Innovations in Early Warning System, Climate Smart Agriculture and Resilient Reconstruction

Ramraj Narasimhan
Deepak KC
Crowd-sourcing design solutions for earthquake housing reconstruction

Rural Housing Design Competition:

- Design competition was held on December 2015

- Sustainable housing solutions were generated for reconstruction in the rural areas affected by the 2015 earthquake-affected districts.

- Selected designs were improved and relevant, replicable designs were incorporated in DUDBC’s design catalogue.
Appropriate Low Cost Technology for Safer Housing

1. Debris Block

- UNDP collaborated with IOE to develop and test building blocks made from unusable rubble—which are hand-rammed using a simple mould. The blocks have met the NBC requirements.

- Blocks making technology and test reports has been approved by DUDBC.

- Included in Volume II of Housing Catalogue

- Can help address issues of difficulty in finding through stones and corner stones
2. GI wire containment technology

- UNDP collaborated with NCPDP-CEDAP to pilot and promote GI wire containment technology: addresses problem of scarcity of timber and water, the high transportation costs and degeneration of traditional technology.

- 39 houses for the most vulnerable beneficiaries have been built with this technology in Sindhupalchowk and Dolakha Districts.

- The technology has been included in Volume II of Housing Catalogue.
Free Drawing Campaigns to expedite reconstruction

Key Objective: to serve people in preparation of drawing required for building permit process in the municipality, in collaboration with IOE

- Drawing Campaign I at Melamchi, Sindhupalchowk, 25 January-28 January 2017: 47 drawings for poor households were prepared in this campaign for earthquake affected households.

- Drawing Campaign II at Chautara, Sindhupalchowk, 14 September-18 September 2017 Total 225 drawings for poor families were prepared in this campaign for earthquake affected households.
Mobile Technology Van

- MTC is a modified, 4 wheeler, self-sufficient van; it carries posters, videos, models, designs on safe construction and conducts awareness campaigns in VDCs.

- MTC has 1 van + 1 Driver + 1 Engineer, coordinates with VDC and District NRA officials, DUDBC and Engineers in conducting Awareness Campaigns.

- More than 28,000 people have been Outreached through MTC campaigns on safer construction practices.
Grievance Redressal through Reconstruction Toll free at NRA

- A toll-free number and automated system to register queries from affected population and to provide appropriate responses
- UNDP launched toll free system at NRA on May 31, 2017.
- Toll free service is being well received by the people across 31 earthquake affected districts - successful in responding over 9700 queries till date.
1. A low-cost, fail-safe computerized building code compliant permit issuance system which can be deployed at any municipality from a central server located anywhere.

2. Demonstrated successfully in Lalitpur Metropolitan City and Kirtipur Municipality.


4. In consultation with MOFALD for upscaling to all other interested municipalities.
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eBPS Work Flow
eBPS Implementation

- Kathmandu Metropolitan City - 2015
- Lalitpur Metropolitan City – 2016
- Kirtipur Municipality - 2016
## Building Permit Application

### Kritipur Municipality

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<td>2071/72</td>
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<td><strong>Total</strong></td>
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### Lalitpur Metropolitan City

<table>
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<tr>
<th>Fiscal Year</th>
<th>Number of Application</th>
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<td>2070/71</td>
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<td>2073/74</td>
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<tr>
<td><strong>Total</strong></td>
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Vulnerability assessment of the existing housing stock is essential to the local bodies to anticipate the performance of the building and take mitigation measures.

Rapid Vulnerability Assessment Tool developed – to assess buildings vulnerable to various disaster such as earthquake, flood and fire in the urban areas and which can be replicable and scalable and used by general people in the community.

Developed a smart and rapid data collection tool - a model creating GIS based database of building footprint- including structural and functional data.

Tested in a block of 400 building in ward number 29 of KMC.

KMC allocated its own resources to replicate the model and upscale it in ward number 20
UNDP/MIC supported in preparation of Reconstruction Information Management System (RIMS) for supporting housing reconstruction program of GON.

RIMS is a mobile based application, that helps in capturing detailed information of individual houses, conducting inspection at all critical stages of construction and tracking progress, thus establishing an accountable, transparent and efficient system.

RIMS could not be used in GON’s housing reconstruction program, but UNDP plans to use it in reconstruction project in Gorkha.
Ask a question about the data on this dashboard.

Average Plinth Area
BY TYPE OF CONSTRUCTION

Distribution by Material of Foundation

Building used for
Load Bearing (Brick in Mud Mortar)
1. Analyze readily available geo-coded damage data from 1 million houses (across 31 affected districts), overlaid with additional data layers (topography/slope and soil substructure) to correlate damage of houses with respect to typologies of buildings and geographical locations (ridges, valleys, plains of soil substructures etc.)

2. Generate a map depicting vulnerability of various building typologies, with gradation of risk of collapse of houses across the country

3. Facilitate action by engaging with decision makers at national (and local) levels and by piloting a solution to prioritize and address the risks in 3 municipalities across the country.
PART 1: At Central Level - Collaboration with Institute of Engineering (IOE)

DAMAGE ASSESSMENT SURVEY DATA (NRA/CBS) ➔ Data Cleaning & Analysis ➔ MODELS OF DAMAGE PATTERN WRT TO LOCATIONAL FACTORS, VALIDATED THROUGH ANALYSIS OF VISUAL DATA ➔ GIS Analysis

GEOLOGICAL/TOPOGRAPHY/LOCATIONAL DATA (GON) ➔ GIS Analysis

PART 2: At 3 municipalities: Dharan, Butwal, Chautara

BASE MAP + INVENTORY OF 500X3 HOUSES ➔ Data Collection/Analysis ➔ RISK LVL. OF EXISTING HOUSING STOCK (500 SAMPLE) ➔ EXTRAPOLATION OF RISK LVL. OF THE MUNICIPALITY ➔ ELECTRONIC BUILDING PERMIT SYSTEM (RISK INFORMATION) ➔ IT/System Establishment Support

GIS INFORMATION + MODEL ➔ GIS Analysis
PART 1: At Central Level - Collaboration with Institute of Engineering (IOE)

- Damage Assessment Survey Data (NRA/CBS)
- Geographical/Topographical Data (GSN)

Data Cleaning & Analysis

Models of Damage Pattern WRT to Locational Factors, Validated Through Analysis of Visual Data

GIS Analysis

PART 2: At 3 Municipalities: Dharan, Butwal, Chautara

- Base Map + Inventory of 5000 Houses
- GIS Information + Model

Data Collection/Analysis

Risk UFL of Existing Housing Stock (300 Sample)

Extrapolation of Risk UFL of the Municipality

Electronic Building Permit System (Risk Information)

GIS Analysis

IT/Systems Establishment Support

PART 3: At 3 Municipalities: Dharan, Butwal, Chautara

Social Behaviour Research: Survey of 250 Houses + Interaction with Municipal Officials and Policy Makers

Data Collection/Analysis

Social Determinants → People (Not) Choosing Safer Construction Practices / Retrofitting

PART 4: At 3 Municipalities: Dharan, Butwal, Chautara

Municipal Action Plan → Short and Long Term Interventions to Enforce Safer Construction Practices

Consultation/Hand-holding
Early Warning System for last Mile Connectivity

1. Systematically collect data and undertake risk assessments

2. Develop hazard monitoring and early warning services

3. Communicate risk information and early warnings

4. Build national and community response capabilities

Four Elements of CB EWS

(Adapted from: UNISDR)
## CBEWS in Tsho Rolpa

<table>
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<tr>
<th>Location</th>
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<tr>
<td>Naa</td>
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<td>Bedding</td>
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<tr>
<td>Bedding</td>
<td>Precipitation Station</td>
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Tsho Rolpa EWS, Dolakha
Communication, Networking for last mile connectivity

- MoSTE
  - DHM
  - DHM/ River Basin Office
  - MoFALD
  - LDRMC
  - CBDRMC
  - EW TF

- MoHA
  - NEOC

- MoIC
  - Broadcasting
  - NTC/NCELL
  - Website /Media

- Communities

- Population

ACTIVATION OF CLUSTERS & TFs
Dynamic Mass SMS System: NTC_NCELL
DYNAMIC SMA, an Example in Riu Khola, Maadi
Selected polygons for dynamic SMS
### Communication is the key: Mobile Service Providers

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Connecting Farmers with the experts
Mobile Apps

- Insurance / weather information/ success stories / disease and pest/ fertilizers/ contacts of officials and experts
- Connecting farmers with agri-experts
- Focused information
- Technology in hands of farmers
Thank you!!!!
Reclustering (resettlement)

Reclustering of earthquake affected communities

- UNDP in collaboration with IOE (TU) and CEPT University, Ahmedabad developed a replicable methodology and framework for undertaking reclustering of affected communities.

- Based on study of a community - Majhigaon (Melamchi, Sindhupalchowk District)

- Process Manual for undertaking Reclustering is developed and Study report was submitted to MOUD
Risk Sensitive Land Use Plan

Assessment of multi-hazards & vulnerabilities
Assessment of suitable settlement areas
Development of RSLUP, planning hierarchy and zones