Summary of Training Report

Technical Assistance on Implementation of Geo-referenced Information Systems for Disaster Risk Management (Geo-DRM)

Conducted in Nepal

11 – 14 February 2014

Submitted by
Lal Samarakoon
September 2013
A training program on Implementation of Geo-referenced Information Systems for Disaster Risk Management was organized by Economic and Social Commission for Asia and the Pacific (ESCAP) at Hotel Malla, Kathmandu, Nepal from 11th to 14th February 2014. Eleven Participants from different agencies of Nepal, namely Ministry of Home Affairs, Nepal Police, Armed Police Force and National Planning Commission, attended this program and participants details are given in Annex 1. During the program the participants were trained on advanced system administration options in Geo-referenced Information Systems as well as detailed GIS analysis techniques.

Since five participants had attended the initial training program held in Bangkok, Thailand in October 2013, the group was divided into two groups; experienced participants and new participants. The two groups were taken separately in the first two days and were taught different subject areas. The experienced group was given knowledge on GIS analysis techniques while the other group was taught on the basics of implementation of Geo-referenced Information Systems and their usage. During the last two days, everyone worked as a single group and learnt about advance system administration tasks of the Geo-Portal system. The training schedule is given in Annex 2. Detail explanation of the contents covered in each day is given bellow.

**Day 01**

The opening ceremony was chaired by the Joint Secretary Mr. Shankar Koirala of Ministry of Home Affairs, Nepal. Mr. Koirala and Dr. Lal Samarakoon, Director of Geoinformatics Center, Asian Institute of Technology, Thailand delivered speeches during the ceremony. After the opening ceremony, Mr. Ramesh De Silva from Geoinformatics Center, Asian Institute of Technology explained about the training schedule and the detail plan of the training. After that Mr. Mukesh Keshari, Computer Engineer of Ministry of Home Affairs talked about the outcomes of their previous training held in Bangkok, Thailand and demonstrated the Geo-Portal system they have developed using the knowledge they gained.

Then the group was divided into two and worked in different subject areas.
New Participants

The participants were mainly trained about the Geo-Portal interface and its features. Then they were given number of country level datasets in both vector (ESRI Shape File) and raster (Satellite images as GeoTIFF files) formats and trained to upload to the Geo-Portal system established in GIC, AIT.

Following modules were covered during the first session of the program.

• Familiarization of Geo-Portal
  - Data Layers
  - Maps
  - Documents
  - Meta Data
  - Thematic Mapping
• Upload datasets
  - Vector Data
  - Raster Data

The hands-on session on implementation of individual Geo-Portals was started following the demonstration. Since the proposed Geo-Portal Application needs to be configured in a Linux based operating system, the participants were trained how to install and configure Ubuntu Linux. Through the experts of UNESCAP communication was made to participants to bring along their laptop computers to setup their own Geo-Portal systems. The main motivation was to guide all the participants to develop a portal by each and everyone following the instruction to give to them. It is expected that this way of training make them understand and learned the method to create a portal as well as it will develop the confidence. After setting up Ubuntu Linux in the laptops, they were given instructions on the setting up and configuring the Geo-Portal. A leading geospatial data sharing platform “GeoNode” was used for this implementation. A list of activities carried out during this session is given bellow.

• Setting up local Environment
  - Minimum System Requirements
  - Ubuntu Linux Installation
• Geo-Portal Setup
  o Install and configure GeoNode
  o Create system users
  o Upload some data sets to own country level Geo-Portal

**Experienced Participants**

2-Days GIS technical training program was started in parallel to the GeoNode portal training with 5 participants attending. The main focus was to develop the knowledge of GIS analysis based on open source QGIS. Earthquake occurred on September 2011 in the border of Nepal-India were used as a case study. The major topics discussed and demonstrated are:

- Earth observation and GIS data resources (i.e., US Geological Survey (USGS), Landsat Glovis, Digital Globe, Open Street Map (OSM), Aster GDEM, Diva GIS, and WorldPop).
- Extraction and mapping earthquake affected areas in district level
- Estimation of population (census data at district level) affected by earthquake maping.

Introduction about GIS was reviewed at the beginning of the session. QGIS free software capable running both Microsoft Windows and Linux System was used in this training. The USGS website where information about earthquake (i.e., near-real time-earthquake events, peak ground acceleration (PGA) maps can be downloaded in various formats (shapefile, KML and text format) was introduced. Freely available Landsat satellite images provided in USGS Glovis browser were presented on search and criteria through interfaces. Due to the limited of internet connection capabilities, only demonstration on the downloading process was introduced. Practical session and GIS analysis was used data which were prepared prior the training period and provided to the participants. Some of other web resources such as Quickbird (QB) Images provided by Digital Globe, OSM, and Diva GIS were introduced to the participants as potential RS and GIS free data resources.

**Day 02**

**New Participants**
Important features of the Geo-Portal system were discussed on the second day. A special attention was given to describe the security features of the Geo-Portal system in terms of its users and its data. After that the participants continued to upload datasets to their own Geo-Portals. Below are the topics covered on the second day.

- Security Features of Geo-Portal
  - User authorization
  - User permissions
  - Data permissions
  - Map permissions
  - Document permissions

- Important Features of Geo-Portal
  - Map printing
  - Map publishing
  - Integrating data and maps with Google Maps
  - Making Thematic Maps
    - SLD files
    - Using Geo-Portal style features
    - Using third party free tools (Udig, QGIS)

- Data Preparation and Upload
  - Upload data to own Geo-Portals

The customization procedures of the developed Geo-Portals were discussed during the evening session. Participants were taught how to customize the appearance of the Geo-Portal according to their organizational need. They could include their organization logo, banner etc. in the portal interface. Also they learnt how to change the background colors, change the text etc. in order to provide more customized look to their organization specific Geo-Portal.

Activities carried out in terms of customization are as follows

- Customizing Geo-Portal
  - Changing Logo
  - Changing Colors
  - Changing Text
Experienced Participants

The second day of the training, participants carried out geo-reference operation on sample QB image with 15-meter spatial resolution which original resolution was 2.5-meter and reformatted to GeoTIff which could be overlain and displayed over maps. Non-spatial data (i.e., earthquake locations) were plotted using QGIS to generate Nepal map using number of GIS functions.

A table of intensity descriptions with the corresponding PGA and peak ground velocity (PGV) values used in the ShakeMaps were illustrated. Spatial overlain capability allows to simply visualize possibly affected elements, for example, PGA map and sensitive and important features (i.e., school, health facilities and government and service sectors). Spatial data analysis (i.e., vector analysis, geo-processing, database, and management tool) were performed. Participants learnt to use intersection techniques on administrative boundary and PGA map to generate the affected areas. The result showed 34 districts affected (possibly sensed by the earthquake but no severe damages) by the earthquake in year 2011. The participants learned how to create, edit and manage attribute on population census data. Simple calculation approaches (i.e., area and population density) were done. Differences of geographic location (latitude/longitude) and projection were briefly discussed. They also learned query, and ways to interpret the results. Finally, participants uploaded produced map to GIC Geo-Portal. In summary following GIS functions were demonstrated and used during the hands-on session.

- Raster Tool (i.e., Georeference, Projection Management)
- Geoprocessing Tool (i.e., Intersect, Dissolve)
- Table Management (i.e., Create, Edit, Calculate, Query)
- Data Properties (i.e., Grid Pixel size)
- Symbology (i.e., categorized, layer file)

Some of the screen shots of the GIS analysis during the training are given in Annex 5.

Day 03

From the third day all participants started working as a single group. The new participants obtained a good understanding about implementation, functionalities and capabilities of the Geo-Portal system during the first two days and joined with the experienced group to proceed
with the advance training. The advance training was mainly focused on administration options of the Geo-Portal system.

During the third day, the main focus was to discuss about the possibilities of accessing external WMS sources within the developed Geo-Portal. Participants were given knowledge on the procedure to temporarily add external WMS sources to their Geo-Portal application and also to add them permanently by configuring the system. The possibility of accessing own Geo-Portal data as WMSs via Quantum GIS desktop application was also discussed. Finally, it was discussed the process of adding base maps such as Google Map permanently to the system.

Below are the topics covered on the third day.

• Temporary add data from external WMS sources
• Permanently add external WMS sources to Geo-Portal
• Access own Geo-Portal data via QGIS
• Add google satellite map as a default base map

Day 04

The main focus of day four was to train participants on backup and restore operations of the Geo-Portal system. The backup process can be further divided into separate components such as configuration backup, data backup and design backup and template backup. The participants were trained on how to backup each of these components and also how to restore them in another Geo-Portal instance.

Having completed the procedure of back up as a hands-on training, the document management options of the Geo-Portal system were discussed. It was showed that administrator could set the document types, maximum document size etc. that can be uploaded to the system.

Finally participants were given some knowledge on how to troubleshoot certain issues by accessing the forums, joining the discussion groups etc. Activities carried out on the last day are as follows;
• Backup and Restore
  o Configuration backup
  o Data backup
  o Design backup
  o Templates backup
• Document Management
  o Set maximum documents size
  o Uploadable document types

At the end of the training, an official closing ceremony was held at the training venue. Mr. Pradeep Koirala, Under Secretary of Ministry of Home Affairs, Nepal chaired the event. Mr. Jeewan Rai from Armed Police Force, Nepal and Mr. Mukesh Keshari from Ministry of Home Affairs, Nepal presented the outcomes of the training and demonstrated the systems they developed. Mr. Syed T. Ahmed, the representative of UNESCAP, Bangkok Office emphasized the scope of the project and future collaboration opportunities during his speech. Dr. Lal Samarakoon, the director of Geoinformatics Center, AIT also addressed the group and acknowledge the positive steps taken by the Nepal agencies specially the Ministry of Home Affairs as a result of this project. Addressing participants Mr. Pradeep Koirala, Under Secretary of Ministry of Home Affairs thanked UNESCAP, GIC-AIT and all the responsible stakeholders. Finally the Joint Secretary distributed the certificates to the participants for successfully completing the training.

Recommendations

1. Provision for Infrastructure: Number of agencies learnt to establish a Geo Portal are capable of doing by their own. The actual implementation may not take place if agencies are not have their servers (own or rented), data to share and internet access. It is necessary to motivate the decision makers to invest on required infrastructure for establishing a Geo Portal for real implementation.

2. Dedicated Staff: This is as important as infrastructure. In the case of Nepal, MOHA has assigned dedicated computer staff to establish the system with few other supporting staff and this human resources allocation works quite well. The staffs who are assigned are very keen to make the system works, and they are very motivated. This has to be observed when dealing with other countries.
3. Develop national collaboration; various organizations can have their own Geo Portal system developed following the system integration developed under ESCAP support or some other means. The important message is that the Geo-Portal systems belong to other agencies can be linked and all permitted data layers can be accessed within a given Geo-Portal framework. This would be a key advantage to motivate people to make use of this system as it provides a shared but secure platform to access data among the agencies, without duplicating data.
Technical Assistance on
Annex 1
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National Planning Commission

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<table>
<thead>
<tr>
<th>TIME</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>0900 h – 1015 h</td>
<td>Opening Remarks UNESCAP Discussion Introduction to Geo-Portal Ramesh</td>
<td>Discussion Availability of country Data Introduction to QGIS Using free data (USGS, OSM, DEM, High Resolution Imagery)</td>
<td>Hands-on Data Upload: Upload own data sets to own Geo-Portal (Continued) Thip</td>
<td>Discussion Backup Geo-Portal Backing up settings, data, templates Ramesh</td>
</tr>
<tr>
<td>1015 h – 1045 h</td>
<td>TEA BREAK</td>
<td></td>
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<tr>
<td>1200 h – 1300 h</td>
<td>LUNCH BREAK</td>
<td></td>
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<tr>
<td>1430 h – 1500 h</td>
<td>TEA BREAK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500 h – 1630 h</td>
<td>Discussion/ Hands-on Configure Geo-Portal including local information Install, Configure Geo-Portal in Participant’s Laptops Ramesh</td>
<td>Hands-on Customizing Geo-Portal Change logo and look &amp; feel Ramesh</td>
<td>Hands-on Add new Base Maps Add google satellite map as a default map in Geo-explorer view Thip</td>
<td>Discussion &amp; Closing -Closing remarks -Evaluation UNESCAP</td>
</tr>
</tbody>
</table>

Annex 2

SCHEDULE
Annex 3
PHOTOS

Mr. Shankar Koirala, Joint Secretary, MOHA chaired the opening ceremony

During the Training
Mr. Pradeep Koirala, Under Secretary, MOHA chaired the closing ceremony

Mr. Syed Ahmed addressing the participants
Armed Police Force Geo-Portal

MOHA Geo-Portal
Certificate Distribution
Annex 4

Screen-prints of the Geo-Portals developed during the training

[Image of Geo-Portal for Armed Police Force]

[Image of Geo-Portal for Ministry of Home Affairs]
Welcome

This Geonode site is prepared for disaster purpose mailing list.

Need help? Getting Started?

LATEST LAYERS

Total 3

- Nepal Satellite Data
  Layer from pans, 45 hours, 13 minutes ago
  Satellite of Nepal

LATEST MAPS

Powered by GeoNode version 2.0 | Developers | About
Annex 5

Screen shot of GIS analysis on Data Resources and GIS analysis using QGIS


Demonstration of Satellite data Overlay

Data Source: Digital Globe (QB image), https://browse.digitalglobe.com

Geo-referenced Processing of satellite Data for Georeferencing
Visualization affected elements due to an Earthquake

Peak Ground Acceleration

- PGA represents contoured in units of percent-g
  \[ g = \text{acceleration due to the force of gravity} = 9.81 \text{ m/s}^2 \]
- The contour interval varies greatly and is based on the maximum recorded value over the network for each event.

<table>
<thead>
<tr>
<th>Perceived Shaking</th>
<th>PGA</th>
<th>Light</th>
<th>Moderate</th>
<th>Strong</th>
<th>Very Strong</th>
<th>Severe</th>
<th>Violent</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not felt</td>
<td>&lt;0.1</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Light</td>
<td>0.1-1.1</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.1-1.5</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Strong</td>
<td>1.5-3.0</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Very Strong</td>
<td>3.0-4.0</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Severe</td>
<td>4.0-5.0</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Violent</td>
<td>5.0-6.0</td>
<td>&lt;1.4</td>
<td>1.4-3.3</td>
<td>3.4-9.2</td>
<td>9.2-18</td>
<td>18-34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td>Extreme</td>
<td>&gt;6.0</td>
<td>&gt;1.4</td>
<td>&gt;3.4</td>
<td>&gt;9.2</td>
<td>&gt;18</td>
<td>&gt;34</td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
</tbody>
</table>

Source: USGS

A table of intensity descriptions with the corresponding peak ground acceleration (PGA) and peak ground velocity (PGV) values used in the ShakeMaps.

PGA Query

- "GRID_CODE" < 4
- "GRID_CODE" >= 4 AND "GRID_CODE" <= 9
- "GRID_CODE" > 9 AND "GRID_CODE" < 18
- "GRID_CODE" >= 18

Potential Damage

- None
- Very Light
- Light
- Moderate

Working with Shake map (PGA value)
Facilities and Public Services affected by earthquake (September, 2011)

Calculation proceeded to estimate population affected by earthquake

\[
\text{Pop}_\text{Den} \Rightarrow \text{Expression: } \frac{\text{"Pop}_\text{2001}"}{\text{"Area"}}
\]

Area \Rightarrow \text{Expression: } \$\text{area}

\text{Pop}_\text{Den} \Rightarrow \text{Expression: } \frac{\text{"Pop}_\text{2001}"}{\text{"Area"}}

\text{Calculation proceeded to estimate population affected by earthquake}