

Nepal Hazard Risk Assessment

Trimester Report

Period November 2009 – January 2010



This trimester report is submitted by ADPC to the World Bank to highlight the issues and progress in the execution of Nepal Hazard Risk Assessment (NHRA) project as a part of the project deliverables.

ACTIVITIES CARRIED OUT

1. Data Collection

Data collection process has started in September 2009 and continued until the end of January 2010 where specific requirement and fine tuning of methodology have been set up by the project team. These data will be utilized to develop the baseline of study area and assess the hazard, vulnerability, and risks.

The data collection covers the following components:

A. Baseline data

- Administrative boundary (VDC, district)
- Land cover, soil, etc.
- Transportation and utility system
- Facility and building
- Water bodies
- Ground elevation
- Demography (census, population distribution)
- Economic value of asset of various sectors

These data were acquired in digital and paper based format from Dept. of Survey (DOS), Central Bureau of Statistics (CBS), and USGS-SRTM.

B. Disaster data

- Historical records (time, place, extent, magnitude/intensity) of earthquake, landslide, flood, epidemic, and drought hazard
- Geology, lithology, soil, etc.
- Precipitation
- River basin, river discharge, etc.
- Agriculture yields
- Existing method in hazard and risk assessment methodology

These data were acquired in digital and paper based format from Dept. of Mines and Geology (DMG), Dept. of Water Induced Disaster Prevention (DWIDP), Dept. of Hydrology and Meteorology (DMH), Department of Health Services (DHS), Central Bureau of Statistics (CBS), International Centre for Integrated

Mountain Development (ICIMOD), JICA, Des-Inventar, Norwegian Geotechnical Institute (NGI), and many other literatures in hazard assessment.

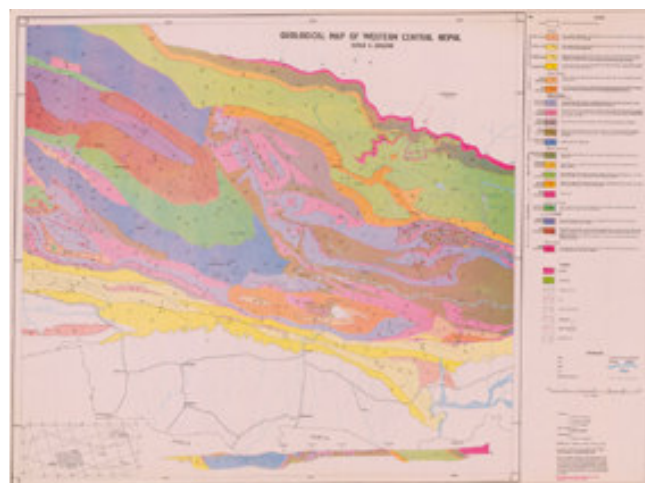


Figure 1 – Example raw data of Geological Map of Central and Western region collected from DMG in paper format

2. Data Generation and Preparation

Most of the spatial analyses in hazard, vulnerability, and risk assessment will be carried out utilizing geographic information system (GIS) and remote sensing (RS) tools. The collected data was then validated and converted into digital format in an integrated GIS database. It covers all components of baseline and disaster data. Relevant attributes (characteristics information) describing the details of those components were also embedded in the GIS database. Scanning, digitization, geo-referencing, attribute entry, code matching, and other necessary works were carried out in developing the GIS database. For spatial reference, NHRA project uses the GIS (shapefile) data in the topographic map provided by National Geographic Information Infrastructure Programme (NGIIP) of Survey Department of Nepal.

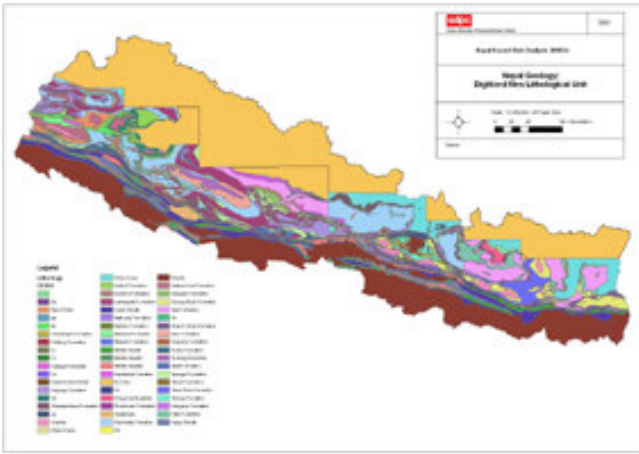


Figure 2 – Merged and georeferenced Geological Map of Nepal developed and presented in GIS environment

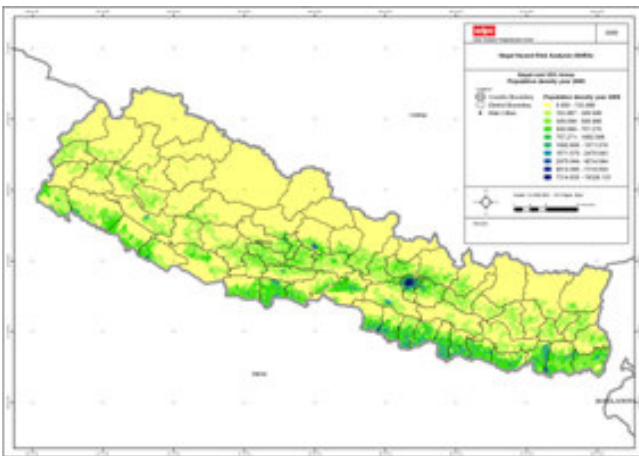


Figure 3 – Population density map in every VDC developed and presented in GIS environment

3. Methodology Development Workshop

NHRA project team of ADPC and NGI conducted an intensive workshop of methodology development on 27-29 November 2009 at Windsor Suite Hotel, Bangkok. It aimed at reviewing and consolidating acquired data and developing hazard assessment methodology. Technical experts participating in this workshop are Mr. Amit Kumar, Mr. Amin Budiarjo, Mr. Rendy Kartiko, Mr. Kittiphong Phongsapan (ADPC), Mr. Bjorn Kalsnes, and Mr. Helge Smebye (NGI). Mr. NMSI Arambepola, UDRM-ADPC Director, provided his guidance for the workshop, and Mr. Amit Kumar, Senior Project Manager of ADPC, facilitated the workshop. The three-day workshop discussed and formulated the assessment methods for earthquake, landslide, flood, epidemic, and drought hazards. The workshop will be followed up by ADPC and NGI in piloting and refining the agreed methods.



Figure 4 – Intensive discussion during the methodology development workshop

4. ADPC Workshop on Hazard and Risk Assessment Methodology

ADPC is recognized by its unique specialization in various aspects of disaster risk management. After initial consolidation of hazard assessment methodology the workshop was conducted on 15 December 2009, with internal technical faculties and staff of ADPC to discuss about the methodology and seek more feedback on proposed methodology for validation. The workshop was facilitated by Dr. Bhichit Rattakul, ADPC Executive Director, and Mr. NMSI Arambepola, ADPC-UDRM Director. The methodology was presented by Dr. Amit Kumar, ADPC Senior Project Manager. Several inputs were received during the workshop. Relevant suggestions were incorporated in the methodology.

5. Hazard Assessment Method Development and Preliminary Analysis

Hazard assessment methodology has been adjusted and enhanced by incorporating the collected data in the GIS database. The methodology development has been carried out for earthquake, landslide, flood, epidemic, and drought hazards. This process will be an iterative one to fine-tune and find the most suitable hazard assessment method for Nepal. Below are general ideas/steps of hazard assessment methods.

- For **earthquake hazard**, the assessment steps include: digitization and identification of existing PGA map; correction factor for PGA; calculation for lower return period; development and validation of earthquake hazard map.
- **Landslide hazard** assessment includes: development of slope map; development of

lithology map; precipitation factor analysis; development of land cover map; moisture factor analysis; factor (weighting) development and validation; and development and validation of landslide hazard map.

- In the **flood hazard** assessment, focused basin will be first delineated and identified; precipitation and river discharge analysis will follow; development of flood hazard map and its validation will conclude the assessment. Development of flood hazard assessment is still on-progress.
- For **epidemic hazard** assessment, the steps will include: reclassification and filtering of health data; incidence rate and case fatality rate analysis; trend analysis of diseases and outbreak; and development and validation of epidemic hazard map.
- **Drought hazard** assessment will include: precipitation analysis; agriculture yield analysis; and development and validation of drought hazard. The hazard assessment development is still on-progress.

Piloting the method, initial preliminary analysis has been conducted in earthquake and epidemic hazard assessment. Update and development of existing PGA has been conducted. For epidemic hazard preliminary analysis has been carried out by utilizing health data from Health Management Information System (HMIS) of Department of Health Services.

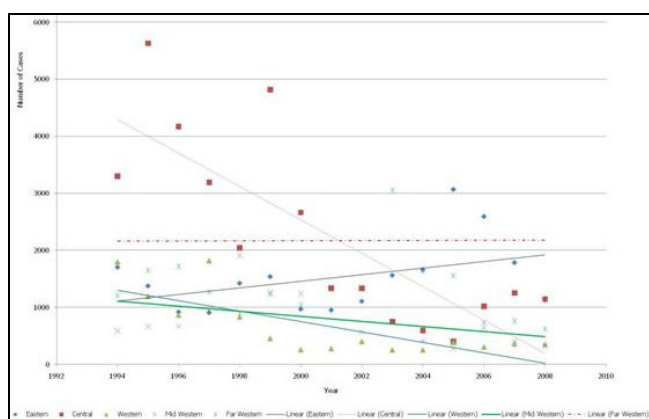


Figure 5 – Example of preliminary analysis on trends of malaria incidence rate in 1994-2008 in 5 development region of Nepal



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