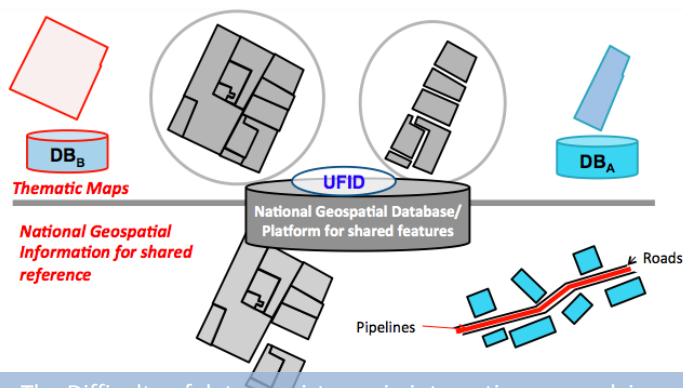
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## Factors Contributing to Effective Disaster Preparedness by NGII

- Geospatial Data (Base Maps, Aerial Images....)
- Recent(Revision Cycle), Reliable(Accuracy) and Authorized Maps
- Thematic Maps & Spatial Analysis for disaster management



The Difficulty of data consistency in integrating or overlying various thematic map

## Users of NGII's Data and Services

### ► Broadcast



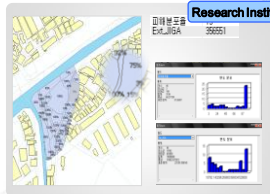
Mass media

### ► Recovery Workplan



Municipalities

76 systems of 23 organizations are integrated



Research Institutions

NGII Database



Central Government



### ► Economic Loss Analysis

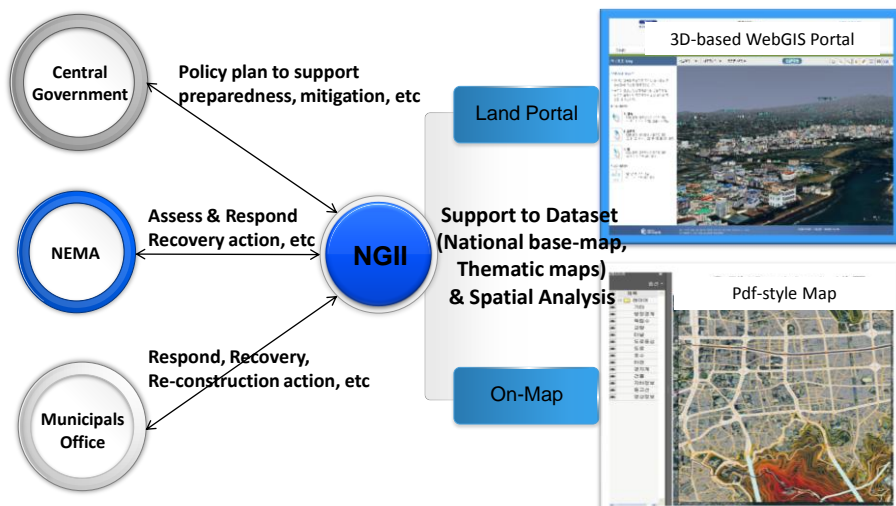
### ► Urban Disaster Response

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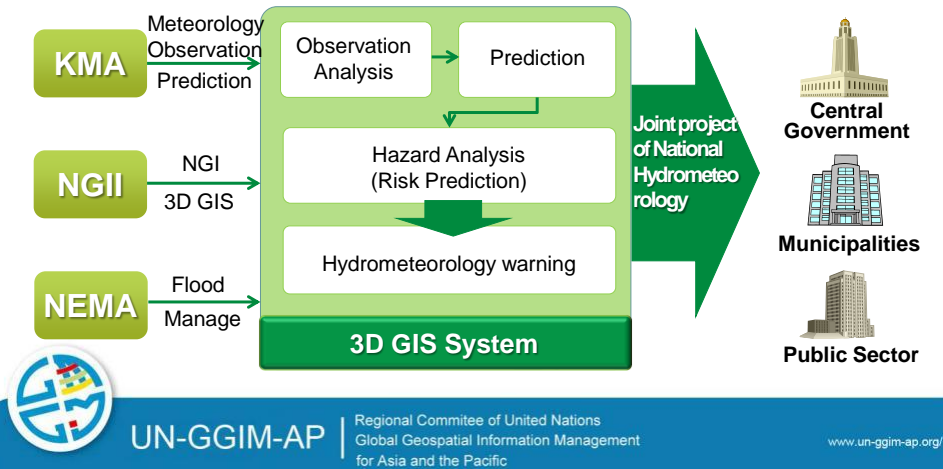
## Cooperation with Related Communities for Disaster Management



Improve Accessibility and make user-friendly environment

## Cooperation with Related Communities for Disaster Management

- **Joint Project of the National Hydrometeorology for disaster prevention**



## Kinds of Data/Services NGIAs Should Deliver to the Communities

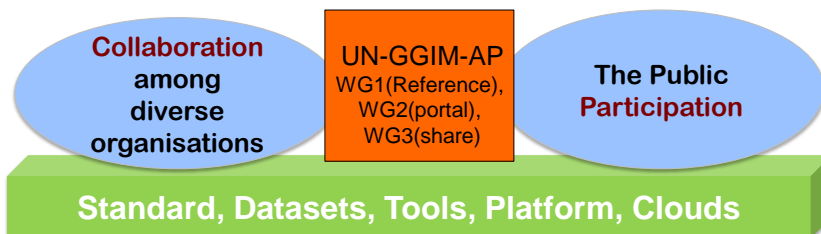
- NGIA should deliver timely GI data/services to response team for their response activities and support decision makers for disaster management before, during and after disasters
- Such data/services should be provided in appropriate manner for utilization of the geospatial information
  - Base Maps, Photos with locations.....
  - Aerial Photos, Satellite images, Ortho Images
  - Accurate Coordinates of Control Points
  - Disaster Overview Maps
  - Thematic Maps including spatial analysis
  - Dissemination System and Platform etc.



## Role of UN-GGIM-AP in Disaster Management

- Share the NGIA's Experiences of Disaster Management with the Asia-Pacific countries
- Support capacity building of developing countries on disaster management
- Establish AP cooperative mechanism for joint project to responding disaster situation with common system and geospatial information
- **Share the Disaster Datasets & Platform** by NGI, Thematic Maps and Photos etc. with the Asia-Pacific countries.

ex) INSPIRE, UN-SPIDER, ....



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