Road Map for Making Kathmandu Valley Development Concept Plan Risk Sensitive: Frameworks and Processes

May 29, 2012
Nepal
Technical Services for Strengthening Risk Sensitive Land Use Planning and Implementation (RSLUP) in Nepal

Road Map for Making Kathmandu Valley Development Concept Plan Risk Sensitive: Frameworks and Processes

Submitted to: UNDP Nepal

Prepared by: Earthquakes and Megacities Initiative
National Society for Earthquake Technology-Nepal (NSET)

May 2012
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ABOUT THE DOCUMENT

This document is the main component of the Deliverable 2: Framework for RSLU Planning of the project. The document acts as a guide for the Kathmandu Valley ministries and municipalities in formulating their risk sensitive land use plans. A detailed summary of the document is provided in the Executive Summary.

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<th>Full Form</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>BM</td>
<td>Bhaktapur Municipality</td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CBOs</td>
<td>Central Business Organizations</td>
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<tr>
<td>DRA</td>
<td>Disaster Risk Assessment</td>
</tr>
<tr>
<td>DRRM</td>
<td>Disaster Risk Reduction Management</td>
</tr>
<tr>
<td>DRMMMP</td>
<td>Disaster Risk Management Master Plan</td>
</tr>
<tr>
<td>DRR</td>
<td>Disaster Risk Reduction</td>
</tr>
<tr>
<td>DUDBC</td>
<td>Department of Urban Development and Building Construction</td>
</tr>
<tr>
<td>EMI</td>
<td>Earthquakes and Megacities Initiative</td>
</tr>
<tr>
<td>FAR</td>
<td>Floor Area Ratio</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographical Information System</td>
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<tr>
<td>GoN</td>
<td>Government of Nepal</td>
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<tr>
<td>ICIMOD</td>
<td>International Centre for Integrated Mountain Development</td>
</tr>
<tr>
<td>IEC</td>
<td>Information and Education Campaign</td>
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<tr>
<td>IMP</td>
<td>Integrated Master Plan</td>
</tr>
<tr>
<td>INGO</td>
<td>International Non-government Organizations</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>IWO</td>
<td>Implementation Work Output</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<tr>
<td>KMC</td>
<td>Kathmandu Metropolitan City</td>
</tr>
<tr>
<td>KVDA</td>
<td>Kathmandu Valley Development Administration formerly the Kathmandu Valley Town and Development Committee</td>
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<tr>
<td>LSGA</td>
<td>Local Self Governance Act</td>
</tr>
<tr>
<td>LSMC</td>
<td>Lalitpur Sub-Metropolitan City</td>
</tr>
<tr>
<td>mld</td>
<td>million liters per day</td>
</tr>
<tr>
<td>MMI</td>
<td>Modified Mercalli Intensity</td>
</tr>
<tr>
<td>MOC</td>
<td>Memorandum of Cooperation</td>
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<tr>
<td>MoEST</td>
<td>Ministry of Environment, Science and Technology</td>
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<tr>
<td>MoHA</td>
<td>Ministry of Home Affairs</td>
</tr>
<tr>
<td>MoLD</td>
<td>Ministry of Local Development</td>
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<tr>
<td>MoLRM</td>
<td>Ministry of Land Reform and Management</td>
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<tr>
<td>MoPPW</td>
<td>Ministry of Physical Planning and Works</td>
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<tr>
<td>M-TM</td>
<td>Madhyapur Thimi Municipality</td>
</tr>
<tr>
<td>NAPA</td>
<td>National Adaptation Programme of Action to Climate Change</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>---------</td>
<td>-----------</td>
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<tr>
<td>NGA</td>
<td>Non-Governmental Agency</td>
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<tr>
<td>NGO</td>
<td>Non-governmental Organization</td>
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<tr>
<td>NSDRM</td>
<td>National Strategy for Disaster Risk Management</td>
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<td>National Society for Earthquake Technology</td>
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<tr>
<td>NWSC</td>
<td>Nepal Water Supply Corporation</td>
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<tr>
<td>RSLUP</td>
<td>Risk Sensitive Land Use Planning</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<tr>
<td>VDC</td>
<td>Village Development Committee</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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ACKNOWLEDGEMENT

A number of institutions and individuals have supported and contributed to the completion of the *Roadmap for Making Kathmandu Valley Development Concept Plan Risk Sensitive: Frameworks and Processes*. The Contributors are grateful for the valuable time, ideas and resources invested by the following entities in support of the project:

- The United Nations Development Programme Nepal (UNDP-Nepal) for lending support to the RSLUP review exercises;
- The participants of the *Risk Sensitive Land Use Planning Blended Training Course* for the information and discussions from the submitted assignments and end of course projects; and,
- The officials from Ministry of Physical Planning and Works (MoPPW), Ministry of Local Development (MoLD), Department of Urban Development and Building Construction (DUDBC) and other Government Agencies and Local Governments in Nepal for sharing their insights in the Closing Ceremonies of the RSLUP blended training course held at the Kumari Hall, Annapurna Hotel, Kathmandu City on April 29, 2012.
FRAMEWORK FOR MAKING KATHMANDU VALLEY DEVELOPMENT CONCEPT PLAN RISK SENSITIVE

EXECUTIVE SUMMARY

1 BACKGROUND AND CONTEXT

This document provides a roadmap on how the Kathmandu Valley (KV) Development Concept published in 2001 can be made risk sensitive. In view of the need identified by the Government of Nepal to integrate disaster risk concerns in the development planning process and land use plans of the Kathmandu Valley, this review looks into the planning process and outputs at the Valley level, and assesses the various aspects of its planning system where disaster risk reduction (and climate change and variability risk aspects) may be introduced to make the KV Development Concept Plan (KV 2020 Plan) risk sensitive and supportive of the sustainable development envisioned in 2001. This document relied mainly on the documentation of the planning exercise and outputs of the endorsed KV Development Concept Plan because it informs on the process of planning at KV level, the stakeholders involved in plan formulation and validation, and the policy framework for developing Kathmandu Valley. The information on the planning process was partly augmented from input provided by the Kathmandu Valley Town Development Committee (KVTDC)\(^1\) to interviews and questionnaire surveys developed by Earthquakes and Megacities Initiative (EMI) and National Society for Earthquake Technology (NSET).

The formulation of this road map and the suggested frameworks and processes were built upon the prior experiences of EMI in crafting the Kathmandu Metropolitan City Disaster Risk Management Master Plan (KMC DRMMP) 2005-2006, and the KMC Risk Sensitive Land Use Plan (KMC RSLUP) 2008-2010, with KMC, NSET and other local stakeholders. It was in the KMC RSLUP project, funded by the German Federal Foreign Affairs Office through the Deutches Komitee Katastrophenvorsorge (DKKV), that the concept of mainstreaming DRR in plans was introduced. These activities included the integration of hazard, vulnerability and (disaster) risk assessment (HVRA) and mitigation elements into local land use planning by: (a) using available seismic, flood, fire hazard and risk information, especially utilizing the findings and results of the 2002 JICA Earthquake study (not updated); (b) including emergency management parameters (e.g., evacuation roads), and (c) prescribing a series of disaster risk reduction strategies and actions in the land use planning practice. Three other related documents were completed as part of the KMC RSLUP: KMC Draft Zoning Ordinance, KMC Socio-Economic Profile and KMC Emergency Operations Plan. Figure 1 presents an example of an output produced in the KMC RSLUP in terms of the Land Use Zoning Map.

\(^1\) The name was recently changed to Kathmandu Valley Development Administration
Parallel to the development of the KMC RSLUP were the conduct of awareness raising activities by EMI and NSET through public consultations and the dissemination of information, education and communication (IEC) materials such as posters and fliers (see Figures 2). These activities helped improve understanding and support to the KMC RSLUP by key stakeholders such as government ministries and donor organizations.

It is important to note that, KMC highlighted the need to integrate its RSLUP with a similarly risk sensitive Kathmandu Valley physical framework plan, which was not available at the time. KMC RSLUP updating and completion is believed to hinge upon a KV physical framework. A three-year plan was proposed in the KMC RSLUP document on how the KV plans and local land use plans in the Valley can be made risk sensitive.

Figure 1. KMC Land Use Zoning Map in the KMC RSLUP

Figure 2. Sample of LUP Flier distributed as part of the awareness campaign
In the last quarter of 2011, under the UNDP-run Comprehensive Disaster Risk Management (CDRM) and the Flagship Programmes of Nepal, the opportunity to update, validate, and endorse the 2010 KMC RSLUP, as well as developing a road map on how to make the KV plan sensitive to risk came about. In December 2011, 2010 KMC RSLUP was endorsed by selected stakeholders from the Valley. A few months later, this was approved for adoption and implementation by the KMC Legislative Council, thus sanctioning an important milestone in the adoption of risk-sensitive land use planning in the country.

Building on all previous work, this document addresses the findings, gaps, strategies and recommendations on how to make the KV2020 Plan and the future Physical Framework Plan risk sensitive.

2 SUMMARY OF ANALYSIS: KATHMANDU VALLEY DEVELOPMENT AND PLANNING CONTEXT

In brief, while the KV 2020 Plan did not address the particular hazards and risks in detail, the policies and strategies opted for the sustainable development of KV in the different land use policy areas: settlements, production, protection, and infrastructural uses were found to be supportive of risk reduction efforts. The development policies and strategies were strongly cored on five proactive policies in keeping an orderly, safe, and balanced built and un-built environment:

1. Environmental Protection and Management,
2. Better Urban Planning and Safer Urban Expansion and Management,
3. Better Enforcement of Building Codes and Bye Laws,
4. Improved Disaster Management, and
5. Improving Institutional Capacities for Planning and Enforcement.

These policies are strongly advocated in the Government of Nepal’s “National Strategy for Disaster Risk Management” (2010) and “National Adaptation Programme of Action (NAPA) to Climate Change” (2009). However, there is a need to update the planning base information of KV 2020 with current available information on hazards, vulnerabilities and risks and with the recent census information. The following sub-sections explain the areas where there are gaps in information, processes, and tools in the KV 2020 Plan with respect to risk sensitive parameters.

Hazards Information

One important parameter that the KV 2020 Plan has yet to incorporate is the hazard risk information that may guide urban expansion. New environmentally constrained areas may need to be mapped as a result of the new information. Interviews and surveys with members of Kathmandu Valley Development Administration (KVDA), NSET, MoPPW, and MoLD already pointed the following as necessary for updating the KV 2020 Plan, among others:

- The disaster prone areas should be shown clearly in KV Plans;
- Physical infrastructure must be able to mitigate the effect of disasters;
- Areas for rescue and relief need to be identified and protected;
- Areas for future expansion of infrastructure need to be designated;
- Open spaces must be defined;

---

2 Formerly the Kathmandu Valley Town and Development Committee
• Conflicts in sensitive areas (ex. encroachment in sensitive areas) must be identified and addressed;
• Integration of KV Plan with Local Periodic Plans;

Updating hazards and exposure information appear critical for the Kathmandu Valley. The succeeding process for detailing the spatial component of the KV 2020Plan shall require updating of the previous Earthquake Impact study made in 2002 and a review of the Flood Study in 2009 and explained in terms of the following:

• Exposure and condition of settlements
• Exposure of condition production areas
• Exposure and condition of buildings and infrastructures, transport network
• Exposure and condition of environmentally constrained areas

For the fire-related hazards, an updated inventory will help determine the places of highest fire hazard risks.

Within the Kathmandu Valley, the risk reduction and emergency management actions that municipalities, Village Development Committees (VDC), sub-metropolitan and metropolitan area will need to undertake shall depend on the severity of risks that will be identified.

**KV Level Committee to Manage and Communicate Hazard Risk Information**

The generation of risk information, integration of risk information in plans, and interpretations may require a group at the KV level to carry them out. These tasks are left unanswered in the KV plan:

• Hazard risks and climate change related risk assessments preparation (new or updated);
• Interpretation and simplification of the assessments for the deliberative body and stakeholders;
• Advocacy for awareness and better understanding of the following disaster risks, climate change risks and environmental management, rural and urban land use management, climate proofing of structures, community preparedness, and implications to economic and social development;
• Coordination and engagement of hazard (mandated) related agencies (ex. Department of Mines and Geology (DMG), Department of Water Induced Disaster Prevention(DWIDP)) scientific organizations, and academe towards hazard and risk information interpretations, validation and further research;
• Preparation of simplified guidelines for mainstreaming disaster risk management (DRM) and climate change adaptation (CCA) in KV Plan formulation and implementation at valley level;
• Explanation to Local and Valley level officials about the hazards and risks and ensuring that decision makers are aware of and understand the essential characteristics of hazards and risks and their implications to the development thrusts pursued;
• Consolidation and taking responsibility over these hazard risk data; translating or interpreting these into popular language; and, disseminating the knowledge through various channels of communication;
• Engaging KVDA, MoLD, MoPPW, district government and disaster management units to ensure that valley-wide development and physical framework are risk sensitive and that common solutions are found among municipalities, cities and VDCs; and,
Engaging municipalities, VDCs, districts to prepare risk sensitive periodic plans and physical development plans and land use plans, which will implement the KV physical framework and development objectives.

**Risk Sensitive Physical Framework and Process**

The detailing and refinement into a physical framework plan have yet to be continued. Both framework and process for this refinement have not been formulated.

**Norms and Standards**

A set of performance criteria need to be developed for the risk reduction efforts in the different development sectors or land use policy areas for monitoring implementation in the following sectors, namely:

- Agriculture and Food security
- Health
- Education
- Shelter, Infrastructure and Physical Planning
- Livelihood Protection
- Water and Sanitation
- Information, Communication, Coordination and Logistics
- Search and Rescue, and Damage and Needs Assessment
- Institutional Framework for Planning
- Transport planning
- Prevention and Security (Public Safety, Hazard Materials)
- Emergency management program and standards\(^3\)
  - Hazard identification, vulnerability and risk assessment;
  - Legal, fiscal and regulatory procedures;
  - Prevention, preparedness, mitigation, response and recovery plans, among others;
  - Incident management
  - Communications and Warning
  - Support for emergency management (facilities, training, among others)

### 3 RECOMMENDATIONS

The recommendations proposed in this document are additions to integrate key components of risk sensitive planning in crafting the KV physical framework plan. They build upon the policy frameworks and strategies identified for sustainable development in 2001. They are as follows:

- Designing a program that would include a wider set of stakeholders to be involved in:
  - Identifying, describing, validating the issues and problems of the Valley;
  - Preparing the Development Vision;
  - Supporting the data collection process;
  - Validating the component plans (settlement, infrastructure, environment and production (economy) plans);

\(^3\) Source: Emergency Management Accreditation Program (http://www.emaponline.org)
- Developing the favorable conditions and institutional environment for mainstreaming.
- Inclusion of natural hazard risks and their management to the different component plans and their development policy and strategy decisions:
  - Hazard, vulnerability and risk information and maps;
  - Inclusion of past disaster information (following research and validation);
  - Inclusion of climate change impact assessments to the region, or Valley (following research and validation);
  - Implications of hazard, vulnerability and risk information to the component plans in terms of land use management, particularly on enforcement issues;
  - Inclusion and review of current programs, projects and activities in the component development plans for Valley wide development;
  - Inclusion of disaster resiliency actions and climate change adaptation strategies relevant to the Valley;
  - Identifying the programs, projects and activities which may be integrated in the periodic plans of Municipalities, and cities;

In transforming the KV plan into a spatial framework, suggestions include the following:

- Combining the component plans into a preferred physical framework:
  - Utilizing hazard maps and disaster risk information as constraints to urban expansion areas (ex. exclusion areas, or development areas with use restrictions and control);
  - Having appropriately scaled hazard maps and disaster risk information to provide a more detailed zoning (ex. municipal level (1:10,000);
  - Inclusion and review of current programs, projects and activities in the components spatial plans for Valley wide arrangements;
  - Inclusion of spatial components of risk management options and climate change adaptation strategies relevant to the Valley;

- A simplified guide to aid in the process of mainstreaming hazard, vulnerability and risk assessment in KV physical framework. Basic steps are proposed to follow the model for risk sensitive physical framework planning (land use planning) at the KV level.

- A set of performance criteria developed for the risk reduction and climate change adaptation efforts in the different development sectors or land use policy areas for monitoring implementation.

In order to carry out the needed enhancements and crafting of the KV framework plan, capacity building must be directed to the technical, operational and institutional aspects of KV governance. Efforts already undertaken under the current projects should continue to ensure professionals and public officials have the competency to implement, enforce and improve on the risk sensitive land use strategies for the country.

The proposed road map is currently a working draft and requires further reviews and updating of information. While it does not aim for comprehensiveness nor exhaustiveness, it aims for further refinement on the premise used and its analysis, to make it a more relevant and substantive working document for its stakeholders, within the remaining project period.

4 WAY FORWARD

To complete the KV Development Concept into a KV Physical framework plan, a three (3)-year plan programmed into four (4) stages is proposed, as follows:

Stage 1 will focus on organization and preparation for KV risk sensitive planning. This shall include the composition of KVDA committee for planning, data inventoring, work planning,
approval process and project budgeting. This stage shall help reach consensus among the Nepalese government agencies and development partners in Nepal on the development strategies, methodology and institutional arrangements for the development of the Kathmandu Valley RSLUP. This may be completed within the first semester of the first year.

**Stage 2** will include updating of the KV concept plan. This shall include updating the information about the planning environment (social, economic, physical and environmental aspects) and the development of a simplified guide towards risk sensitive physical framework planning. This may be completed within the first year.

**Stage 3** will include the Valley wide multi hazard analysis, transport planning, and physical framework planning. Because of possible data requirements which can only be acquired by primary data gathering (surveys and interviews), model development and processing, at least two (2) years may be required to complete an integrated transport and land use planning for the Kathmandu Valley. The government partners for the project will be MoPPW, MoLD, KVDA, KMC and other Municipalities and VDC’s within Kathmandu Valley. Previous studies will be reviewed for relevance to this particular effort.

**Stage 4** will focus on municipal land use planning or periodic planning of selected sub-metropolitan cities, municipalities and urbanizing VDCs. This stage will also include the finalization of the KMC RSLUP. Special studies on heritage areas or historical sites are proposed while the land use plans are similarly prepared, in order that these master plans are concurrent with the land use plan preparation. This is expected to start in the last three semesters of the three year period.

The recommended process is consistent with previous initiatives and efforts including the KMC RSLUP and the goals of the CDRM program. Capacity building activities are proposed to be spread over the entire project period and be made parallel to the different tasks.
1 BACKGROUND AND RATIONALE

Land Use Planning, generally, may be defined as the “proper management of land resources” (Serote, 2004). This means that the land is used consistent with its natural qualities and made productive to yield benefits for many generations of users. Proper management necessarily involves interventions in decisions which involve State and Local regulation and control of certain activities such as those related to environmental protection and management, land use management, building development, among others. As a matter of public interest, land use planning is the responsibility of the government or State.

When land resources are poorly managed, it can lead to its abuse, disuse or misuse. Lack of planning or poor planning may also result to urban agglomerations which are uncoordinated, inefficient and can lead to many conflicts in land use (ex. incompatible uses, encroachment, occupation of hazard prone area), lesser economic productivity, less than optimum social welfare leading to unsafe conditions which are major causes of risks and vulnerabilities. These risks and vulnerabilities are manifested by the disasters which happen in an area.

One aspect of proper land use planning is its consideration of natural hazards which can seriously put a place at risk. Often, the absence of information on natural hazard risks, or its neglect to include it in land use planning and management can contribute to disasters. Hence, this integration of hazard, vulnerability, risks, emergency management and climate change related impacts in the planning analysis, and translating them into development concerns (ex. land use management), and addressed through policies, strategies, programs, projects and activities make the planning process risk-sensitive, with the great benefits of achieving better living environment and sustainable development.

The Government of Nepal (GoN) is met with many challenges, among which is the sustainable growth and development of Kathmandu Valley. A report on the development plan of the Valley in 2001 (KV 2020 Development Concept Plan) revealed the GoN prime concerns in achieving the following goals: meeting community needs; managing its urban expansion; undertaking redevelopment; providing the appropriate sites and services, controlling and managing environmental damage and providing adequate protection to its people from natural and man-made hazards, among others.

Within the last decade, it has become imperative to national and Kathmandu Valley local leaders to rethink their policies and approaches in addressing these development problems, more so that natural and man-made disasters have continued to undermine the gains made by the component cities, municipalities, VDCs, and Kathmandu Valley as a whole. The concerns on climate change and variability impacts to several sectors (agriculture, water, health, among others) have put forward the need to monitor, evaluate and address long term vulnerabilities such as the inability of people to adapt or cope with day to day and extreme risks because of poverty, lack of economic opportunity, poor access to services, water scarcity, among others. Other institutional and political factors may include the lack of enabling environment (ex. capacity, knowledge, institutions, technical and financial, cultural) to sustain a risk-reduced environment. Several activities, projects, policies, both local and national have highlighted the importance of reducing disaster risks through the development planning and implementation processes. Table 1 below presents this progression of efforts to integrate disaster risk reduction and climate change adaptation into the physical development processes of Kathmandu Valley. A suggestion is given at the end of the table for its continuation.
Table 1: Milestone in Integrating DRR and CCA into the Physical Development Process of Kathmandu Valley

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
<th>Description</th>
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<tr>
<td>2000-2001</td>
<td>Approval of Kathmandu valley Development Concept</td>
<td>Long term development plan, cored on policies and strategies that address KV urban expansion and management, environmental protection and management, efficient infrastructure development, safe settlement patterns; natural calamity mitigation; and institutional capacity building specially on land use management and enforcement. No detailed plan or physical framework was prepared.</td>
</tr>
<tr>
<td>2002</td>
<td>GoN, JICA-Kathmandu Valley Earthquake Mitigation Study</td>
<td>Earthquake Risk Assessment was prepared for the Valley and recommendations on risk reduction and emergency management activities were given. Identification of possible temporary and permanent spaces for evacuation and settlement were identified. Partial inventory of structures and a typology of these structures were used in the risk assessment.</td>
</tr>
<tr>
<td>2005-2006</td>
<td>Development of a Disaster Risk management master plan (DRRMP)</td>
<td>KMC, EMI and NSET and other local and international partners develop a disaster risk management master plan (DRRMP) for Kathmandu City during the period 2005-2006.</td>
</tr>
<tr>
<td>2007</td>
<td>National Urban Policy</td>
<td>The long term goal of the policy is to contribute in poverty alleviation through sustainable urbanization of the development regions. It addresses this through appropriate planning urbanization activities, reversing the deteriorating urban environment, and providing clearer roles of central and local bodies in urban development.</td>
</tr>
</tbody>
</table>
| 2009-2010  | Kathmandu Metropolitan City Risk Sensitive Land Use Plan (KMC-RSLUP)       | • The concept for mainstreaming DRR in land use planning was presented as a framework and process by EMI. (See Figure 1.0). This is the EMI RSLUP project, KMC, EMI and NSET collaborated to craft the KMC RSLUP to guide the future development of Kathmandu City. It integrated hazard, vulnerability and (disaster) risk assessment (HVRA) and mitigation elements into local land use planning by: (a) using available seismic, flood, fire hazard and risk information, especially utilizing the 2002 Earthquake study (not updated); (b) including emergency management parameters (e.g., evacuation roads), and (c) prescribing a series of disaster risk reduction strategies and actions in the land use planning practice.  
• Three other related documents were prepared with this plan: Draft Zoning Ordinance, KMC Socio Economic Profile and KMC Emergency Management Plan.  
• Advocacy programs and activities were prepared jointly by EMI and NSET. The KMC RSLUP underwent a limited round of public consultations and validations, facilitated by KMC government and NSET.  
• The document highlighted the need to integrate KMC RSLUP with a similarly risk sensitive Kathmandu Valley wide physical framework which was not available at the time. KMC RSLUP updating and completion is believed to hinge upon KV physical framework.  
• A three year plan was proposed in the KMC RSLUP document on how the KV plans and local land use plans in the Valley can... |
<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>NAPA-National Action Plan for Climate Change</td>
<td>• A Program of Action by the GoN to address direct impacts of climate change such as those related to disastrous floods and reduced freshwater supplies. Indirect impacts of climate change could be experienced due to extreme events that may increase food prices and/or damage livelihood, assets of the vulnerable communities.</td>
</tr>
</tbody>
</table>
| 2009      | National Strategy for Disaster Management                                     | The NSDRM prepared by the GoN, follows a paradigm shift from merely responding to post disaster situations to disaster prevention through development. Its main vision is to have disaster resilient communities in Nepal. To do this, the long term strategies include:  
  • Development and restructuring of institutional structures;  
  • Strengthen policy-wide and legal arrangements to ensure stakeholders' participation while adhering to integrated policy and decentralized implementation process.  
  • Create enabling environment from the central to household level within the State to prepare and implement disaster risk reduction and preparedness plans.  
  • Ensure mainstreaming disaster reduction into overall development process along with sectoral development and poverty reduction plans. |
| 2010-2013 | Three Year National Plan                                                      | This plan has given the importance to the disaster risk management and sets the long term vision for developing the capacity of the country for coping with any type of natural and human-induced disasters. It has clearly mentioned in the policy and actions under the section 6.3 (Disaster Risk Management), that the preparation of risk sensitive land use plan and following the building code will be made compulsory in urban and urbanizing areas. It has also mentioned about the minimization of the impacts of climate change by protecting environment and availing opportunities; increasing the access of people in water induced disaster prevention services; developing safe, low cost and environment friendly housing; developing appropriate settlements and cities from the environmental and social perspective. |
| 2011-2012 | Kathmandu Metropolitan City RSLUP endorsement and adoption (GoN Flagship Programme 1 & funded by UNDP-Nepal) | The KMC RSLUP prepared in 2010 went into another round of review and updating. An endorsement through a validation-workshop in Dec. 2011 was made, subject to the conditions outlined by the participants from various levels of Government. The RSLUP was later approved by KMC Council and adopted for implementation in early 2012. |
| 2012      | Framework (Road Map) for Making KV 2020 Development Concept (GoN Flagship Programme 1 & funded by UNDP-Nepal) | Taking off from the recommendations made in the KMC RSLUP 2010 that a risk sensitive KV framework is needed towards proper land use planning of KMC and other member municipalities, sub-metropolitan cities and VDCs in KV. A review, analysis of KV 2020 and road map are presented (this document) on how the KV physical framework (Valley-wide land use plan) can be made risk sensitive.  
This document suggests the use of the KMC mainstreaming framework for analyzing and planning for Kathmandu Valley. Integrating risk reduction in periodic plans (through the physical development plan) would be the way of preparing local risk sensitive land use plans. |
Land use planning is identified as one of the most effective ways to achieve DRR and to take the National Strategy for Disaster Risk Management (2009) and the National Adaptation Programme of Action (NAPA) to Climate Change (2009) forward. For highly vulnerable and fast growing urban areas such as the Kathmandu Valley, a risk sensitive land use plan or physical framework plan offers an opportunity to incorporate risk reduction into development and spatial plans by engaging the government (at various levels), private sector, civil society, international development organizations, and other key stakeholders (e.g. academe, media, private sector, etc.). The land use planning process helps the Kathmandu Valley address its need to reduce disaster risks as part of its pursuit for sustainable development.

The work done by Kathmandu Municipal City (KMC), NSET, EMI, and other local partners in completing a Risk Sensitive Land Use Plan (RSLUP) in 2010 provided the learning experience to local and national government officials that traditional land use planning can be enhanced or made risk sensitive and be used to meet national and local agendas on risk reduction, climate change adaptation towards sustainable development. However, it is necessary that existing planning structures (institutions) and legal frameworks are in place, and that tools and process are appropriate. They collectively provide the environment that will enable communities to develop sustainably and become disaster resilient. The framework for RSLUP is illustrated in Figure 3.
This enabling environment may be anchored on several themes of development policies such as: environmental protection & management, land use planning and management, safe infrastructure & building construction and enforcement, disaster risk management and good governance.

Hence, in practice, mainstreaming disaster risk reduction in development planning (ex. land use planning) requires one to review existing systems and identify gaps in the following:

- Supportive legal, institutional arrangements;
  - Clear mandates, functions, responsibilities and jurisdictions;
  - Legal frameworks;
  - Capacities;
- A clear framework for plan formulation and implementation;
  - Planning process and linkage (ex. linkage between sectoral development and land use);
  - Participatory planning;
  - Planning practice and implementation/ enforcement;
  - Implementation tools used (ex. zoning, building by- laws, incentives)
- Plan outputs;
  - Norms and standards used
  - Use of scientific information(ex. hazard and risks)
- Analytical process (ex. suitability mapping)

Recommendations are then made to ensure that these gaps between the existing situation and that which is desired are addressed in the different themes or policy areas.

Unfortunately, important elements of the RSLUP such as implementation and enforcement (middle box in Figure 3) were not completed in 2010 due to lack of resources. While it was suggested by the relevant stakeholders that the RSLUP for Kathmandu City should be integrated into a full exercise to develop a risk sensitive physical framework plan for the full Kathmandu Valley, the EMI RSLUP project in 2010 did not have the resources at that time to cover the whole Valley. Thus, the work was limited to Kathmandu City. Nonetheless, the importance of the RSLUP for the Kathmandu Valley is recognized in the Flagship Programme and was originally included in Flagship 5. The development of the RSLUP for the Kathmandu Valley is a logical starting point for DRR in the country since it will help address inadequate development conditions and hazard exposures which translate to its vulnerabilities. Consultations with the stakeholders including MoPPW, MoLD, KVTDC, KMC, ADB, JICA and others point to the importance and urgency of the development of a RSLUP for the Valley. This project should also be recognized and fully integrated in the CDRM Programme.
2 SITUATIONAL ANALYSIS: DISASTERS IN THE KATHMANDU VALLEY

Kathmandu Valley (KV) is located in the Bagmati Zone, Central Development Region of Nepal. It covers an area of 66,650 hectares of land within Kathmandu Metropolitan City, Madhyapur Thimi Municipality, Bhaktapur Municipality, Lalitpur Sub-metropolitan City, Kirtipur Municipality and 98 Village Development Committees. Snow-covered mountains rise behind the green hills in the north to provide an awe-inspiring backdrop to the city. The city is located at 27°42’ north Latitude and 85°20’ east Longitude.

Figure 4. Location Map
2.1 Disaster Losses and Associated Risks

Earthquake Vulnerability

Concerns over seismic risk to Kathmandu are driven not only by the high rate of seismicity (See Annex 1) but also by the extreme vulnerability of structures and infrastructures and the high density of the built environment. The percent of building construction that could be considered to withstand the impact of earthquake is negligible, whereas the overwhelming majority of buildings and structures indicate a high to very high vulnerability. The density of buildings and population, the extreme vulnerability, the difficulties of access due to narrow roads and the potential for secondary effects such as fire following an earthquake, hazardous material release, landslides, liquefaction and others are indicators of a large scale urban catastrophe waiting to happen with a level of destruction that is unprecedented. Further, Kathmandu is also subject to other hazards such as flooding, landslides and has high exposure to climate change because of its location and fragile environment, which aggravate the vulnerability of the city to natural hazards (KMC RSLUP, 2011). The following tables reveal actual losses (past events) and potential losses estimated from the Mid-Nepal earthquake scenario.

Table 2: Losses due to Earthquake in Kathmandu Valley, 1971-2011

<table>
<thead>
<tr>
<th>Hazards/Disaster Events</th>
<th>Human Population</th>
<th>Buildings</th>
<th>Farming/Forests (ha)</th>
<th>Livestock</th>
<th>Education Centre</th>
<th>Losses value (NRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Data</td>
<td>Death</td>
<td>Missing Injuries</td>
<td>Visits</td>
<td>Affected Destroyed</td>
<td>Damage Evacuated</td>
</tr>
<tr>
<td>Earthquake</td>
<td>4</td>
<td>3</td>
<td>---</td>
<td>6</td>
<td>-----</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>254</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>---</td>
</tr>
</tbody>
</table>

(Source: Nepal DesInventar data base, NSET 2011)

Table 3: Loss estimation figures for mid-Nepal Earthquake (intensity IX MMI)

<table>
<thead>
<tr>
<th>Municipality / VDC</th>
<th>Projected Population, Buildings and Impacts due to Scenario Earthquake in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
</tr>
<tr>
<td>Kathmandu Metropolitan City (35 Wards)</td>
<td>956,364</td>
</tr>
</tbody>
</table>
2.1.1 Flood, Landslide and Debris Flood

There are more than 6,000 rivers and streams in Nepal, most of which flow from north to south generally at high velocity due to steep river gradient. The majority of the larger rivers are snow fed from the Himalayas. Since the topography of the country is steep and rugged, with high-angle slopes and complex geology, large quantities of rainfall during the monsoon season lead to floods, landslides, and debris flows in a number of cities. Costly yet ineffective land conservation causes flooding and landslides. Unplanned settlements and structures built without consideration of natural hazards aggravate the situation. In addition, landslides caused by torrential rains add enormous volume to streams and rivers causing floods and debris flows downstream that kill numerous people and inflict immense harm to agricultural lands, crops, and properties. (KMC, RSLUP, 2011)

In July 1993, the Tarai region experienced a destructive flood which claimed the lives of 1,336 people and affected another 487,534. In 1998, floods and landslides struck various parts of the country, mainly the Tarai and middle Hill regions, killing 273, injuring 80, and impacting 33,549 families. The floods and landslides also ruined 45,000 hectares of crops. Similar flooding occurred in 1999 and continues to occur annually. (KMC, RSLUP, 2011)
Table 4: Losses due to flood and landslide in Kathmandu Valley, 1971-2011

| Hazards/Disaster Events | Human Population | Buildings | | | | | | | |
|-------------------------|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                         | No of Data | Death | Missing | Injuries | Victims | Affected | Destroyed | Damage | Evacuated | Farming/Forests (ha) | Livestock | Education Centre | Losses value (NRs) |
| Flood                   | 60       | 53    | 18      | 8        | ---     | 10,579   | 186       | 225      | 322       | ---                  | 33,252     | 62                 | 58,674,000 |
| Landslide              | 60       | 68    | 6       | 20       | ---     | 573      | 134       | 39       | ---       | 21                   | 5          | ---                | 35,012,050 |

(Source: Nepal DesInventar data base, NSET 2011)

2.1.2 Fire

Fire occurs mainly between April and June during the dry season when it seldom rains and temperatures in the Tarai region reach higher than 35°C. Fires are common to the rural Tarai and Hill regions where 90.8 percent of the total population lives in very poor housing conditions. Houses in rural regions, especially Tarai, are composed of straw or timber and tend to be very close to each other, thereby increasing the risk of fire and fire spread. In 1999, a blaze killed 39 people, injured 10, and affected 1,065 families. The fire, with estimated total losses of NRs 45.23 million, destroyed 1,035 houses, 52 cattle sheds and 148 livestock.

Table 5: Losses due to fire in Kathmandu Valley, 1971-2011

<table>
<thead>
<tr>
<th>Hazards/Disaster Events</th>
<th>Human Population</th>
<th>Buildings</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of Data</td>
<td>Death</td>
<td>Missing</td>
<td>Injuries</td>
<td>Victims</td>
<td>Affected</td>
<td>Destroyed</td>
<td>Damage</td>
<td>Evacuated</td>
</tr>
<tr>
<td>Fire</td>
<td>603</td>
<td>126</td>
<td>50</td>
<td>168</td>
<td>---</td>
<td>1,336</td>
<td>390</td>
<td>296</td>
<td>3</td>
</tr>
</tbody>
</table>

(Source: Nepal DesInventar data base, NSET 2011)

Natural hazards which threaten Madhyapur Municipality through the years 2004 to 2011 can be categorized as related to: fire, hailstorm, rains and monsoon, earthquake, landslides. Fire appears frequent and occurred in this city four times, in the following year: 2007, 2008, 2010, and 2011, with a single human loss in 2010. The hail storm in 2007 caused huge destroy of ripen crops. In 2011, heavy rains and flood destroyed the several houses and cultivated areas. Roads were water -logged for several hours. In 2011, an earthquake of magnitude 6.9 caused minor losses and landslides seriously affected the historic and picnic spot of the city so called Nil Barahi jungle area. About a decade ago, a large landslide occurred causing the erosion of the mostly the east and west part of this Significant Temple area.

For Kathmandu City, using a 41 year record, (1971-2011), fire events (295 events) rank first among hazards, in number of deaths, injuries and missing persons and in terms of damage losses to built- up areas. With forest fires included, it gives a picture that fire hazards are the most destructive to KMC environment. Floods appear to affect lesser numbers of people and very few had been recorded to die from floods, but it leads fires in terms of building damages. There is a short record and lack of damage estimates to indicate destructive impacts of...
earthquakes; but they are perceived to be more devastating when left unaddressed considering the vulnerability of buildings and structures mentioned in this land use plan.

Fire and building collapse appears frequent in Lalitpur. The earthquake of 2011 had revealed that damage to structure will be more under stronger earthquakes.

In Bhaktapur municipality, based on a 10 year record: fire, flood, landslide and structural collapse has contributed to the many affected people and building damages.

Based on the Table shown below; fire flood, rain, structural collapse and epidemic account for most of the hazard threats to the population in Kathmandu Valley. Fire, flood, landslide, forest fire and structural collapse comprise the monetary losses from damages.

Table 6: Hazard Threats to the Population in Kathmandu Valley

<table>
<thead>
<tr>
<th>Hazard / Disaster events</th>
<th>No. of Data</th>
<th>Human Population</th>
<th>Buildings</th>
<th>Evacuated</th>
<th>Forest and Livestock</th>
<th>Education Centre</th>
<th>Losses Value (NRs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deaths</td>
<td>Missing</td>
<td>Injuries</td>
<td>Victims</td>
<td>Affected</td>
<td>Destroyed</td>
<td>Damaged</td>
</tr>
<tr>
<td>Accident</td>
<td>73</td>
<td>77</td>
<td>1</td>
<td>19</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Boat Capsize</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cold Wave</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Earthquake</td>
<td>4</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>10</td>
<td>254</td>
<td>-</td>
</tr>
<tr>
<td>Epidemic</td>
<td>72</td>
<td>58</td>
<td>486</td>
<td>222</td>
<td>4,495</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Explosion</td>
<td>15</td>
<td>10</td>
<td>11</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Fire</td>
<td>603</td>
<td>126</td>
<td>50</td>
<td>168</td>
<td>1,336</td>
<td>390</td>
<td>296</td>
</tr>
<tr>
<td>Flood</td>
<td>60</td>
<td>53</td>
<td>18</td>
<td>8</td>
<td>10,579</td>
<td>186</td>
<td>225</td>
</tr>
<tr>
<td>Forest fire</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Frost</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hail storm</td>
<td>17</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Landslide</td>
<td>60</td>
<td>68</td>
<td>6</td>
<td>20</td>
<td>-</td>
<td>573</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Panic</td>
<td>1</td>
<td>70</td>
<td>-</td>
<td>97</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Plague</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Pollution</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rains</td>
<td>24</td>
<td>4</td>
<td>10</td>
<td>-</td>
<td>1,096</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Snow Storm</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Storm</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Strong wind</td>
<td>10</td>
<td>4</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14</td>
</tr>
<tr>
<td>Struct. Collapse</td>
<td>128</td>
<td>91</td>
<td>6</td>
<td>170</td>
<td>-</td>
<td>548</td>
<td>149</td>
</tr>
<tr>
<td>Thunderstorm</td>
<td>25</td>
<td>19</td>
<td>-</td>
<td>26</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Total                      | 1,126  | 593     | 82       | 1,049   | 222      | 18,648   | 888     | 907       | 327                 | 1250.37          | 2,527   | 699,151,589 |

Source: Nepal DesInventar Database, NSET 2011

Note: Nepal DesInventar Database includes the period of January 1, 1971 to June 15, 2011
2.2 Climate Change and Variability Impacts to Urban Settlements and Infrastructures

Nepal’s climate is influenced by the Himalayan mountain range and the South Asian Monsoon. The climate is characterized into four distinct seasons: pre-monsoon (March-May), monsoon (June-September), post monsoon (October- November) and winter (December-February). Annual average rainfall is about 1800 mm yearly. The monsoon rain is abundant in the east and gradually declines as it moves westwards; while winter rains are higher in the northwest declining as it moves south-eastwards. The highest rainfall occurs in the central and mid-hill areas around Pokhara and northeast and east of the Kathmandu Valley. Temperature tends to increase from north to south.

In terms of projections, mean annual temperature may increase between 1.2 deg C- 1.4 deg C by 2030 and about 1.7 deg C by 2050. Increases in temperature from 2 deg C to 3 deg C may be expected until 2100. Precipitation may increase in the range of 15 to 20% for the whole country during summer months. Generally there is an increase in monsoon and post monsoon rainfall in terms of intensity of rainfall.

Nepal, largely an agrarian economy, is highly sensitive to these changes in climate and nature resource availability (i.e. water resources).

The NAPA report indicates that Kathmandu is one among the more vulnerable districts with a very high rating in terms of a vulnerability index. Essentially, it described that poor people are vulnerable to loss of physical capital (damage to shelter and infrastructure), human capital (malnutrition and disease), social capital (displacement of communities) and financial capital (more disasters and lower income).

In that same report, it indicated that the direct impacts of climate change may result to disastrous floods and reduced freshwater supplies. Indirect impacts of climate change could be experienced due to extreme events that may increase food prices and /or damage livelihood assets of the vulnerable communities.

The report further adds that climate change is likely to result in increased damage to buildings, energy services, telecommunications, transport structures and water services, hence, generally affecting the quality of lives and safety of local communities.

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4 Excerpts of this section are culled from the of the National Adaptation Programme of Action (NAPA) to Climate Change 2009 of the Ministry of Environment
3 VULNERABILITY OF KATHMANDU VALLEY TO DISASTERS

The Nepal, Kathmandu Valley is considered one of the most disaster-prone countries in the world. It is ranked 11th among 150 countries, according to the Humanitarian Aid Office of the European Commission.

In addition, there are certain social, economic and political factors in the Kathmandu Valley, which tend to aggravate the impact of hazard events. The following section briefly describes the development related aspects which contribute to the physical, social and environmental vulnerability of the Valley. Information was mainly sourced from KV Development Concept 2001 and various agency reports.

3.1 Population and Social Aspects

3.1.1 Population

The Valley district growth includes Kathmandu, Lalitpur and Bhaktapur, and encompasses five (5) municipalities and ninety-eight (98) VDCs. Urban growth rate was 3.38% per year and rural growth rate was 1.03% (2001-2011). Population projections indicate a rise to 3.6 million people in 2021 from 2.642 million in 2011. Among these, sixty-eight (68.5%) will be living in the Kathmandu District, 18% in Lalitpur district and 12.5% in Bhaktapur district. A significant percentage, about 80% of the Valley population will be residing in the urban areas and 20% in the rural areas. The burden will be on KMC. There is a great pressure of migration on the Kathmandu metropolitan area. It is highlighted in the KV report that a natural increase alone in the Valley population can propel the urbanization on its own.

3.1.2 Social Aspects

Kathmandu Valley continues to experience a number of pressing social issues. Key components of vulnerability reveal the following:

- **Widespread Poverty**: Poverty drives many people to engage in unsustainable livelihoods the effects of which exacerbate environmental disasters, for example, deforestation or destruction of forests.

- **Movement to High risk areas**: Poverty also drives some people to inhabit high-risk areas such as unstable slopes, river banks, or along road and rail rights of way and along easements of power lines. This exposes the poor directly to hazards and their deprivation reduces their capacity to cope with disasters, much less recover quickly from the effects of disasters.

- **Political Instability**: The long-running conflicts (1996-2006) have triggered armed conflicts which have displaced many communities living in the remote areas of the country and lack of security and safety of life and property in the rural areas compelled many families to move to urban centres. The four year-old Constituent Assembly dissolved on 27th May 2012 at the stroke of midnight without delivering a new constitution.

- **Threat to Cultural and Heritage Sites**: Seven cultural heritage sites enlisted in the world heritage sites, namely Kathmandu Durbar Square, Patan Durbar Square, Bhaktapur Durbar Square, Swayambhunath, Boudhanath, Pasupatinath, Changu Narayan, etc. are at risk to damage from environmental hazards. These heritage sites consist of numerous temples, monasteries, stupas, palaces, chowks, ponds, and waterspouts etc., which represent the culture, history, religion and architecture of the Valley. Apart from the heritage sites, there are also more than thirty religious and monument sites in various places such as Dakshin Kali, Nil Barahi, Bajra Barahi, Surya Binayak, Karya Binayak, Bajra Yogini and Budha Nilakanth.
3.1.3 Economy

Tourism, agro-service, business, commerce and industry sector fuels the growth in Kathmandu’s economy. The manufacturing industries engaged a total of 123,000 persons (National Research Associates, Nepal 1999). Such principal industries are carpets, textiles and ready-made garments, weaving/hosiery, handicrafts and wooden craft, furniture, brick and tile factories. A great number of hotels and resorts may be found in the Valley.

- **Economic infrastructure support is weak**: As a result of fast urban expansion, services and facilities can no longer cope and can eventually destabilize the urban management. For this, employment and services and facilities, in addition to economic opportunities, should be expanded in urbanizing areas. The carrying capacity needs to be determined.

- The Agriculture sector is also weakening.

3.1.4 Environment & Resource Related

Day-to-day risks are faced by the people living in the Valley and are strongly related to environmental degradation.

- **Degraded and denuding water resources**: According to a joint study in 2007 by Ministry of Environment, Science and Technology (MoEST), International Centre for Integrated Mountain Development (ICIMOD) and United Nations Environment Programme (UNEP) titled, “Kathmandu Valley Environmental Outlook,” the Valley’s surface water sources, such as rivers and “kunds”, have received tremendous pressure from increasing population and economic activities. The pressure on these water sources has also increased over the years as the agricultural sector intensified its demand for water. Almost all major rivers have been tapped at source for drinking water supplies. This supply is only about 120 million liters per day (mld) during the rainy season and 80 mld during dry season, against the estimated daily demand of 170 mld (NWSC 2001). In dry season, 60-70 percent of the water supply comes from groundwater. Only 79 percent of the total demand for water of the urban population has been met. (MoEST, ICIMOD and UNEP, 2007). In view of the climate change impacts identified in the NAPA report of 2009, there is a need to address these resource issues immediately.

- **Hazard Prone & Disaster areas**: Information on hazards and negative impacts may be sourced from various agencies, NGO database (Nepal DesInventar, NSET, 2011) and from project reports specially related to earthquake and flood impacts.
  - Natural hazard & risk information integrated in Development plans and processes: Most of the reports on natural hazard impacts in the Valley had been published after the KV 2001 plan. Hence, hazard information and other vital information were not available during KV 2020 plan conception and finalization.

- **Land, Water & Air Pollution**: The KV report had identified the cause of air pollution in the Valley included motor vehicles, factories, bio-mass and fuel; out of which, vehicular emission is the major factor. The reasons for aggravating vehicular emission can be attributed to the use of old vehicles, poor maintenance and use of substandard fuel, among others.

- **Poor sanitation & waste management in Kathmandu Valley**: This is mainly due to household sewage and wastes, and industrial effluents dumped into the river without treatment. There is also a high level of air pollution due to poor road conditions producing dust and particulates. Improper solid waste disposal due to temporary dumping of garbage along roadsides also contributes to urban pollution in the city.

3.1.5 Land Use Related

The agricultural, non-agricultural and forest zones occupy 41%, 28%, and 31% of the total land of the Valley (as of 1998), respectively. There is much diversification of land use. Urban
residential use covers about 7% while rural settlement covers 12.6%. The total land area covers about 66,665 hectares. The analysis of the land use trend of the Valley in 2001 reveals rapid decline of the agriculture land and that this trend is likely continuing. During the period of 2041-51 B. (1984-1994), a total of 7642 hectares of agriculture land was converted for urban uses whereas during the period of 2051-57 B.S. (1994-2000), a total of 5,738 hectares of agriculture land was converted.

It is estimated that 3600 hectares of land will be required for the next 20 years at the rate of 300 persons per hectare. Because land for built up areas are getting scarce, multi-storeyed structures were promoted in the development concept plan. This densification approach, mentioned in the report is deemed to help in preserving the agricultural land. On the other hand, new sites for urban expansion must be pre-identified.

### 3.1.6 Key contributors of vulnerability:

- **A rapid urbanization of the Valley is uncontrolled**: It is likely that the uncontrolled population growth and inadequate services and facilities will eventually destabilize the urban management.
  - **Rapid conversion of unproductive agricultural lands**: One of the derived constraints is that habitation with low density of population was taking place in the Valley and causing decline of fertile agriculture land. The report mentions that between 2041B.S. (1984) and 2057B.S. (2000), the agriculture land in the Valley decreased from 64 percent to 42 percent. If this trend continues, the agriculture land in the Valley will go to zero in 2082 B.S. (2025)\(^6\).

- **Rapid and haphazard urban transformation of the Kathmandu Valley**: It has inflicted a great pressure on the Valley’s precious natural resources such as agriculture land, environment, cultural heritage, services and facilities; and the way of life of the people in the Valley has changed and their living is getting dearer and more painful\(^6\). “The growth of settlements in the Valley is generally spontaneous, and there is very little planning intervention on the part of the government to guide its directions. The low-density urban sprawl and uncontrolled settlement development in rural areas similarly pose a challenge for urban managers because of the high cost of providing and maintaining municipal services” (MoEST, ICIMOD and UNEP, 2007).

- **Densification issues**: The average gross residential density in the Valley was proposed in KV 2020 at 300 persons per hectare (or net density of 600 persons per hectare) considering a 50% occupation for residential purposes. Given the assumption that 500 persons per hectare (net density-KV 2020 report), there is still enough room for densification. Standards for land allocation for educational or health institutions were provided in the report, cultural and entertainment areas; however, there is no study on where this maybe considering the hazard risks and terrain of the Valley.

- **Current causes and effects and trends of urbanization need to be updated**: The Land Use Plan of the Valley 2033 B.S. (1976) remained in effect until the reported period (2001) when KV 2020 was crafted. The current approved plan is still in effect. The current causes and effects, trends of urbanization should be analyzed for Kathmandu Valley to aid decision making\(^7\).

- **Basin or watershed approach is not yet developed for Kathmandu**: It is not yet clear how a basin wide approach may be tackled as the watershed planning covers a wider

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\(^5\) Source: KV 2020

\(^6\) Source: KV 2020, RSLUP E-Learning, 2012 Discussion Forum

\(^7\) Ibid.
scope of uses, generally settlements or built up areas, agriculture and crop areas, forest areas (protected forests and agro-forests), and inland waters. The Kathmandu Valley Urban Development Authority, when formed, will need to integrate broader plans on natural resources (forest, agriculture) with Valley wide urban plans.

3.2 Building, Infrastructure & Transport related

3.2.1 Building Related

In principle, future constructions should not increase vulnerabilities or risks to already high-risk areas. However, there is an increasing risk to building stock damage to a very strong earthquake, not only because of old buildings (non-seismic designed) but because of poor enforcement of local byelaws and national building codes.

- **Increasing physical vulnerability of Kathmandu Valley**: This is a result of several factors related to poor building planning, lack of municipal land use plan and a supporting transport plan to guide development and poor enforcement of building codes and construction standards.

- **Poor site planning of spaces**: Buildings and other structures are built in either side of the major roads in the Valley. The current land use trend reveals that rural settlements are scattered and building works are being done around such settlements in an unplanned manner.

3.2.2 Transport and Infrastructure Related

- **Traffic congestion**: The rise of private vehicles as compared to public transport vehicles and poor condition of such vehicles have caused congestion of motor vehicles in the urban area of the Valley and been increasing air and noise pollution. Non-encouragement of pedestrian walking, bicycle and rickshaw has also caused congestion of motor vehicles.

- **Small internal roads**: It is necessary to improve internal roads and improve surface of important urban roads. This will similarly improve the situation of transport in the future. In doing so, undeveloped areas and open spaces and the places where there is no wider road and there is difficulty with movement should be chosen. (KV 2020). There may also be a need to reduce internal vehicular traffic in inner roads to reduce congestion.

- **Lack of service roads**: This absence makes transition from main road to interior areas difficult.

- **Lack of open space**: There is currently a lack of open space in urban areas, making adjustments or realignments difficult to pursue.

- **Lack of adequate supply of clean safe drinking water** or the prolonged exposure of some communities to stagnant water which causes occasional outbreaks of water-borne diseases.

- **Lack of fire fighting equipment**: Lack of modern (fire fighting) equipment in the Kathmandu Valley renders them unable to cope with frequent fires especially during the hot dry months.

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8 Source: KV 2020
9 Ibid
10 Ibid
3.2.3 Institutional Aspects

There are laws covering both land use planning and disaster risk management and are interlinked by the policy & strategies of NAPA and the NDRM. However, the Operationalization of disaster risk reduction and climate change adaptation through land use planning, periodic planning and their implementation has yet to be realized in a Valley wide scale. There seems to be very limited funding to support for institutional and organizational reforms related to DRRM at the Valley and local level.

- **The lack of the institutional capacity to effectively manage state of urbanization:** The policies of the Kathmandu Valley Town Development Committee (now KVDA) to control land developments and construction works are not becoming effective to mitigate the effects of the externalities in the Valley.

- **Weak enforcement of public safety and environmental regulations:** These have been mentioned in the KV report (and in the current project) as a prime concern related to disaster proneness of the Kathmandu Valley.

4 THE KATHMANDU VALLEY DEVELOPMENT CONCEPT PLAN: A REVIEW AND GAPS ANALYSIS

The actual target of this review and analysis is the Kathmandu Valley Development Concept Plan. The content of the intervention is mainly the preparation of plans at KV level. It is assumed that the KV planning process, described in the KV 2001 report, captures the existing practice of planning at the KV level. The analysis is geared towards how the KV 2020 can be made risk sensitive and what can be recommended to implement it.

4.1 The KV Planning System

The Kathmandu Valley level planning system may be said to be composed of several components, namely; 1) the planning structure (those involved in formulation), 2) the KV planning mandates (or what particular plans are required to be prepared), 3) the planning process (how the plans will be prepared), and 4) the KV implementation tools (how plans can be implemented). The KV planning system is summarized in Figure 5.

<table>
<thead>
<tr>
<th>Table 7: KATHMANDU VALLEY PLANNING SYSTEM</th>
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<tbody>
<tr>
<td>Local Planning Structure</td>
</tr>
<tr>
<td>Who are involved? (A)</td>
</tr>
</tbody>
</table>

Prepared jointly by: EMI & NSET
Political Decisions: Who performs these?
- Deliberation – KVDA, MPPW
- Policies Formulation – GoN, MPPW/KVDA
- Decision taking – GoN, MPPW

Technical Aspects: Who are involved in the following?
- Data generation for sectoral and land use planning - (Sectoral departments)
- Formulation of Goals, Objectives
- (Sectoral agencies with participatory process) (KVDA along with MPs)
- Identifies programs and Projects (Sectoral ministries/ dept./ municipalities KVDA)
- Conducts Public consultations
- (Sectoral agencies, Municipalities, KVDA)
- Monitors Programs, Project Implementation
- (Sectoral agencies, KVDA)
- Conducts detailed researches and analysis- (outsourced by DUDBC/KVDA)

**Development concept**

1. Data Collection & Inventory
2. Inter- & Intra-Area Analysis
3. Goals/Objectives Setting
4. Generation Of Alternative Strategies
5. Evaluation & Selection Of Preferred strategy

**Spatial plan not yet prepared**

6. Detailing & Refinement
7. Formulating Policies & Implementation Tools
8. Plan Adoption & Legitimization
9. Implementation, Monitoring & Feedback

**Figure 5. Identified Planning System at KV level**

**Development concept**
1. Data Collection & Inventory
2. Inter- & Intra-Area Analysis
3. Goals/Objectives Setting
4. Generation Of Alternative Strategies
5. Evaluation & Selection Of Preferred strategy

**Spatial plan not yet prepared**
6. Detailing & Refinement
7. Formulating Policies & Implementation Tools
8. Plan Adoption & Legitimization
9. Implementation, Monitoring & Feedback

Are the plans implemented by the following?
- Zoning (building by-laws by KVDA)
- Co-management
  - (with municipalities)
- Development regulation (Zoning Bye- Laws- KVDA& Municipalities)
- Local investment programs (KVDA& Municipalities, sectoral agencies, MPs)
- New Taxation – (local Gov. property tax)
- Private Investments – (FNCCI)
- Innovative Approaches – (Academia)

Adapted from: Serote, 2004, Comprehensive Land Use Plan and Management of Local Territories, C-9, Property, Patrimony and Territory: Foundations of Land Use Planning in the Philippines, School of Urban and Regional Planning, UP-PLANADES
Note: Intra area analysis refers to spatial and sectoral analysis (socio economic, demographic, environment, and infrastructure) among municipalities within Kathmandu Valley. Inter area analysis refer to spatial and sectoral relationships of adjacent districts of Kathmandu Valley.

4.2 On Planning Structure

As shown in Figure 5, the local planning structure consists of the political decision makers and the technical working group. The political component represents the persons who will deliberate, formulate the policies and head the decision making and is composed of members of KVTDC (currently KVDA), minister of MoPPW and other representatives from the Government of Nepal. These groups are the decision makers who deliberate on the policies, strategies, plan and coordinate KV wide programs, design projects and source funds from national government budgets, financial institutions, and foreign donors (among others) towards plan implementation. The technical working group provides technical support to the decision makers. They are in charge of data generation; analysis; generates and evaluates policy options in order to aid decision makers towards resource allocation and approval of programs, projects, and activities. Comprising the technical group may be the following: members from sectoral Ministries, MPs representing KVDA, VDC chairperson, Mayor of Municipalities, representatives from the District Development Committees and other heads of ministry government agencies with field offices in the locality.

4.3 On KV Plan (KV Concept) and Planning Process

In 2056-57 B.S (1999/2000) a Kathmandu Valley long-term draft development concept was prepared by the Kathmandu Valley Town Development Committee (KVTDC), under instructions by the Board formed under the Ministry of Physical Planning and Works. This development concept provides the policy framework and a road map that will guide Valley wide activities and physical development, to include land use and physical and infrastructure development in a sustainable manner. The emphasis on incorporating environmental values of the Valley provides for a balanced built and un-built environment. The draft concept plan underwent many consultations in the following years 2057/58 (2000/2001) involving Non-governmental Organization (NGOs), People’s Organizations (POs), intellectuals, politicians, local authorities and experts. These interactions took place in four stages and culminated into a final draft in the same year.

The draft plan was prepared by various thematic teams appointed by KV Committee. Following Figure 5 in column (B), the sectoral profiles for the Development concept plan was initially prepared by the Committee's employees who (a) gathered information and data collected by various bodies (b) did on-site inspection and (c) verified information and data in order to reduce error. The intra-analysis and inter analysis were likely prepared initially by then KVTDC with consultations among government agencies. From this technical viewpoint, interactions to validate the analysis took place at various four stages in fiscal year 2057/058 B.S. (2000/01) on the draft plan prepared in fiscal year 2056/057 B.S. (1999/2000). The vision and goal setting, identification and validation of sectoral development thrusts, policy frameworks and strategies were made through these interactions and participated in by the concerned bodies, local authorities and experts concerned.¹²

¹² Source: KV Concept Plan, 2001
4.4 Gaps Analysis

4.4.1 Hazards Information

One important parameter that the KV 2020 Plan has yet to incorporate is the hazard risk information that may guide urban expansion. New environmentally constrained areas may need to be mapped as a result of the new information. Interviews and surveys with members of Kathmandu Valley Development Administration\(^\text{13}\) (KVDA), NSET, MoPPW, and MoLD already pointed the following as necessary for updating the KV 2020Plan, among others:

- The disaster prone areas should be shown clearly in KV Plans;
- Physical infrastructure must be able to mitigate the effect of disasters;
- Areas for rescue and relief need to be identified and protected;
- Areas for future expansion of infrastructure need to be designated;
- Open spaces must be defined;
- Conflicts in sensitive areas (e.g., encroachment in sensitive areas) must be identified and addressed;
- Integration of KV Plan with Local Periodic Plans;

Updating hazards and exposure information appear critical for the Kathmandu Valley. The succeeding process for detailing the spatial component of the KV 2020Plan shall require updating of the previous Earthquake Impact study made in 2002 and a review of the Flood Study in 2009 and explained in terms of the following:

- Exposure and condition of settlements
- Exposure of condition production areas
- Exposure and condition of buildings and infrastructures, transport network
- Exposure and condition of environmentally constrained areas

For the fire-related hazards, an updated inventory will help determine the places of highest fire hazard risks.

Within the Kathmandu Valley, the risk reduction and emergency management actions that municipalities, Village Development Committees (VDC), sub-metropolitan and metropolitan area will need to undertake shall depend on the severity of risks that will be identified.

4.4.2 KV Level Committee to Manage and Communicate Hazard Risk Information

The generation of risk information, integration of risk information in plans, and interpretations may require a group at the KV level to carry them out. These tasks are left unanswered in the KV plan:

- Hazard risks and climate change related risk assessments preparation (new or updated);
- Interpretation and simplification of the assessments for the deliberative body and stakeholders;
- Advocacy for awareness and better understanding of the following disaster risks, climate change risks and environmental management, rural and urban land use management, climate proofing of structures, community preparedness, and implications to economic and social development;
- Coordination and engagement of hazard (mandated) related agencies (e.g., Department of Mines and Geology (DMG), Department of Water Induced Disaster Prevention (DWIDP))

\(^{13}\) Formerly the Kathmandu Valley Town and Development Committee
scientific organizations, and academe towards hazard and risk information interpretations, validation and further research;

- Preparation of simplified guidelines for mainstreaming disaster risk management (DRM) and climate change adaptation (CCA) in KV Plan formulation and implementation at valley level;

- Explanation to Local and Valley level officials about the hazards and risks and ensuring that decision makers are aware of and understand the essential characteristics of hazards and risks and their implications to the development thrusts pursued;

- Consolidation and taking responsibility over these hazard risk data; translating or interpreting these into popular language; and, disseminating the knowledge through various channels of communication;

- Engaging KVDA, MoLD, MoPPW, district government and disaster management units to ensure that valley-wide development and physical framework are risk sensitive and that common solutions are found among municipalities, cities and VDCs; and,

- Engaging municipalities, VDCs, districts to prepare risk sensitive periodic plans and physical development plans and land use plans, which will implement the KV physical framework and development objectives.

### 4.4.3 Risk Sensitive Physical Framework and Process

The detailing and refinement into a physical framework plan have yet to be continued. Both framework and process for this refinement have not been formulated.

### 4.4.4 Norms and Standards

A set of performance criteria need to be developed for the risk reduction efforts in the different development sectors or land use policy areas for monitoring implementation in the following sectors, namely:

- Agriculture and Food security
- Health
- Education
- Shelter, Infrastructure and Physical Planning
- Livelihood Protection
- Water and Sanitation
- Information, Communication, Coordination and Logistics
- Search and Rescue, and Damage and Needs Assessment
- Institutional Framework for Planning
- Transport planning
- Prevention and Security (Public Safety, Hazard Materials)

- Emergency management program and standards\(^1\)  
  - Hazard identification, vulnerability and risk assessment;
  - Legal, fiscal and regulatory procedures;
  - Prevention, preparedness, mitigation, response and recovery plans, among others;
  - Incident management
  - Communications and Warning

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\(^1\) Source: Emergency Management Accreditation Program (http://www.emaponline.org)
5 AN ENABLING ENVIRONMENT FOR KV 2020

The KV Development Concept of 2001 or KV 2020 provides a long term policy guide for the management by the KVDA of all lands, waters, and other natural resources within its territorial jurisdiction. It provides for a comprehensive policy covering every portion of its territory, and can be subdivided into four basic policy areas namely: settlements, infrastructure, production, and protection areas.\(^{15}\)

5.1 Key Policies

The areas for settlements, infrastructure, and production comprise the built-up area or the built form while the protection area constitutes the un-built environment. The expansion of an area follows the population growth, but left unchecked, the un-built environment is rapidly decreased and may result in an unhealthy ecological situation.\(^{16}\) It is then important to maintain a healthy balance between the built form and the un-built environment. This shall mean, in the context of the KV development plan the following:

- Forests, agricultural lands, freshwater sources, and the like are kept open to create a healthy and pleasant environment;
- Protection from encroachment by human settlements to prevent their degradation;
- Clear delineation of settlement areas, production areas, protected areas and infrastructural areas is necessary to reduce conflicts in use;
- Buffers and exclusion zones are provided to protect people and their livelihoods; and
- Safe carrying capacities, zoning and combinations of mix use, building byelaws and national building codes and standards are risk sensitive and shall be the guide towards managing urban expansion and vertical development.

A risk sensitive KV Development Concept and Physical Framework therefore is one which incorporates DRR-sensitive policies for each of the four policy areas. In terms of social dimensions of development, key characteristics of disaster resilient communities are as follows:\(^{17}\):

- There is community decision making regarding land use and management; this highlights participatory planning or engagement of stakeholders in the planning and implementation;
- Local (community) emergency management programs feed into local development and land use planning;
- Community decisions and planning regarding built environment take potential natural hazard risks into account (including potential for increasing risks thru interference with ecological, hydrological, geological systems) and vulnerabilities of different groups;
- Security of land ownership/tenancy rights. There is low level of homelessness and landlessness;
- Communities in safe locations: community members & facilities (homes, workplaces, public & social facilities) not exposed to hazards in high-risk areas within locality and/or relocated away from unsafe sites;

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15 Serote, 2004
16 Ibid
17 Adapted from works by Twigg, 2007
• Meeting more than the basic needs of communities (or resiliency).

The key policies and related strategies incorporated in the KV Plan, namely: Environmental Protection & Management, Better Urban Planning and Safer Urban Expansion & Management, Better Enforcement of Building Bye-laws and National Building Codes, Improved Disaster Management and Improved Institutional Capacities for Planning and Enforcement shall support a risk sensitive environment in Kathmandu Valley. To elaborate, aspects of these policies are discussed below.

Environmental Protection and Management: in the KV plan, it is concerned with improved, water and air quality, sustainable utilization of land and other natural resources, solid and liquid waste management, among others. Policy formulation is also cored in regularizing and managing the water supply, protection of wetlands. Policy enforcement is strongly proposed to be done through national legislation and implemented in the Valley.

Better Urban Planning and Safer Urban Expansion & Management: in the KV plan, it focused on the proper use of land and other natural resources with concern on safe carrying capacity. It aims to improve the form of the urban areas of the Valley and increase the supply of cost-effective residential houses; strong enforcement of zoning ordinance and building bye-laws are also advocated. Policy measures related to improvement of linkages of parking facilities, land-use and transport, and specification of certain forms and sizes of urbanized and non-urbanizing areas were proposed to be pursued. Guided by its development concept and vision, there is a need to harmonize and detail these policy areas, through a physical framework plan to reduce the conflicts in land and resource use.

Better Enforcement of Building Bye-Laws and National Building Codes: It involves the application of standard engineering procedures that result to disaster resilient structures. They are enforced on all types of construction ranging from repairs, rehabilitation, existing building stock; retrofitting to improve the resistance of non-engineered buildings and special retrofitting heritage & historic structures. Building by laws are enforced at the local level but this also entails amendment or adaptation of the national building code through local ordinances that are responsive to local requirements.

Improved Disaster Management: These are aimed at directly protecting lives and property by providing sufficient information, warning to and appropriate response by threatened stakeholders and authorities. These should similarly be supported by the other four pro-active policies proposed to be continuously pursued in the Valley.

Improvement of Institutional Capacities: There is a strong need to effectively manage the state of urbanization, enforce public safety and environmental regulations which have been the prime concerns related to disaster proneness of the Kathmandu Valley.

5.2 Key National Policies

Several key National policies and development action plans that are relevant to disaster risk reduction and management reinforce these pro-active policies in Nepal and especially at Kathmandu Valley18.

5.2.1 Three-Year National Plan (2009/10 - 2012/13)

This plan has given the importance to the disaster risk management and sets the long term vision for developing the capacity of the country for coping with any type of natural and human-induced disasters. It has clearly mentioned in the policy and actions under the section 6.3 (Disaster Risk Management), that the preparation of risk sensitive land use plan and

18 Source: KMC RSLUP, 2011
following the building code will be made compulsory in urban and urbanizing areas. It has also mentioned about the minimization of the impacts of climate change by protecting environment and availing opportunities; increasing the access of people in water induced disaster prevention services; developing safe, low cost and environment friendly housings; developing appropriate settlements and cities from the environmental and social perspective.

### 5.2.2 Kathmandu Valley Development Authority Act of 1988

Section 6 pertains to the development of Kathmandu Valley by improving existing town development and identifying new areas for urban expansion. It also highlights the development and implementation of land pooling program and building construction in identified areas.

Section 7 explicitly highlights the need to stop land fragmentation in the identified land use plan area. Land fragmentation is the result of dividing a parcel of land into smaller sizes by the head of the family and distributing the pieces of land to his heir or members of his family. In many cases, the resulting lots become inadequate in size and shape for the construction of a comfortable house or that the building is built higher in order to accommodate the expanding family occupants. However, whenever the original lots are pooled or consolidated into bigger lots or parcels, the resulting area would yield a building structure with adequate amenities and open spaces for air to flow through.

### 5.2.3 National Urban Policy 2064 (2007)

The National Urban Policy has been formulated for an integration of all the issues of urban development and to clarify the role of implementing institution for addressing those issues. This includes giving clear information on how to mobilize necessary resources and public and private investment for implementation of working policy set in the policy document. The long term goal of the policy is to contribute in poverty alleviation through sustainable urbanization of the development regions. It addresses this through appropriate planning urbanization activities, reversing the deteriorating urban environment, and providing clearer roles of central and local bodies in urban development.

Hence, the three main objectives set by the policy: 1) balanced national urban structure, 2) clean and developed urban environment, and 3) effective urban environment are supportive of disaster risk reduction.  

1. **Balanced national urban structure.** Working policies proposed were the following:
   - North-south corridor (ex. Terai region to Hills and Mountain) shall be developed for equal distribution of facilities to all regional development center;
   - Develop trade linkage between mountain-terai region and boosting tourism;
   - Develop at least one large urban economic center;
   - Develop inter-linkage of other small urban center to it and each other through physical facilities;
   - Give priority to large industrial activities in regional urban center and small and medium industrial activities in medium urban center;
   - Encourage government and private investment for fulfillment of these policies and special encouragement to private investment.

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2. **Clean and developed urban environment.** Working policies proposed were the following:
   - Give priority to conservation of cultural and natural resources;
   - Give due consideration to urban sanitation and public health;
   - Minimize natural disasters;
   - Encourage and formulate environment friendly vehicles and transportation system;
   - Promote various economic activities based on local resources and opportunities;
   - Increase access of low income group to urban infrastructure facilities; and opportunities and management economic activities in unorganized and informal sectors.

3. **Effective urban management.** Working policies proposed were to ensure that the Proposed Physical Planning Act shall address the following:
   - Identify concerned agencies, their responsibilities, to include bringing physical development plan preparation, approval and implementation in the legal framework of law;
   - Strengthen capacity of local body accordingly by making urban development planning compulsory under it;
   - Form a separate unit within the central and regional body for physical development planning, approval and implementation;
   - Declare only those municipalities as urban centers when they have developed a required level of physical facilities and urban character; and to help transform the urban municipality to be a responsible for urban development activities.

5.2.4 **Building Act of 1999**

The Preamble of this Act provides for disaster-resistant building design and construction standards to make buildings safe from natural disasters like earthquake, fire, floods, among others. Section 4 calls for the formulation and adoption of a building code and implementation of the same with the end in view of improving the quality and safety of each building. Section 8 mandates the categorization of buildings into different classes and the issuance of a building permit prior to construction in the municipal areas.

5.2.5 **National Adaptation Programme of Action (NAPA)**

NAPA is a strategic tool which assesses vulnerability to climate change and variability and provides for the process and framework for developing adaptation measures. When related to environmental hazards. In these adaptation measures may fall within the risk reduction themes of disaster mitigation, prevention and preparedness. NAPA is mainly core on six basic themes which fall within the national and local development sectors. They are:

- Agriculture and Food Security – adaptation priorities in agriculture have been set at sustainable agricultural land use system, agro-biodiversity management and favorable and conducive governance mechanism.
- Forests and Biodiversity – adaptation measures set on sustainable forest management, improved governance and capacity at the local level.
- Water resources and Energy – adaptation priorities set on better and more accessible information and technology, stronger and more adaptable institutions, and natural and human-made infrastructure to store water, transport and treat water, and to maintain energy production base, and expand and integrate transmission and distribution networks.
- Climate Change Induced Disasters – relevant to adaptation, the DRR practices include strengthening resilience, diversifying livelihood, planning, providing insurance and developing and early warning system, and community based approaches for DRR.
• Public Health-adaptation strategies focus largely on awareness raising and public health initiatives at local level. Carry out research, formulate appropriate strategies and conduct IEC on health related issues caused by climate change.

• Urban Settlements and Infrastructure-adaptation measures are cored at the following:

  **Settlements:**

  • improving effective and pro-poor structures of governance
  • reduce the threat through prevention
  • improve coping capacity of vulnerable communities

  **Infrastructures:**

  • formulate and implement sound climate change adaptation measures
  • providing enabling conditions to ensure resilient infrastructures\(^{20}\)

CCA measures, especially with regards to hydro-meteorological hazards (ex, floods, storm surges, windstorms) are usually drawn from the best practices and norms of the disaster risk management field (i.e. prevention, mitigation and preparedness). New experiences and best practices are still being brought forward by CCA practitioners to address adaptation issues. It is then critical to view the CCA and DRR agendas together to support the sustainable development of Kathmandu Valley. The process of planning must identify and address current and long term vulnerabilities and the disasters they may bring about.

At the local level, implementation of the disaster reduction and adaptation measures is within the purview of the municipal and city functions and duties. Coordination, capacity building, financial and technical support from the Ministries and Districts are needed to ensure success.

**National Strategy for Disaster Risk Management, (NSDRM-2009)**

National Strategy for Disaster Risk Management is a National Framework with the commitment of the Government of Nepal for protection, growth, and promotion of national heritages and physical infrastructures. It provides for a course of action to address the loss of physical properties and human lives, destructions of basic infrastructures. This is done by proposing an organizational structure for DRM in Nepal and by mainstreaming disaster reduction in the development process.

Similar to the NAPA, the NSDRM is an inseparable component of all other sector strategies contributing to sustainable development of Nepal. An Inherent objective of this Strategy is to guide towards reducing disasters in the process of formulation and execution of development programs for national development.

The NSDRM follows a paradigm shift from merely responding to post disaster situations to disaster prevention through development. Its main vision is to have disaster resilient communities in Nepal. To do this, the long term strategies include:

• Development and restructuring of institutional structures;

• Strengthen policy-wide and legal arrangements to ensure stakeholders’ participation while adhering to integrated policy and decentralized implementation process.

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\(^{20}\) Source: National Adaptation Programme of Action (NAPA) to Climate Change, Ministry of Environment, 2010
Create enabling environment from the central to household level within the State to prepare and implement disaster risk reduction and preparedness plans.

Ensure mainstreaming disaster reduction into overall development process along with sectoral development and poverty reduction plans.

The Government of Nepal (GoN) strongly realizes that disasters are tied up with inappropriate development. Hence, the GoN had set up priorities based on sector-wide activities by assessing the nature of potential disaster. This may be seen in Nepal's need-based development agenda with HFA 2005-2015. The NSDRM follows five priorities in the implementation process:

- Put up an institutional framework in place for its implementation by prioritizing DRR at both the national and local levels.
- Strengthen assessment, identification, monitoring, and early warning system on potential disaster;
- Make use of knowledge, new ideas, and education for the development of safety and disaster resilient culture at all levels;
- Minimize existing risk factors; and
- Make Disaster Preparedness strong enough for effective response.

Mainstreaming of DRR in the various development sectors become imperative to ensure that preparedness, mitigation or response arrangements are in place and that damages, losses are reduced, thereby bringing sustainability of development. In the same sense, the GoN has identified the following sectors as targets for risk reduction efforts:

- Agriculture and Food security
- Health
- Education
- Shelter, Infrastructure and Physical Planning
- Livelihood Protection
- Water and Sanitation
- Information, Communication, Coordination and Logistics
- Search and Rescue, and Damage and Needs Assessment
- Institutional Framework for Planning

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21 Source: NSDRM, 2009
22 Source: NSDRM, Government of Nepal, 2009
6 ENHANCING THE CAPACITY OF THE VALLEY PLANNING STRUCTURE

In order to support the formulation and implementation of the KV framework, it must have a responsive organizational set up as well as acquire the proper capacity to perform the following:

- Mainstreaming work as described in Figure 7
- Prepare the Land Use plan
- Facilitate Generation & Management of hazard risk information
- Communicate Risks
- Support Trainings

This KV committee (or subcommittee) forming a technical working group, may comprise of thematic teams of KVDA, dedicated especially towards formulating a risk sensitive physical framework plan and its communication (ex. creating basic awareness). The thematic teams may be formed from the environment sector, land use sector or from the infrastructure sector. For the decision-making aspect, this may comprise of the existing deliberative group comprised of the MPPW, KVDA, MoLD and joined by the Valley or District Level Disaster Coordinating Council (DCC).
7 FRAMEWORK FOR MAKING KATHMANDU VALLEY DEVELOPMENT CONCEPT PLAN RISK SENSITIVE

This framework for mainstreaming DRM in Kathmandu Valley Concept Plan and Planning processes aims to a) guide the Valley in ensuring disaster risk management is integrated in the plans and processes; b) ensure that the proactive policies support DRR in the Development Concept and Physical Framework; and that c) implementation tools adhere to the preferred strategies. These are presented in this chapter.

7.1 Framework for Mainstreaming DRR

Figure 6 shows the DRR mainstreaming concept developed by EMI to promote the integration of risk reduction measures in local governance, in a way that significant risk reduction occurs at the local level\(^2\). The mainstreaming framework can be highly effective when local authorities, engaged in the normal conduct of their functions, responsibilities, and practices, integrate DRR measures and objectives in various aspects of local governance such as urban planning. This framework also suggests that DRR can be mainstreamed in local governance by harnessing existing mechanisms, processes, and systems that are already in place and making use of such resources.

![Diagram of DRR Mainstreaming Concept](image)

**Figure 6.** Framework for Mainstreaming Disaster Risk Reduction (EMI, copyright)

7.2 Framework for Mainstreaming in Plans

Essentially, the risk sensitive physical framework planning shown in Figure 7, came about as an offshoot of a previous study undertaken by KMC, NSET and EMI and other local and international partners to develop a disaster risk management master plan (DRMMP) for Kathmandu City in 2005-2006. The KMC RSLUP integrated elements (i.e. disaster risk assessment and mitigation) into local land use planning by: (a) using available seismic, flood, fire hazard and risk information; (b) including emergency management parameters (e.g., evacuation roads), (c) prescribing a series of disaster risk reduction strategies and actions in

\(^2\) EMI, 2006
the land use planning practice; and (d) delivering a rational risk-sensitive land use plan to guide the future development of Kathmandu.

Prior to the initial crafting of the KMC RSLUP in 2010, a participatory approach was applied to ensure full ownership of the project by KMC and other local partners and build the capacity within local professionals. The engagement of the partners in the project and their integration in a single team was instrumental to the success of the project.

In 2011, and under this same project with UNDP-Nepal, KMC, NSET and EMI held a round of consultation meetings among KMC stakeholders, leading to the endorsement of the KMC RSLUP. Later, in early 2012, the KMC Legislative Council approved of its adoption and implementation. It is then, a useful framework to follow and use for the Valley wide planning which includes the DRR mainstreaming work.

The KV 2020 development concept already demonstrated that land use planning could be an effective tool to lessen the physical, social and economic vulnerabilities of cities to natural hazards. It aims to combine several development plan components that will form the physical framework (plan) of Kathmandu Valley, and by which land use plans prepared by the municipalities, cities, VDC and higher-level plans are guided. Regional plans or Valley-wide projects shall be chosen with the participation of affected local residents and in consideration of the inherent natural hazards of the place.

Figure 7. Framework for Mainstreaming Disaster Risk Reduction in Land Use Planning (EMI, copyright) Note: Also presented in Figure 3

Prepared jointly by: EMI & NSET
7.3 Mainstreaming Activities

With continued efforts by KVDA and local stakeholders, and with strong support by the Nepal Ministry (i.e. MoPPW, MoHA, MoLD and DUDBC) and departments, by UNDP and by scientific organizations such as NSET and EMI, a blueprint towards sustainable urban development within the Kathmandu Valley can be pursued.

The KV Development Concept Plan had already initiated a participatory approach by having the initial document undergo a series of reviews among its stakeholders in latter stages in 2001. The approved KV Plan consolidated the reviews and comments with the original proposal and formed the basis for future land use planning activities. However, as the plan needs updating, the following enhancements are proposed:

- A program that includes a wider set of stakeholders to be involved in:
  - identifying, describing, validating the issues and problems of the Valley;
  - preparation of the Development Vision;
  - validating the component plans (settlement, infrastructure, environment and production (economy) plans);

- Inclusion of natural hazard risks and their management to the different component plans and their development policy, strategy decisions:
  - Hazard, vulnerability and risk information and maps;
  - Inclusion of past disaster information;
  - Inclusion of climate change impact assessments to the region (or Valley);
  - Implications of hazard, vulnerability and risk information to the component plans in terms of land use management, particularly on enforcement issues;
  - Inclusion and review of current programs, projects and activities in the component development plans for Valley wide development;
  - Inclusion of risk management options and climate change adaptation strategies relevant to the Valley;
  - Identifying the programs, projects and activities which may be integrated in the periodic plans of Municipalities, and cities;

In transforming the KV plan into a spatial framework, suggestions include the following:

- Combining the component plans into a preferred physical framework:
  - Utilizing hazard maps and disaster risk information as constraints to urban expansion areas (ex. exclusion areas, or development areas with use restrictions and control);
  - Having appropriately scaled hazard maps and disaster risk information to provide a more detailed zoning (ex. municipal level (1:10:000);
  - Inclusion and review of current programs, projects and activities in the components spatial plans for Valley wide arrangements
  - Inclusion of spatial components of risk management options and climate change adaptation strategies relevant to the Valley;
  - A simplified guide to aid in the process of mainstreaming hazard, vulnerability and risk assessment in KV physical framework.

7.4 Capacity building

In order to carry out the needed enhancements and drafting of the KV framework plan, capacity building must be directed to the technical, operational and institutional aspects of KV governance. This capacity building should aim for the attainment of the KV development objectives by carrying out the policies and strategies set forth in the KV 2020 Development Concept, and further refined towards a physical framework plan. These shall be in accordance
with existing national laws especially with the NSDRM for disaster risk management and the NAPA for Climate Change policies and strategies. The capacity building effort should continue on the efforts undertaken by this project, where several public officials from various government institutions and KMC were trained on risk sensitive land use planning (refer to separate report for this particular element of the project).

7.5 Enhanced Planning Steps

This section will focus attention on the following KV planning steps:

7.5.1 Data Collection & Inventory/Analysis

Data from five development sectors, namely social, economy, infrastructures, environment, and institutions contribute towards developing the socio-economic and physical profile. These same data shall form the bases for planning the different land use policy areas-settlements, production, infrastructure and protection land use. Significant data has already been collected for Kathmandu City in relation to the earlier project on KMC Risk Sensitive Land Use Plan where a sectoral profile was developed. The proposed data collection should be extended to the Valley. Figure 8 provides an example of the Sectoral Profile developed for KMC.

To be of more effective use for planning, the following tasks should be accomplished:

- a common data set prepared for both sectoral development and physical framework planning analysis;
- indicators of development drawn from the data are used to provide the existing development scenario and to establish trends;
- a lead agency shall be assigned towards harmonization or streamlining the information requirements for planning.

Figure 8. The Kathmandu Metropolitan City Sectoral Profile as a sample

At later stages, these tasks must similarly be done by the municipalities in preparing their periodic plans and component physical development plans. Eventually, they shall be used to prepare the individual municipal land use plans:

Thematic Mapping. The thematic maps are necessary to build the physical framework plan of the Valley. The list of thematic maps shall cover the different land use policy areas. With regards to risk reduction, these shall include geo-hazard maps. These maps may be obtained from project reports and maps on earthquakes and floods, existing databases or from new hazard mapping exercises. These shall be used to determine areas vulnerable to climate-related and geologic disasters.

Disaster Risk Mapping. The risk maps may be drawn from the disaster risk assessment outputs. The Disaster Risk Assessment (DRA) process entails several steps and may be prepared ahead of the planning stage. It involves an assessment of the following: (a) hazard, (b) the vulnerabilities and risks of different elements (e.g. people, buildings, facilities, activities, etc.) in the Valley or component areas, (c) risk parameters represented by estimates.
of damage or loss, and the (d) requirements for emergency management (e.g. open spaces, open access, access routes, etc.).

Vulnerability analysis refers to the following: physical vulnerability of the built environment, socio-economic vulnerability, climate change and variability vulnerability. Risk analysis is related to determining severity of consequence (e.g. direct and indirect damages and losses), expressed as monetary loss, loss of function of specific sectors.

Understanding the implications of the risk assessment to development requires the collective experiences and expertise of the planners, scientific experts and stakeholders in different sectors to address these threats. To treat them as significant or not, or whether they are impediments to development and progress, will require further evaluation by the stakeholders. (KMC RSLUP, 2010)

- **Emergency management.** In view of the spatial requirements for emergencies, information on possible escape routes of an area, temporary sites for evacuation, and locations of critical infrastructures (e.g. hospitals, water sources) may be mapped and evaluated. The basic information on critical infrastructures, routes, temporary sites can make use of the aerial images. The information shall be validated on the ground as to suitability in ground conditions.

- **Decision zones.** Overlays comprising various thematic maps provide for finding suitable or compatible areas or finding those conflicts among land use areas. These common areas are called decision zones. For hazard and exposure mapping, a specific hazard map is overlaid with the existing land use map, or with other component plan maps (ex. infrastructures, productive assets, and social infrastructures and facilities) to reveal different levels of vulnerability or risks to the hazard.

### 7.5.2 DRR-Sensitive Physical Planning Goals

If efforts had been made to ensure that the vision statement is risk sensitive, other sectoral goals, particularly the goals of physical development, are expected to be equally risk sensitive. Some examples drawn from the KV 2001 include the following:

- **Rational population distribution.** For the KV 2001 it means dispersion to prevent over-concentration of development in the metropolitan cities. At the local scale, rational population distribution may mean promoting the development of human settlements in hazard-free and well-serviced locations.

- **Environmental integrity maintained.** This means that environmentally constrained areas are not degraded further and areas under protection remain protected at all times.

### 7.5.3 DRR-Sensitive Spatial Strategies

In drawing up a KV physical framework, a preferred spatial strategy (or spatial form) that will support the objectives of the KV development concept and in general the people’s vision for their community is needed.

The physical framework of the KV development concept would be this form and will serve as the organizing concept to guide the detailed elaboration of the Valley wide land use plan and its implementing tools such as the zoning ordinances.

- **Demand-supply balancing of land for urban development.** In projecting the future demand of land for urban development, the following exclusion areas help identify available areas for urban expansion:

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24 Serote, 2004
- the land areas of existing settlements in hazard prone areas are added to the total demand.
- land areas for future urban development which are highly prone to different types of hazards are excluded from consideration if mitigation is not cost effective.
- Protected areas and environmentally constrained areas are considered not available for urban expansion purposes.

The result of the demand-supply balancing process will indicate whether or not there will be a need to augment supply to satisfy the demand. In-filling, densification, urban renewal, agricultural land conversions are among other ways of meeting demand.

- **Designing alternative spatial strategies or urban forms.** Generation of alternative spatial strategies is a major activity in the crafting of risk sensitive KV physical framework. The spatial strategy is a form or pattern of physical development of the Valley (and components) that will contribute to the realization of the long-term vision.
  - The evaluation of the alternative spatial strategies aims to analyze and determine the advantages and disadvantages of each strategy:
    - **Sectoral development issues and concerns.** The sectoral profile, thematic maps, hazard risks and other data outputs are used to describe the development issues and concerns. In the context of the KV plan, the previously identified problems and concerns that still resurface are documented in the updating. These are then reviewed, validated, prioritized among the various sectoral issues and concerns in the updated KV Development Concept. Their implications to sectoral development and their possible solutions are discussed in workshops.
    - **Sectoral development objectives and targets.** These are derived from the KV vision statement. The development goals and targets are framed from these development issues and concerns.
    - **Sectoral policies and strategies.** These guide the formulation and implementation of proposed sectoral programs and projects. As with the KV plan, they cover: i) the spatial trends of settlement expansion, ii) economic concentration and specialization and iii) environmental concerns, iv) capacity development and v) risk reduction and adaptation.
    - **Spatial content.** Spatial content or implications of the different sectoral plans are then included in the KV physical framework plan and into the zoning policies, ordinance and other proposed local legislation.
    - **Sectoral Programs and Projects.** Programs and projects necessary to realize the development objectives and achieve the targets of the sectors and subsectors are identified in the development and physical framework plan. These may be integrated later in the periodic plans.
    - **Public consultation.** The outputs of this stage are then subject to public consultation. It is expected that the public consultation will result in a consensus on the final vision statement and the preferred spatial strategy.

### 7.5.4 Evaluation and selection of the preferred strategy

The preferred spatial strategy for Kathmandu Valley serves the basis for the preparation of the draft RSLUP. The main activities include identifying and mapping the land use policy areas and their sub-components, namely: settlements, protection, production and infrastructure. The preferred urban forms are also reflected in the land use plan.
7.5.5 **Detailing the land use plan**

The chosen spatial strategy or urban form will now become the organizing concept for detailing the Valley wide land use plan, the zoning ordinances and other plan implementation tools.
8 DRR RELATED IMPLEMENTATION TOOLS

8.1 Zoning

The Zoning Ordinance, which basically translates the KV risk-sensitive land use plan into an implementing tool, is based on the preferred land use plan and the land use policy frameworks. It is necessary for the KVDA to strongly enforce the derived zoning and to impose penalties and fines on violators of its provision.

Fines and Penalties

Fines and penalties can also have a regulatory effect. Acts such as the following should be penalized:

- Settlement encroachments into “no build” zones. High risk-areas shall be included among areas to be included in protected zones. As “no-build” zones, necessary easements and buffers are in place to protect communities or resources.
- Violations in development plan and building plan permitting.
- Non-conformance of allowed occupancy use.
- Non-conformance of construction work with approved plans or building bye-laws and codes.
- Non-provision of Open spaces. Remaining open spaces must be maintained and that requirements must be determined and met.
- In a watershed approach, interrelationships and impacts of upland activities on lowland areas are considered in evaluating proposed land uses.
- Non-conformance of owners, developers to approved building bye-laws and zoning ordinances. Necessarily, municipal and city land use plans and periodic plans must be guided by the Valley wide physical framework (spatial) plan.
- Degradation of the environment by unlawful activities and poor practices in waste management shall be penalized in the Valley.
- Adopt the “polluter pays” principle. Project proponents whose projects are determined to cause risks to the local population should pay the intended or unintended effects.
- Penalties and fines should be used to compensate victims of man-made risks (ex. poor fire proofing of buildings, building collapses).

8.2 Safe Building By-Laws

Safe building construction should be guided by the Nepal (National) Building Code and should be integrated in the local building bye-laws. The structure, functions, resources and equipment needed to enforce this must be determined by the KVDA and the component municipalities, VDCs and cities.

- The building by-laws (Valley wide) should be more responsive to local needs and peculiarities, but guided by National Building Code.

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25 The implementation tools discussed in this section were obtained from the KV 2001 report, E-learning discussion forums and adaptations and from works by Serote, 2004, Comprehensive Land Use Plan and Management of Local Territories, Property, Patrimony and Territory: Foundations of Land Use Planning in the Philippines; School of Urban and Regional Planning, UP-PLANADES) pp.371-386.
• Strict enforcement of safe engineering standards should be encouraged especially in the
design and construction of building structures and their foundations.
• Monitoring, assessment and evaluation programs for existing structures must be in place.
• Regular monitoring of the structural and environmental quality of residential districts
must be in place. Appropriate treatment measures ranging from conservation to
rehabilitation to redevelopment should be considered. Urban expansion and management
shall be formulated to create a balanced built and un-built environment, that is, for
example, preserving open spaces, non-conversion or remaining lands, adjusting systems
to more compact and efficient forms; monitoring, assessment and evaluation programs
must be in place.

8.3 Co-management
Ministries (through KVDA) and local governments (e.g. the municipalities, cities and VDCs)
undertake joint responsibility for managing the different land use areas that lie within their
territorial jurisdiction. The activities may include enforcement of national building codes,
opening of Valley wide building bye-laws and zoning ordinances, co-managing the
environment and natural resource areas (forest land areas).

8.4 Public Investment Programming
The annual investment program should be the principal instrument for implementing the KV
plan. For example, the municipalities and urbanizing VDCs use a portion of their individual
annual budgets for its risk sensitive programs, projects and activities.

8.5 Private Investments Incentives
Incentives are given to private investors for implementing DRM activities; the different levels
of Government may consider:
• Giving fiscal and monetary rewards (tax –subsidies) to private firms that put into practice
significant risk reduction measures in their day to day operations or to those who ensure
that an Environmental Impact Assessments are prepared and a Monitoring, Evaluation
Program for Environmental Management are designed and funded before any project is
allowed to operate in an area

Prepared jointly by: EMI & NSET
9 WAY FORWARD: COMPLETING THE RISK SENSITIVE KATHMANDU VALLEY PHYSICAL FRAMEWORK PLAN

It is proposed that to complete the KV Development Concept into a KV Physical framework plan, a 3-year plan be programmed in four stages as indicated in Figure 9.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<td>STAGE 1:</td>
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<tr>
<td>Task 1. Organizing and tasking activities for Risk Sensitive physical framework planning for Kathmandu Valley</td>
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<td>Task 1.1 KVDA planning committee &amp; structure defined</td>
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<td>Task 1.2 KV Data inventory and Thematic Map inventory</td>
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<td>Task 1.3 Work Plan and Approval, Funding source</td>
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<td>STAGE 2:</td>
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<td>Task 2. Updating of KV Concept Plan,</td>
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<tr>
<td>Task 2.1 Updating of Ecological profile,</td>
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<td>Task 2.2 RSLUP Guideline preparation</td>
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<td>STAGE 3:</td>
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<tr>
<td>Task 3 Valley Wide Multi Hazards Analysis</td>
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<td>Task 4. Valley wide Transport Planning</td>
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<td>Task 5. Valley wide Physical Framework Planning</td>
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<td>STAGE 4:</td>
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<tr>
<td>Task 7. Special Studies (Selected Heritage/Historical Sites)</td>
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<tr>
<td>Task 8. Capacity building, monitoring tools development</td>
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Figure 9. Proposed Activities and Timeline for the Completion of the Risk Sensitive Land Use Plan for the Kathmandu Valley

Stage 1 will focus on organization and preparation for KV risk sensitive planning: composition of KVDA committee for planning, data inventorying, work planning, approval process and budgeting. This stage shall help reach consensus among the Nepalese government agencies and development partners in Nepal on the development strategies, methodology and institutional arrangements for the development of the Kathmandu Valley RSLUP.

The activities of Stage 2 will include updating of the KV concept plan. This shall include updating the information about the planning environment (social, economic, physical and environmental aspects) and the development of a simplified guide towards risk sensitive physical framework (land use) planning.

Stage 3 shall include the Valley wide multi hazard analysis, the transport planning and physical framework planning. Because of possible data requirements which can only be acquired by primary data gathering (surveys and interviews), model development and processing, the period is given two (2) years to complete an integrated transport and land use planning for the Kathmandu Valley. The government partners for the project will be MoPPW, MoLD, KVDA, KMC and other Municipalities and VDC’s within Kathmandu Valley.
Stage 4 will focus on municipal land use planning or periodic planning of selected sub-metropolitan cities, municipalities and urbanizing VDCs. This stage shall also include the finalization of the KMC RSLUP. Special studies on heritage areas or historical sites are proposed while the land use plans are similarly prepared, in order that these master plans are concurrent with the land use plan preparation.

Capacity building activities are proposed to be spread over the entire project period and be made parallel to the different tasks. Capacity building of Nepalese planners in risk sensitive land use planning shall be cours ed through active participation in the various activities, workshop and lectures, field trips and site visits among others. These activities are hoped to support the future implementation of the CDRM and the Flagship Programmes.
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8. National Adaptation Programme of Action (NAPA) to Climate Change, Ministry of Environment, 2010


12. Ministry of Physical Planning and Works, Department of Urban Development and Building Construction, Babar Mahal


ANNEXES

According to the Kathmandu Valley DRM Profile (EMI, 2005), the most frequent natural disasters in Nepal are flood, landslide, and fire causing loss of life and severe damage to property. The middle hills are mainly prone to landslides while the flat Tarai region is susceptible to flood and fire. While earthquakes are not frequent, historically, Nepal has experienced several destructive earthquakes with more than 11,000 people killed in four major earthquakes just in the past century.

The more devastating natural hazards for Kathmandu Valley are related to earthquakes, floods and fires.

Annex 1.  Earthquake

The historical earthquake catalogue of UNDP/UNCHS (1994) showed high seismicity along the Himalaya.

Historically, Nepal has experienced several destructive earthquakes with more than 11,000 people killed in four major earthquakes just in the past century. Based on the earthquake catalog, Nepal faces one earthquake of Magnitude 7 or greater every 75 years, on average. Such magnitude earthquake could be extremely damaging to urban metropolises as demonstrated by the M7.0 January 2010 Haiti earthquake. Even more alarming is that since 1800 five (5) events of M>= 7 have affected Kathmandu; the most recent severe earthquake was the 1934 M8.3 earthquake. On average earthquake intensities equal to or greater than VIII MMI (Modified Mercalli Intensity) take place every 36 years while earthquake intensities of IX MMI or greater take place every 75 years. The last significant earthquake M6.6 causing a loss of 721 lives occurred in east Nepal in 1988. It caused a total direct economic loss of about 5 billion Nepalese Rupees. Further a recent M6.9 event shook eastern and central Nepal as well as north east India causing damage to 30,684 buildings and inflicting a total direct economic loss of 5.65billion Nepalese Rupees. The consolidated earthquake catalogue of Nepal (1255 to 1992 A.D) and subsequent reporting by National Seismological centre (NSC) of Department of Mines and Geology (DMG) shows high frequency of large earthquakes in Nepal. Based on these observations, it is reasonable to conclude that there is a high likelihood of an earthquake which will cause intensities of 8 or greater in Kathmandu. Such intensities will create catastrophic damages in the city.

Table A.1: Magnitude-Frequency Data on Earthquakes in Nepal and the Surrounding Region (1911-1991)

<table>
<thead>
<tr>
<th>No. of Events</th>
<th>Approximate Recurrence Interval, yr.</th>
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<tbody>
<tr>
<td>5 to 6</td>
<td>2</td>
</tr>
<tr>
<td>6 to 7</td>
<td>5</td>
</tr>
<tr>
<td>7 to 7.5</td>
<td>8</td>
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<tr>
<td>7.5 to 8</td>
<td>40</td>
</tr>
<tr>
<td>&gt;8</td>
<td>81</td>
</tr>
</tbody>
</table>

Source: Earthquake Catalogue in BCDP, 1994

Table A.2: Frequency and Various levels of earthquake intensities in Kathmandu since 1800 A.D

(KATHMANDU)

5 Events of M>=7 since 1800 with one event of M=8.3 (1934)

(Source: EMI from historical earthquake catalogue)
For example, it was reported that in 1833, a strong earthquake resulted in the destruction of 643 houses, and death of 414 people. The 1934 Bihar-Nepal Earthquake produced strong shaking in Kathmandu Valley, the country’s political, economic and cultural capital, and destroyed 20 percent and damaged 40 percent of the valley’s building stock. In Kathmandu itself, one quarter of all homes was destroyed along with many historic buildings. In Kathmandu valley 19,000 buildings were heavily damaged, 3800 people were killed and 1000 people were seriously wounded by 1934 earthquake (from a study by JICA and MOHA in 2002).

Figure 3 presents the historical epicentral distributions in and around Nepal. The epicentral distribution map indicates the following characteristics:

- There are three main tectonic lines running across Nepal, namely, the Main Central Thrust (MCT), Main Boundary Thrust (MBT) and Main Frontal Thrust (MFT), and many of the past earthquakes occurred in the area between MCT and MBT.
- Seismicity is active in the west of Nepal.
- The central part of Nepal has suffered relatively few earthquakes.

A study by JICA and MOHA in 2002 covered seismic risk assessment for the whole Kathmandu Valley. It was, however, conducted within a short duration of time under limited resources. At that time, there was no official building inventory of the area so the total number of buildings was estimated from population and household distribution as reported in the 1991 census. Information on building vulnerability was based on an inventory survey of only 1,000 buildings and from onsite observation of the main sites.

Figure A.1: Epicentral Distribution around Nepal, 1255 to 2001

There are several faults in the Kathmandu Valley. If one of them moves, part of this lineament in the Valley will be severely damaged, even if the damaged area is not so large. The nature of damage from the earthquake in the valley will be different from that of a huge earthquake that occurs outside the Valley.

According to the same earthquake study, the main source of seismic activity in Nepal is the subduction of the Indian plate under the Tibetan plate or Himalayas. Another earthquake

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26 Source: Earthquake Disaster Mitigation in the Kathmandu Valley, March 2002.
generator in the Valley is the identified seismic gap zone in the middle of Nepal. Based on seismic records dating back to 1255, destructive earthquakes (estimated to have reached M7 or greater) have occurred in 1255, 1408, 1681, 1767, 1803, 1810, 1833, and 1866, 1913, 1916, 1934 and 1936 with the M8.3 1934 earthquake being the largest magnitude recorded earthquake.

Annex 2. The Kathmandu Valley Development Concept of 2001:

The main objective of the KV plan was to maintain coordination between the land use and transportation system for the well-planned urban development of the Valley. Its other objectives, outlined in the KV report were as follows:

a. Pursue the carrying capacity as the basic ground in order to manage the population growth in the Valley.

b. Maintain the balance between the urban growth and the scarce natural resources, by conserving the social, economic and environmental values.

c. Improve the quality of life of the Valley people.

d. Select possible places for areas with transport facility and its development in order to encourage urban development only in the designated areas.

e. Constantly monitor the land-use situation in order to manage population and urban development.

f. Identify the land available for urban development, and analyze its constraints and opportunities.

g. Guide the land-use by arranging for efficient transportation.

h. Involve all the concerned stakeholders in the planning process.

In essence, the following principles had been advocated by the KV draft concept plan in order that KV will succeed in conserving its finite natural resources and make the life of the future generation enjoyable, by guiding the future urbanization through land use fixation, transport management and infrastructure services. These principles stated in the KV 2020 are deemed risk sensitive:

Principle 1: Participatory planning and a strong engagement of District Development Committees (DDCs), Municipalities and Village Development Committees (VDCs) in plan formulation, plan implementation and enforcement of local and national laws.

1.1 Central and local bodies have a prime responsibility to initiate development and construction works in the Valley. This means that the five municipalities have to prepare and enforce land –use plans in their respective municipal areas;

1.2 Properly plan urban development and to provide essential services and facilities to their constituents;

1.3 Village Development committees have to give emphasis on protection of agricultural land, natural resources and building physical infrastructures in their respective areas.

Principle 2: A Valley wide structure plan or physical framework shall be based on a watershed development concept.

- The District Development Committees have to consolidate interrelationship of rural and urban areas in the Valley and establish a useful and dynamic synergy among them;
• Governmental and semi-governmental bodies shall formulate and implement valley-wide programs in accordance with the structure plan (or guided by the development concept);

**Principle 3:** The Valley must be planned taking into consideration its natural, historical, cultural (built) resources and its primary role in Nation building.

• The land must be utilized considering its opportunities for best and highest use and takes into account its inherent constraints (ex. ecological fragility, hazards) and derived constraints (ex. pollution, poverty)

In order to carry out these principles, two main strategies are pursued in the KV 2020 development concept,

**Strategy 1:** Deconcentration of economic and capital investment in the Valley in other regions.

The implementation of this strategy involves pursuing economic diversity:

a) Developing and expanding the tourism sector and hinges on the cultural and religious heritage of the Valley; thereby, creating employment opportunities and business;

b) Shifting of incompatible and highly pollute industries (e.g. carpet, ready-made-garment, cement and brick factories) away from settlement areas and environmentally sensitive areas.

c) Promoting state of the art but environment friendly technologies;

d) Transferring police and military premises covering much land located in inner urban areas into the periphery of the Valley;

e) Develop traditional agricultural system commercially and protect cottage and handicraft industries.

**Strategy 2:** Pursue studies that will clarify as to where and how urban development of the Valley shall be channelled.

a. Ensure well-planned development and expansion of the Valley;(i.e. Reduce sprawl, congestion and organize built and un-built spaces)

b. The boundaries of urban and rural areas of the Valley will be delineated using legal, policy and financial measures. This is to facilitate the differentiation of development patterns for each area and reduce the fragmentation of agricultural land. Currently, the legal provision of minimum plot size is enforceable for the entire Valley;

c. Urban development works shall be guided in existing urban areas and in proposed urban expansion areas;
  - A minimum of 300pph may bring a change in land use patterns and densities because it encourages higher FAR, resulting to multi-storied apartment buildings in place of individual low rise structures.

d. Harmonization of the physical, transport development and land use policies;

e. An extensive improvement and adjustment in the existing institutional structures and separate laws will be made to implement the plan.
i. The Valley-wise regional planning body to be established under Nepali law will play the role of adviser and regulator; (i.e. currently taken as KVDA)

ii. Local authorities and sectoral agencies will be implementers and operators;

iii. An act will contain provisions that these bodies will prepare their plans, programs and projects subject to the regional plan of the Valley;

iv. KVDA to provide the regulatory guidelines, coordinate, and facilitate preparation and approval of plans, programs and projects made by the various bodies in consonance with the Plan;

v. Provisions of KVDA legislative powers to curtail annual budget of the governmental and semi-governmental agencies which operates programs contrary to the objectives of the Plan; and

vi. Provisions of their executive powers would include the following:
   - To withhold fully or partly grants and loans provided by His Majesty’s Government and;
   - Regulatory powers such as cancellation of approval certificates for non-complying designs.


The following guiding policies (or goals) describe the conditions and characteristics of sustainable development in the various land use policy areas: settlements (ex. related to urban development and housing), economy (ex. diversification), physical infrastructure, natural environment (ex. open spaces, environmental management).

A risk sensitive KV Plan therefore is one which incorporates DRR-sensitive policies for each of the above mentioned land use policy areas. Necessarily, hazard, vulnerability and risk information and emergency management concerns should inform these land use policy areas.

Annex 4. General Settlements Policy

   a. Regional basis

The Valley is considered as a single unit based on its geographically limited size, natural resources and its social setting. For this, all the stakeholders having concerns with the development of the Valley should make joint efforts in tune with the specified goals of the proposed Plan.

   b. Hierarchy of development nodes

It is imperative that the hierarchical set up of development nodes in various places of the Valley be geared towards balanced development.

   c. Interrelationship between land use and transportation

For planned urban development, the proposed Plan maintains an interrelationship between the land-use and transportation. Proper balance between the land-use and transportation reduces air and noise pollution, and traffic volume on the roads.

   d. Land use efficiency

A land-use system should be practical and sustainably developed and managed. The land in the outer areas will be utilized for (future) urban expansion, properly utilizing the unoccupied

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27 Source: KV 2020

Prepared jointly by: EMI & NSET
land in the urban area. It also encompasses the matters of discouraging uncontrolled urban expansion and conserving agriculture land.

e. **Formulation of plan based on easy transport linkage**

It was proposed to develop dense settlements in various places of the Valley through linkage, easy and accessibility between urban settlements.

f. **Accessibility to public open space**

Provision of public open space in the neighbourhood and community is important from viewpoint of plan formulation. Public open spaces are necessary in rescue works in times of emergency and in public functions, etc.

Places which are not suitable for the construction, such as riverbanks and unstable slopes, shall be protected through plantation or farming in such places; it will help maintain environmental balance. Hence, a policy should be pursued to identify and protect such lands.

g. **Settlement area with physical facility**

Creation of physical environment liveable for the communities is necessary from the viewpoint of urban development.

Provision of basic infrastructures such as road, drinking water, drainage and sanitation, proximity to community facilities such as school, play-ground, hospital, police post, market and public transport, with proper protection and promotion of the natural environment.

h. **Carrying capacity**

The proposed urban expansion strategy will, to some extent, increase the carrying capacity of the Valley. The carrying capacity of the Valley must be respected. It means its ability to accommodate maximum population without destroying its natural resources or disrupting environmental balance must be followed.

**Annex 5. Urban expansion policy**

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a. **To have equitable urban expansion**

The projection of the Valley's future urban population reveals that most population will concentrate in the Kathmandu metropolitan city. This will consequently exert excessive pressure on the services and facilities. To avert this, an equitable provision of services and facilities and creation of employment opportunities in other towns adjoining the Valley and increase population should be promoted.

b. **To have urban expansion conforming to infrastructure capacity**

In carrying out development works in any location of the Valley, the infrastructures available should be taken into account so that such works do not cause adverse impacts on the environment.

c. **To carry out development works in the designated areas**

Planned growth can be ensured with the provision of facilities and services only in the areas designated by the plan. The haphazard urban growth can, to a larger extent, be streamlined by concentrating economic investment in certain areas and in areas with transportation facility.

d. **To control urban expansion in risky and environmentally sensitive areas**

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28 Source: KV 2020
Naturally risk prone areas such as seismically active areas, liquefaction zones, steep slopes, areas with risk of flood will be identified and construction works will be prohibited in such areas.

Construction works in the environmentally sensitive areas such as ponds, forests and wetlands are not appropriate areas because such areas are very necessary to maintain ecological and environmental balance.


a. Orderly transition from rural setting to urbanization

It is highly essential to manage urbanization process in the rural area in order to manage urban expansion. It is also necessary to proceed with urban development in a certain pattern by controlling the urban expansion that is taking place haphazardly.

The planned urbanization can be ensured through measures such as provision of land for the future, classification of urban and rural land and preservation of agricultural land. Moreover, infrastructure development, housing policies etc. are necessary to move ahead this act strongly.

b. Delineation of urban and rural areas

The Kathmandu Valley is suffering from problems such as gradual loss of agriculture land, lack of employment, environmental degradation, lack of infrastructures. So, it is imperative to control urban expansion by having clear delineation of urban and rural areas.

c. Preservation of agriculture land

There is need to preserve the agriculture land in the Valley, which are as follows:

- To maintain the reservoir of underground water resources,
- To recycle/ filter the polluted air and gas emanating from the urban area,
- To meet the requirement of open space around the town.

d. Land reserved for urban development

The future urban expansion will be encouraged only in the designated areas for urban development. A mixed land-use rather than specification of separate places for different types of land-uses shall be pursued.

Annex 7. Housing Policy

An appropriate housing policy will be pursued in order to improve the form of the urban area of the Valley and increase the supply of residential houses. Such housing schemes will be encouraged so as to maintain certain population density in the urban area and have efficient utilization of the limited land through development of cost-effective infrastructures.

Annex 8. Infrastructures Policy

Regional level infrastructures such as highway, arterial road, drinking water supply system, sewerage, electricity and telecommunications, and unplanned urbanization will be controlled.

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29 Ibid
The land pooling and guided land development programs, which are being practiced now, should be guided by appropriate principles.

In order to reduce the demand of motor vehicles, measures such as discouraging the use of private vehicles and attracting the people towards public transport and encouraging pedestrian walking in inner city will be adopted.

Provision of high capacity trolley buses on the ring road and Kathmandu-Lalitpur and Kathmandu-Bhaktapur routes will reduce the number of motor vehicles; mitigate air pollution and fuel consumption.

Policy measures such as improvement in the linkage of parking facility, land-use and transport and specification of certain form and area of the cities are pursued.

**Annex 9. Protection of Cultural Heritage and Landscapes**

A policy to protect and promote cultural and religious sites will go on in order to preserve the age-old religion, culture and parts of the Valley. This will help develop tourism business and consolidate the economy of the Valley.

**Annex 10. Environmental Policy**

**Air quality**

The air quality of the urban area in the Valley shall be improved to protect health of the Valley inhabitants, foster tourism, attract external investment and enhance the vitality and aesthetics of the city.

**Annex 11. Natural resources**

**Forests**

It is necessary to formulate a program that will sustainably utilize natural resources to improve the living standard of the inhabitants around the areas, particularly:

- To protect the forests around the Valley as the green belt, by not allowing the increase in settlement there and if possible to shift the currently existing settlements there to other appropriate places;
- To enhance entertainment and tourism attraction in certain areas and make provision that the inhabitants in those areas will be the beneficiaries of the plan;
- To prepare a work plan to develop leasehold forests and community forests, through the users’ committee

**Rivers and rivulets**

The rivers and rivulets in the Valley are playing an important role in the preservation of underground water resources, exit of rainwater, irrigation of agriculture land, supply of drinking water and preservation of religious and cultural activities shall be protected.

- Demarcation of river boundary has become because of changes in river flow each year;
- After such demarcation, not to allow encroachment on such areas;
- Extraction of sand near these water bodies will be prohibited;
- To discourage the disposal of solid wastes and liquid wastes in the river;
- Public gardens and parks will be built in the riverbanks on either side of the bridges;

**Wetland**
• It is necessary to demarcate the river and wetland areas in the survey map and control construction works in those areas;
• Local Authorities should strictly apply the rule that prohibits construction works up to 20 meters from the riverbank and allows construction works in other wetlands only in consonance with certain standards;

Natural Calamity mitigation
• It is essential that on the one hand urban expansion and construction works here should be controlled and on the other hand public awareness should be enhanced;
• The concerned bodies and general public will be informed in time about the risky areas that are vulnerable to land-erosion, collapse and the geographically risky areas;

Policy on Solid Waste Management
• Solid waste management shall not only focus on collection and proper disposal, but also focus on lesser waste generation, recycling and reuse; involvement of stakeholders in the proper waste management;

Policy on Water Supply
• A need to regularize and manage the water supply in the Valley. It is necessary to increase the quantity of drinking water and it is highly imperative to develop well-planned distribution system;
• A number of the water sources and quantity of water therefrom can be increased by protecting the forests in the hilly areas around the Valley;
• Rain water harvesting and storage shall be promoted;

Rural Development
Demarcation of the rural and urban area proposed in this Plan will make it easy to formulate separate policy and regulation for the rural area. On the one hand provision of minimum physical infrastructures in the rural area;