



Training and Capacity Building Action Plan

Bangladesh Urban Earthquake Resilience Project

February 2014



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Contributors

Practice Leaders

Mr. Jerome Zayas, *Project Manager*

Ms. Richelda Miranda, *Training and Capacity Building Co-Practice Leader*

EMI Project Management Team

Dr. Eng. Fouad Bendimerad, *Team Leader*

Dr. Jamilur Choudhury, *Senior Technical Advisor*

Dr. Mehedi Ansary, *Deputy Team Leader*

Mr. Jerome Zayas, *Project Manager*

Dr. Ahmadul Hassan, *Local Project Coordinator*

EnP. Joyce Lyn Salunat-Molina, *Project Coordinator*

Ms. Ishtar Padoa, *Research Assistant*

Ms. Ma. Bianca Perez, *Layout Artist*

Ms. Tanya Mia Hisanan, *Layout Artist*

World Bank South Asia

Mr. Marc Forni, *Senior Disaster Risk Management Specialist*

Ms. Swarna Kazi, *Disaster Risk Management Specialist*

Md. Faruk Hossain, *Operations Assistant*

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IEC-TCB Focus Group Members

Moha. Norul Alam Raju, *Program Officer Urban DRR, Oxfam*
 Niger Del Nahar, *National Program Manager, Christian Aid*
 Md. Simon Rahman, *Programme Coordinator, Islamic Relief*
 Md. Akhlaqur Rahman, *Senior program officer, Action Aid*
 Md. Sohrab Hossain, *SAE, DNCC*
 S.M. Mazibur Rahman, *SSA, Bangladesh Bureau of Educational Information and Statistics*
 Md. Moniruzzaman, *SSA, DNCC*
 Mohammad Shawkat Osman, *Assistant Director, Bangladesh Public Administration Training Centre*
 S.M Shafiqur Rahman, *Architect, DNCC*
 Syed Matiul Ahsan, *Senior Manager, Save the Children*
 Shamnaz Ahmed Rumi, *APO, Concern Universal*
 M.A Wazed, *ERPC, CARE-Bangladesh*
 Abdul Haque, *Director, Federation of Bangladesh Chambers of Commerce and Industry*
 Engr. Md. Abdus Salam, *Senior Research Engineer, Housing Building Research Institute*
 Md. Mamun, *Fire Inspector, Fire Inspector*
 Mr. Dilip Kumar Ghosh, *Vice-Principal, FSCD*
 Mr. Ekram Elihi Chowdhury, *Director, CBDRR, Bangladesh Red Crescent Society*
 Afsar Uddin Siddique, *DD, BDRCS*
 Khaled Masud Ahmed, *Senior Manager, DMPR unit, IFRC*
 Ms. Ciara Rivera Vazquez, *Education Specialist, UNICEF*
 Imamul Azam Shahi, *Project Manager-DRR & CCA, Plan International*
 Abdullah Al Razwan (Nabin), *Climate and Humanitarian Project officer, BBC Media Action*
 Quazi Md. Nurul Islam, **DGM, Dhaka Power Distribution Company**
 Mr. M. A. Akher, *Senior Asst. Chief, Planning, Ministry of Education*
 Mr. Julius Adhkadi, *Coordinator, DPU & CPRP, CCDB*
 Khaled Masud Ahmed, *Senior Manager, DMPR unit, IFRC*

Acronyms

BUERP	Bangladesh Urban Earthquake Resilience Project
CST	Course-Support-Team
DAP	Detailed Area Plan
DCC	Dhaka City Corporation
DDM	Department of Disaster Management
DF	Discussion Forums
DNCC	Dhaka North City Corporation
DSCC	Dhaka South City Corporation
DRA	Disaster Risk Assessment
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction and Management
DRMMP	Disaster Risk Management Master Plan
DSCC	Dhaka South City Corporation
ECP	End-of-Course-Project
EMI	Earthquakes and Megacities Initiative
GFDRR	Global Facility for Disaster Risk Reduction and Recovery
GIS	Geographic Information Systems
GOB	Government of Bangladesh
HVRA	Hazards Vulnerability and Risk Assessment
ICT	Information, Communication Technology
IEC	Information, Education, and Communication
LIA	Legal and Institutional Arrangements
NDRMP	Natural Disaster Risk Management Program
RAJUK	Rajdhani Unnayan Katripakhaya
RSLUP	Risk Sensitive Land Use Plan
SOD	Standing Orders on Disaster
SME	Subject Matter Expert
TNA	Training Needs Assessment
UDD	Urban Development Directorate

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About the Document

This Training and Capacity Building Action Plan, along with the gaps analysis, is part of the Training and Capacity Building Program which is an output of the Bangladesh Urban Earthquake Resilience Project. This Action Plan is formulated to further support earthquake risk reduction in Bangladesh by building knowledge and skills among practitioners and professionals in the government and private sectors.

The report summarizes the needs assessment and tutorials conducted in the duration of the Project, including:

- Training needs assessment results and proposed training strategy
- Delivery of two (2) (ie face-to-face and online) blended learning and capacity building programs
- Courses targetting disaster risk management professionals, planners, architects, engineers, regulators on concepts, methods and applications or urban disaster risk reduction with emphasis on earthquake risk and limiting the physical and social vulnerability of high-density settlements and include risk-sensitive land use planning

The action plan is developed to address the gaps in capacity as identified in the gaps analysis. Specific initiatives are additionally recommended to be implemented by the Government of Bangladesh.

1 Introduction

EMI sees training and capacity building as a crosscutting element that extends across the different components of disaster risk management. In the Bangladesh Urban Earthquake Resilience Project (BUERP), the training and capacity building component supported the project by providing stakeholders with the concepts, tools, and methodology to empower them to become more informed and engaged contributors in the project. There were two ways how this was accomplished:

- ✓ Through the participatory process, where members of the project focus groups were able to share knowledge, participate in meetings, workshops, discussions, and contribute their own experiences in defining and developing the project elements. This led to building not just capacity, but ownership of the processes and the outputs of the project as a whole.
- ✓ Through the delivery of a specialized Course on Risk-Sensitive Land Use Planning (RSLUP) for key technical specialists coming from various departments and agencies of the Government of Bangladesh, including members of the private sector, academe, and civil society.

The interaction between EMI Practice Leaders with Focus Group members facilitated the transfer of knowledge and allowed for sharing of experiences across the teams. Focus Group members were provided with the opportunity to work hands-on in developing the elements of the BUERP at every step of the process. Focus Groups learned the methodology and tools from EMI while EMI benefitted from the inputs of Focus Groups to validate the project assumptions, interpretations, findings, and recommendations. This dual-loop learning process enriched the outputs of this project and made them more

relevant and useful for the stakeholders of Bangladesh. The blended specialized course on RSLUP was the opportunity for building knowledge and practice around a core competency of disaster risk reduction (DRR). The specialized course on RSLUP injected other DRR technical elements such as database management, geographic information system (GIS), and hazard vulnerability and risk assessment (HVRA).

This Training and Capacity Building Action Plan summarizes the learning activities conducted in the project, particularly the conduct of the Blended Training Program on RSLUP. It contains the following sections:

- ✓ Results of the Training Needs Assessment
- ✓ Conduct of the Risk Sensitive Land Use Planning Blended Training Program
- ✓ Recommendations for Sustaining Capacity Building in Disaster Risk Reduction in Bangladesh

Training Needs Assessment was conducted with selected participants in the RSLUP Blended Training to determine their existing capacities and identify areas for capacity building interventions. The findings of the TNA also provided the basis for the design of the RSLUP Blended Training Program. A total of thirty-two (32) participants participated in the course - they came from government, the academe, and the private sector. The course ran for 6 weeks, which culminated in the submission of an End-of-Course Project (ECP). From the thirty-two (32) who enrolled, thirty (30) graduated and attended the closing ceremonies held on July 2, 2013 at the World Bank Country Office. Recommendations for sustaining DRR capacity building in Bangladesh is likewise provided in this report mainly in terms of building from the momentum for learning and sharing created in the BUERP.

2 Methodology

The Training and Capacity Building (TCB) component of the BUERP is closely linked with the other components and objectives of the project. Figure 1 below provides the workflow and how TCB links with the other project objectives.

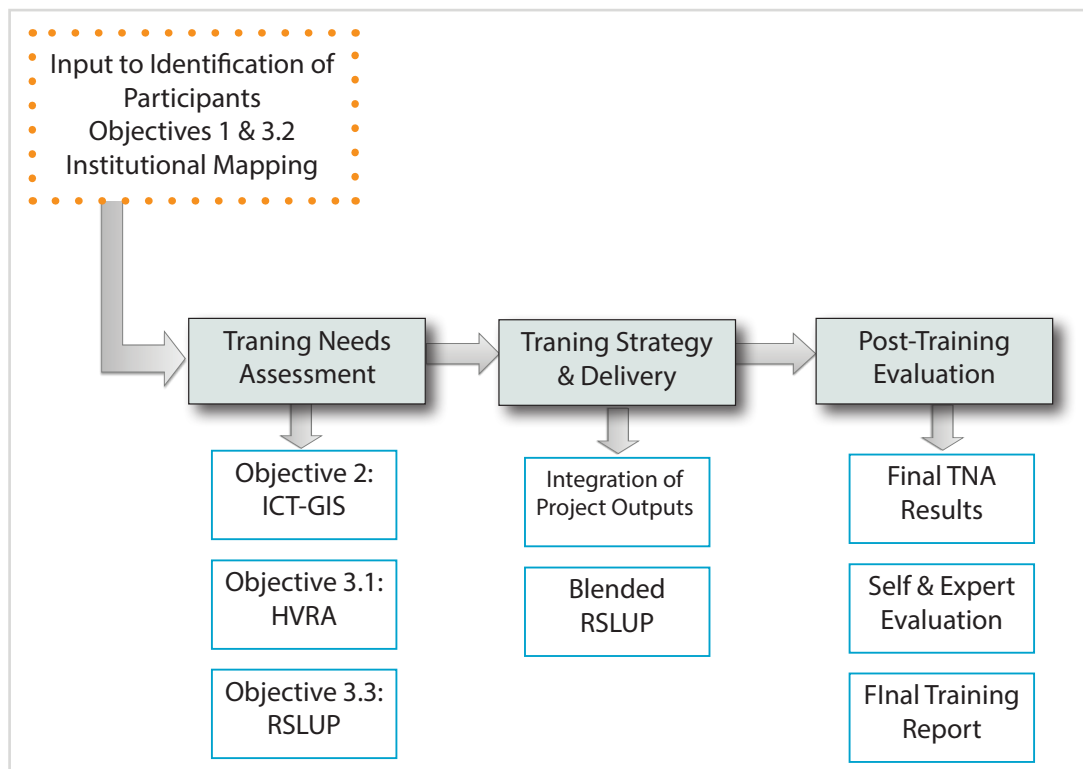


Figure 1. Training and Capacity Building Workflow

The initial activity is to review the output of Project Objective 1, which is needed in order to determine the initial list of stakeholders who will be involved as participants in the specialized courses.

From this initial list, an agreement was reached with the World Bank and Advisory Committee for the shortlist of training participants. A total of thirty-two (32) participated, coming mostly from the Land Use Planning Focus Group

Prior to the conduct of the RSLUP Blended Training, a training needs assessment (TNA) was conducted to measure capacity and needs of the participants in RSLUP, HVRA and ICT-

GIS - areas which are aligned with the objectives of the BUERP. This way, there is consistency and coherency in the training and capacity building program with respect to the over-all goals of the project. Several methodologies were employed in collecting the needed information for the TNA. It also included key informant interviews with key officials of various government institutions, private sectors and the academe to get insights on existing training programs on DRR in Dhaka.

3 Results of the Training Needs Assessment

The TNA was conducted to further customize the RSLUP Blended Training Program to meet the learning requirements of the training participants. There were three objectives of the TNA, as follows:

1. Assess the existing capacity building initiatives in the country particularly those initiated by DDM and other government institutions, private sectors, NGOs and other key organizations involved in DRR.
2. Determine the level of competencies of DRR practitioners, planners, architects, engineers, and other key people involved in DRR;
3. Design a training and capacity building program that meets the needs of the participants in RSLUP.

The TNA looked into the relevant profile of the participants, which included educational attainment, years of experience, responsibilities, and other trainings attended. It also looked into their technical competencies in the areas of land use planning, HVRA, ICT-GIS. In general, the assessment results show that most participants have insufficient knowledge and experience on HVRA, RSLUP and GIS. Majority of the respondents do not have any form of training in those areas. This was further validated in interviews conducted with key government institutions, which shows that in addition to a gap in technical competency in RSLUP, HVRA, and ICT-GIS, it also appears that there is a gap in understanding the new Disaster Management Act of 2012 and the institutional roles and functions spelled out in Standing Orders on Disaster (SOD) among DRR stakeholder in Bangladesh. This was further validated in an interview with key government institutions, some of whom were not even aware of their roles as specified in the SOD. Some were aware, but expressed that the provisions were not being implemented yet. Other TNA findings include the following:

- Risk Sensitive Land Use Planning (RSLUP) and Land Use Planning and Codes and Construction Standards (LUP-CCS), particularly on structural safety inspection of buildings were identified by RAJUK as important and crucial in the performance of their jobs.
- Most government institutions and utility companies want to put in place a regular training program on prevention & mitigation, response, preparedness, and recovery & rehabilitation including emergency management, risk awareness and need for insurance coverage.
- Training manual on risk assessment and RSLUP procedures and relevant document to supplement the learning process was also requested by the respondents. Together with these manuals and references, training of trainers was also suggested as a training activity.

Most of the suggestions by the participants were incorporated and used as inputs in the design of the RSLUP Blended Training Program under BUERP. However, there were other suggestions that are outside the scope of the project such as structural safety inspection of buildings, training of trainers, and other training related to response, preparedness and emergency management. They were nonetheless included in the TNA report for future reference on training activities and courses that the participants remarked as necessary to build capacity in Bangladesh.

The full discussion on the results of the TNA is found in Annex 2 of this Training and Capacity Building Action Plan.

4 RSLUP Blended Training Program

The RSLUP Blended Training Course was designed to explain and illustrate the basic concepts and methodology of risk sensitive land use planning. The training materials were designed for the participants to have a better understanding of the following:

- a) General land use planning;
- b) Basic concepts on disaster risk assessment (DRA);
- c) Mainstreaming risk reduction in plans; and
- d) Integration concerns into Dhaka Detailed area plans.

Participants found themselves engaged in discussions on issues and concerns related to earthquake hazards and risks, vulnerability parameters, land use management and building code implementation problems e.g. zoning, building codes and building permitting process.

The course provided the opportunity for participants to handle practical problems such as assessing Dhaka situation in view of the earthquake risks, and recommend the applicable land use management strategies to their study areas. The following analytical processes were carried out in the training through the assignments, discussion forums and end of course projects which enriched the learning experience of the participants:

- Look into the past planning process, Detailed Area Plan (DAP) proposals and its implementation;
- Identify earthquake hazards and risks in the City based on study materials and e-consultations;
- Consider risk theme areas and progression of vulnerabilities and risks along with the process of city development;
- Identify gaps (strengths, weakness, opportunities and challenges) of plan

implementation in an assigned cluster (group of wards);

- Identify implementation tools (e.g. zoning, building code enforcement) to reduce earthquake risks; and
- Agree on changes needed in the planning and implementation.

Towards the end of the course, some participants suggested to include GIS operations in the blended training, which could possibly be done as exercises on mapping overlays, especially in the use of hazard map as a constraint parameter in defining urban exclusion zones or decision zones. These are outside the scope of the RSLUP Blended Training Course but they are being suggested for follow-up training.

4.1 Features of the RSLUP Blended Training Course

One of the modalities designed to deliver a learning program for working professionals is through web-based distance learning (e-learning). E-learning bridges the gap in terms of participation by those with full-time jobs who may otherwise be limited by the requirements of reporting to their day-to-day work. It also makes available and accessible international technical expertise when these are not found locally.

The RSLUP Blended Training Program is part of EMI's suite of training courses being offered under the Natural Disaster Risk Management Program (NDRMP). Training activities in the RSLUP Blended Training Program include online discussions, assignments, readings and end-of-course group project. A Course Support Team (CST) composed of course facilitators and subject matter experts were available online to facilitate the participants' learning needs. The learning was also customized to include

a weekly three (3) hour online consultation (e-consultation) meeting, in order to provide a forum for supplemental lectures and discussions, especially on highly technical items such as land use planning and management and risk assessment. Figure 2 provides a schematic of the RSLUP Blended Training Course.







	Instructions
	Assignment Section
	End of Course Project Section
	Online Discussion Forum and Face-to-face Consultation
	Required Readings Section
	Suggested Reading Section
W1	Week 1 Activity
W2	Week 2 Activity
W3	Week 3 Activity
W4-6	Weeks 4-6 Activity

Figure 2. Schematic of the RSLUP Blended Training Course

A. E- Consultations

In response to request by participants to have real-time interaction with the subject matter experts (SME), e- consultations were added into the original online feature. These real-time interactions were conducted every Saturday of

the week at 2:00PM for the first four (4) weeks of the training course. These meetings utilized e-conferencing tools such as *Skype* and *WebEx* to discuss the course content, provide feedback on assignments, and clarify issues related to the end of course project. Figure 3 provides the outline of topics covered in the e-consultations.

B. Required Readings and Suggested Readings

The RSLUP online platform has a set of required readings originally developed both by GFDRR and EMI to introduce the basics of Risk Sensitive Land Use Planning. As part of the customization of the training and to better explain the context and concepts, reading materials were incorporated and were compiled in the Training Platform Companion Kit.¹ Further, the training course had two sets of readings, namely the required and suggested readings. Required readings were mandatory for the RSLUP coursework, as these readings provide the basic information and insights on methods, tools and information on RSLUP to the participants. Suggested readings are materials that provide supplemental information to enhance their knowledge on the subject matter.

C. Discussion Forum (DF)

Every week, the SME would post questions on selected topics to trigger discussion, critical thinking, and sharing of knowledge and experiences among the participants. The participants were expected to provide at least two responses for every question posted, and

¹ Each participant was provided with a Training Companion Kit which contains all the relevant reading materials and presentations, including the course schedule and other materials to facilitate the learning process.

the responses were posted in the “Discussion Forum” created for the purpose of organizing the responses of the participants. There were three (3) sets of forum in the RSLUP training course and the participants were required to participate all of the Discussion Forums.

Participants were active in discussions on resilience issues related to implementation and enforcement aspects of land use planning, zoning, building codes, and building by laws in the Dhaka City Corporation Areas. Some participants, especially the geologists and civil engineers, shared more about the earthquake hazards and risks in relation to ground conditions and building construction practice. Planners, on the other hand, shared their knowledge on land development. Participants also shared their views on socio-economic issues, urban governance and building construction project management issues that contributed to the vulnerability and risks development in Dhaka.

Box 1 lists down the questions posted in the discussion forum.

D. Group Assignments

Two (2) sets of group assignments were provided to the training participants. For the first assignment, the focus was on Seismic Hazards and Impact Areas in Dhaka City Corporation Areas. For the second assignment, the participants were given questions related to risk sensitive land use planning features applied to Dhaka. Box 2 lists down the questions given for both assignments.

E. End of Course Project

The End of Course Project (ECP) served as the final activity for participants to apply and consolidate what they have learned in the RSLUP Blended Training Course. The participants were given two (2) weeks to complete and hand over their ECPs. The ECP is a major course requirement for passing the RSLUP Blended Training Course. The structure of the ECP paper is explained in Box 3.

Nine papers for the different clusters were received. Two were selected as best ECPs which were recognized during the Closing Ceremonies. A sample submitted is found in Annex 4 of this report.

Box 1. Discussion Forum Questions

Discussion Forum-1

Based on your readings on historic earthquakes and seismic risk assessment of Dhaka, what negative impacts can result from a very strong groundshaking in the city? Identify one or more wards in Dhaka City Corporation Areas where government interventions should be a priority to reduce the physical damage and losses in those areas. What interventions do you have in mind?

Discussion Forum-2

Which seismic source do you think may be most relevant for Dhaka? Which areas of Dhaka would be most severely affected in the event of an earthquake? Which types of structures we should be most concerned about for seismic risk? What particular risk parameters would be useful for your organization? How these outputs of risk assessment can be presented?

Discussion Forum-3

What do you recommend to improve Dhaka Urban plan & detailed area plans and make these documents address earthquake related hazards & risks? Where emphasis should be made in terms of implementing these plans? (e.g. clear process for building and development permitting, strict enforcement of building codes)

Box 2. Group Assignments

Assignment 1 -

- » Based on your understanding, which earthquake related hazards affect Dhaka? Please identify and describe the situation.
- » Briefly, what were the estimates of the extent of damage in terms of fatalities, families displaced, private property lost, and public infrastructure damaged?
- » What decisions, actions and measures are taken by your city authorities to protect people and their properties before, during and after disasters?
- » In the event the phenomenon reoccurs, or another disaster strikes, how vulnerable are the city's inhabitants?

Assignment 2 -

- » Based on the reading on "Kathmandu City RSLUP Preparation", How will you integrate seismic risk assessment results in the land use planning decision processes?
- » Which agencies or departments are mandated to prepare or facilitate preparation of a seismic risk assessment?
- » Which agencies or departments are mandated to prepare or facilitate preparation of a flood risk assessment?
- » What difficulties do you think would be encountered by your office in preparing or interpreting a seismic risk or a flood risk assessment?
- » Consider the step-by-step process shown and described in the mainstreaming framework; for each step, reflect on the ease or difficulty in performing each step.
- » Is there a working group mandated by law to organize land use planning process? Please elaborate.
- » Are there difficulties in organizing agencies or departments in preparing a land use plan? What are they?
- » What do you think should a future land use plan for your municipality (or City) focus on? Please explain.
- » What land related conflicts in your study area should be addressed or given solution in the land use plan? Please explain.
- » Based on your understanding of the mainstreaming activities, please describe for your area, the possible activities that should be done.

Box 3. Structure of the ECP Report**Part 1:**

The information should give the reader an idea of the development context of the cluster. It should provide a brief description of the area (ex. geographic, socio-economic information, infrastructures found, land use patterns, earthquake hazards and risks in the cluster).

The group can also comment (or assess) on the data base used to detail the plan or cluster if they remain relevant. For example, if the current information on land use development (ex. infilling, densification, redevelopment, greenfield expansion), socio-economic, infrastructure, economic activities, natural environment (ex. open space) remain relevant to capture the development issues and problems and to aid in decision-making. Also consider if the detailed plan or cluster were informed by earthquake hazard maps, vulnerability indicators and earthquake impact (risk) assessments.

Part 2:

Based on the participant's knowledge of the locality, an in-depth analysis on the responsiveness of the land use plan to address earthquake DRR concerns is asked. The following aspects should be considered:

- » Development Issues and Concerns. Here one can briefly discuss the development problems and issues of the cluster (or city corporation area) and the gaps (strengths, weakness) in institutional arrangements, in the practice of land use planning and in implementation to carry out solutions. One can also discuss the opportunities and challenges of the city in carrying out solutions with stakeholders. In the sixteen theme areas described above, what are the major gaps in your cluster? How serious is the problem for each theme the group identified? Why does it remain an unsolved problem?
- » Vision. What was the vision for the structure plan or urban plan covering the cluster? Is the Dhaka structure plan risk sensitive? Explain.
- » Goals. Consider the different development objectives identified in the detailed plan related to your cluster. Are the development goals and objectives addressing the problems the group has identified in the sixteen (16) theme areas above? Why or why not?
- » Spatial strategies. Consider how the preferred urban form or urban pattern was detailed. For example, are the urban land use zones for the cluster sensitive to potential earthquake hazards and vulnerabilities. Why or why not?
- » Provide map overlay(s) showing the cluster and the hazards and risks found in the area.
- » Look at how the existing urban development patterns (Dhaka City corporation areas) had evolved to what it is now; and if it is more or less susceptible to earthquake disaster risks.

4.2 Operability of RSLUP Blended Training

Logistical support was provided by the World Bank Country Office in Dhaka in coordination with EMI's Local Project Management Team. There were technical and operational difficulties at the beginning of the course, but were remedied along the process. Blended training participants gave premium on lectures provided by the SMEs and on opportunities to ask questions and get answers at the end of each presentation. The e-consultations proved to be an effective medium of personalizing the course, by using current information on the hazards and risk, in depth explanations of the RSLUP mainstreaming concepts and providing examples related to Dhaka City Corporation Areas. Familiarity of the subject matter experts with Dhaka City also provided the opportunity to contextualize the hazard and risk, risk sensitive planning concepts and methods into Dhaka situation.

Use of "English" as Language of Instruction and Communication

Conversations in English by the participants somehow limited the amount of conversations between the facilitators and Dhaka participants. Facilitation and translation of questions and answers by EMI Local Experts in the local language helped encourage more discussions. An assigned translator can be a one way of removing the uneasiness of participant's to engage in discussions using English language.



Figure 3. Training participants brainstorming for the consolidation of the End of Course Project outputs

Attendance in Meetings

Majority of the participants attended the weekly e-consultations. Each week, the participants gathered themselves in the World Bank office for the e-consultation. Only few participants have utilized the WebEx, a web conferencing facility, for this training activity.

During these e-consultations, EMI team and counterpart were present to assist the needs of the participants in terms of moderation, and completing the weekly activities for the course.

4.3 Face to Face Sessions

Face to face sessions were conducted to finalize the End of Course Projects of the training participants. The participants were given opportunity to consult with the Subject Matter Experts and seek guidance for the completion of their ECPs and presentation for the closing ceremonies.

In the face-to-face sessions, the group findings from the nine (9) ECPs were further consolidated for the North and South City Corporation areas. The key issues identified for resilience building and the recommendations for land use management were consolidated. A summary of the issues and recommendations were presented during the closing ceremonies.² Representatives from RAJUK and Dhaka City Corporations presented their ECPs.

The camaraderie among the training participants was very evident as they agreed to further improve their ECPs for future reference and to also share their respective assignments and ECPs with others. They were also open to have their ECPs reviewed and expressed great interest that they be published as their contribution to DRR mainstreaming efforts in Dhaka.

² See Annex 5 for summary of findings for North and South Dhaka Corporation Areas

4.4 Closing Ceremony

The RSLUP Blended Training Closing Ceremony was held on July 2, 2013 at the Jamuna Conference Room, World Bank Office Dhaka. Guests who attended the Ceremony were Prof. Dr. Jamilur Reza Choudhury, Senior Advisor, BUERP; Assistant to the Chairman of RAJUK; Mr. Mohammad Abdul Wazed, Director General, DDM and Architect Abul Hasanat Fuad, Director, UDD, Ministry of Housing and Public Works and Ms. Swarna Kazi, Disaster Risk Management Specialist of the World Bank. About 22 of the 30 participants attended the closing ceremony.

Three of the training participants shared their views about the blended-learning training course. One of the participants shared her appreciation for having participated in the training and being in a field other than her specialty (public health engineering). She expressed much learning from the course work and from fellow participants. Another participant, from the Geological Survey of Bangladesh also expressed her appreciation of being engaged in the training and looks forward to learning more about GIS applications and Geonode³ in future trainings. There is another participant, an architect, who shared her unfamiliarity with the topics and with the field of land use planning and even decided to quit the training. However, she later on realized the importance of the training to her practice as an architect and educator. She expressed belief that the training will influence the way she is going to teach her students in physical planning in terms of incorporating risk parameters.

The presentations from the North and South DCCs and RAJUK expressed their concern

³ Geonode is the tool that is being suggested to host data sharing platform conceptualized under the BUERP. For full details, see report on “Roadmap for Data Sharing” which is a separate deliverable of the BUERP.

on poor DAP implementation, lack of enforcement of codes, variable development permitting processes, among others, as key issues contributing to the congestion, vulnerability and seismic risks in Dhaka City.⁴

There was a common concern expressed in terms of the lack of enforcement of building codes and of the poor implementation of the Detailed Area Plans. One of the guests shared his experience as a member of the DAP review committee, where he found the preparation of the DAP by different consultants were not being coordinated as violations continue to take place (i.e. backfilling up of wetlands and occupation of flood zones) even as the DAP was being reviewed at that time.

The training was very useful to both the Course Support Team and the training participants. The knowledge and experience exchange in the training became the venues for data gathering and validation of the RSLUP element of the BUERP. Some participants even suggested keeping the discussions alive in another forum. There was another who remarked that the participants could serve as resource persons to continue the risk sensitive land use planning in Dhaka and be involved in the next DAP formulation.

⁴ See Annex 5 for Summary of Issues



Figure 4. Training participants during the closing ceremony

Considering the contributions by the training participants in assessing resilience in Dhaka it is suggested that the end of course projects and workshop outputs be further refined, peer reviewed for another publication by World Bank as sample cases for mainstreaming earthquake DRR in Dhaka planning. The review, refinement process and publications can be made a component of succeeding projects on Dhaka earthquake urban resilience building.

It is also suggested that trainings be continued on RSLUP in order that a greater number of the professionals, including those in the academe, can start putting in place a risk sensitive planning practice in Bangladesh to support urban development efforts by the Government of Bangladesh.

- Not all participants have attended the series of face to face consultations through online conferencing (via *WebEx*). In general, the participants rated the conduct of e-consultations very useful though there were issues on slow internet connection which impeded and disturbed the learning interaction among the participants.

Overall, the participants commended the expert facilitation of the Course Support Team and the well-coordinated and well-organized administration and delivery of the training course. They expressed interest to attend other training courses, if given the chance.

4.6 End of Course Evaluation

There were several inputs and feedback from the participants regarding the RSLUP Blended Training Program:

- The use of GIS in hazard mapping and assessment should be integrated in future training courses.
- Among the platform features, the following were identified as relevant and have been useful in the course:
 - » Discussion Forum
 - » File Sharing
 - » Latest News
 - » Personal Messaging
- Majority of the participants enjoyed the discussion forum sessions where they were given opportunities to interact with Subject Matter Experts and fellow participants and share their experiences and ideas on the topics provided. The diversity among the participants, coming from different agencies, brought in new ideas and enhanced the learning process.

5 Recommendations

Based on the inputs and feedback from the training participants, the RSLUP Blended Training Program has proven to be effective in terms of creating the knowledge base on risk sensitive land use planning in Bangladesh. It has generated much interest and active support from the participants as evidenced by the quality of ECPs submitted. The challenge is how to build from the momentum of RSLUP Blended Training Program and scale it up to create an enabling environment for RSLUP policy and practice in Bangladesh. This involves creating a critical mass of human resources who will be the change agents for RSLUP in the country.

1 Start the foundations for building a RSLUP community of practice in Bangladesh

This recommendation is linked with Strategy 1 of the Information, Education, and Communication (IEC) component of the BUERP⁵. As explained in the IEC Action Plan, “the 6-week long blended training on Risk Sensitive Land Use Planning (RSLUP) has increased not only knowledge but expectations for continuing the dialog for greater access to and sharing of data and knowledge. The RSLUP training attended by planners, engineers, researchers and other disaster risk management practitioners in Bangladesh received positive feedback from the participants and indicated a strong support for more training and learning opportunities. In particular, the online *discussion forum*, where participants discussed and shared experiences and knowledge on specific topics on RSLUP, generated much interest from the participants, and was recommended to continue beyond the training period.”

⁵ Strategy 1 of the IEC component of the BUERP pertains to the creation of a community of practice on Earthquake Risk Management in Bangladesh. Full details can be found in the IEC Action Plan, which is a separate deliverable of the BUERP.

This RSLUP Community of Practice (RSLUP-CoP) could also serve as local resources that could carry forward the implementation of risk sensitive land use planning in Dhaka. There were several opportunities to do this such as the next DAP formulation⁶. Membership of the RSLUP-CoP could be expanded to include other professionals who did not have the opportunity to participate in the initial run of the RSLUP Blended Training Course.

Suggested Actions to Implement Recommendation:

- Reconstitute the RSLUP Focus Group and get them involved meetings and workshops related to land use planning and urban development in Dhaka such as the updating of the DAP⁷
- Reactivate the RSLUP online discussion forum for BUERP Phase 2 to continue technical discussions and knowledge sharing on urban development policy and practice in Dhaka and possibly for other cities in Bangladesh
- Offer the RSLUP Blended Training Course to other planners and DRM practitioners
 - » Include technical specialists from ministries, departments, and special agencies that are mandated to carry out sectoral development services in Dhaka Metropolitan City
 - » Include planners and DRM practitioners from other cities such as Sylhet, and others

⁶ This is also linked with the recommendation found in the RSLUP Guidebook, which is a separate deliverable of the BUERP.

⁷ Linked with Strategy 1 found in the RSLUP Guidebook

Reinforce the initial learning in RSLUP concepts and framework by supporting specialized and/or supplemental courses such as the use of tools to support RSLUP, i.e. GIS and Geonode

In order to sustain the learning process on RSLUP that was triggered in the initial run of the RSLUP course, specialized and/or supplemental courses are being suggested by the participants. The focus of the specialized courses should be in the use of tools that they could use for developing risk sensitive land use plans. There is a particular interest among the participants on the applications of GIS and Geonode to land use planning. Investment in continuing RSLUP training activities and in the use of tools have direct and practical benefits to changing the current land use planning practice in Dhaka since this creates the enabling conditions for influencing the way planners and practitioners do their plans.

Suggested Actions to Implement Recommendation:

- Offer training on GIS and Geonode for RSLUP⁸
- Provide access to the Earthquake Risk Atlas developed in the BUERP and use the database for the specialized/supplemental RSLUP training⁹

⁸ This recommendation is linked with the recommendation for Geonode training found in the “Roadmap for Building a Geospatial Data Sharing Platform for Urban Earthquake Resilience in Dhaka”, which is a separate deliverable of the BUERP

⁹ Linked with Strategy 3 of the IEC Action Plan which is to “Make Hazard and Risk Information Available” and Target Outcome 1 of the Roadmap for Geospatial Data Sharing which is to “Operationalize an initial centralized Geospatial Open Data Sharing Platform.”

Support similar training programs in other DRR areas such as Emergency Management, Hazards Vulnerability and Risk Assessment, Construction Codes and Standards, and others.

In addition to RSLUP, stakeholders expressed interest in learning about other DRR competency areas that were not addressed in the BUERP. Investing in additional DRR training programs supports the broader aim of building a critical mass of human resources in Bangladesh who will be the change agents for DRR in the country.

Suggested Actions to Implement Recommendation:

- Consider a training program on Emergency Management for Phase 2 to select agencies with responsibility in preparedness, response, and relief.¹⁰
- Consider training courses on HVRA and Construction Codes and Standards, which could be joined as part of the supplemental/specialized training courses mentioned in Recommendation 2 above.
- Develop an inventory of available DRR training courses and course providers and make them available to the stakeholders as reference on additional DRR course offerings that they can avail of.

¹⁰ EMI offers a full suite of training courses on Emergency Management which may be considered in the training program on EM

6 Annexes

Annex 1. List of RSLUP Blended Training Course Participants

Name	Job Title	Agency/ Institution	Dep't / Office
Major Sayed Saeed Ahmad	Major	Bangladesh Army	Engineering
Md. Iqbal Bahar Bulbul	Assistant Instructor	Fire Service Civil Defense Training Complex	Fire service and Civil Defence
Md. Maksimul Islam	Lecturer	BUET	Civil Engineering
Sadia Afrin	Lecturer	BUET	Civil Engineering
Dr. Tariq Bin Yousuf	Superintending Engineer	Dhaka North City Corporation	Environment, Climate Change and Disaster Management Circle
Shamim Ahammed		Dhaka North City Corporation	
Md. Mehedi Hasan	Asst. Manager (Tech)	Dhaka Power Distribution Company	System Planning, Design, Policy and Standards
Ms. Firoza Akhter	Asst. Engineer	Dept. of Public Health Engineering	MIS Unit
Md. Anisur Rahman	Traffic Engineer and Project Director, CASE-DTCA	Dhaka Transport Coordination Authority	n/a
Md. Hasibul Kabir	Asst. Director (Town Planning)	RAJUK	Plan Preparation Section
Farhana Rahman	Asst. Director (Strategic Planning)	RAJUK	Plan Preparation Section
Abdul Latif Helaly	Exec. Engineer	RAJUK	Engineering Division
Farzana Khatun	Lecturer	BUET	Dept. of Urban and Regional Planning
Mr. Mohammad Mazharul Islam	Urban Planner	Eastern Housing Ltd. (Islam Group)	Planning & Regulatory Dept.
Arun Kumar Datta	Asst. Gen. Manager	Hamid Construction Ltd.	Civil Engineering
Engr. Md. Harun ur Rashid	Deputy General Manager	Eastern Housing Ltd. (Islam Group)	Planning and Development
Md. Abul Kalam Azad	Part-time Teacher	University of Dhaka	Institute of Disaster Management and Vulnerability Studies
Ar. Shaila Joarder	(1)Managing Partner, (2)Member Education & Research, (3) Asst. Professor	(1)Nayreet Architect, (2) Institute of Architects, (3) North South University	Architecture

Name	Job Title	Agency/ Institution	Dep't / Office
Md. Anwar Hossain	(1) Lecturer and (2) Researcher	(1)University of Dhaka and (2)Centre for Urban Studies	Dept. Geography and Env't
Muhammad Ariful Islam	Senior Manager	Sheltech (pvt.) Limited	Planning & Research
Tanvir Morshed	General Manager, Head of Design Solutions	Hamid Real Estate and Constructions Ltd	Design Solution
Mrs. Salma Akter	Deputy Director (Geology)	Geological Survey of Bangladesh	Ministry of Energy and Mineral Resources
Mrs. Nurun Nahar Faruqa	Deputy Director	Branch of Environment Geology & Natural Hazard Assessment	Geological Survey of Bangladesh
Musa Nurur Rahman	Executive Engineer	Bangladesh Water Development Board.	Planning-1
S.M. Ataur Rahman	Executive Engineer	Bangladesh Water Development Board.	Office of the Chief Engineer Hydrology
Md. Abdur Rouf Khan	Assistant Programmer	Department Of Environment	Department Of Environment, Head Office.
Zikrul Fahad	Research Assistant	BUET	
Mr. Md. Sirajul Islam	Chief Town Planner	Dhaka South City Corporation	Urban Planning Department
Ms. Kazi Hasiba Jahan	Geographer	Dhaka South City Corporation	Urban Planning Department
Md. Shahinoor Rahman	Board Member (National and International Liaison), Lecturer	BIP, BUET	Bangladesh Institute of Planners

*Annex 2. Results of the Training Needs Assessment***Respondents Profile**

The total number of respondents for the TNA survey was 36 (see Annex 1), 21 of which were from the national government representing 10 ministries and 15 government agencies. Six (6) respondents were from the academe, one (1) was from a utility company, three (3) from professional organizations, one (1) from an international organization, and four (4) from developers/contractors group.

Table 1 Number of respondents per agency

AGENCIES/OFFICES	# of Agencies	# of Respondents
Government of Bangladesh (under 9 ministries)	14	21
Academe	2	6
Utility Company	1	1
Professional Organizations	2	3
International Organization	1	1
Real Estate Developers	4	4
TOTAL	24	36

Table 2 List of Ministries with representatives/respondents

MINISTRY	OFFICES/DEPARTMENT
Ministry of Power, Energy and Mineral Resources	Geological Survey of Bangladesh Branch of Environment Geology & Natural Hazard Assessment
Ministry of Water Resources	Bangladesh Water Development Board (BWDB)
Ministry of Environment and Forest	Department of Environment
Ministry of Defence	Bangladesh Space Research and Remote Sensing Organization (SPARRSO)
Ministry of Disaster Management and Relief	Department of Disaster Management (DDM)
Ministry of Housing and Public Works	RAJUK
Ministry of Local Government, Rural Development and Co-operatives	Dept. of Public Health Engineering Dhaka North City Corporation Dhaka South City Corporation Dhaka WASA
Ministry Of Home Affairs	Bangladesh Police Fire Service Civil Defense Training Complex
Communication Ministry	Dhaka Transport Coordination Authority (DTCA)
Prime Minister's Office	Bangladesh Army

Table 3 Educational background

Bachelor's Degree	36
MA	22
PhD	3

Competency Level

Land Use Planning

1. Number of Years Working in Land Use Planning
Fifty percent (50%) of the respondents have at least 5 years of experience in urban/land use planning while 25% have no experience at all. Twenty-five percent (25%) have 1 to 4 years.
2. Knowledge & Experience
In terms of knowledge and experience, almost 50% of the total respondents have basic to intermediate knowledge on urban planning but only about 8% have actual involvement in implementing a risk-sensitive land use plan.
3. Advanced/Specialized Trainings
Four (4) participants have attended an international training in Japan and Australia on Comprehensive City Planning, Regional Planning, and Environmental Impact Assessment. Other relevant trainings attended by the respondents were done locally and conducted by BUET and other NGOs on Land Use Planning, Urban Safety and Town Planning.
4. LUP issues/topics recommended by the respondents
 - a. RSLUP incorporating Earthquake Microzonation Map
 - b. Sustainable Land Management, Land Use and Land Cover Change Land Use Planning
 - c. DAP and its implementation in Dhaka
 - d. Land use projection data for major cities of Bangladesh
 - e. Earthquake-prone city design precautions and standards
 - f. Post Disaster City Management
Consider the geology, geomorphology, subsurface geology, engineering geology whenever we will think about urban and land use planning of an area.
 - g. Building Sensitivity on combating hazards in the coastal areas of Bangladesh Sustainable Urban Risk Hazard Plan
 - h. Population Density Planning and Risk-Sensitive Land Use Planning

Geographic Information System

1. Experience in the Use of GIS Softwares
Sixty-one percent (61%) of the participants know or are familiar with the GIS software. Some of the

Table 4 List of Software that the respondents are familiar with

ArcGIS	IDRSI	ArcMap 10 and Arc Catalog 10
ArcInfo	ILWIS	Autodesk Infrastructure Map (Web GIS)
ArcView	ENVI	GSI 3D (Modeling Software)
MapInfo	MapServer	Quantum GIS
AutoCad	EARDS	ERDAS Imagine
Map3D	ArcExplorer	

software identified were the following:

Eleven (11) respondents have at least 5 years of experience working with maps, mapping software and spatial analysis; 12 respondents have at least 1 year and 10 respondents have less than a year experience.

2. Knowledge & Experience

About 30% to 40% of the participants have limited knowledge on GIS particularly on GIS software utilization and navigation; overlaying GIS files on maps; and creating, editing and analyzing GIS maps. Most of them know the concepts and terminologies. Fifteen percent (15%) have intermediate knowledge and another 15% have advanced knowledge.

3. Advanced/Specialized Training

Two (2) participants have attended an international training on Surveying and Mapping using GPS in Singapore and GIS Training in California. Some trainings attended were conducted locally.

4. GIS issues/topics recommended by the respondents

- Incorporation of earthquake microzonation map in RSLUP

Hazards Vulnerability and Risk Assessment

1. Experience in HVRA

Seventy percent (70%) of the participants have no experience in HVRA while 30% have conducted HVRA.

Of the 30% who had experience in conducting HVRA, their involvement was on the tsunami in Chile, Vulnerability Assessment after cyclone in Habiya and Subanachar Upazila in Noakhali District, flood and riverbank erosion in Siraigonj district, and landslide hazard zonation maps in Chittagong.

2. Knowledge & Experience

About 40% to 50% have no experience in HVRA especially in data collection, hazard identification/mapping, hazard analysis and in conducting vulnerability assessment, analysis, risk profiling, mapping and analysis. Respondents with basic knowledge consist of about 25% to 30% of respondents. Those with intermediate and advanced knowledge comprise 15% and 3% of respondents, respectively.

3. Advanced/Specialized Training

There were only a few training attended by the respondents that were related to HVRA. Only 3 people were able to attend trainings related to HVRA. These training were on Seismic Sensitivity, Earthquake Disaster Management and Mitigation Strategy for Urban Earthquake Disaster.

4. HVRA issues/topics recommended by the respondents

- a. Use of CAPRA and Geonode in HVRA
- b. Modern equipment that could be used in identifying hazardous zone
- c. Hazard analysis, risk profiling, mapping and risk analysis

Training delivery

1. Internet Access

Seventy-eight percent (78%) of the participants have regular access to the internet while 17% have unlimited access through mobile, at home and in workplaces.

2. Computer Capacity

In terms of computer hardware capacity, 50% have moderate capacity, 44% have fast capacity and only 3% (or 1 person) has a low capacity.

3. Number of hours to be able to commit in this online training course per week

Most of the participants or 72% will be able to allot at least four (4) hours of their time per week for the online course tasks such as reading the course materials, doing the assignments, participating in the discussion forums and completing other requirements. Seventeen percent (17%) said they can allocate more than eight (8) hours while 8% said that they can only allocate at most three (3) hours per week.

Table 5 Hours per week allocated for online training

1-3 hours	3
4-6 hours	13
6-8 hours	13
8+ hours	6
No Answer	1
TOTAL	36

4. Proficiency in English

The mode of instruction of the training course will be English, and most of the participants understand the language. Twenty-two percent (22%) have advanced skills in writing, speaking and understanding the language while the rest claim that they are in the “good” proficiency scale.

Table 6 Participants' level of English proficiency

Proficiency in English	Good	Fair	Advanced	No Answer	TOTAL
Comprehension Skills	27	0	8	1	36
Writing Skills	26	1	8	1	36
Oral Skills	26	2	7	1	36

Key Informant Interviews

In order to develop the elements of the training and capacity building (TCB) component of the project, two (2) key informant interviews were conducted during EMI's Field Investigations in Dhaka City. The first one was held last March 25, 2013. The purpose of the interviews were to get initial information on the training activities of the different government agencies related to earthquake reduction.

The key informants were representatives from the following agencies: (1) Fire Service and Civil Defence (FSCD), (2) Dhaka South City Corporation (DSCC), (3) Department of Disaster Management-Disaster Management Bureau (DDM-DMB) and (4) Comprehensive Disaster Management Programmes (CDMP).

Results/Findings of the 1st Set of Interviews

The table below provides a summary of the capacity building activities of the different agencies interviewed, including the respective target participants of the said activities.

AGENCY	CAPACITY BUILDING ACTIVITIES	TARGET PARTICIPANTS	REMARKS
FSCD	EQ Safety Tips, rescue techniques, first aid, EQ drills	Media, School, Urban Volunteers, Slum, Garments, Government and NGOs personnel.	Planned activities and being conducted regularly in partnership with other government agencies and INGOs (NARRI Consortium)
	6-day workshop on "Disaster management in Dhaka city"	120 ward commissioners, 40 representatives from different NGOs, 10 imams of different mosque, 20 officials of Fire Services Civil Defense and 20 other peoples attended.	
	A day-long training workshop on "search and rescue of earthquake disaster"	Ward commissioners, DCC Officials, journalists and volunteers.	Conducted in partnership with DMB
	"Mock Exercise" at Dupkhola Play Ground,		Conducted in partnership with DMB
	Marine Air Ground Task Force Technical Warfare Simulation (MTWS) Command Post Exercise (CPX) "Exercise Durjoge Durnibar 2008".		DSCC as participant of this training
	Workshop on "Use of Earthquake Risk Maps and Validation of Scenario Based Earthquake Contingency Plan for Dhaka City" held on 24/08/09 at Nagar Bhaban Auditorium.		
	Workshop on Earth Quake Risk Reduction on 07/06/11 & 08/06/11 in City Hall,	Participated by 150 members of City Disaster Committee.	
	Disaster Response Exercise and Exchange (DREE), September 19, 2012	DSCC, AFD, FSCD, UNICEF, AUSAID, Foreign Armed Forces and 20 other organizations	DSCC as participant
DDM	Organizes trainings/ workshops in partnership with other government agencies, INGOs, NARRI Consortium, and other stakeholders and through the CDMP.		

AGENCY	CAPACITY BUILDING ACTIVITIES	TARGET PARTICIPANTS	REMARKS
CDMP	Establishment of a Disaster Management curriculum and programmes in the academic and training institutions		
	Institutional Capacity Building Enhanced skills and technical capability Bangladesh Fire Service and Civil Defence, Geological Survey of Bangladesh Ensuring Mainstreaming DRR in the Department Public Health Engineering, Land Use Planning, in women and children affairs development initiatives		
	Training workshop on disaster management in Bangladesh	Defense service command and staff college (DSCSC) training participants, faculty of DSCSC, and representative from armed forces	
	National Training Workshop on Hyogo Framework for Action (HFA) Progress Monitoring	Government Officials, Representative from Civil Society, INGO Officials, NGO Officials, University Teachers, Armed Forces Officers, NPDRR members	
	Divisional Training Workshop on Hyogo Framework for Action (HFA) Progress Monitoring, Sylhet	Government Officials, Representative from Civil Society, INGO Officials, NGO Officials, University Teachers, Armed Forces Officers	
	Disaster Management Curriculum Development Workshop	University Teachers, Government Officials, Armed Forces Officials	
	Workshop on Natural Hazards and Disaster Studies Curriculum	University Teachers, Government Official	
	Union Level Comprehensive Disaster Management Training Workshop	Member of Union Disaster Management Committee (UDMC), UNO & PIO, NGO Representatives, Civil Society Representatives	

The second set of interviews were conducted last June 29 to July 3, 2013. The interviews were used to validate the information gathered from the survey and gather more in-depth information about the government's communications initiatives and awareness-raising activities particularly on earthquake.

The key informants were representatives from the following agencies: (1) Bangladesh University of Engineering & Technology (BUET), (2) Dhaka University (DU), (3) *Bangladesh* Public Administration Training Centre (BPATC), (4) BBC Media Action, (5) Bangladesh Bureau of Educational Information and Statistics (BANBEIS), (6) ISLAMIC RELIEF, and (7) BAPA.

Results/Findings of the 2nd Set of Interviews

The table below provides a summary of the results of the 2nd set of interviews conducted during the fourth field investigation in June-July 2013

Trainings Conducted by different agencies

AGENCY	CAPACITY BUILDING ACTIVITIES	TARGET PARTICIPANTS	REMARKS
BUET	Trainings Conducted: EQ resistant design for engineers, architects and planners	Government agencies, NGOs, students, professionals, skilled workers (i.e., bar binders, masons, etc)	Trainings requested by CDMP, NARRI Consortium and other INGOs
	Curriculum Development	NGOs/INGOs, Government agencies	By request
DU	Disaster Management incorporated in the curriculum	MS and undergraduate students	
	Trainings conducted: Disaster Management GIS (ArcInfo and ArcView) Certificate Course on GIS & Remote Sensing		
	Research: Coping with Natural Disaster & Mitigating Environmental Degradation		
BAPTC	Training (for 29 Civil Service Cadre Officials (Government Officials) - Payee Mandatory courses for government officials International courses (TQM) 24 short courses (includes short course on Environmental Management & Sustainable Development Course)	Government Officials	This is mandatory for all the government officials.

AGENCY	CAPACITY BUILDING ACTIVITIES	TARGET PARTICIPANTS	REMARKS
BANBEIS	Trainings Conducted: ICT – basic computing, networking and troubleshooting for teaching and management staff GIS – for planners Partners with BUET on Diploma course in ICT	Planners, teaching staff, other professionals	
ISLAMIC RELIEF	Capacity building program for masons and bar binders Institutionalization of DRR concepts to the local authorities through schools, hospitals capacity building programs for health professionals, school safety: evacuation routes, drills, etc.; safety at home	Masons and bar binders, government personnel, NGOs, private sector, health professionals, factory workers, students, urban dwellers, etc.	

Training Recommendations from LIA Workshop

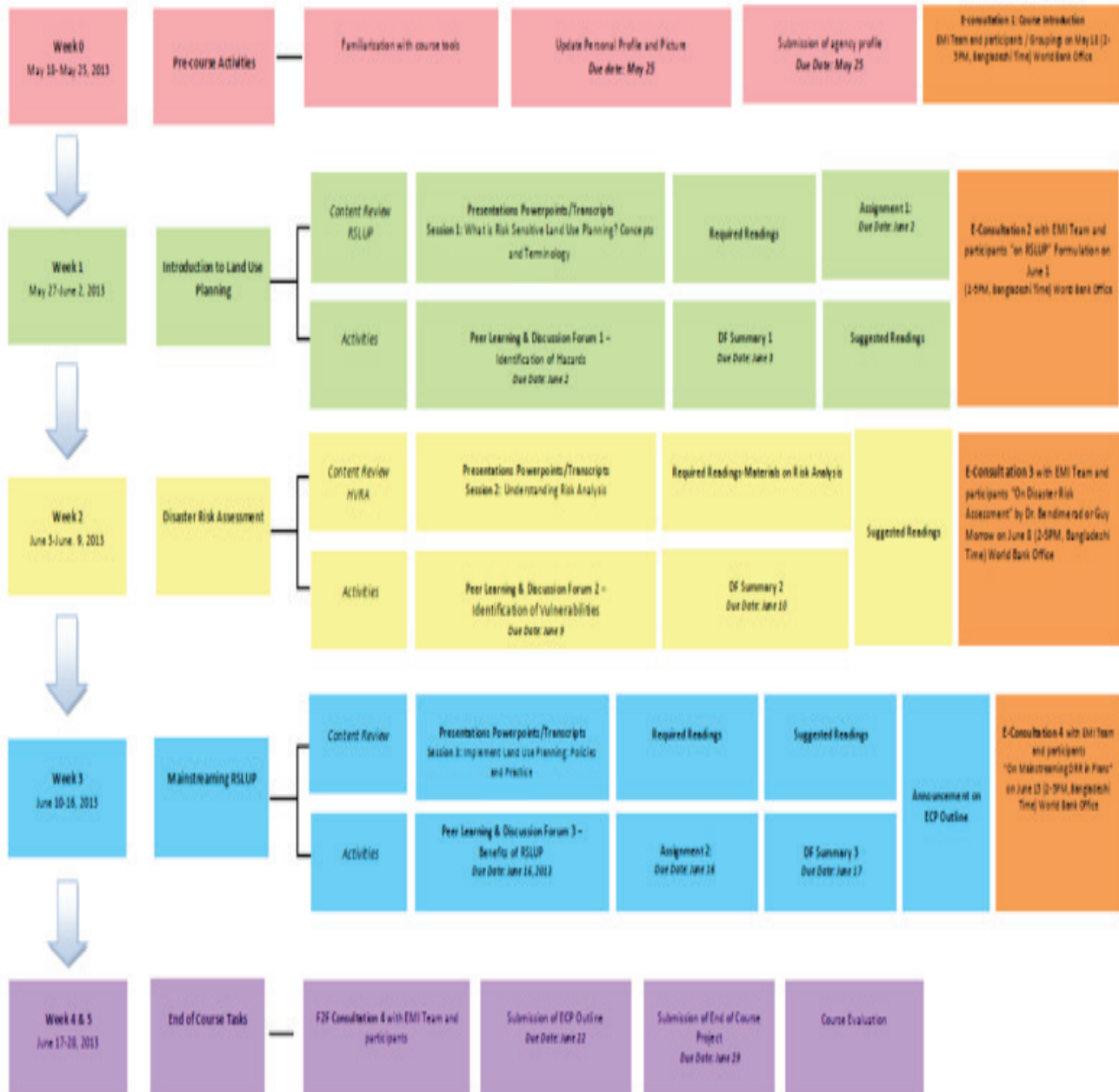
The table below provides a summary of recommendations related to training generated from the Legal and Institutional Arrangements workshops conducted in the project.¹¹

Agencies/Organizations	Recommendations Related to Training
Ministry of Disaster Management and Relief	Training and awareness program for practitioners
	Monitoring and Evaluation development
	Introduction of 3rd party evaluation system of evaluation
Department of Disaster Management	Orientation of stakeholders on the new DM Act
	Training and capacity building of DRR professionals
	Capacity building on modern technology
	Strengthen monitoring and evaluation
RAJUK	Need for competent/skilled manpower
	International training on monitoring and evaluation
	Insufficient equipment for hazard assessment
	Training on structural safety inspection of buildings
	Regular training on prevention & mitigation, and preparedness
Housing and Building Research Institute	Train more people on research

¹¹ Further details on the recommendations related to training can be found in the Draft LIA Guidebook which is another deliverable of the Bangladesh Urban Earthquake Resilience Project

Agencies/Organizations	Recommendations Related to Training
DPDC	Need for skilled manpower (prevention & mitigation) Training on monitoring and evaluation
SoB	Training on prevention & mitigation Training on monitoring and evaluation
BWDB_a	Improve competencies/skills on prevention & mitigation, response, and recovery & rehab
BWDB_b	Improve competencies/skills on response, and recovery & rehab
ADPC	Improve competencies/skills on prevention & mitigation, response, preparedness, and recovery & rehab
LGED	Capacity building on prevention & mitigation
Pioneer Insurance Co. Ltd.	Training on assessment and evaluation of risk including risk awareness
	Training on risk awareness and need for insurance coverage
	Workshop or seminar for updates on M&E development
Urban Development Directorate (UDD)	Training of at least 6 planners on RSLUP
	Development of Training Manual and conduct of raining of trainers for UDD Officers
	UDD to train hospital and school officials on risk assessment in their compound
	UDD to train planners and engineers on RSLUP
	WB to provide manuals and ToT on Risk Assessment and RSLUP procedures
Health Engineering Department	Monitor the activities of volunteer groups after the training
	Field training on prevention & mitigation

Annex 3. Course Map of the RSLUP Blended Course



Training Course on Risk-Sensitive Land Use Planning

(May 18, 2013 to July 04, 2013)

End of the Course Project: Critical Analysis of Land Use Plan

Cluster 4: DCC Ward 22-36

**Abdul Latif Helalay (Rajuk)
MD. Iqbal Bahar Bulbul (Fire)
Muhammad Ariful Islam (Sheltech)
MD. Mehedi Hasan (Power)**

June 28, 2013

Critical Analysis of Land Use Plan (DCC Ward 22-36)

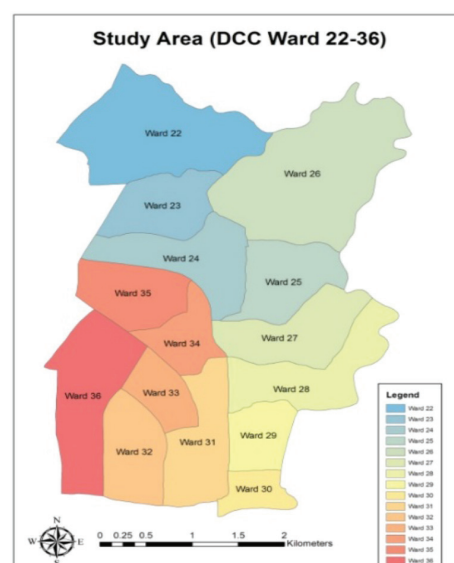
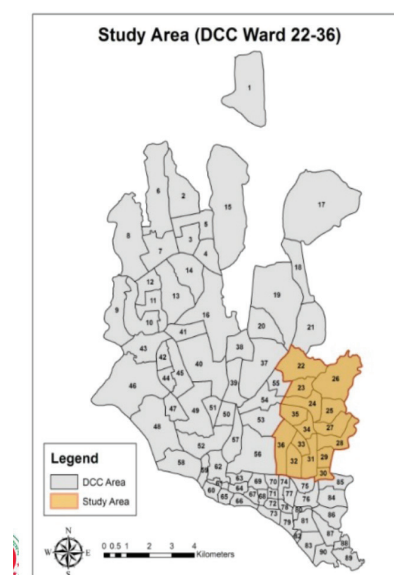
1. Back Ground of the Study

1.1 Introduction: Dhaka city is divided into 90 wards. Among those only 15 wards have been selected here for critical analysis of Detailed Area Plan. The land use plan of the study area is Detailed Area Plan (DAP) which is the third and final tier of DMDP (Dhaka Metropolitan Development Plan) 1995-2015. DMDP is a three tier plan package comprised of the Structure Plan, the Urban Area Plan and the Detailed Area Plan. The first two tiers of DMDP i.e. the Structure Plan (1995-2015) and the Urban Area Plan (1995-2009) were prepared in 1995. The DAP is prepared for RAJUK jurisdiction or DMDP area of 590 sq.mile (1528 sq. km.). The total DAP area was divided into five groups and a number of small locations. The study area is mostly under Group-C area along with location 9 & 10. Each group formulated several Detailed Planning Zones (DPZ) to prepare detailed plan. Maximum part of the study area is in DPZ-4 & 5 of Group-C.

1.2 Geographic Information of the Study

Area: To critically evaluate the Dhaka City Corporation (DCC) Area has been divided into Nine Clusters. Our study area is Cluster Four comprised of 15 wards (22-36) in DCC South Area. The study area is situated between latitudes 23°43' and 23°46'N and longitudes 90°24' and 90°26'E. According to DCC database, total area is 14.35 sq. km. The study area covers Middle Rampura, East Rampura, West Rampura, Ullan, Aftab Nagar (Part), Banasree, Middle Meradya, Ansarbag, Sipahibag, Khilgoan, Malibagh (Part), Malibagh Chowdhury Para, Goran, Adashabag, North Basabo, Middle Basabo, South Basabo, Kadamtoli, Shantibag, Shahid Bag, Mugdharapa (Part), Golapbag (Part), Kanmlapur, Motijheel, Rajarbag, Shantinagar and Naya Paltan area.

The area is plain land and urbanized with densely built-up residential and commercial buildings. The Central Business District (CBD) of the city is within this study area. Rapid urbanization without considering the geological aspects has brought significant changes in the geo-environment of the area. Water logging, pollution, changes in the hydro-geological system, localized land subsidence, and building collapse are the hazards associated with these



changes in the geo-environment.

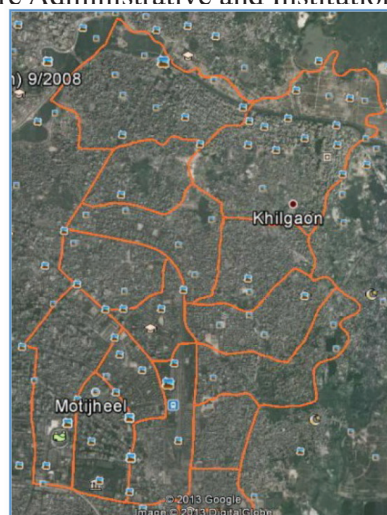
1.3 Socio-economic information of the

Study Area: According to DCC database, total population of the study area is 1,044,569. The study area is south-east part of the capital city Dhaka. It is part of the national financial power and centre of culture, educational, banking opportunity. Its economic base takes a major share, while sale of all types of goods including construction materials (building) and other commodity are a significant commercial activity. Apart from this, plenty of trading houses have grown over a decade that does the imports of foreign goods especially foodstuffs. Another prominent feature of the economic activity is the operation of numerous commercial Banks, Insurances, which operate from their own building. The financial institutions of the area play a lead role in regulating the commercial activities. However, Informal sector trade at the roadside (hawkers) is a common feature that creates considerable financial turnover weekly, operating from selected place of the study area.

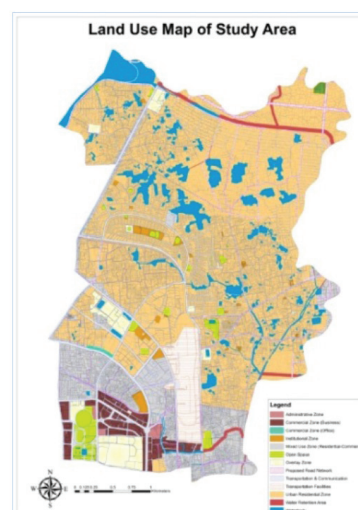
1.4 Infrastructures in Study Area: The study area is full of raw structures, constructed and Sami-constructed structures. There are several major roads connected to the national highways and the study area has plenty of secondary and tertiary roads. However the road width is not sufficient enough to serve the community properly. Traffic congestion is very common scenario here. In the study area there are Private Universities, Colleges, huge number of Schools, Madrasas, huge number of Mosjid, bridges and over bridges, culverts, cinema halls, bus stoppages, filling stations, hospitals or clinics, police stations, post offices, temples and monuments. There are three stadiums and rail station in the area.

1.5 Land Use Patterns in the Study Area:

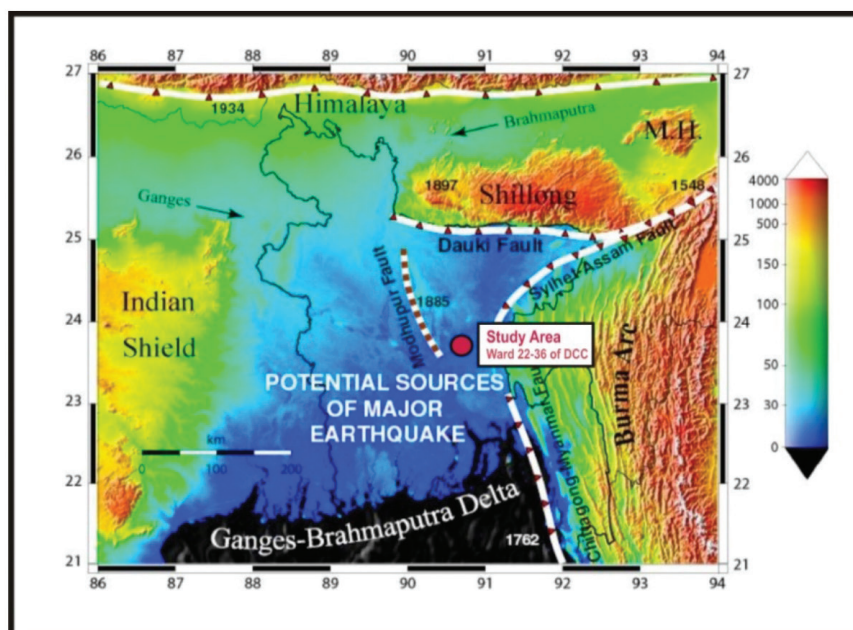
As per Detailed Area Plan database, a large portion of the study area is to preserve for Water Retention Area. There are also designated water bodies in the area. Except these, the land use of the area is mostly residential and commercial. Mixed use area (Residential-commercial) occupies a large portion of the area. In addition there are Administrative and Institutional areas. Very li



gle Earth, 2013



1.6 Earthquake Risks in the Study Area: It is a



Source: Google Image, 2013

fast growing and densely populated community, poses an extremely high risk because of its population density (72,792 per sq. km.) and innumerable high-rise apartments and office buildings constructed through ignoring the Bangladesh National Building Code (BNBC) and failing to adhere to standard construction practices. According to Earthquake Disaster Risk Index (EDRI) parameters Dhaka is one of the top twenty high earthquake risk cities in the world.

The hazard that is inferred from tectonic analysis is backed by historic evidence. Bangladesh, a country of multiple natural disaster vulnerabilities, and its capital Dhaka are under the looming threat of cataclysmic earthquakes. Records show that large earthquakes have previously ravaged the country and the neighboring region several times over the last 450 years.

Baunia Fault is a small feature in the Baunia depression, west of Shahjalal International Airport; this lineament is characterized by sigmoidal fractures. This Baunia Fault is much closed to the study area. Bansi Fault is one of the major structural features near the study

area. It has developed in the western part of the Madhupur Tract, along which zone the Bansi River flows. The fault is approximately 70 miles long. The western block is the down thrown block and the eastern block is the up thrown block. The Bansi Fault is also characterized by sharp fault scarps, hanging valleys, abnormal ground level and springs. Turag Fault is approximately 10 miles long. The feature is characterized by abnormal ground level. The northern block of the Turag Lineament moved west and the southern block east. The Turag River (Tongi Khal) flows along the northern side of the study area.

From geological setting and topography, it is clear that Dhaka City and its surrounding area have experienced major and minor faulting at different times. Some faults and lineaments were observed in satellite images and aerial photographs and were confirmed through field surveys of Detailed Areas Plan but, in many places, human settlement activities have destroyed the field evidences.

2. Themes for Risk Sensitive Plan

2.1 Planning Process and Plan Formulation:

The stages of DAP preparation included geo-referencing of mauza maps, different types of surveys, consultation with stakeholders, draft plan preparation, public hearing and final plan preparation. Socio-economic survey, physical feature survey, topographic survey and land use survey were done during the period of 2005-2006. The high tech digital GIS (Geographic Information System) data base was prepared for the very first time for Dhaka under the project. Quality checking of survey activities was done by Survey of Bangladesh (SOB). A series of consultation meeting was held with local government authorities (Wards & Paurashavas), Honorable Members of the Parliament of the RAJUK jurisdiction, concerned development agencies (RHD, LGED, WASA, WDB etc.), academics, professionals, socially concerned groups, study groups, business groups, etc.

2.2 Legal Environment and Institutional Arrangements The 'Dhaka Improvement Trust' (DIT) was established in 1956 under the provision of the 'Town Improvement Act -1953' (TI Act 1953). The objectives of the Act are aiming to improve physical and urban condition of the Dhaka City. After that Rajdhani Unnayan Kartripakkha (RAJUK) had been emerged through the ongoing crisis of planned and controlled development of Dhaka City. RAJUK established in April 30, 1987 by replacing Dhaka Improvement Trust (DIT). The prime intension of the organization was to develop, improve, extend and manage the city and the peripheral areas through a process of proper development planning and development control.

The national level agencies are the National Economic Council (NEC), the Planning Commission (PC), the Urban Planning Directorate (UDD) and the Board of Investment (BOI). Each plays an important role in urban development decision making for Dhaka. The special agencies for urban development, which are involved in Dhaka, are the Rajdhani Unnayan Kartripakhya (RAJUK), the Dhaka Water and Sewerage Authority (DWASA), the Dhaka Electric Supply Authority (DESA), the Dhaka Metropolitan Police (DMP), and the

Cantonment Board (CB). The various sectoral agencies responsible for extension of services within the city include: Ministries of Finance, Industry, Education, Health, Commerce, Works, Defense, Irrigation, Water and Flood Control, Agriculture, Land, Youth and Sports etc. All have specific sectoral functions. The local level Agencies involved with planning and development of Dhaka Metropolitan Area (DMA) is the Dhaka City Corporation (DCC) and the Cantonment Board.

Among all these institutions the more comprehensive and obvious responsibilities lie with DCC and RAJUK along with important roles played by the Housing and Settlement Directorate (HSD) for housing, Power Development Board (PDB) for electricity, WASA for water and sewerage, Titas Gas and Transmission Company Ltd. For gas, Road and Highways Department (RHD) for major inter-city roads and the DMP for traffic management and maintenance of law and order.

2.3 Implementation Process: Any development within the jurisdiction of RAJUK must be permitted by the authority. At first they check the proposed land use in Detailed Area Plan (DAP) of the plot with the use of proposed building. For permission of development building types can be categorize in three; (i) Low-Rise Building, (ii) High-Rise Building, (iii) Large or Special Projects.

The building below 10 storied is considered as low-rise building. For low-rise building, plan is to prepare as per regulations such as Water Body conservation Act-2000; Dhaka Metropolitan Building Construction Rules-2008 and Bangladesh National Building Code-1993 (Gazetted 2006).

The building above 10 storied is considered as high-rise building. For high-rise building, plan is to prepare as per regulations mentioned above but it requires initial endorsement of eight more agencies before plan submission to RAJUK. The agencies are (a) Civil Aviation, (b) Concerned Word Commissioner (c) Dhaka Water and Sewerage Authority (DWASA) (d)

Dhaka Electric Supply Authority (DESA)/ Dhaka Electric Supply Company Ltd. (DESCO), (e) TITAS Gas Transmission and Distribution Company Ltd., (f) Fire Service (g) Dhaka Transport Coordination Authority (BTCA), (h) Department of Environment (DoE).

The project having more than 40 dwelling units or 7500 sq.m. floor space or 5000 sq.m. commercial floor space is considered as Large Project. Moreover any project within 250 meter of any conservative area is also treated as Special Project. For Large or Special Project, an additional pre-approval is required form a committee consisting of the following members (1) Member (Planning) RAJUK; (2) Urban Planner (Director), RAJUK; (3) Chief Engineer, RAJUK; (4) Representatives from Department of Architecture, Institute of Architect, Institute of Engineers, Institute of Planners; (5) Director (Development & Control), RAJUK.

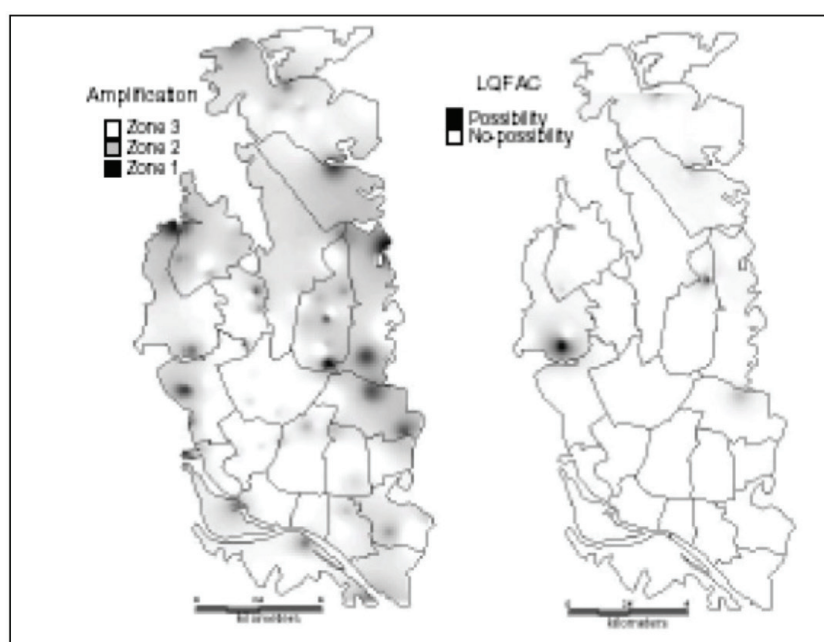
Bangladesh National Building Code was formulated in 1993 but made mandatory in 2006. But no authority is enforcing the code. According to RAJUK the engineer signed in the plan document during approval is entitled to

follow-up and supervise to ensure construction as per code. This is very weak enforcing method as our people do not try to follow any regulations if they are not bound to do that.

RAJUK is now enforcing the land use zoning as per DAP proposal. However there is no density zoning or height zoning in Dhaka city.

2.4. Risks in Macro-Form and Growth Tendencies in the Metropolitan Area:

Seismic microzonation maps for Dhaka (Ansary, 2004) have been prepared by using microtremor observation as well as one-dimensional numerical simulation (SHAKE). The following figures present site amplification and liquefaction potential maps of Dhaka. The site amplification map has three zones with the following characteristics: zone 1 with resonant frequency of less than 3 Hz and mean ground motion amplification of 2.5; zone 2 corresponds to resonance frequencies in a band of 3 to 5 Hz having a ground motion amplification of 1.8; zone 3 corresponds to resonance frequency greater than 5 Hz and mean ground motion amplification of 1.8 Hz. The liquefaction map has two zones: a zone with liquefaction possibility



Disaster Risk Management Profile, 2006

and the other with no liquefaction possibility.

2.5 Urban Fabric Risks as Related to Location and Nature of Physical Development:

Development control function is very poor in the study area. With present capacity RAJUK cannot oversee or pro-act to guide and steer development in desired areas of urban expansion. This resulted in:

- Un-necessary invasion of agricultural land by urbanization
- Non-conforming uses are found every where
- Residential areas are being invaded by industries

2.6 Incompatible Land-Use Risks of neighbouring units: Development in the study area is going on in spontaneously as a result land use is changing without considering the land use plan. In individual effort, people are constructing structures without engagement of professional engineers as a result BNBC is violated in most of the cases. In some cases people are occupying low lying areas and water bodies due to crisis of land in excessive population pressure. The study area has plenty of Non-engineering, Self-engineering building construction, slums & old Buildings. There also has densely build-up area & unplanned Narrow Lanes. Violation of Building Code, soft soil filling, shortage of evacuation Space, haphazard unplanned public utilities and lack of disaster management equipment are very common in the study area.

2.7 Risks of Productivity Loss: Motijheel, central business district of the Dhaka city is located in the study area. Here, commercial activities are very higher compared to other parts of the city. Approximately 0.5 sq. Km. is used as commercial and manufacturing activities of the study area. Total 1500 (appx.) structures are used as economic purpose.

2.8 Risks of Hazardous Uses: There are nine filling stations in the area is highly risky in natural hazard like earthquake in this densely populated community. The number of CNG station in and around Dhaka city has increased significantly.

2.9 Risks in the Building Stock: There are total 40,431 structures in the area consisting of 7,779 raw structures, 18,393 Concrete and 14,259 semi-concrete structures. Among structures 5% RCC, 30% Engineered Masonry, 30% Wood & Bamboo, 21% Non-engineered masonry, 5% Mud wall and 9% GI Sheet. Thus very limited engineered structures can withstand during earthquake hazard but most of the structures are vulnerable.

2.10 Risks in Lifelines: There are 1.2 sq. km. of road area, 1 gas transmission centre, 3 fire service stations, 8 bridges, 10 culverts, 4 flyovers, 2 over bridges and 5 overhead tanks are available in the study area.

2.11 Risks in Emergency Facilities: The office cum residence of the Honorable President known as Bangabhaban, the largest railway station of the country Kamlapur Railway Station, the central bank of the country Bangladesh Bank, One National Stadium, 3 private universities, 45 colleges, 161 schools, 36 hospitals and clinics are in the study area.

2.12 Special Risk Areas: The eastern side of the study area is near to Balu River and historically flood affected area. During previous flood history, most of the area was inundated. The study area is low and vulnerable to flood.

2.13 Open Space Deficiency Risks: There is shortage of open space which is revealed from the land use map. However in detailed area plan 1.73% open space has been proposed but which is difficult to avail as there is no step has been taken by the authority in last 3 years.

2.14 Risks in Administrative Incapacities:

RAJUK chief is always claiming that they are in scarcity of skilled manpower to monitor the development works in the city. Many training programs were conducted among the existing personnel. Moreover, technological up-gradation and computerization is not at satisfactory level.

2.15 Risks of Alienation of Citizens: As per section 74 of Town Improvement (TI) Act 1953, RAJUK carried out a two month long Public Hearing on the draft plan from October 3, 2008 to December 4, 2008. A series of consultation meetings was appraise the city dwellers of the draft final DAP and obtain their valuable suggestions and recommendations. However, feedback from them is very poor. Most of the people are very indifferent of the land use plan as they have limited technical knowledge.

2.16 External Vulnerabilities and Risks: Dhaka experiences a hot, wet and humid tropical climate. Under the Koppen climate classification, Dhaka has a tropical savanna climate. The city has a distinct monsoonal season, with an annual average temperature of 27.5 °C (81.5 °F) and monthly means varying between 19.5 °C (67 °F) in January and 32 °C (90 °F) in April. Approximately 87% of the annual average rainfall of 2,121 millimeters (83.5 in) occurs between May and October. Increasing air and water pollution emanating from traffic congestion and industrial waste are serious problems affecting public health and the quality of life in the city. Water bodies and wetlands around Dhaka are facing destruction as these are being filled up.

3. Development Problems

3.1 Drainage and Flooding Problem: Flood is a serious hydrologic event which causes inundation of the area. Flood occurs due to heavy rainfall for longer duration and sometimes by oncoming of excess flood water carried by the rivers. The reason for flooding is topography, development and built-up area. Dhaka city east

area (the study area) is lower than west area and floodwater comes from the Padma and Meghna basins. In most flood events, floods enter in Dhaka east area from the backwater flow of the Dhaleswari and Meghna rivers and the Sitalakkhya and Balu Rivers. Rampura, East Rampura, Basabo, Mugdapara, Khilgaon etc. are very low areas. Flood water of the Balu, Sitalakkhya and Buriganga could easily enter in the area and stay in the area until water level of surrounding rivers fall below danger level. In monsoon or wet months from April to September the area remains under pool of water.

3.2 Geological Fault: From geological setting and topography, it is clear that Dhaka City and its surrounding area have experienced major and minor faulting at different times. Some faults and lineaments were observed in satellite images and aerial photographs and were confirmed through field surveys but, in many places, human settlement activities have destroyed the field evidences. However, the study area falls in the earthquake Zone-2 of the seismic map of Bangladesh. Besides main sediments of the many parts of the project area are poorly compacted, highly plastic, collapsible thick peat and organic clay layers. With the presence of organic layers and sediments with low compaction, the area is considered to be a weaker foundation layer.

3.3 Uncontrolled Densification: There is no density control guideline in the study area. Population density is very high (72,792/sq.km.) where Dhaka city population density is 45,508/sq.km. We know that Dhaka is densely populated area and study area is the densest part. High population density is one of the major problems in planned development of the area.

3.4 Spontaneous Development: Development control function is very poor in the project area. With present capacity RAJUK cannot oversee or pro-act to guide and steer development in desired areas of urban expansion. This resulted in (i) Un-necessary invasion of agricultural land by urbanization, (ii) Non-conforming uses are

found every where, (iii) Residential areas are being invaded by industries.

4. Critical Analysis of Existing Plan

4.1 Structure Plan Vision: The Structure plan provides a long-term strategy for the 20 years for the development of the greater Dhaka sub-zone with a population target of 15 million. It vision was to identify the order of magnitude and direction of anticipated urban growth and define a broad set of policies considered necessary to achieve overall plan objectives. During Structure plan preparation earthquake hazard assessment based on fault line is considered but liquefaction affects were not considered. Ultimately proper risk assessment including exposure and vulnerability were not properly done. So, the plan is not appropriately risk sensitive.

4.2 Development Objectives of Detailed Area Plan (DAP): The provision of DAP is inherent in the Structure Plan with some specific purposes. These are:

- a. Provide basic infrastructure and services in the project area through systematic planning.
- b. Create congenial environment to promote economic activities.
- c. Improve drainage system and protect flood flow zones from encroachment.
- d. Serve as a reference document for land clearance and building permission.
- e. Provide guidelines for public and private investment priorities
- f. Provide relevant planning policies for sustainable development
- g. Serve as a document for Land Use and development control

Among the sixteen theme areas to consider is moderately addressed in DAP. Planning process and plan formulation were sufficient but they could not address the seismic risk in detailed. Legal environment and institutional Arrangements was adequate for plan preparation but in implementation phase there is lack of

coordination among the institutions. It is very common problem in local context. Development permission is in a systematic manner but monitoring of development is very poor. There is no designated authority to enforce building code. RAJUK in default is responsible but they never take any initiative to enforce building code to ensure sustainable development. Zoning enforcement is also very poor. Considering risks in Macro-Form and Growth Tendencies in the Metropolitan area alternatives in settlement configuration has been proposed in detailed area plan. However there is not follow-up action to implement the proposals. Productivity loss has been considered but proposal are not addressed the things to do. In the study area relocation of filling stations and chemical uses are not proposed to address the risk. There is no proposal to strengthen the existing building stock in the study area. Only new building would be constructed following building code. The vulnerable existing stock should be demolished and redevelop or retrofitted. Proper guidelines to save the lifelines and emergency facilities in seismic hazard are not addressed in DAP. It considered the micro environmental aspects of Dhaka, both in its existing urban form as well as for future development to keep the city free from all sorts of natural and manmade hazards. The plan recognizes the role of green belts, preservation of high quality wet and agricultural lands and existing rivers in and around the city limits and their continuous upgrading and evaluation and thus recommends for building a circular waterways round the city. The plan also earmarks a number of retention ponds around the city limits for retaining rain water as well as for maintains an ecological balance too and a healthy environment. However, after passing 18 years city is not free from all sorts of natural and manmade hazards. Still there is no green belt, high quality wet and agricultural lands are occupying by illegal encroachers for unauthorized land development projects. Existing canals, wet lands and water retention areas are also affected by unauthorized

development without following the plan proposal.

4.3 Proposed Urban Land Use in the Study Area

Area: Total study area is 14.35 sq.km. According to detailed area plan, land use proposed for administrative area 0.28%, Commercial 2.78%, Industrial 0.98%, Residential-Commercial mixed use 10.49%, Open Space 1.73%, Transportation Purposes 17.30%, Water Retention Area 41.29%, Water body 7.45% and Residential area 14.45%. The existing land use proposal is not risk sensitive enough. There should have more accessibility for better communication especially emergency rescue operations. The area is highly densely built-up. Non-engineered and engineered structures are situated very closely which will make severe problem for safe structures if unsafe structures collapsed on it. Density control zoning must be incorporated based on proper analysis.

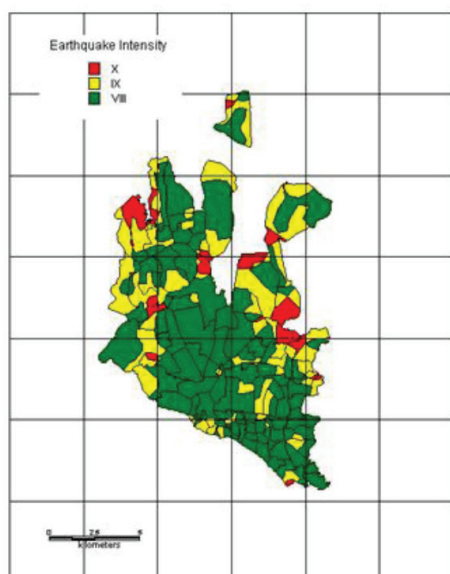
4.4 Hazard Risk Map

4.5 Existing Urban Development Patterns: It is seen quite commonly in every development project that more than one agency is involved

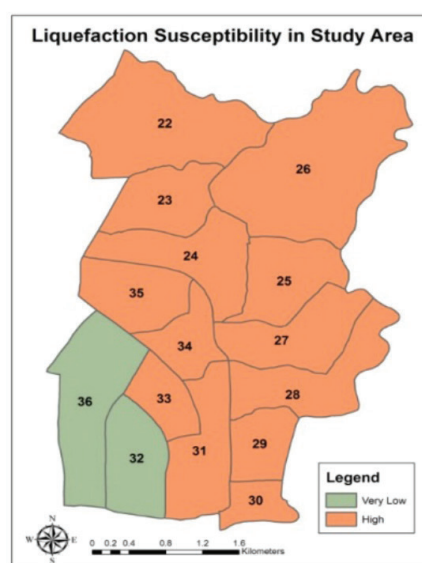
with its implementation and monitoring. So, there is always having a chance of duplication of effort of two or more organizations in sharing their responsibility. These results in conflict what ultimately fore the project life longer than expectation. This happens because of lack of knowledge about the jurisdiction of the boundary of responsibility. There is a straight provision of different rules and regulation by different agencies in a project starts from the project initiation to the project implementation. But it is quite a common picture in our country that most of the development initiative does not follow that rules and regulation properly. And the most unfortunate fact is that the line agency does not monitor these things in most of the cases.

The success of a project mostly depends on its implementation enforcement mechanism. Presently, it is very much understandable that we are going with a very poor mechanism concerning the development project implementation; because not a single project completes in time and the implementation of the project is hindered significantly due to its poor quality relevance with reality. It's quite common, especially in our country that

Seismic Microzonation Map of Dhaka



Source: Ansary, 2004



Source: CDMP Report, 2009

a lot of stakeholder is violating the plan due to their own interest. There is a provision of taking action to that party to control the violation. The violation is not getting the slower speed as the concerned authority does not take the necessary action or the action cannot make its effect.

4.6 General Land Use Proposals in DAP: The CBD (Motijheel) needs to protect its commercial importance and thereby a corporate image by keeping the distinctiveness of its commercial use.

- Mixed use in the rest of area, needs to be limited along major and secondary roads in order to protect the residential sanctity of the inner areas as well as to freeze the total conversion of the previously renowned residential areas (Arambag, Bijoy Nagar, Fakirapul, Moghbazar etc). Following the proposed road network of land use need to be controlled in these areas. These areas shall come under planned development and shall be compatible with Motijheel Areas.
- Areas of National importance (Baitul Moqarram Mosque, National Stadium etc) needs to be free from further densification in order to keep the civic image of this area high.
- Residential areas of Motijheel need to be reconstructed with higher densification for government staff with not less than 350 persons per acre.

The above land use proposal did not transform into specific zoning ordinance. There is some proposal of land use zoning given below. However, those are not properly implemented. Administrative capacity is not sufficient to address the risks and action accordingly. The main reasons for incapability are lack of political will, bureaucratic complexity, corruption and lack of qualified manpower. Finally the Detailed Area Plan for the study area is not properly risk sensitive. That is because; proper risk assessment was not done. The risk assessment

program named Comprehensive Disaster Management Program (CDMP) findings should be incorporated in DAP.

5. Recommendations

In the area, mainly road circulation and widening should be primarily considered. This area generates major traffic, as Motijheel CBD is located here. This area also harbors large-scale commercial activity and is a mixed-use zone. Therefore, road extension, widening, linking of roads etc. must be taken as strategy to develop the area.

The area has a major geological fault line. So, development control is vitally needed. Low and middle-income residential area may develop here with the co-ordination of private developers. Land readjustment policy is suitable and can develop through public and private negotiations. The retention ponds in this zone are playing a vital role; these need to be preserved along with canals, to keep the area flood-free. Future planning of new settlement areas (growth areas) must consider risk sensitive engineering planning, design and construction which allows for mitigation to earthquake risks in place. A rule may be enacted so that every private land developer should keep a separate area which should be kept open, which may be used as playground or other purposes for normal time use.

In case of land use planning, open urban space is a critical area in the disaster mitigation process. Within earthquake recovery scenarios consideration must be given to the planning, design, and provision of emergency shelter, temporary housing, and neighbourhood needs in study area land use plan. In appropriate earthquake preparedness planning efforts, urban spaces, including facilities such as public parks, large scale public parking lots, high school campuses, must be provided. Identification and developing escape routes and open spaces for evacuation is a good preparedness strategy.

RAJUK should ensure strict enforcement of building code incorporating earthquake-resistant design. Strict enforcement of building code will promote earthquake-resistant buildings which ultimately reduce the economic and social disruption due to earthquake. The enabling environment can come through appropriate regulatory mechanism where the existing building regulatory authority through the building rules, regulations, planning standards, development control rules or building codes operating in the city. Government should establish different standards and Manuals for Earthquake resistant buildings considering Risk Sensitive Land Use Planning, Earthquake hazard microzonation map (such as site amplification & liquefaction).

Awareness may be developed among the citizens about disaster and hazards. They may also be trained by drill how to cope with the hazards. Government should ensure Minimize gaps in urban planning in the context of increasing risks, effective utilization of educational institutes to reduce the impacts of the urban risks, enhance the capacity of the stakeholders along with mainstreaming of risk reduction activity, arrange regular training/orientation programs at the implementation level to enhance knowledge and raise awareness on vulnerability and management process.

To reduce the liquefaction risk in those newly developed areas, government should establish different standard for building construction considering the earthquake. An immediate and appropriate strategic plan can make success of the 'green building approach'.

It is to inform you that we have enough rules, regulations, national building codes, laws and acts etc. for improving resilience of Dhaka city and reducing risk of natural disasters but unfortunately lack of proper implementation of all these rules make our city vulnerable. Corruptions, bureaucratic entangle, lack of political will and shortage of technical man power of RAJUK has deteriorated the physical condition of Dhaka city.

To improve enforcement of building codes (for mitigation) and local ordinances, protecting critical environments, avoiding serious earthquake hazards (prevention), providing open spaces (preparedness), the following information and incentives may be provided:

- Reduced business permits costs or realty taxes
- Construction practice seminars or trainings
- Tax reduction incentives for developers who practice "green building"
- Defining a guide for urban forms and patterns and how this should be integrated into the natural environment

For the existing highly dense built up and fragile built environment, a recovery plan, temporary housing plan and reconstruction plan can be options to take in already developed areas. Future planning of new settlement areas (growth areas) must consider risk sensitive engineering planning, design and construction which allows for mitigation to earthquake risks in place. Identification and developing escape routes and open spaces for evacuation is a good preparedness strategy. This should be part of the DAP report and in ward map.

The existing Canals (Rampura), Lakes (Hatir Jheel), Retention Ponds (Khilgaon, Basabo & Mugdapara) demarked in the DAP should be protected and more water retention ponds near highly urbanized areas should be increased by proper re-development for controlling consequential phenomenon of earthquakes such as Fire.

Upgrading and retrofitting of buildings projects can be implemented by offering financial incentives to city dwellers. The existing Narrow roads, Lanes and By Lanes widening projects can be implemented by offering financial incentives to Land Owners.

6. Conclusion

Proper construction monitoring is essential to make everyone bound to maintain rules of construction. Zoning should be maintained and construction and development should not be allowed other than permitted land use by DAP. If there is any violation during construction of building, it should be stopped immediately and penalty should be imposed as soon as possible. Surprisingly, most of the people of our country are interested to reduce cost of building construction ignoring the risk of hazard and disasters in the future. Creating awareness among people is an important issue. All types of media, electronic and print, should come forward to urge people so that they maintain rules and regulations during building construction. Likewise, seminar, symposium, rally, demonstration and discussion should be arranged to disseminate disadvantages of violation of building codes. Incorporating

proper risk assessment can ensure risk sensitive land use planning and development.

Reference

- Rajdhani Unnayan Kartipakkha (RAJUK), Dhaka. (2010, June). Detailed Area Plan.
- Akhter, S. H. (2010, September 10). Earthquakes of Dhaka.
- Ansary, M.A.(2004). Seismic Loss Estimation of Dhaka for an Earthquake of Intensity VII : Oriental Geographer, Vol. 48, No.1.
- Bendimerad, F. (2011). Loss estimation: a powerful tool for risk assessment and mitigation.
- Bendimerad, F. (2001). Modeling and Quantification of Earthquake risk.
- Bendimerad, F., & Seva, V. (2010, October). Disaster Risk Reduction of Highly Vulnerable Urban Areas through Urban Re-Development Case Study of Barangay Rizal, Makati, Philippines.
- Comfort, L. K. (2006, March). Cities at Risk Hurricane Katrina and the Drowning of New Orleans.
- Comprehensive Disaster Management Programme. (2009, June). Risk Assessment of Dhaka, Chittagong and Sylhet City Corporation Area.
- Kathmandu Metropolitan City (KMC). (2010, January). Risk Sensitive Land-use Planning.
- Kristoffer B. Bersea, F. B. (2011). Beyond geo-spatial technologies: promoting spatial thinking through local disaster risk management planning.
- Pelling, M. (2003). Cities as Sites of Disaster . In M. Pelling, The Vulnerability of Cities: Natural Disasters and Social Resilience (pp. 19-45). London: Earthscan.
- Sanderson, D. (2000). Environment and Urbanization.
- World Bank. (2011, August 5). Risk Sensitive Land-use Planning.
- http://www.google.com.bd/url?sa=i&rct=j&q=Earthquake%20Fault%20Line%2C%20Dhaka&source=images&cd=&cad=rja&docid=73cQiquCy3eAM&tbnid=NJmR5c-3MEYl4OM:&ved=&url=http%3A%2F%2Fm hkawsar.wordpress.com%2Ftag%2Fbangladesh%2F&ei=0vzLUbepD4rqrAeGzYGYCw&psig=AFQjCNFSL6dU_vBMpCMCifaA3it-LzzETAw&ust=1372409426563631

Annex 5. Consolidation of ECPS into North and South Corporation Areas**CLUSTER-North****1. Issues/ Concerns prioritized to be addressed**

1. BNBC to be enforced.
2. To develop more escape routes and open Spaces for emergency management as well as to protect the flood flow zone, water bodies (lowlands/ wetlands).
3. Narrow road network should be widened and planned network to be developed
4. Awareness for community and organize regular mock exercise for the community.
5. To aware people about the ground suitability of the area (geology, amplification and liquefaction)

2. Implication of No-Action

1. 1. Huge damage of life and loss of properties
2. Liquefaction susceptibility as well as vulnerability would be higher if wetlands or water bodies are not conserved.
3. 3. Search, rescue and recovery operation will be hampered

3. Recommendations Policy/Strategies to implement Objectives

1. Institutional capacity (technical capabilities, enforcement of codes, rules and regulations) of RAJUK, DCC and other related agencies should be enhanced
2. Ward level disaster management committee should be formed and activated.
3. Preparation of zoning map for density control
4. More realistic and implementable land use planning considering the earthquake disaster risk factors
5. Proper implementation of DMDP and DAP with coordination among the related line agencies directly or indirectly involved in planning, development and development control of Dhaka City

Cluster - South

To make the Cluster safe from earthquake: List of three issues under following Sections

Issues/Concerns prioritized to be addressed

1. Unplanned and densely built-up area (population density 72,792/sq.km.) with lack of emergency accessibility.
2. Unauthorized encroachment and violation of land use plan (DAP)
3. 65% of total building stocks are non-engineered structures
4. Identification of existing buildings in already developed liquefaction susceptible area and Locating fault lines in DAP and identification of vulnerable buildings in that fault zone
5. Poor construction practice and unplanned lifeline services
6. **Existing conditions of physical features:**
Buildings: Old; Non-engineered; built without maintaining any set back rules; plan irregularities, vertical irregularities; can have serious pounding effects; many old heritage buildings at risky condition.
Road networks: Very narrow roads; condition of roads and its materials are also very poor; no footpath for pedestrian at all; building height and road width ration are not properly maintained;
Utilities and service facilities: risky electrical/telephone poles and wires at everyplace; leakages in water supply lines; emergency services like: fire services, hospitals are at a very poor condition
7. Hazardous Chemical industries at ground floor of most of the residential buildings.

Implication of Non-Action

1. Increase risk of life of citizen
2. Buildings & other property damage and lifeline collapse enhance.
3. Without awareness of people – only Govt. Organisations can't minimize lose of earthquake.
4. Severe ground shaking and fire hazard

5. High level of casualties
6. Severe building destruction and serious economic effects
7. Cultural loss
8. Lack of accessibility and discourage smart growth
9. Search and rescue operation will be severely disrupted after earthquake hazard
10. Ecological imbalanced conditions will be created that will increase vulnerability
11. Severe infrastructural damages and huge casualties
12. direct and indirect damages to life, property & life line services
13. Due to economic collapse city may have difficulty in recovering
14. Health service will be damaged due to lack of accessibility of medicine and doctors

Recommendations Policy/Strategies to implement Objectives

1. The state should create an independent authority and free from political bias for the implementation of Bangladesh National Building Code (BNBC)
2. Creating awareness on earthquake hazards among the city dwellers
3. In order to make an earthquake resilient city the concern authority should identify risky buildings and retrofit Heritage Building & demolish other risky building.
4. Delegate responsibility to Local Government Authorities & empower them.
5. Organise workshop/Seminars to the Local area and distribute earthquake awareness leaflet and include curricula on earthquake risks at primary and tertiary level.
6. We should give more emphasizes on strict reinforcement of BNBC, Dhaka Mahanagar BC Act 2008 for building construction.
7. Revitalization and redevelopment rather than retrofitting of the area (retrofitting can be applied on emergency services only.)
8. Heritage buildings should be properly maintained and hazardous chemical industries should be removed
9. We need to mainstream disaster risk reduction (especially earthquake for old Dhaka area as well as for new structural area) in land use planning process such as DAP. In this regard, the concern authority should build awareness on earthquake preparedness, response and recovery measures through conducting workshops, seminars, mock drills and through community participation.
10. To develop a scientific land use management plan
11. Like land use management plan the city authority should also concern on urban regeneration and conservation of free space, forest and ecological balance.
12. The government should give priority on urban renewal and readjustment programs for density control as per DAP.
13. Proper Implementation of DAP
14. The earthquake resilient training related organization like World Bank should organize residential training programme on RSLUP process so that the participants from different organization can develop more knowledge on how to make an earthquake resilient city.
15. Public participation is important to have a successful RSLUP
16. Strict enforcement of RSLUP and proper monitoring and evaluation for any PPAs
17. Land use prioritizing urban construction and retrofitting
18. Transfer of development rights
19. Transit oriented development
20. Relocation of hazardous industries from vulnerable area
21. Changed land use other recommended in DAP resulting in densification & critical access to hazard fighting such as in the event of fire and earthquake.



