Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific

(UN-GGIM-AP)

Working Group 2

Data Sharing and integration for disaster management

Status Report 2012–2013

for the

UN-GGIM-AP Plenary Meeting

28-30 October, 2013

Teheran, Iran

Chair
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Vice Chair
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1. TERMS OF REFERENCE FOR WORKING GROUP2

1.1 Purpose

Based on the resolutions of the 18th UNRCC-AP in Bangkok (Thailand), the Working Group II was intended to act on three items including Capacity Building in Disaster Management, Data Access and Data Integration. These items were the objectives of WG2 Work Plan (2010-2012).

The 19th UNRCC-AP adopted nine resolutions, a number of which charged the UN-GGIM-AP with undertaking further activities on geodetic framework, data sharing and disaster management, and place based information management for economic growth.

Recognizing that the Asia-Pacific region is prone to a number of devastating disasters including earthquakes and floods, and that geospatial information plays a very important role in making timely response the emergency situations. Recalling that one of the inventory issues listed for the UNCE-GGIM includes the sharing of geospatial information between government agencies in an official and sustainable manner with much relevance and application to disaster management and response.

1. UNRCC emphasizes that for achieving best analysis and result from the Working Groups activities all members should participate in any related referred actions, especially filling out and returning the questionnaires that had been distributed by the WG2 chairman.
2. Design and implementation of a regional Geoportal for disaster management is the main task of UN-GGIM-AP-WG2 work plan 2012-2015, recognizing that this will be a phased and piloted approach. At the end of this term we expect to have in place a sub-regional portal as a minimum outcome.
3. Initial research should be carried out on existing national and international geoportals for the sharing of data and information related to disaster management.
4. A phased approach to developing a regional pilot(s) to support data sharing for disaster management should be initiated, dealing with issues such as:
    a. Standards to be used for data, metadata and services
    b. Catalogue federation within a geoportal
    c. Examining the thematic data contents and user requirements to support disaster management; the commonality of these between hazard types; methods of hazard and risk assessment
5. Liaison between working groups is essential to avoid duplication of effort and expedite results.

1.2 Timeline

The work began 2012 and continued through 2015.

1.3 Membership of the Working Group

Chair:

Hadi Vaezi
National Cartographic Center of Iran (NCC)

Vice-Chairs:

Mr. Dodi Sukmayadi, Indonesia

Dr. Zhou Xu, China

Mr. Robert Deakin, New Zealand

1.4 Resources

The existing resources of WG2 Chair Hadi Vaezi include:

(a) Asian Disaster Reduction Center. (2012). " Natural Disaster Data Book 2011", Government of Japan; and many other related scientific resources was used to provide the "Investigating disaster management Geoportals (DM-GP) at the national and regional levels";

(b) Expert GIS team of National Cartographic Center provide experiences and technical supports on "Investigating disaster management Geoportals (DM-GP) at the national and regional levels"

1.5 Responsibilities

The Chair of the UN-GGIM-AP WG2 will:

(1) Develop more specific terms of reference based on each project,

(2) Implement and complete work plans,

(3) Report regularly on working group activities at the UN-GGIM-AP Executive Board Meetings, Plenary meetings, UNRCC-AP meetings,

(4) Provide expert advice, on request, to agencies and organizations,

(5) Lead discussions at relevant meetings,

(6) Draft resolutions.

Vice Chairs of the UN-GGIM-AP WG2 will:

(1) Carry out the Chair's duties in his or her absence,

(2) Provide support and assistance to the Chair in carrying out his or her responsibilities,

(3) Taking on specific responsibilities from the Chair

2. RESOLUTIONS ADOPTED AT THE 19th UNRCC-AP (corresponds to WG2)

Data Sharing and integration for disaster management

The Conference,

Recognizing that the Asia-Pacific region is prone to many natural hazards and devastating disasters, and that geospatial information plays a very important role in making timely information available to support and respond to emergency situations,

Recalling that the Rio+20 outcome document urged governments and organizations to commit to disaster risk reduction in order to enhance the resilience of cities and communities to disasters, according to their own circumstances and capacities.

Also recalling that the Rio+20 outcome document specifically recognized the 'importance of comprehensive hazard and risk assessments, and knowledge and information-sharing, including reliable geospatial information',

Noting that one of the issues identified by the UN-GGIM Inventory of Issues included the sharing of geospatial information between government agencies in an official and sustainable manner,

Mindful of the existing national, regional and global projects and activities relevant to data sharing for disaster management,

Mindful also that implementing any solution to improve data and information sharing for disaster management needs to be based on an understanding of different user requirements, and recognition of the variability of spatial data infrastructures and their content between member States.

Recommends that UN-GGIM-AP undertakes

(a) Initial research on existing national and international geoportals for the sharing of data and information related to disaster management in order to identify the different types of user requirements associated with different hazards types, different phases of the disaster management activity (e.g. risk assessment; preparedness planning; rescue and recovery), and how this reflects on data requirements;

(b) A phased approach to developing a standards-based sub-regional pilot(s) to support data sharing for disaster management to demonstrate the federation of national data, metadata and web services to a regional level;

(c) Initial design and implementation of a regional geoportal for disaster management with an objective to have in place a sub-regional portal as a minimum outcome in the next 3 years**.**

3. WORK PLAN OF WG2

Operation items	Executive manager	Time table		
		2013	2014	2015
A. Investigating disaster management Geoportals (DM-GP) at the national and regional levels. 1. Investigating Disaster Information Networks (DINs) 2. Investigating existing disaster management portals/geoportals 3. Selecting two disasters as case studies and clarifying: a. spatial data requirements for disaster response b. spatial analysis required for emergency operations (e.g. sheltering, path finding) c. atomic spatial operations to satisfy spatial analyses d. composition flow of atomic operations to satisfy spatial analyses	The chair with the cooperation of the vice-chairs	☑		
B. Design and development of a disaster management Geoportal (DM-GP): pilot project. 1. Design the architecture of the DM-GP. 2. Clarification of required standards and specifications for the development of DM-GP 3. Investigation of service composition techniques ★ 4. Development of sample web services to satisfy atomic operations ★ 5. Development of the DM-GP ★ 6. Development of a service composition technique within the DM-GP	The chair with the cooperation of the vice-chairs	☑ (items 1 to 3)	☑ (items 4 to 6)	
★ C. Implementation of the Geoportal: pilot test 1. Evaluation of the DM-GP at the national level 2. Implementation of the DM-GP in	The chair with the cooperation			☑

three countries in Asia and the Pacific region (sub-region implementation) 3. Evaluation of the DM-GP at the sub-regional level 4. Planning the development and implementation of the DM-GP at the regional level	of the vice-chairs and three member countries as pilots.			

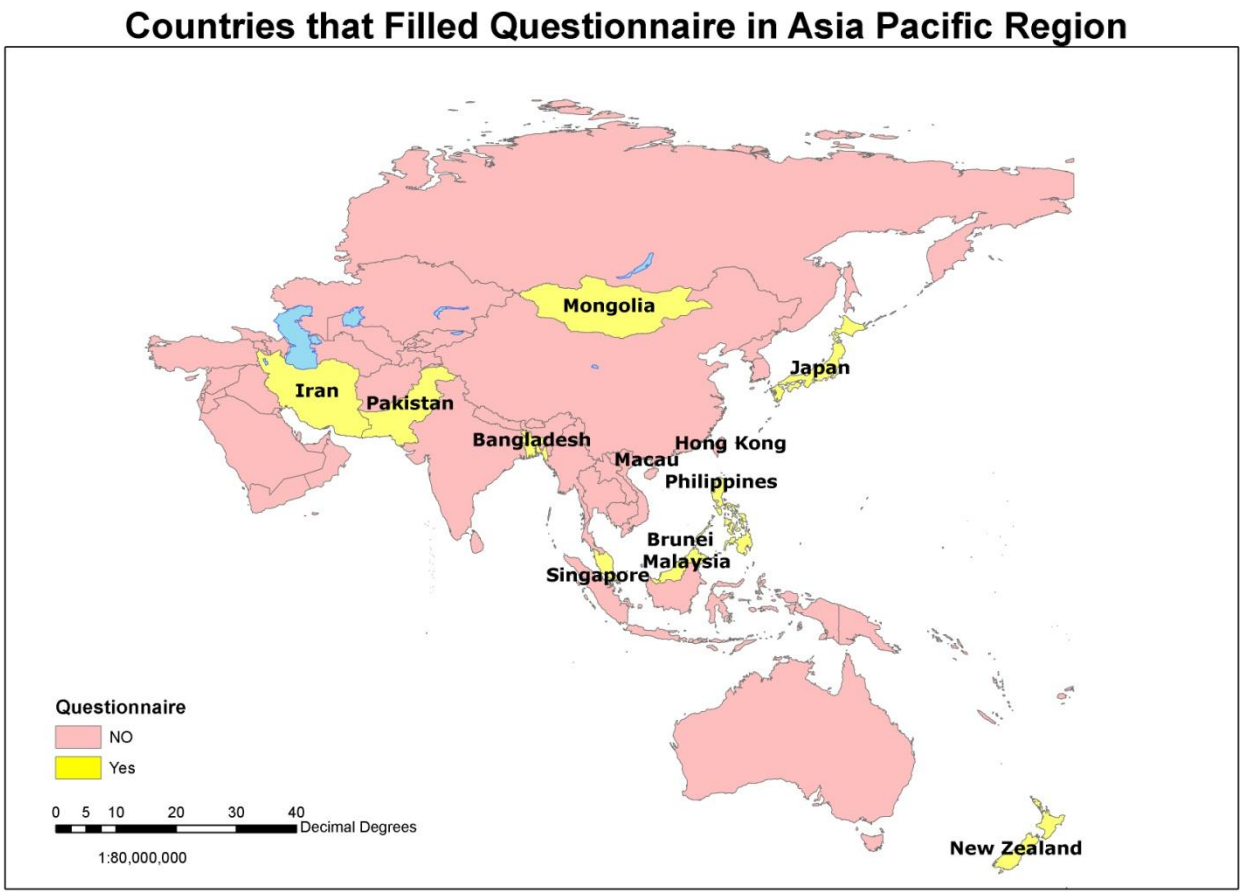
4. ACTIONS TAKEN BY WG2 SINCE THE 19TH UNRCC-AP

The following activities have been conducted according to the resolution and work plan of WG2.

4.1 Investigation the status of UN-GGIM-AP member countries related to capacity building, access network and data integration for disaster management

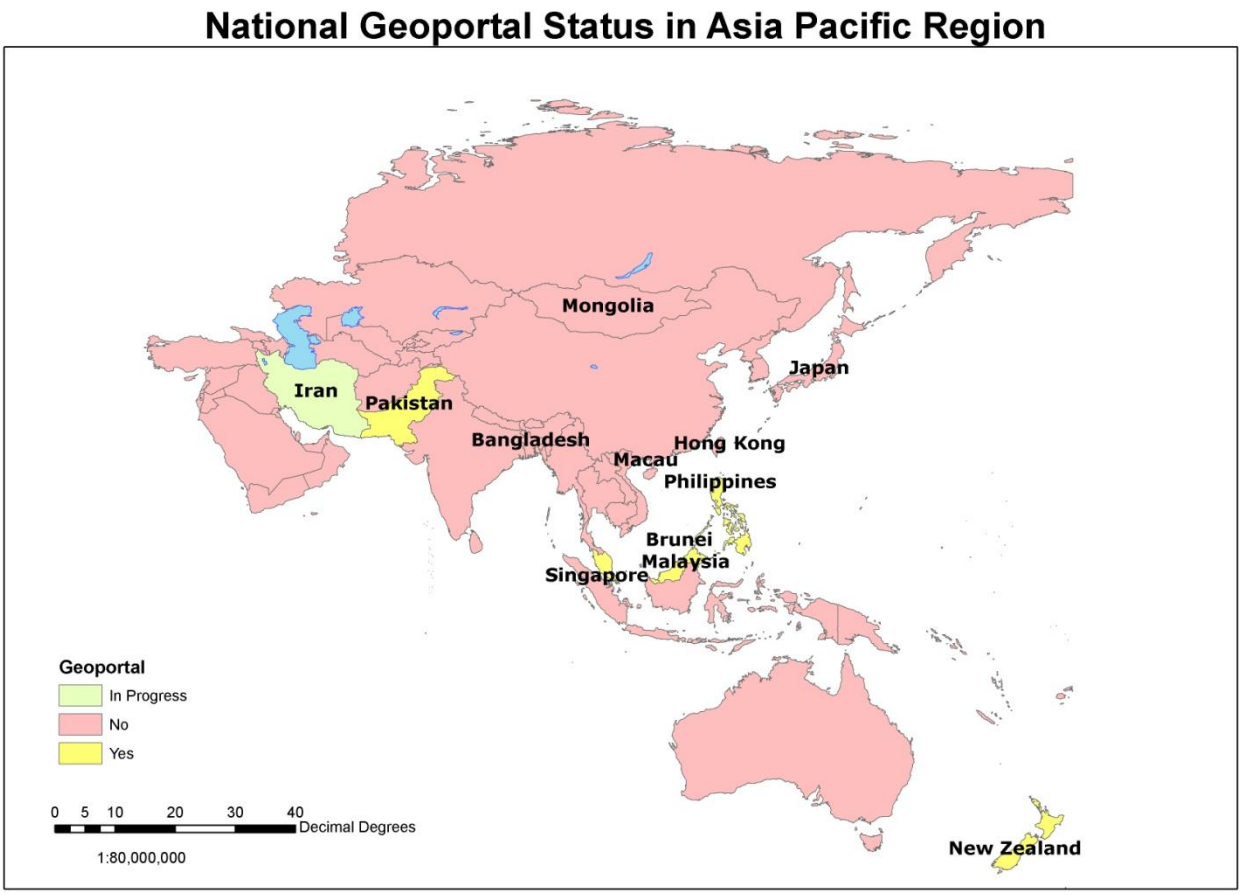
According to the work plan, the questionnaire 1 and questionnaire 2 in relation to the status of PCGIAP member countries concerning using spatial data and access network and web services infrastructure respectively for the disaster management, were provided by Iran and presented in 16th PCGIAP meeting (Singapore). Furthermore, according to the resolutions of the 16th PCGIAP Meeting in Singapore, two more questionnaires were prepared by Indonesia and China as Vice Chairs of the WG2 in identifying the present status of PCGIAP member countries; one was in terms of *accessibility to spatial data and methods of data exchange between governmental organizations* and the other was to survey *the fundamental socio-economic demographic geospatial data for better disaster management*. Next, the three questionnaires from three above mentioned countries were summarized and were circulated. According to the concept of the disaster management, this questionnaire aims to identify potential data resources for the disaster management in the region of Asia and the Pacific by surveying fundamental, socio-economic, demographic and geospatial data available in member countries of PCGIAP.

The questionnaire has been received from Malaysia, Philippines, Brunei, Macao, Singapore, Bangladesh, Mongolia, Pakistan, Japan, Hong Kong, New Zealand and Iran. The result of analyzing and recommendations are given as the followings:



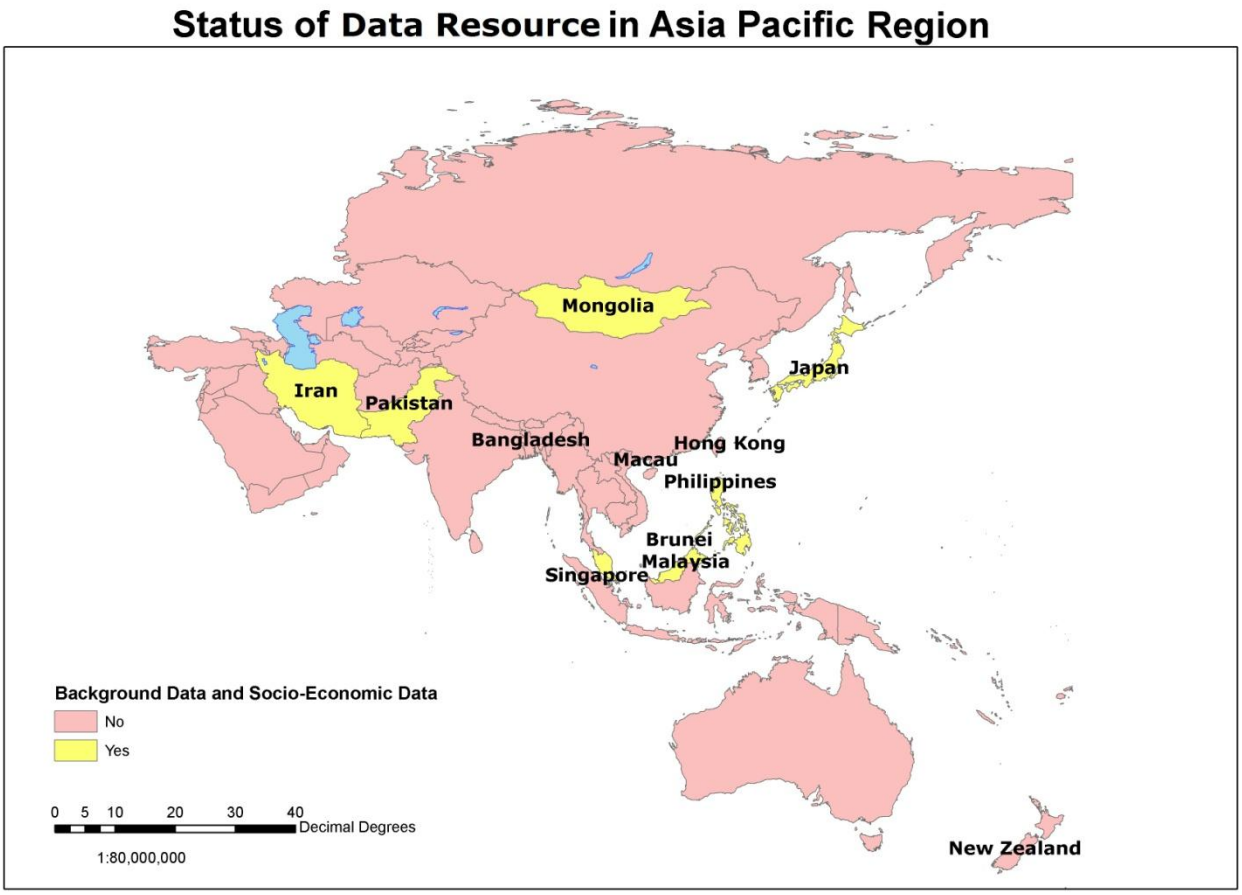
4-1-1-Data accessibility and sharing

The following figure shows present status of some PCGIAP member countries in respect of data accessibility and data sharing related to disaster management. In fact, the figure illustrates the status of geoportal of countries.



4-1-2-Data Resource

The below figure shows present status of some PCGIAP member countries in respect of data resources related to disaster management. The figure contains the extracted results about existence of background data and socio-economic data of each country that could help to manage disasters efficiently.



4-1-3-Spatial data for disaster management

This table shows present status of some PCGIAP member countries in respect of spatial data for disaster management. The table contains information about disasters that are occurred in each country, administrative structure for disaster management, risk vulnerability assessment, kinds of data and scale contributing to regional disaster management.

No.		1	2	3	4	5	6	7
Country		Malaysia	Philippines	Brunei	Macao	Bangladesh	Singapore	Iran
Disasters	Earthquakes		×	-	-	-	-	×
	Landslide	×	×	-	-	-	-	×
	Floods	×	×	-	-	-	-	×
	Drought		×	-	-	-	-	×
	Avalanche			-	-	-	-	×
	Tsunami		×	-	-	-	-	

	Volcanic Eruption		×	-	-	-	-	
	Hurricanes/Monsoon		×	-	-	-	-	
	Cyclones/ Typhoons		×	-	-	-	-	
	Wildfire			-	-	-	-	×
	Agricultural Pests		×	-	-	-	-	
	Sandstorm			-	-	-	-	
	Epidemics	×	×	-	-	-	-	×
	Other			-	-	-	-	
Administrative structure for disaster management		Prime Minister Department • JUMPEM responsible to supply topography maps to any working group related to disaster • Landslide Working Group member which is led by the Department of Public Works Malaysia	An internet based national disaster event database system that serves as a tool to support evidence-based preparedness and mitigation initiatives for disaster risk management. This system was developed by the Office of Civil Defense in cooperation with the Asian Disaster Reduction Center (ADRC).	-	-	-	-	Ministry of interior - Other involved organizations cooperate to manage disasters under its supervision.

		www.ndrrmc.gov.ph					
Risk and Vulnerability Assessment	Flood Land slide	Project-based climate change-related and natural hazards (www.ndrrmc.gov.ph)	-	-	-	-	Earthquake Flood Land slide Drought
Kinds of data and scale contributing to regional disaster management	Images ,1:10000 DTM ,1:25000 Topographic	Shape file, 1:50000	-	-	-	-	

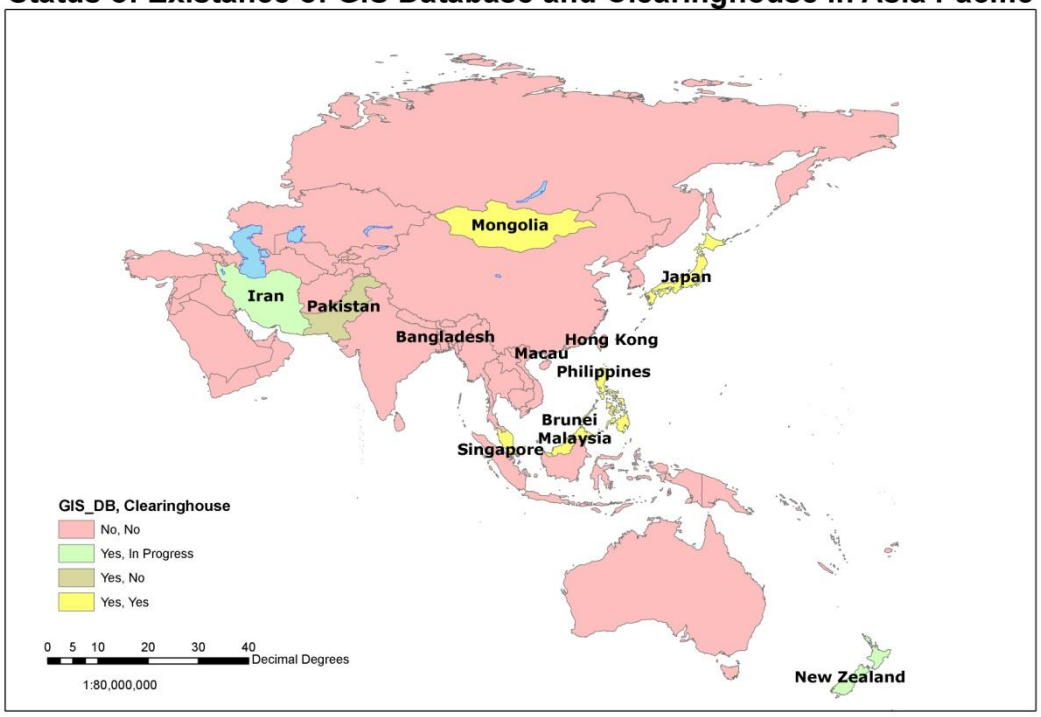
No.		**8**	**9**	**10**	**11**	**12**
Country		**Mongolia**	**Pakistan**	**Japan**	**Hon Kong**	**New Zealand**
Disasters	**Earthquakes**	×	×	×		×
	Landslide			×	×	×
	Floods	×	×	×	×	×
	Drought	×	×			×
	Avalanche			×		×
	Tsunami			×		×
	Volcanic Eruption			×		×
	Hurricanes/Monsoon					
	Cyclones /Typhoons			×	×	×
	Wildfire	×		×		×
	Agricultural Pests					×
	Sandstorm					
	Epidemics	×			×	×
	Other	Heavy snow				

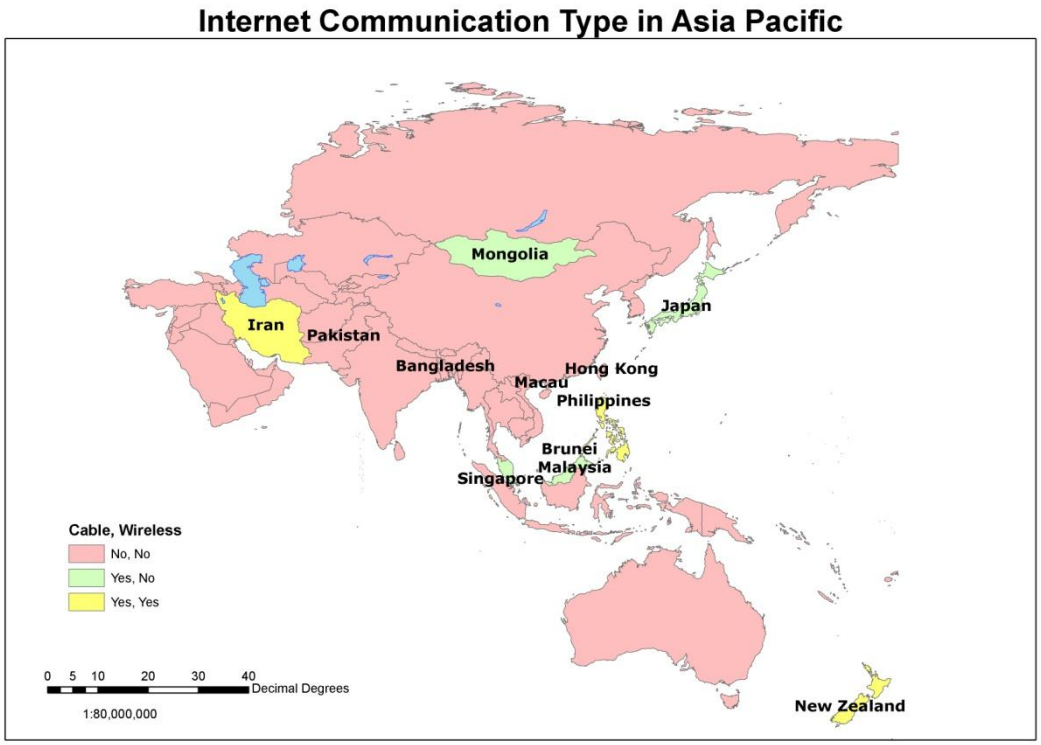
Administrative structure for disaster management	National Emergency management agency • Provinces' emergency authorities departments	National disaster management authority • Provincial • district	Central Disaster Management Council President/Prime Minister • Minister of State for Disaster Management • Disaster Management, Cabinet Office	Security Bureau	Local government With oversight from national government
Risk and Vulnerability Assessment	-	-	Earthquakes Flood	-	Flood risk assessments
Kinds of data and scale contributing to regional disaster management	-	Data about Earthquake, Flood and Drought	-	-	• generally in the form of cartographic map products in response to specific events • Some vector data has become available e.g. via the New Zealand Defense Force

4-1-4- Network Access and web services

The below figures show present status of some PCGIAP member countries in respect of network access and web services related to disaster management. The first figure illustrates the extracted results about existence of GIS database and clearinghouse and the next shows internet communication types in the region.

Status of Existance of GIS Database and Clearinghouse in Asia Pacific





4-1-5-Results

According to first item -data accessibility and sharing- most member countries have implemented their national clearinghouse or the implementation is in progress and sufficient spatial web services are provided through their geoportals. National organizations involving spatial data are connected to clearinghouse and the main users are governmental organizations.

According to the second item- data resource- some member countries have suitable background and socio-economic data that covers the country and have been updated properly. Besides, there is appropriate data accessibility for users. Notwithstanding, lack of such data in some other countries is a harmful weakness that may lead to great casualties and losses due to disasters.

According to third item -spatial data for disaster management- sufficient data are documented about occurred natural disasters in some member countries. Existence of administrative structure in these countries leads to risk and vulnerability assessment. Some member countries have contribued to other countries to manage natural disasters and some have capabilities to hold training courses in respect of disaster management. On the other hand, some other countries have not accomplished enough practices in the field of providing data and risk or vulnerability assessment. It could extremely damage these countries.

According to the forth item - network access and web services- some member countries have proper network access and infrastructure to share data. The GIS servers and clearinghouse

cover country and sufficient bandwidth for connection is supported.

Considering available information through filled questionnaires, it is concluded that most of the countries have appropriate situation in data accessibility and sharing, data resources, spatial data for disaster management and access network and web services. Therefore, it seems that developing a regional clearinghouse can be an efficient solution for the best regional disaster management.

4.2 Research plan for investigating disaster management Geoportals (DM-GP) at the national and regional levels

The summery report of this investigation is given as below:

Abstract

Human society and the natural environment have become increasingly vulnerable to natural hazards, such as earthquakes, floods, droughts, and hurricanes. Asia and Pacific region has the highest rate in the indices of disaster occurrences and number of people affected, and economic damage. Disaster management tasks are inherently uncertain, requiring knowledge sharing and quick decision making. Synchronous data sharing between organizations and emergency workers could effectively promote the process of decision making. It has been gradually understood that up-to-date spatial data for disaster management, especially data during the response phase, is quite important. Besides spatial data describing the disaster, information gathered from the citizens and other organizations are also valuable for emergency management and decision making. Information about available resources, access to roads and damaged areas, required resources, and required disaster response operations should be available and accessible for use in a short period of time. Geoportals support the ability to publish and search collections of descriptive information (metadata) for data, services, and related information objects. The maps derived from the GeoPortal provide valuable information for the relief teams in the process of planning and emergency management. The objective of this research is investigating disaster management Geoportals at the national and regional levels. Asia and pacific is the considered region. The research is related to workgroup2 of UN-GGIM-AP and meets item A of its work plan which focuses on the response phase of disaster management. To fulfill the objective, the following steps need to be taken including investigating disaster information networks, existing Geoportals, required data for disaster management Geoportals and investigating required spatial analyses. It could be an appropriate guideline towards implementation of a regional Geoportal for disaster management.

Background

Natural disasters can be described as rapid and extreme events within the geophysical system (lithosphere, hydrosphere, biosphere or atmosphere), which create potential danger to life and

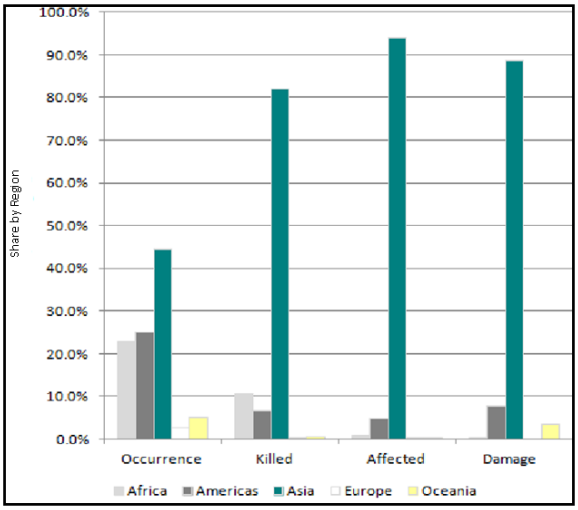
property.

According to EM-DAT, 196 natural disasters occurred in 2011 worldwide, killing about 28,800 people and affecting over 85 million people. The estimated amount of economic damage came close to US$290 billion.

By region, Asia is the highest in the indices of disaster occurrences and number of people affected, and economic damage. Asia accounts for 44.4 percent, occurrences; number of people killed, 82.0 percent; number of affected people, 94.0 percent; and amount of economic damage, 88.7 percent.

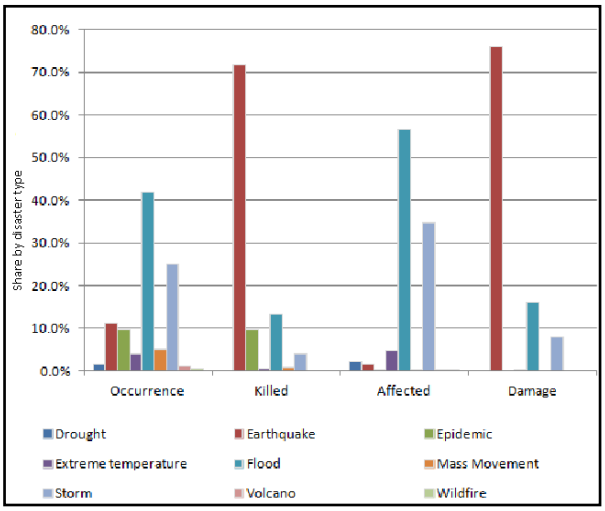
The following figure shows the impacts of natural disasters—occurrence, number of deaths, number of affected people, and economic damage—that took place in different regions across the world in 2011.

Impacts of Natural Disasters by Region, 2011



The below figure provides the breakdown of impacts of disasters sorted by disaster type.

Impacts of Natural Disasters by Disaster Type, 2011



Datasets compiled by different organizations are often different in terms of resolutions (spatial, temporal, and thematic), precision, accuracy, completeness and semantics. This is due to varying requirements of applications and different interests and emphases. Therefore, sharing of information (under proper guidelines) about natural disasters is crucial and beneficial for all stakeholders even though very different needs may be present among them. The collaborative and coordinative effort should lead to an easy access of comprehensive natural disaster information in a shorter time and with much less effort. The result could be of enormous benefit to both the stakeholders and the general public.

Research on disaster management events and threats shows that there is a lack of effective cooperation and coordinated action through collaboration and information and knowledge sharing and that these issues are still critical and unresolved problems in the disaster management field. For disaster managers to identify entities susceptible to damage from the effects of natural disasters as is required by vulnerability analysis, they need access to disaster data.

To reduce disaster impacts and achieve safer and more sustainable communities, the importance of proper understanding and management of disaster events has been widely recognized. Knowing where and when the natural disasters have occurred and the nature of their impacts is essential for understanding disasters and planning for damage reduction. It is particularly important to take the vulnerability of human populations into consideration.

Geospatial technologies support decision making in all phases of the disaster management cycle. In disaster management, there is a need for a variety of geo-spatial information at different scale, such as topographic, geologic and soil maps, vegetation cover, road network, location and type of buildings, aerial photography, satellite imagery, and global positioning system data (GPS). The volume of the data required for disaster management is too much to be handled by manual methods in a timely and effective way. Geoportals can assist disaster management in national and regional levels and can be useful for all phases of disaster management.

Research objectives

Asia and the pacific is the considered region. The research is related to workgroup2 of UN-GGIM-AP and meets item A of its work plan. The focus of this research is in response phase of disaster management. The research objectives is:

- Going through the basic concepts such as definition of disasters, type of disasters and disaster management phases.
- Investigating disaster management Geoportals at the national and regional levels
- Preparing an appropriate guideline towards implementation of a regional Geoportal for disaster management

To fulfill the objective, the following objectives need to be addressed.

Investigating disaster information networks

As spatial data describing the disaster, information gathered from different organizations and NGOs are critical for emergency management. This highlights the need for both Intra- and Inter-Organization communications. There, hence, arises a need for an Integrated Communication and Information Network for Disaster Management. So we investigate existing disaster information networks to reveal the best alternative.

Investigating Geoportals

We investigate launched Geoportals that aims to assist disaster management at national and regional levels. The aim of this investigation is to extract the disaster types and the disaster management phases they support, the information they represent and the analyses and services they provide. It could be a proper guideline for a regional disaster management Geoportal.

Investigating required data for disaster management Geoportals

To investigate required data for disaster management Geoportals in the research, we limit the research domain. We choose two first disasters in the region, earthquake and flood as case studies to investigate required data. The required data must provide for spatial analysis in order to manage disaster.

Investigating required spatial analyses

Same as the previous objective, some important required spatial analyses suggests for earthquake and flood as case studies. We investigate existing implemented disaster management projects to extract the analyses they performed related to flood and earthquake.

Geospatial Support for Disaster Management

a- Geo-Information science and disaster management

Many studies have shown that analysis capabilities based on GIS technology has enhanced decision making. Geospatial technologies support decision making in all phases of the

disaster management cycle (Warfield, 2012). Gas dispersion simulation (Tumay et al., 2002), forest fire management (Akay et al., 2012), earthquake hazards assessment (Tarek, 2003) etc. have all been improved. At the same time, it has been gradually understood that up-to-date spatial data for disaster management, especially data during the response phase, is quite important. Besides spatial data describing the disaster, information gathered from the citizens and other organizations are also valuable for emergency management and decision making. In some cases, they become two critical data sources. For example, public intents and emergency supplies' distribution are very important data representing the current status of an emergency. Web-based disaster information systems and related coordination tools are one of the key features of this system to provide instant alerts and automatic impact estimations for response planning.

b- Disaster Information Networks

To address disasters in a fast and highly coordinated manner, the optimal provision of information concerning the situation forms an essential pre-requisite. For the whole exercise to be the most effective and coordinated, stakeholders, players and organizations involved have to react not only efficiently and individually, but also in a coordinated manner.

This highlights the need for both Intra- and Inter-Organization communications at several stages. A lack/lag in communications implies lack/lag of information flows between the level players thereby hindering the critical resource usage and its effective and efficient management. There, hence, arises a need for an Integrated Communication and Information Network for Disaster Management that provides efficient & reliable exchange with real-time processing of relevant information.

The first thing that goes off and that is so critical is the communication backbone, as in the hours and even days following an event communication is often limited because existing infrastructure was destroyed or the event occurred in an area without infrastructure. Voice service may be severely restricted because of the environmental or non-infrastructure issues.

During emergencies when terrestrial telecommunication networks are damaged or severely impaired, alternative and flexible networking arrangements become critically important to ensure ongoing and effective coordination of emergency response and relief efforts. Thus, there is a recognized need for wireless communications, including high capacity wireless, for emergency management.

The international counter-disaster community today is increasingly considering computer mediated networking as a powerful tool for improving disaster communications. Central to this trend is a belief that computer mediated communications capabilities, both inter-organizations and intra-organization level, can improve disaster management practice to a large extent.

Since Disasters themselves are unstructured in scope and hence difficult to be managed centrally, there is a need for a user centric decentralized, distributed and hierarchy-independent approach wherein even the end user is empowered accordingly for quick and

effective results. The main objective here is to match the available resources at any time with the needs, at the right time and to the right people. This forms our research objective in the fields of Technology enabled, real-time activated & strategically enhanced Disaster Management.

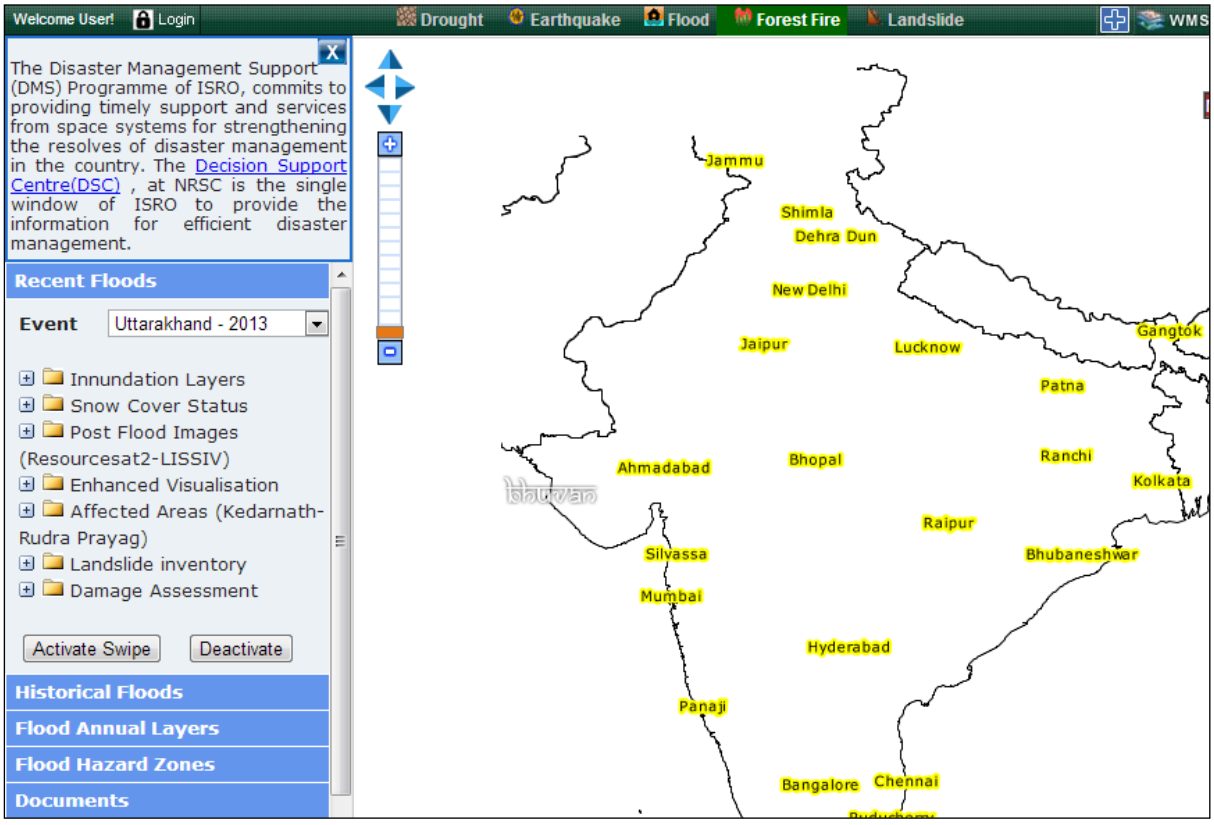
c- Investigating disaster management Geoportals

In this part, the Disaster Management Geoportals of some countries in Asia and the Pacific region were investigated. The services that can be provided by the Geoportals were considered.

In this research, a few disaster management geoportal from several countries were investigated. For example, Indian disaster management geoportal is given below:

The Disaster Management Support (DMS) Program of ISRO commits to providing timely support and services from space systems for strengthening the resolves of disaster management in the India. The Decision Support Centre (DSC), at NRSC is the single window of ISRO to provide the information for efficient disaster management.

Indian Geoportal for disaster management



The GeoPortal in Indian is Bhuvan Beta. This GeoPortal is content of:

- Land Services
- Weather Services

- Ocean Services
- Disaster Services

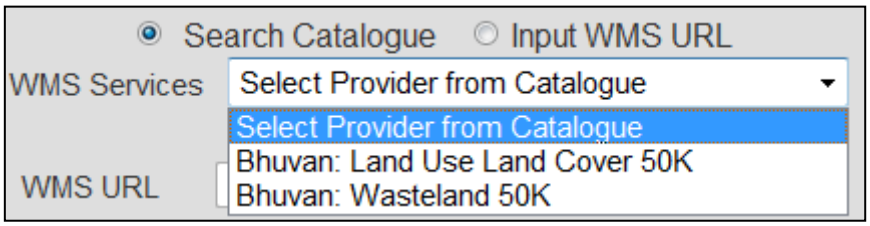
The address of this Geoportal is http://bhuvan-noeda.nrsc.gov.in/disaster/disaster/disaster.php

The kinds of disasters in this Geoportal: Drought, Earthquake, Flood, Forest Fire, Landslide.

Bhuvan Catalogue provides some of the WMS Services available; User can input WMS URL for listing the Layers.

We can add Bhuvan WMS or External WMS Layers Figure shows about that.

Support WMS layer in Bhuvan Geoportal

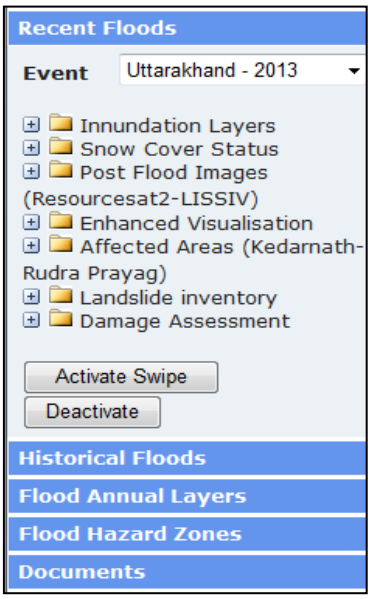


In this Geoportal we have tools for Zoom in, Zoom out, Pan and we can Measure Distance and add or remove Base Layers and we have Map, Satellite and Hybrid view in Bhuvan.

Bhuvan has archive with the updated information on the portal which can be used for future references.

This site gives information about disaster, for example for flood disaster, information about historical floods, flood annual layers, affected areas and damage assessments are presented.

Information and Analysis for Flood in Bhuvan Geoportal



Data Requirements for Disaster Management Geoportals

a- Data characteristics required for disaster management Geoportals

Geospatial data catalogs are discovery and access systems that use metadata as the target for query on raster, vector, and tabular geospatial information. Indexed and searchable metadata provide a disciplined vocabulary against which intelligent geospatial search can be performed within or among SDI communities.

In other words, catalog services support the ability to publish and search collections of descriptive information (metadata) for data, services, and related information objects. Metadata in catalogs represent resource characteristics that can be queried and presented for evaluation and further processing by both humans and software. Catalog services are required to support the discovery and binding to registered information resources within an information community.

b- Geospatial data requirements for disaster management Geoportals in the case of earthquake and flood

The type of data required for disaster management Geoportals depends on the state and condition of the study area. Comprehensive studies by NCC revealed the great amount of spatial data that is needed to manage disasters. These data are divided into base data and required data for earthquake and flood. More than 120 spatial data layers detected as base data.

There are more required technical data when we are managing earthquake. these are as below:

- Epicentric
- geology layers

- Fault

These layers are specifically required for earthquake management that belongs to Geology classification.

When we investigate flood disasters in more detail, much more detailed problems appear. Population density, local topography, historic hydrological records and many other factors have to be considered carefully during flood emergency management. Types of data that have been considered specifically for flood disaster management are as below:

- Meteorological data such as Gauging station
- Topographic data such as catchment boundary
- Hydrological data such as Flow direction, catchment area, Rainfall, runoff
- Agriculture data such as Agriculture boundary, Land cover

Geospatial Analyses Required for Disaster Management

a- Some of the GIS analyses for disaster management

GIS is used in many phases of disaster management, starting with planning before an event happens. Disaster relief involves the response phase of disaster management. GIS and GIS professionals can assist immediately by helping decision makers understand the scope of the damage and identify locations where people may be trapped or injured or require medical support and rescue (Ralston, 2002). Analyzing critical infrastructure (facilities essential for the operation and sustainability of health services, food services, and government operations) that could be damaged or destroyed is essential to restoring vital services and government operations.

Decision makers can assign response resources to the highest life safety and facility repair priorities. Another critical mission that geospatial technology supports is emergency supply chain management.

A few specific examples of how geospatial technology supports disaster relief include Rapid identification of potential shelter/housing locations (schools, libraries, churches, public buildings) appropriate for supporting affected populations.

Identification of supplies and materials is necessary for response, relief, and recovery efforts. Identification of locations is suitable for staging areas and incident command posts (areas with the appropriate power, space, access, etc.) to provide logistical support for public safety personnel.

If the disaster is persistent (flood, wildfire, chemical dispersion, weather event, etc.), GIS can model the speed, direction, and intensity of the event in order to warn people in harm's way or position public safety resources for immediate deployment.

GIS can produce maps and imagery of the incident for government officials at regional and national levels who are responsible for providing additional public safety, logistical, and financial resources support.

During the large-scale disasters in remote locations throughout the world (based on the type of emergency or disaster), GIS is used to determine how many tents will be needed based on the location of populations affected by the disaster.

Analyze vulnerable populations for secondary health effects from a disaster, implementing inoculation and preventive treatments, and positioning medical teams and medical supplies in locations to optimize preventive treatments.

Analyze areas where large numbers of refugees can establish camps out of harm's way that are accessible for supply delivery and have access to water and other resources necessary to support large numbers of people.

Identify where the appropriate relief supplies can be obtained, transported, and delivered to various refugee camps or where they are most needed (highways, bridges, sites suitable for landing fixed-wing or rotary aircraft, etc.).

Analyze security requirements to protect responders, refugees, and supplies. Maintain and display the status of the response, relief, and recovery efforts.

GIS technology is used to collect, store, analyze, and share geospatial information needed by agencies to effectively support operations and restore disaster-affected communities. Properly trained emergency planners and geospatial analysts can use GIS for disaster relief operations. They can use GIS to implement measures such as establishing communications sites, restoring electrical power, and planning traffic routes to carry emergency supplies to critical facilities. In many cases, specific datasets will not be available to accommodate every possible contingency that may arise in disaster operations. For geospatial analysts, the challenge is to quickly gather data and accurately fuse it together to provide actionable information in support of emergency managers (Mansourian et al., 2006).

b- GIS for earthquakes disaster management

Emergency management professionals are responsible for assessing risks and hazards and identifying potential emergencies and disasters. Emergency operations personnel recommend appropriate prevention or mitigation strategies that can reduce the impact of potential emergencies.

Large, complex emergencies such as earthquakes often affect multiple departments or multiple agencies and require data to be collected and assembled from a variety of locations quickly under adverse conditions. Part of the Emergency Operations Center (EOC) role is to understand the details of the emergency, order the required response resources, coordinate with adjoining agencies, and determine the immediate actions necessary to contain the incident.

b-1- GIS Analyses Samples for earthquake

Two cases from two countries including Japan and Turkey were given. Also developing a GIS to manage earthquake response phase is performing by a research team in K.N.T University

of Iran. The main object of this team is to develop a GIS for managing earthquake response phase to better decision-making during and just after the earthquake. In this way, some steps have been mentioned:

- Repairing lifelines networks to stabilize the situation and reduce the probability of secondary damages (for example, gas network to prevent secondary damages or shutting off contaminated water supply sources…)
- search and rescue activities
- transport and communication
- evacuation are the priorities to operate
- Quick rescue of people by search and rescue teams from collapsed buildings, after the impact of a destructive earthquake, can save considerable number of lives.
- Then, emergency sheltering should be managed
- distribution of water, food and public services should be provided
- medical heath centers should be identified in order to give medical care to the casualties

Other activities in this phase include:

- burying deaths immediately
- damage assessment to speed recovery operations

c- GIS for flood disaster management

A flood can be defined as a natural phenomenon that results in the temporary submerging with water of a land that does not occur under normal conditions. As they are naturally occurring, they cannot be prevented and have the potential to lead to fatal causes such as displacement of people and damage to the environment (Adeoye et al., 2009; IFRC, 2001).

Some general reasons of flood include weather related reasons: heavy rainfall, duration of pre capitation, sudden snow melting and physical conditions soil variety, slop of lands, land degradation and human activities: deforestation, misusing of land and transforming to grasslands or agricultural area, misconstruction of roads, bridges, dams and environmental situations. Flooding can also occur when a dam breaks, producing effects similar to flash floods.

Floods can be caused by anthropogenic activities and human interventions in the natural processes such as increase in settlement areas, population growth and economic assets over low lying plains prone to flooding leading to alterations in the natural drainage and river basin patterns, deforestation and climate change. Accessibility and dissemination of timely and accurate information is very essential in flood management. In the analysis of the flood vulnerability and in an emergency management after occurring a flood, planers, emergency managers and relief authorities need accurate and timely information to take emergency measures. Immediately after a flood, the affected people, emergency managers, relief authorities and other relevant organization need the real time and up to date information about the extent of the damage, the areas affected severely, the number of people affected, the people need to be evacuated, the nearest shelters and other services etc.

Evaluation of user needs is a very important aspect in post disaster emergency management. To find out the real needs for the affected people in the emergency, experienced organization and people can provide a comprehensive scenario from their previous experiences. The post flood situation and user needs depend upon the extent and duration of the disaster, the natural and geographical aspects of the regions where the disaster hits, the social and economic aspects of the area, the institutions involved, the preparation taken other factors.

c-1- GIS Analyses Samples for flood

A flood can be defined as a natural phenomenon that results in the temporary submerging with water of a land that does not occur under normal conditions.

- Flood prediction and warning
- Identify the area affected by flood
- Identify the affected building/infrastructure.
- Estimate the number of affected people in the affected area.
- Flood hazard assessment
- Identify the building and places used for shelters and relief centers.
- Identify and estimate the needs/requirements for the affected people.

Conclusions

The objective of this research is investigating a disaster management geoportal at the national and regional levels. Asia and pacific is the considered region. The research is related to workgroup2 of UN-GGIM-AP and meets item A of its work plan based on resolutions adopted at the Nineteenth United Nations Regional Cartographic Conference for Asia and the Pacific (UNRCC). In more accurate word, design and implementation of a regional Geoportal for disaster management is the main task of UNGGIM-AP-WG2 work plan 2012-2015.

Natural disasters can be described as rapid and extreme events within the geophysical system which create potential danger to life and property. Each year, natural disasters cause billions of dollars of property and infrastructure damage, unexpected disruption to socio-economic activities and tragic loss of human lives globally.

According to EM-DAT, 196 natural disasters occurred in 2011 worldwide, killing about 28,800 people and affecting over 85 million people. The estimated amount of economic damage came close to US$290 billion.

By region, Asia is the highest in the indices of disaster occurrences and number of people affected, and economic damage. Asia accounts for 44.4 percent, occurrences; number of people killed, 82.0 percent; number of affected people, 94.0 percent; and amount of economic damage, 88.7 percent. On the other hand, most in number of killed and damage are attributed to two catastrophic disasters: Earthquake and flood. So, these two kinds of disasters were selected as case studies.

Flood and earthquake are two main disasters that can affect, kill people and make financial

damage. In comparison with the rest of all disasters, flood and earthquake concern with the most damages and losses. For this reason, the two above mentioned disasters were investigated in this research.

Many studies have shown that analysis capabilities based on GIS technology has enhanced decision making. Geospatial technologies support decision making in all phases of the disaster management cycle.

Sharing information (under proper guidelines) about natural disasters is crucial and beneficial for all stakeholders even though very different needs may be present among them. Disaster-induced losses can be significantly reduced through an enhanced coordination of observations related to hazards, timely processing of the data and dissemination of the resulting information to relevant authorities. Geoportals provide a major contribution to the monitoring, prediction, early warning and mitigation of hazards occurring at local, regional and global levels. For example Indian disaster geoportal applies information about types of disaster such as flood, earthquake and supports WMS service and can do analysis for disaster management like flood hazard assessment.

The focus of this research is in response phase of disaster management. To fulfill the objective, it is needed to investigate disaster information networks, Geoportals and required data for disaster management Geoportals.

Comprehensive studies by NCC revealed the great amount of spatial data that is needed to manage disasters. These data are divided into base data and required data for earthquake and flood in this research.

Emergency users of disaster management Geoportals can apply GIS to help manage the impact of disasters by:

- Assessing risk and hazard locations in relation to populations, property, and natural resources
- Integrating data and enabling understanding of the scope of an emergency to manage an incident
- Recommending preventive and mitigating solutions.
- Determining how and where scarce resources should be assigned
- Prioritizing search and rescue tasks
- Identifying staging area locations, operational branches and divisions, and other important incident management needs
- Assessing short- and long-term recovery operations

Similarly, users of disaster management Geoportals are able to meet the following needs:

- Identify the area affected by flood
- Identify the affected building/infrastructure
- Estimate the number of affected people in the affected area
- Flood hazard assessment
- Identify the building and places used for shelters and relief centers
- Identify and estimate the needs/requirements for the affected people

- Select the transportation routes for transporting the materials

Briefly, a disaster management geoportal aims to become a centralized Port to represent spatial services for disaster management by providing integrated and interoperable observations and derived maps for:

- Vulnerability/Risk assessment: Relevant observations and derived maps will be made available and easily accessible through the disaster management clearinghouse.
- Crisis Management: Users will be able to request information on-line, via the geoportal or else. The request will be sent to all providers that will contribute the data/products through an agreed mechanism to the disaster management clearinghouse which will generate maps and other products and publish them through the geoportal or any other portal that users can access.
- Related Forecasts (i.e. weather, population migration, fire risk etc): Forecast products to support disaster management will also be made available in standardized formats through the clearinghouse.

4.3 Promotions

5. Further workplan

The proposed workplan for the coming year is as follows:

Operation items	Executive manager	Time table		
		2013	2014	2015
B. Design and development of a disaster management Geoportal (DM-GP): pilot project. 1. Design the architecture of the DM-GP. 2. Clarification of required standards and specifications for the development of DM-GP 3. Investigation of service composition techniques ★ 4. Development of sample web services to satisfy atomic operations ★ 5. Development of the DM-GP ★ 6. Development of a service composition technique within the DM-GP	The chair with the cooperation of the vice-chairs	☑ (items 1 to 3)	☑ (items 4 to 6)	

6. Annexed

1. Nima Ghasemlou and et al., 2013, Investigating Disaster Management Geoportals (DM-GP) At the National and Regional Levels (Asia-Pacific), NCC of Iran.

2. Hadi Vaezi and et al, 2013, Summary of Questionnaires on Presents Status of PCGIAP member countries related to capacity building, access network and data integration for disaster management, NCC of Iran.