

# DISASTER MITIGATION PLANNING: THE GROWTH OF LOCAL PARTNERSHIPS FOR DISASTER REDUCTION

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**Key Words:** urban disaster mitigation, mitigation planning, community participation, public-private partnerships

## ABSTRACT

This working paper addresses the experiences of a number of cities, communities and countries in developing and implementing disaster mitigation plans in Asia, as well as other regions. It summarizes the experiences of various localities and countries, particularly those in the Asian Urban Disaster Mitigation Program (AUDMP), mitigation planning, including lessons learned and good practices.

This paper will explain the concept of mitigation planning and its current applications in the region, including discussion of some examples of disaster mitigation plans. The review examines the benefits of integrating disaster reduction into development planning and some different approaches to mitigation plan development. The role of various stakeholders, key elements of mitigation planning, and implementation issues are discussed in the third section. Finally, from the examination of concept and practice some issues to consider are presented for cities or agencies planning to develop disaster mitigation plans.

## 1. Introduction

### Overview

Throughout Asia communities and nations are recognizing their opportunities for disaster reduction, shifting efforts from preparedness to risk management. And local communities are taking on increasing responsibilities -- including emergency management -- in many countries due to decentralization. These efforts require the coordination of diverse government ministries and departments, local and national, and often the substantial involvement of the private sector, community and non-governmental organizations, researchers, and the general public.

### What is Mitigation Planning?

Mitigation planning is *the development of a strategy for reducing the impact of disasters on a community, facility, agency, city or country*. While the development of such a plan at its minimum may involve a small number of disaster managers or other specialists, ideally *mitigation or disaster reduction planning is a broad priority-setting exercise to coordinate the efforts of multiple agencies and levels of government and society*.

These plans have various names to reflect their development or their particular emphasis or concept -- mitigation action plan, disaster reduction plan -- but all reflect an emphasis on pre-disaster activities to manage risk and reduce the impact of future disasters. Most include preparedness activities, such as the development of emergency response plans, though the term mitigation plan may refer specifically to plans for mitigation as distinct from preparedness or emergency response.

### The Growth of Local Mitigation Planning

The growing trend for communities, cities and countries to develop mitigation plans derives from several sources. First, the ongoing shift in the disaster field from *post-event relief and recovery to pre-disaster preparedness, planning and mitigation*. This shift has been underway for the last two decades culminating in the current approach of disaster reduction and total risk management. Increasingly communities, learning from their own disaster experiences and increasingly from other disasters around the world, are setting disaster reduction as their goal rather than simply mobilizing after a disaster.

Second, the responsibilities of government in many countries of the region are increasingly *decentralized*. Decentralization has many causes, appearances and speeds in the countries of Asia but the process is widespread. In India, Thailand, Indonesia, the Philippines and many other countries local governments are taking on additional responsibilities for delivery of public services, development of infrastructure, and many others – including disaster management and mitigation.<sup>1</sup> In times of disaster community members and local agencies, public and private, are nearly always the first to respond. As local governments and administrations mobilize to address these new responsibilities they recognize local opportunities for disaster reduction and the need to coordinate their efforts with national and provincial agencies and surrounding communities and cities. Often taking on additional responsibilities with little increase in resources, local governments are taking the lead in building partnerships with the private sector and local civil organizations.

As the disaster community increasingly emphasizes the importance of disaster mitigation, mitigation plans are also being developed as part of disaster recovery and reconstruction efforts. National agencies, as well as international agencies, have begun to require the development of mitigation plans or the inclusion of mitigation features as part of their plans and funding for disaster reconstruction. The World Bank and Asian Development Bank as part of their recent reconstruction loans are addressing not only reconstruction and emergency response capacity building but also the development of mitigation plans and mitigation measures as part of policy changes. In the United States, as well, starting in 2003 a city must have a FEMA approved disaster mitigation plan in order to receive post-disaster mitigation grants.

## **2. Why Mitigation Planning?**

Cities and communities face many priorities on a daily basis, ranging from provision of basic services including water, wastewater and sanitation, to health, education, development of infrastructure, emergency services, crime and security issues, and many others. Leaders and officials, elected and unelected, must allocate scarce finances, time, personnel and other resources according to their perceived benefit to the community. How does the mayor or commissioner of a city, governor of a province, or leader of a community make the decision not to spend part of his or her budget on construction of a school or better solid waste management or an area development scheme, and instead focus on developing a disaster mitigation plan and funding its implementation?

Recurring disasters erode progress toward development goals by undermining economic progress or infrastructure development. Large, long return-period disasters such as earthquakes can eliminate years or even decades of development progress in minutes. Natural disasters create major shocks to the national and local economies in developing and developed nations alike, resulting in measurable declines in Gross Domestic Product. Disasters can also exacerbate regional and occupational income inequalities and reinforce poverty. According to one study in the of the Philippines, natural hazards have discouraged new investment and placed a continual burden on government to meet the costs of public prevention, mitigation, and preparedness, as well as relief and rehabilitation following disasters. In particular, poverty programs have ignored the role disasters play in sustaining poverty, and failure to address this issue is reinforced by donor agencies that focus on preparedness and response, rather than prevention and mitigation. (Benson, 1997) Only by integrating goals for disaster mitigation into annual municipal or department budgets and other regular development mechanisms local governments achieve the long-term efforts necessary to reduce disaster vulnerability.

Integrating disaster risk into development is an essential part of making cities and communities sustainable. Good city managers understand that human settlements are complex interactions of humans and their environment, requiring an understanding not only of the impact of human activity on the environment but the potential impact of the natural world on the city or community. [more] While many cities and communities appreciate their risk to floods, earthquakes, storms, etc. they often believe that they often feel that they have no resources to address the risk. While all cities face resource constraints in addressing disaster risk no city is powerless to shift the priorities of regular urban management and

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<sup>1</sup> India's 74 Constitutional Amendment (the 'Nagapalika' Amendment) specifically lists disaster management in the schedule of responsibilities to be decentralized to towns (nagarपालikas) and cities. Other decentralization legislation in the Philippines and other countries also include disaster management and relief functions.

development Regular decisions about and use planning, staffing, and budgeting can reflect disaster reduction priorities effectively if the city has a mitigation strategy and a plan for implementation. For example, in the case of Kathmandu, Nepal the GESI assessment of the city's mitigation plan estimated that constructing all new buildings to code over the next ten years would decrease the casualties of a future "scenario" earthquake<sup>2</sup> by up to 20-25%. (GHI, 2001)

By increasing an awareness of mitigation into new public infrastructure -- and private construction through regulation and investments -- disaster reduction can often be achieved with only an investment amounting to a small percentage of new construction costs. Later retrofitting or reconstruction may exceed half or even the total cost of original construction. This requires a systematic understanding of disaster risk and a long-term plan for disaster reduction

Mitigation planning also promotes a risk-based approach to development in which sustainable development is based on an understanding and management of all risk – physical, environmental, economic and social. This *total risk management* approach is the most comprehensive approach to disasters, fully integrating the proactive mitigation of disaster risk with sustainable development.

### **Approaches to Mitigation Planning**

Mitigation or disaster reduction plans are as varied as the communities and cities that develop them. Reflecting the city's disaster experience, culture, administration, politics, history and resources, mitigation plans can be grouped in many categories – primarily structural or nonstructural, etc. But in examining the plans rather than the individual mitigation solutions identified in them, the most useful comparisons may be found in the processes that developed them. Three useful groupings of plans include: Government-Developed Plans; Grassroots/Citizen-led Plans; and Integrated Private-Public Plans.

**Government-Developed Plans:** As guarantors of public safety, local, provincial and national governments take primary responsibility for areas related to disaster mitigation including development and enforcement of building codes, land-use planning, emergency response, public health, education, infrastructure development and many others. As such they are well positioned to develop disaster mitigation plans. In most government structures a mitigation plan focuses on the coordination of the efforts of various national ministries or local government departments. Such efforts have the advantage of being better resourced, drawing on regular government operating budgets, staff or facilities, or on annual budgets for infrastructure or training. Government-developed mitigation plans may also carry addition weight due to the official mandate of a plan. One example of a government mitigation plan is the 2001 plan for reducing the vulnerability of the city of Hat Yai, Thailand to flooding. Developed in response to a devastating flood in November 2000, the plan focused on coordinating and allocating resources to national government ministries to implement structural and non-structural mitigation measures.

However, the implementation of government-developed plans depends on the associated allocation of resources and political will. Government agencies may be adept at ascribing mitigation to previously planned projects, or in easily agreeing to a mitigation plan without clearly defined and measurable targets. Such plans may not address local issues and priorities if they fail to consult with vulnerable communities. They may also lack accountability to a local community. If developed after a disaster, they may assuage immediate concerns such as the need for additional emergency response capability but fail to address more systemic issues such as enforcement of building codes.

**Grassroots, Citizen-led Mitigation Plans:** Non-governmental organizations and community-based organizations are frequently central to local disaster response and recovery efforts, and therefore often the first to recognize the importance of disaster reduction efforts and begin to implement them. NGOs develop mitigation plans in order to coordinate their efforts with each other and with government agencies. Because they are often created due to an awareness of vulnerability gained from response

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<sup>2</sup> A scenario earthquake is a model of a potential earthquake typical for a city's risk profile. In the case of Kathmandu both AUDMP and GESI activities use the example of a repeat of the last major seismic event in 1934.

efforts, they may focus primarily or exclusively on past events and not on scientific assessments of vulnerability. However, because they draw deeply from the community's perception of its vulnerability, past disaster experiences, awareness of their own resources, and connection with other development priorities these grassroots efforts are extremely valuable and most likely to be sustained over longer periods.

Other citizen-led mitigation plans have been developed as advocacy plans, outlining efforts to change government policies that they believe fail to address the vulnerabilities facing their communities. Unfortunately, such plans are often developed in response to the devastation and losses of a recent disaster, building on fears of future disaster events or on anger at a perceived lack of preparedness or investment in vulnerability reduction.

In implementation grassroots mitigation plans benefit from public involvement and support, particularly useful in mitigation efforts that involve public awareness or social marketing efforts focuses on changing behaviors. (For example, getting households in earthquake-prone areas to secure heavy furniture and gas tanks to reduce the risk of toppling over). Grassroots efforts, however, may lack large or consistent resources to invest in long-term efforts or structural mitigation measures. They may focus on reducing vulnerability due to a specific incident but not incorporate vulnerability into long-term planning. Grassroots organizers also face the "competition" from other high priority issues in a community such as provision of services and facilities, income generation, environmental concerns, and many others in continuing grassroots mitigation or advocacy efforts.

**Integrated Public-Private Mitigation Plans:** Some of the most effective mitigation planning exercises incorporate both government and grassroots elements into partnerships between government and civil and private organizations. These private-public partnerships for disaster mitigation integrate the financial resources and regulatory role of the government with the activism and resources of civil society organizations and the private sector. Such plans benefit from the pressure that each side feels to meet public commitments towards a plan of action. A private-public plans can help foster communication between public and private sectors and increase political support for investments in mitigation. Civil organizations can help to increase the accountability of both public and private institutions to progress towards mitigation goals. Government agencies gain public support for their activities and for investments in mitigation. By interfacing with civil organizations they also have an increased ability to disseminate information about their efforts and to increase public awareness about disaster vulnerability.

Implementation of public-private mitigation plans depends on continued commitment by all organizations responsible for mitigation activities. Successful implementation requires a clear and publicly stated understanding of the plan, including goals, sequence of activities, and responsible agencies and individuals. Development of public-private plans typically involves significant publicity and media coverage and can result in high expectations among the general public for 'quick solutions' if the limitations, timetable and requirements of a plan are not clear.

### **3. Elements of Mitigation Planning and Implementation**

The process of developing disaster mitigation or reduction plans is unique to each city, community or country. However, certain elements are essential to mitigation planning and common features of many plans. These include building awareness and understanding of risk; involving key stakeholders; community participation, and implementation issues including prioritization, cost-benefit analysis, and resource mobilization.

#### **Building Awareness and Understanding of Risk**

What factors does such a local or provincial administrator consider when planning or approving a new housing scheme, or school, or hospital? Is it increased technical information about level of risk? Increased public awareness about cost effectiveness? More support from the national government? How does such an administrator make a decision about relocation of a vulnerable community or facility, or to evacuate an area in time of possible flood or typhoon?

The more extensive and accurate the available information about risk, the more effective a potential disaster mitigation plan. To begin with, communities at risk may base mitigation plans for recurrent disasters -- such as flooding -- on their historic experience with disasters, if accurate records exist. This kind of local information often provides the most accurate description of the cost of disasters on a community. However, historic records may not be accurate predictors even of regularly occurring events such as riverine flooding. For example, changing land use patterns, demographics, and construction of physical infrastructure such as bridges or canals can drastically change flooding patterns. And long return-period events such as earthquakes often occur with effects completely unknown in a community's experience. Climatic cycles such as El Nino/La Nina may shift weather patterns in ways difficult to evaluate from a local perspective but predictable on a regional or global scale. Effective disaster mitigation planning, therefore, needs to be based on both the community's experiences and the best scientific and technical information available.

More technical information about risks is usually available for most cities and communities in many forms, including: reports of past disasters; past meteorological reports; projections about future rainfall and storm cycles; studies of geology, soil structure, topography, etc; information on the built environment including data on population density, infrastructure, critical facilities; and many other types of information.

All of this may not make the city's risk situation clear enough to change its investment priorities. City mayors or community leaders are often flooded with information to base decisions on, on a wide variety of issues, each with their own constituency. Decision makers in a community or city need:

- Concrete, specific information about hazards;
- Criteria to assess risk; and
- Prioritization of the vulnerabilities on which to base decisions for disaster reduction.

For a more detailed discussion of risk assessment and other issues related to collection of information and decision making about risk and vulnerability see Theme Paper #1 from this conference.

### **Involving Key Stakeholders**

While a well-informed and trained disaster management office may be able to develop an excellent mitigation plan on paper, a plan developed without the participation of those responsible for implementing it and those who stand to gain (and to lose) from it is unlikely to gain sufficient support to meet its goals. As with all new initiatives, disaster mitigation has to compete for resources with many other issues for resources – environmental protection, provision of basic services, education, health, police services, and many others. Information about disaster risk may also be distributed among many different government agencies, as well as academic institutions and others. Successful implementation also requires the involvement of many different public and private organizations, as well as the general public. Development of the most effective mitigation plans begin with a basic understanding of the If a mitigation plan begins with a risk assessment or a data collection process, the most effective plans involve key stakeholders from this point. If key agencies, groups and representative understand that the risk scenario on which a mitigation plan is based includes their experiences and information their commitment to the plan is likely to be much higher.

Key stakeholders may include but are not limited to:

- Local community leaders;
- Emergency service personnel including the
  - fire department and
  - police;
  - army;
  - medical first responders
- representatives from local government departments including planning, education, engineering, water supply, transportation, and welfare services;
- state or national ministries including
  - planning,
  - infrastructure,

- emergency management,
- security,
- communications,
- transport,
- urban development,
- environment/interior, and
- health;
- private sector organizations including
- chambers of commerce,
- professional associations,
- key businesses
- NGOs
- academic institutions, and
- community organizations.

### **Community Participation**

Of the above key stakeholders, community organizations and the involvement of local communities is a particularly important element of any mitigation planning process. The participation of local communities is as essential to developing mitigation plans as any other activity of sustainable development. Community participation may manifest itself in different ways in different communities, varying not only with the uniqueness of each community but with community size, income, homogeneity, history of cooperation, political participation and other issues. These communities and neighborhoods often have unique knowledge of the disaster experiences of an area, as well as coping mechanisms to deal with local disasters unrealized by planners. The involvement of community based organizations, community leaders and NGOs which work at the community level are vital parts of a planning process.

For a more detailed discussion of community participation in disaster reduction see Theme Paper #1 from this conference.

### **From Planning to Action: Implementing a Disaster Mitigation/Disaster Reduction Plan**

As noted above, the development of a mitigation action plan is only the crucial beginning stage of a disaster reduction process. Implementation often relies on continued effort from many organizations and individuals. A number of issues commonly arise during implementation:

**Prioritization:** Mitigation planning requires technical expertise and experience, pragmatism and common sense, and broad range of inputs. After being presented with a detailed risk scenario, working groups of key officials, stakeholders and planners can often develop detailed lists of proposed actions and policies for disaster reduction. There may be hundreds of actions which a city or community can take to reduce the risk from earthquakes, floods, etc. How can these be developed into a coherent plan? How can planners ensure that recommended actions are realistic and appropriate? Developing a “to-do” list of activities can be relatively easy; deciding which to do first and which are feasible is often the critical step in implementation.

Mitigation planning is ultimately a goal-setting exercise in which individual organizations – various ministries, local government department, agencies, private companies, NGOs, community groups, etc. – agree on common goals. This prioritization process is ideally a ranking of all resources addressing the disaster reduction goals in order of importance. In practice resources are divided among many ministries, agencies, and organizations and each must make their own prioritization. But through an agreement on goals and responsible agencies the priority should be increased. The criteria for prioritization may also vary between implementing agencies. Such criteria may include: reduction in mortality or morbidity; reduction in vulnerability of critical facilities or of economic assets; or reducing recovery time after a disaster.

One useful tool for prioritization of mitigation options employed in the development of at least one mitigation plan is *cost-benefit analysis*.

**Cost Benefit Analysis:** Cost-benefit analysis is a means of weighing the effectiveness of various mitigation options relative to the costs so that they can be compared. One definition of cost benefit analysis is:

A practical way of assessing the desirability of projects, where it is important to take a long view (in the sense of looking at repercussions in the further, as well as in the nearer, future) and a wide view (in the sense of allowing for side-effects of many kinds on many persons, industries, regions, etc.), i.e. it implies the enumeration and evaluation of all the relevant costs and benefits" (Hugh, 1993).

When considering structural mitigation options, cost benefit analysis can be readily applied to technical and physical solutions based on measurable criteria – for example, comparing the relative effectiveness of two building designs in improving earthquake resistance, relative to cost. [Better examples?] Non-structural mitigation measures, such as improved emergency response planning, public awareness, and zoning may be more difficult to measure. But these comparisons of different types of mitigation solutions are necessary and inevitable, and are done by decision makers many times in any planning and budgeting process of a government agency. But because the evaluation may not be based on any measurable criteria, relying on past experience and common sense, some more effective measures may not be attempted.

One recent effort to quantify the costs and benefits of different mitigation measures is the Global Earthquake Safety Initiative, developed by GeoHazards International. Focused on measuring and comparing the earthquake risk trends of a sampling of the world's cities, one of the GESI objectives is the development of tools to evaluate the comparative effectiveness of various means of reducing earthquake casualties. Using reduction of earthquake casualties (both mortality and morbidity) as the primary criteria, the GESI project compares various mitigation options -- including improving local emergency response plans, enhancing emergency response capability, improving the percentage of buildings constructed according to local building codes -- and ranks them according to effectiveness, with results that have sometimes surprised local disaster managers. The GESI analysis, applied to over 25 cities, also found that the character of risks vary greatly between cities and that the most effective mitigation efforts differ between cities. (GHI, 2002)

### **Resource Mobilization**

Developing a mitigation action plan, however, only begins the process of sustainable disaster reduction. Implementation depends on identifying and mobilizing resources for implementation of mitigation actions and policies. If a plan is based on clear information and developed with the full participation of all stakeholders and decision makers, potential sources and methods of funding can be identified through the plan development. But how can resources of funding and support be secured? Sources of funding for mitigation investments include: public sources of funding, both from annual budgets and from longer-term investment budgets; international funding sources; private sector investment, both for private sector activities and donations; and even household investments in mitigation.

Development or endorsement of a mitigation plan by a government -- local, provincial or national -- should lead to a corresponding shift in government spending and investment. Of most public interest are highly visible public infrastructure, such as the construction of flood control structures, fire stations, or reinforcement of seismically vulnerable infrastructure such as hospitals, schools or bridges. Funding for these investments may come from national investment budgets directed to locally identified priorities, or from annual ministerial budgets for infrastructure or construction. Mitigation planning by a local government or community may serve as a project identification exercise for ministries such as public works, transportation, construction, or finance to incorporate into their plans. These priorities may also be incorporated into long term plans such as national five year plans.

But city governments may also be able to incorporate disaster mitigation costs as part of their recurring budget expenditures. For example: increasing staffing of planning departments or building inspectors; raising funding for safety inspections; improving maintenance of public infrastructure; adding resources

for emergency response and emergency management. By *increasing public awareness* of disaster risk and support for mitigation measures, advocates for disaster reduction can build public support and political will for these recurrent expenditures.

International funding sources such as World Bank or Asian Development Bank loans or development assistance grants from bilateral donors increasingly support investments in mitigation. Often available after major disasters when awareness of a country's risk is high, these resources may be accessible by cities or communities, which can clearly describe their risk and a clear, prioritized plan for disaster reduction. Communities with clear awareness of risk can often reduce vulnerability by ensuring that an awareness of risk is incorporated into all new infrastructures. For example, making new schools, hospitals and other infrastructure earthquake resistant, or shifting new area development out of floodplains.

Some cities have developed innovative disaster reduction methods that combine public and private resources, as well as NGO involvement. For example, city residents applying for a building permit from the Kathmandu Municipal Corporation now receive, along with their permits, calendars detailing safe construction methods. NSET-Nepal, a local NGO, develops the calendars and supplies them to the corporation. The calendars are sponsored by the local private sector - building materials suppliers and construction companies -- whose logos and advertisements are printed on the calendars.

#### 4. Issues to Consider

The following are issues that have arisen from the development of many disaster mitigation planning and implementation processes, both supported by the AUDMP and other plans. These are meant as discussion questions for these plans and for cities interested in developing their own disaster reduction plans.

- What prompted the development of a mitigation plan in the first place? What organization or agency started the process? Which led it?
- How and why different cities have adopted different approaches (based on the resources available and economic and technological development)
- What were some of the problems and constraints faced in implementation?
- What were the key elements for success?
- Who were the key stakeholders (local governments, city governments, NGOs, and others) at various levels involved in development and implementation?
- What are the measures to evaluate success of integration of mitigation in development planning
- How to encourage political commitment to mitigation?
- What options for are available for financing mitigation initiatives?
- What recommendations would you make to cities starting a disaster reduction process?

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# **MITIGATION PLANNING THROUGH COMMUNITY BASED APPROACHES IN BANGLADESH URBAN DISASTER MITIGATION PROJECT (BUDMP)**

**Monzu Morshed and Nurul Huda, CARE Bangladesh**

## **Introduction:**

In order to apprise disaster mitigation needs, policies and capacity an informed judgment are to be made concerning flood hazards and its' effect, the adequacy and cost effectiveness of existing risk reduction and preparedness measures and the ability of all concerned to act on the measures. Actually BUDMP mitigation planning aims to:

- ensure community participation in flood preparedness and mitigation
- utilize optimum project resources
- complete BUDMP activities within stipulated time
- maximize community contribution in project interventions
- make bridge between community and Municipal Disaster Management Committee
- make more accountable of municipality office bearers through community mobilization process
- make transparent municipality activities regarding disaster mitigation to community
- mobilize community household level preparedness
- make sustainable project interventions

## **Factors Considered in Mitigation Planning:**

Disaster mitigation planning requires also certain organizational and procedural measures. In context of BUDMP, the following factors are considered:

- Policy Direction (e.g.- Government Standing Order & Environmental Law of the country)
- Possible Disaster Scenarios
- Scope of Disaster Management efforts
- Municipality's development plan (Annual and Master)
- Vulnerability Assessments through participatory process
- Prioritized Community's Demand and disaster threats
- Common community interests
- Highest Flood Level (HFL-1998)
- Resource relevant of BUDMP
- Sound engineering designs
- Good Maintenance of interventions
- Future impact of each intervention-especially in environment and community's long-term benefit.
- Good workmanship under adequate supervision of community
- Community Participation and mobilization of community contribution
- Public Information based on flood hazard
- Community level institutions like scheme implementation committee
- Consideration of public place, targeting community through different means
- Longevity of means for mobilizing public information
- Support traditional mitigation measures of community and coping mechanism
- Authorization of Municipality Disaster Management Committee
- Transparency and Accountability of project output to Community
- Time bound implementation

**How BUDMP started Mitigation Planning:**

With a view to formulate mitigation, BUDMP was followed following steps:

- Step-1: Explored views on projects concept to Municipality and community level
- Step-2: Analyzed root causes of problems in the community
- Step-3: Tried to organize community in the form of CBO and enhance community leadership
- Step-4: Created openness, criticism, sharing through feedback round with the community.
- Step-5: Sought approval from the Municipality Disaster Management Committee.

**Process:**

In fact existing policies and objectives of the project guide the mitigation planning process in BUDMP, which is described below:

- Conduct baseline survey
- Re activate Municipality Disaster Management Committee
- Recruitment of Volunteer from the Community
- Impart knowledge based and skill based training to both MDMC members & volunteers.
- Preparing action planning for volunteers
- Conduct vulnerability assessment
- Prepare a draft mitigation plan with lot of alternative means
- Prioritize interventions according to BUDMP resources
- Finalize tentative mitigation plan
- Approval from Municipality Disaster Management Committee
- Carryout Planning
- Lesson learned
- Seeking alternative interventions
- Place to MDMC for approval
- Carryout plan again
- Community interest on means for mobilizing public information

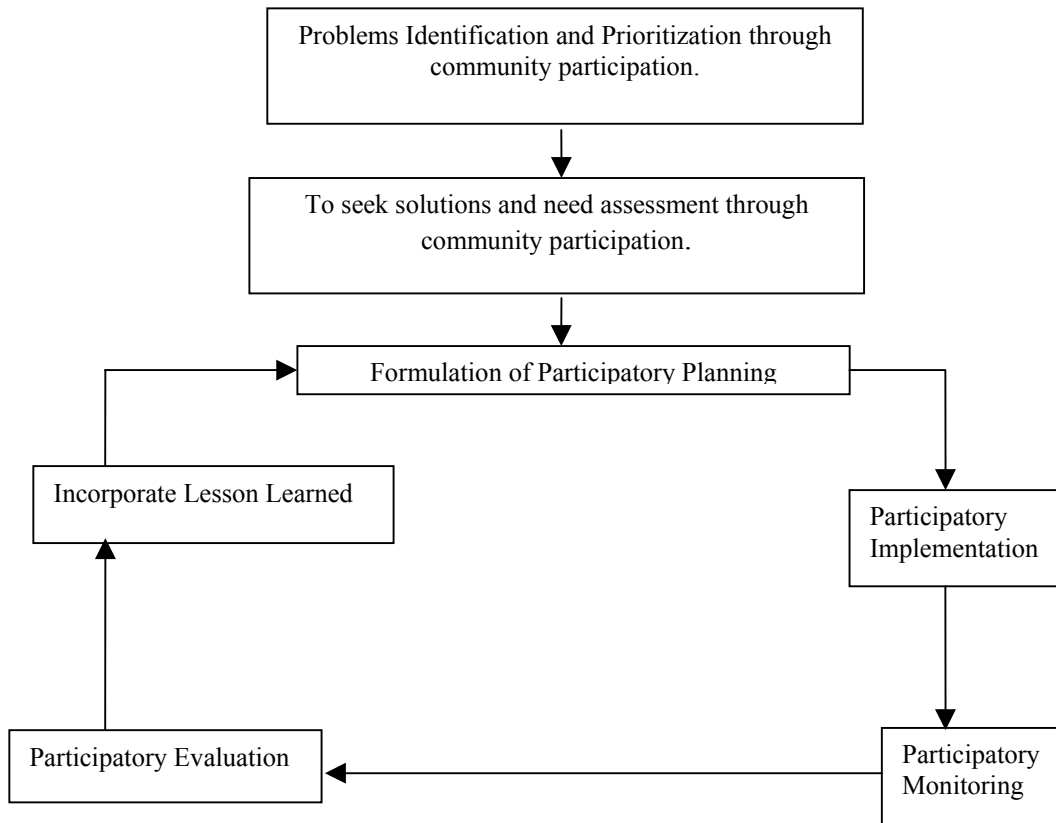
**How problems are identified and prioritized:**

Through focus group discussion in the form of workshop with the participation of community at ward level of municipality, it was tried to find out problems as well as probable solution(s) related with flood hazard by problem identification and prioritization tool of participatory rapid appraisal process. Triangulation process was also followed with the mobility chart, social mapping and transect walk of participatory rapid appraisal system. In this case full freedom was imparted to community with view to express their opinions as well as recommendations with following process.

In Tongi: a) Community people draw the picture of problem as biggest problem biggest size basis, then volunteers put as it is in big white paper b) At the time of municipality level compilation, the uses grading like 7=biggest, 6=bigger, 5=big, 4=middle 3=lower middle 2= small and 1=Smallest and accordingly compiled.

In Gaibandha: (1) At field level volunteers handed over to community huge number of particles of jute sticks (2) The community used jute sticks big numbers for big problem basis. (3) Accordingly respective volunteers compiled and ranked problems for the ward. (4) At municipality level compilation, it is listed all problems for all wards avoiding duplication of each problem, then it is found 17 specific problems for whole municipality. (5) So in municipality level grading, it is used highest number for highest problem of the ward, then second highest and so on. 17= highest, 16= 2nd highest... 1= lowest.

**Conceptual Frame work Mitigation Planning under BUDMP:**



**What are the structural and non-structural mitigation measures under BUDMP:**

In broad head BUDMP is considered both structural and non structural mitigation activities as follows:

a) Structural Mitigation Activities:

On the light of Vulnerability Assessment Reports, BUDMP has formulated 2 structural mitigation plan as well as approved it by the respective Municipality Disaster Management Committee. Structural interventions undertaken by BUDMP as follows:

- Construction of new drains
- Construction of new culverts
- Road raise up above flood level
- Road repairing due to damaged of flood
- Homestead raise up above flood level
- Raise up latrine above flood level
- Distribution of latrine above flood level
- Raise up tube well above flood level
- Distribution of New tube wells and raise up tube well above flood level
- Community place ground raising
- House repairing due to damage of flood
- Low Cost Housing above flood level
- Community Latrine Complex above flood level

b) Non Structural Mitigation Activities: Apart from above mentioned activities BUDMP has been conducted many non structural mitigation activities like training, awareness campaign, networking and

linkage with government and non government institutions and assist to Municipality in formulation of disaster contingency planning.

**Problems Encountered:**

Mitigation planning should aim to develop a disaster "safety culture", one in which the general public is fully aware of potential hazards, choose to protect itself as fully as possible and can readily support protective efforts made on its behalf. However, in the process of formulation of mitigation planning, BUDMP has experienced following problems:

- Insufficient Information at Municipality Level
- Inter boundary conflict of neighbors within the community
- Leadership gaps in Scheme Implementation Committee
- Inter boundary conflict within urban area
- Scarcity of earth
- Government Rate Schedule did not suit in case of earthwork
- Lack of awareness of community
- Heterogeneously fluctuates labor market, labor supply and unstable prices of inputs
- Poor capacity of community regarding contribution

**Lesson Learned:**

- There was no sufficient data at municipality level
- Huge money needs to address vulnerability reduction in the two working municipalities.
- Unplanned urbanization is the main problem to design an environmentally sound structure.
- Insufficient fund for development at municipality level
- Has no updated master plan of municipality but has skilled under utilized manpower.
- Poor initiatives of municipality regarding public awareness.
- Community emphasized hard interventions more than soft awareness activities.
- Mitigation will be most effective if safety measures are spread through a wide diversity of integrated activities.

## **MITIGATION PLANNING AND IMPLEMENTATION EXPERIENCES OF KVERMP**

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### **Approach adopted for Mitigation Planning and Implementation**

- Earthquake Risk Management Action Planning, was one of the objectives of the Kathmandu Valley Earthquake Risk Management Project (KVERMP).
- The Action Planning process was a logical continuation of the earthquake hazard evaluation and risk assessment component (earthquake damage scenario development) undertaken prior to the Action Planning process.
- The Action Planning was limited to earthquake risk management action planning. It did, however, consider the full disaster management cycle. That way, the action plan considered the pre-earthquake actions as well emergency response actions.
- About 80 different institutions, mostly government, but also non-government, academic and private businesses were involved to different extent in the creation of the action plan. These were the institutions that have mandated or presumed responsibilities before, during or after a disaster.
- Prior to the formulation of the plan, a survey was made to explore the current responsibilities of earthquake risk management in Kathmandu Valley. This survey showed that there was not any single institution with focus on earthquake risk management, and that there were several institutions working in aspects of disaster management in the country and their activities covered areas of earthquake risk management also. However, for many important tasks, there was no organization clearly responsible. Additionally, many of even those organizations with mandated tasks of disaster management did not have adequate capacity and preparedness to conduct the functions they had responsibility for.
- A consensus was reached within the team and with the project advisors regarding the general approach for creating the plan:
  - i. The understanding of the earthquake risk to Kathmandu Valley should be based upon the loss estimation conducted earlier.
  - ii. The structural mitigation options and other mitigation issues, such as the levels of earthquake risk acceptable to Nepalese societies, should be based upon the findings of the School Earthquake Safety Program (SESP) being implemented in parallel.
  - iii. Identification of the initiatives to be considered for inclusion in the plan should come primarily from the Nepalese managers and institution. Pertinent actions included in the National Action Plan for Disaster Management in Nepal were also to be considered. Lastly, it was thought necessary to consider the initiatives that other communities from around the world have conducted successfully to reduce their earthquake risk, and to assess their applicability to the Nepalese conditions.
  - iv. The plan activities should be tangible, supported by the related institutions, urgent, and cost-effective for implementation.

### Methodology of Mitigation Planning in KVERMP

- The results of the loss estimation study discussed and accepted in the scenario workshop by the participants that came from the emergency management system and critical facility management was taken as the level of earthquake risk that the plan should address.
- Social and economical issues of plan implementation, such as, the costs of structural intervention for strengthening existing buildings, the cost of conducting vulnerability assessment of typical Nepalese buildings, the level of the community's interest in earthquake safety etc were based on the finding of the School Earthquake Safety Program (SESP).
- A long list of earthquake risk reduction initiatives was prepared based mainly upon *i) ideas that came from the representatives of the critical facilities and emergency management organizations, ii) The National Action Plan for Disaster Management in Nepal – a plan developed by the government for disaster risk reduction and management for all types of hazards, for all over Nepal, and iii) activities that other communities from around the world have conducted successfully for earthquake risk management.* Care was taken to critically judge the applicability of the successful case studies in conditions of Nepal.
- Information packets containing the list of initiatives, possible plan objectives and implementation strategies were sent to about 100 different organizations to help them determine which activities could be realistic for inclusion in the action plan. NSET specialists visited the different institution for providing explanation, clarification, and assistance in the selection of the initiatives that could be the most urgent, and have the chance of being supported by communities in Kathmandu.
- The project team held intensive consultation with specialists and NSET management Committee members on *i) Prioritization criteria for selecting the initiatives, ii) plan objectives, and iii) its implementation strategy.* A half-day workshop with these specialist could help develop the initial ideas of modify the ones developed by the project team.
- The plan development team then wrote a preliminary draft of all sections of the plan, including, *i) objectives, ii) implementation strategies, and iii) the priority initiatives.* The draft was again distributed to all stakeholders for comments and suggestions, which were taken into account appropriately for the preparation of the Final Draft.
- The Final Draft of the Action Plan was presented to the participants of the two-day Action Plan Workshop attended by about 85 representatives of all the related organizations-government administration, emergency response, critical facilities, NGOs, Donors, local and international experts. Extensive discussion was held on the first day when the working groups discussed the approach, content, objectives, plan implementation strategies, and divided the priority initiatives into two baskets *i) Initiatives to Implement Now, and ii) More Endorsed Initiatives.* On the second day of the workshop, the team presented the plan to the NSET management Committee who edited the plan based on the opinions of the workshop participants.
- The Kathmandu Valley Earthquake Risk Management Action Plan was printed. It was released by then Prime Minister of Nepal in National Meeting devoted to the annual Earthquake Safety Day of Nepal. The Prime Minister assured the participants the Government's efforts in the implementation of the plan.
- The Plan has been the guiding document for NSET in its efforts towards earthquake risk reduction activities in Nepal. NSET has been assigned to implement two of its ten priority initiatives. NSET has been given the responsibility to assist other institutions to implement the corresponding initiatives.

- The plan implementation strategy assigns NSET to i) build support for the plan and earthquake risk management in general, ii) support the individual initiatives, and iii) to update the plan periodically.

### **Implementation of the Action Plan Initiatives**

- NSET has been putting efforts towards implementation of the initiatives of the action plan. Two of the initiatives are the direct responsibility of NSET. These two initiatives are being implemented for which NSET is receiving institutional support grant from OFDA.

NSET has been supporting the implementation of other initiatives related to earthquake risk reduction in Nepal by other institutions or projects under bilateral or multilateral financial or technical support. Some of these initiatives are similar to what has been considered in the action plan. But the others are not as much closely connected, and instead, they tend to repeat what has already been completed.

- Successful mitigation initiatives implemented by NSET include School Earthquake Safety Program, ward-level community-based disaster preparedness education, awareness raising programs including the annual Earthquake Safety Days, vulnerability assessment of Bir Hospital and others. Success of these programs were largely due to
  - i) Involvement of the stakeholders right from the planning phase. The participatory approach was not a wish, but a logical outcome of the process initiated during risk assessment,
  - ii) Use of simple, low-cost technology and transfer of technology and ownership of achievements to the community. It emphasized on the use of local materials, local manpower.
  - iii) Organization of appropriate training supported by good training materials during implementation of mitigation such as the school retrofitting,
  - iv) Transparency in project implementation,
  - v) Development of synergy. The program involves the government, the district government, the education office, and local government at village level, private citizen and local NGOs. The involvement was through a series of advisory committees and construction committees.

### **Problems in the Implementation of the Action Plan Initiatives**

- While there is a general appreciation of the plan, many national institutions identified as responsible for implementing the rest of the initiatives, have not been able to start the work. Various reasons are put forward, such as:
  - i. Low priority of earthquake risk reduction programs as against other pressing needs
  - ii. Lack of resources: human, financial, and technological.
- Other causative factors for the government not taking positive initiation for the implementation of the action initiatives are:
  - i. High mobility in the higher ranks in government institutions. A new person not exposed to the issues and concepts of disaster risk reduction and management replaces persons educated and motivated in earthquake risk reduction in the position. This condition leaves no room for institutional memory and its periodic usage.



- ii. Lack of motivation and inspiration leading to a non-conducive legal and policy environment to work in.
  - iii. The country does not have any comprehensive policy pertaining to disaster risk reduction. The related legislation, coming from the 1980s, is still bias towards relief and response.
  - iv. Low priority assigned by donors
- Despite the apparently unsatisfactory state of the action plan implementation, there have been several exemplary works in earthquake risk management in Nepal. Needless to say that the impetus was provided by the Scenario and action planning process of KVERMP.

### **Implementation of Other Endorsed Initiatives**

- Efforts at disaster risk reduction, if done sincerely, in an economically weak and disadvantaged country like Nepal makes the process very dynamic. This creates new demands or modifies the earlier demands rapidly as one goes forward. This is especially so if there is a successful awareness raising strategy. Increased awareness results in increased demands for safer community. Because of this reason, NSET had to use part of its resources in several other activities that were not included in the action plan. Examples are 1) our efforts, in cooperation with Nepalese consultants and businessmen, towards establishment of Earthquake Safety Forum within the structure of Nepal Standards Institution, 2) Revitalization of the Health Disaster Working Group within the Epidemiology and Diseases Control Division of the Ministry of Health, 3) Contribution in the JICA-sponsored 1-year Project on Earthquake Mitigation Planning for Kathmandu Valley, 4) Establishment of Earthquake Safety Group in Pokhara – a town of high tourism value, 5) assistance to Kathmandu Metropolitan City towards implementation of training programs and establishment of Disaster Management Committees in several wards, and several others.
- The approaches employed by NSET in the implementation of these additional tasks were similar to what has been described above and also in our Action Plan document.

### **Lessons Learned**

#### **1. Scenario and action planning process is a very strong and convincing/Awareness raising Tool**

- Creation of the earthquake scenario and the action plan and their wide distribution has resulted in unprecedented rise in the level of earthquake awareness with the population of Kathmandu.
- These documents are also used as training materials during orientation / training programs that has become very popular in Kathmandu.
- Scenario and action planning process helped propagate pertinent suggestions and advice from the science of seismology, earthquake engineering and geology to administrators, decision/policy makers and the common man. It helped create gradually a demand for a practical use of the fruits of science in disaster mitigation.

#### **2. Retrofitting of public buildings such as schools is an affordable solution**

- At the start of the program, many were skeptic regarding the practicality of seismic retrofitting in Nepalese conditions. Main concerns were the cost implication. IT could be demonstrated that with community participation, the cost becomes not a hindrance. Retrofitting is almost sustainable in Kathmandu Public School.

- Low-cost technology was optimal. Simple language helped people to understand complex concepts such as retrofitting, Earthquake-resistant construct and earthquake safety became household talks even in rural communities.
- Transparency pays. Formation of Advisory committee widened program outreach, and helped wider participation of people. Transparency helped develop mutual trust, synergy and optimization of limited resources. It also helped in peoples' participation.

**3. School Earthquake Safety Program (SESP) is a must for grassroots level earthquake mitigation work**

- SESP is a wonderful program to start earthquake mitigation at community level in developing countries.
  - i. A significant proportion of public schools in developing countries are small and simple structures constructed with traditional materials. This condition offers the school building as the excellent objects for the mitigation specialists to work and learn from. This is because while the building structure itself is simple, but the analysis of such structures, say adobe or brick masonry in mud mortar, is difficult, and not much theory exists. The challenge, hence the call, is great!
  - ii. The schools, especially in rural and semi-urban environment, are the center of community activity. The whole community is concerned about the running of the schools. So what happens in schools gets very widely spread in the community.
  - iii. When we started this program, NSET was criticized for excessive focus on public schools and neglect of other facilities. Many people questioned why hospitals, a critical facility for post-earthquake response, were not chosen. Additionally, people asked why cinemas, private schools and colleges were not examined. The project team continued explanation for its focus on school did not quell the criticism. However, given the limited resources available, KVERMP continued the focus on schools, noting that the work on schools was building NSET's capacity to evaluate the vulnerability of other systems in the future. The school survey examined many previously unknown attempted activities: the costs of conducting a survey of building vulnerability, the technical expertise required for this type of survey, the costs involved in strengthening existing vulnerable buildings, the types of techniques to use for strengthening typical Nepalese structures, the interest of the community in strengthening buildings, the ability to attract funds (local and international) to this type of work, and the levels of earthquake risk acceptable in Nepalese society.
  - iv. **Mason Training Program is a must for a successful School Earthquake Safety Program**: Local masons need to know the technology. They also need to be convinced of affordability of mitigation intervention. The masons help to get the buy-in from the community – they convince the communities to accept the technology, concepts, construction process and additional costs for this.

Construction of a safe public school is very important. But more important is the fact that the school earthquake safety program is continuing and growing day by day.

- Strengthening the school was important and attractive. • But more attractive outcome was
  - Retrofitting the school building, and
  - TRAINING THE MASONS, and
  - RAISING AWARENESS OF VILLAGERS, and
  - TEACHING THE CHILDREN AND TEACHERS

#### **4. Awareness raising became part of all project components**

- Raising awareness was originally stated as a project objective, but as we worked it became clear that raising awareness was, in fact, a crucial component of everything we were doing. Every activity we undertook was shaped to raise the awareness of different groups - government officials, media, international agencies, etc.
- Specifically, our emphasis in developing the earthquake scenario was not in producing precise, technically sophisticated results, but in involving all key institutions in developing and understanding simple technical results. The action plan development was not focused on identifying the activities that made the most sense to experts, but to educate policy makers that actions can and must take place. The action plan was developed by querying policy makers about which activities were most feasible to undertake given Nepal's current political climate. Similarly, the school earthquake safety program emphasized educating headmasters about their risk and their ability to reduce it. Low-tech methods were used to classify the structural safety of each school so that headmasters could participate in and learn from the process. One result of this outreach is that project workshops were actually working sessions, not platforms for various individuals to display their wisdom, which happens frequently in Nepal.
- As an additional note, we were surprised to find that release of the results of loss estimates did not create any panic in the population. It rather made a larger part of the society wanting to improve the situation. This leads us to believe that the traditional belief of possible generation of panic should not be used as an excuse for not releasing information on risk.

#### **5. Low-tech approach was optimal**

- The project consistently adopted simple technical approaches, which made the project cost-effective and understandable to the laypersons. It also helped to focus the project on implementation of risk reducing actions, our major aim. NSET's suggestion to use "stone Crete" in Kabhresthali for the reconstruction of the school building not only gave credits, but it also helped convince the community and their elected representatives on the possibility of achieving safety against earthquakes.

#### **6. Emphasis on community level work is important**

- Implementation of the action plan and earthquake risk reduction as such cannot be achieved unless consideration for earthquake safety starts becoming a part of the society's culture. Common people started taking interest in earthquake issues and raising questions shortly after the project began. This prompted the project to work on an experimental basis with Ward 34 of Kathmandu Metropolitan City and Ward 10 of Lalitpur Sub-municipality. The results were amazing. The residents of these wards have, on their own initiative, taken several actions to try to assess and decrease the risk of their neighborhoods. The enthusiasm and potential of these groups has been exciting. Although resource constraint did not allow NSET to assist the Ward No. 10 of Lalitpur as much as we could desire, the works done in Ward 34 by the Disaster Management Committee (Ward 34 DMC) has been exemplary. The experience of Ward 34 DMC is being replicated in other wards such as ward number 3 and 5 of KMC. At the same time, UNDP Kathmandu is using this experience for the formulation of community level disaster risk reduction and preparedness project in Kathmandu for possible funding by OFDA.

#### **7. Efforts at transparency difficult but valuable**

- NSET made many efforts to be transparent. It was done through the creation of School Earthquake Safety Advisory Committees at central and district levels. Thus in Kathmandu Valley, there is one SES Advisory Committee headed by the Regional Director of Education of the Ministry of Education. Additionally, there are 3 District level SES

Advisory Committees for the three districts of Kathmandu, Lalitpur and Bhaktapur. These committees provide the oversight at various levels. There is a Construction Committee set up at every community with the SESP project. This committee oversees all project works. The dialogue of these committees and other groups helped to build an environment of trust.

- For the purpose of transparency, NSET organized several visit programs for the advisors to the different schools, as well as visits by one community to other schools. This also helped much in building the required trust.
- All financial transactions and books of accounts were made publicly accessible. This provided very strict financial discipline. People knew at any time how much money came from where and how it was used. Such a mechanism preempted any misappropriation.

#### **8. SESP is a Tool for Disaster Risk Reduction**

- Global Applicability
  - Can fit into any community in a developing country
    - Rural
    - Urbanizing
    - Urban
    - Urban Core
  - Successful replication in several countries
    - Bangdung
    - Benkulu
    - Chamoli
- Addresses local Needs and priorities
- Acts as a catalyst to build the community
- Provides confidence in the community
- Promotes culture of mitigation
- Ensure leadership among future generations
- All the above leads to:
  - Self-help
  - Cooperation
  - Education through community Involvement

# DEVELOPMENT OF RISK BASED METHODOLOGY FOR MITIGATION PLANNING IN RATNAPURA AND NAWALAPITIYA, SRI LANKA

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## Introduction

Ratnapura faces a multitude of natural disasters such as frequent floods, landslides, subsidence, erosion as well as health hazards. It has been a site for several catastrophic events in the past. An event like the Helauda landslide killing about fifty people and destroying many houses within seconds is somewhat difficult to erase from the memories of the community. At a time like this, the intervention of the Sri Lanka Urban Multi-Hazard Disaster Mitigation Project (SLUMDMP) to suggest and provide support in finding mitigatory activities as solutions to these problems was a relief to the council and the community. SLUMDMP intervention helped the council to realize the priority issues of initiating actions for shifting the emphasis of current actions from post disaster to pre disaster mitigation. This was possible as the Ratnapura Municipal Council was selected as the demonstration city for the SLUMDMP. Within the main project itself the demonstration activities were to be replicated in two other selected urban areas. For this purpose Nawalapitiya Urban Council and Kandy Municipal Council were selected.

Worldwide attention is focused presently on urban and spatial planning and introduction of changes to policy environment for appropriate structural modifications in the planning process. In this respect development of a methodology for risk based mitigation planning poses a great significance. This is beneficial to the planners as well as other professionals associated with development activities.

## Development of the Methodology

In the context of the above, a workshop on Risk Based Mitigation Planning was organized by the SLUMDMP in June 1968, which was conducted by Ms. Linda Noson, an ADPC Consultant. Amongst the participants of the workshop were engineers, urban planners, architect planners, geologists, scientists etc. from project partner agencies, demonstration project, replication cities etc. Resource persons for future risk analysis endeavours were especially selected for participation. Examples of maps, hazards and risks used at this workshop were those of Ratnapura Municipal Council. This workshop was followed by the activities listed below for Ratnapura MC:

Publication of the **Guidelines on Risk Based Mitigatory Approaches for Planning** based on the workshop by end of the third quarter of 1998. This was made available to all UDA Planners.

Conducting a second workshop on **Considerations of the Natural Hazard Aspects in the Planning Process** in January 1999 with the same ADPC consultant mainly for planners of the UDA and other project staff.

Compilation and publication of the materials used by the consultant at the second workshop as "**Integrating Natural Hazards into the Planning Process – Risk Control Planning Workbook**". Copies of this book too were made available to UDA planners.

The exposure of the selected resource persons in the above exercises helped them to analyse the *risks and elements at risk at the Ratnapura area identified at the hazard identification workshop* at the beginning of the project activities. This analysis led to the preparation of the **Action Plan for Ratnapura Municipal Council**. Finalization of mitigation strategies in the Action Plan was completed and then reviewed by the ADPC. This was followed by discussions with stakeholder agencies at several meetings before finalisation. The strategies selected were prioritised on the basis of time scale and funding availability under the project.

The details of the Development of Risk Based Methodology are given in Annexure I. The steps involved are summarized as follows:

- Risk Based Mitigation Planning Concept
- Definition of Risk
- Preparation of the Work Plan
- The Methodology
- Preparatory Activities
- The Risk Based Mitigation Planning Process
- The Workshop
- Workshop Purpose
- The workshop agenda
- Workshop Exercises
- Risk Control Techniques and Options
- Evaluation of Risk Control Techniques and Options for Effectiveness

### **Mitigation Planning for Ratnapura MC and Nawalapitiya UC**

As explained above, the Action Plan for Natural Disaster Management for Ratnapura MC area was finalised and produced as a sample publication, which could be used in similar exercises in other local authorities.

Based on this experience the Action Plan for Nawalapitiya UC was prepared by the SLUMDMP and UC officials, which was discussed in great detail at a meeting of the DMSC of the Nawalapitiya UC. This plan is a working plan and does not contain the process as in the Ratnapura Plan, but only the resulting Action Plan for use by the stakeholders.

For Kandy MC, Disaster Mitigation Action Plan could not be developed as this council was selected as a replication city only at a later stage in the project period.

### **Strengths, Obstacles and Lessons Learned**

The high level of co-operation from the Mayor and officials of the Ratnapura Municipality was a strength for the implementation of activities, especially during the hazard and risk identification, the field visit and getting other information necessary for the consultant to conduct the workshop.

Due to the delay in identifying Kandy replicating city, the officials did not get the opportunity of participating in the Workshop on Risk Based Methodology for Mitigation Planning and other connected activities. This deprived them of getting the benefit of this training.

### **Lessons Learned**

Political patronage as well as the cooperation of all stakeholders including the community and NGOs is essential for successful identification of hazards and risk prevalent in the locality.

Early identification of local and foreign resource persons would reduce delays in organizing workshops. Adequate budgetary provision should be made available for future endeavours based on the current experiences (Budgetary adjustments had to be made).

For effective use of this methodology in hazard and risk identification, the commitment of planners and other relevant officials is necessary. Otherwise the methodology is of not of much use.

### **References**

- SLUMDMP Process Documentation Report, 1999
- SLUMDMP Project Completion Report, May 2000
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- SLUMDMP, UDA, NBRO, CHPB, Risk Based Mitigation Planning Approach, September 1998
- SLUMDMP, Action Plan for Natural Disaster Management for Ratnapura MC Area, April 1999
- SLUMDMP, Action Plan for Natural Disaster Management for Nawalapitiya UC Area, March 2000

## **Annexure I**

How the Risk Based Methodology was developed

### **Risk Based Mitigation Planning Concept**

**Definition of Risk:** Risk is defined as the *probability that a hazard will occur x the consequences*. Risk is composed of three elements:

- Hazard
- Vulnerability and
- Exposure.

A high risk may be identified for an infrequent hazard if the vulnerability and exposure of community elements to that hazard is very high. Similarly, a frequently occurring hazard may not pose a significant risk if community elements have a very low vulnerability to the hazard and the exposure is very low.

### **Preparation of the Work Plan**

Developing a work plan based on an analysis of risk involves a preliminary assessment of

- The types and frequencies of hazards, the vulnerability of categories of community elements within the hazard area, and
- An estimate of the exposure in the hazard area.
- When carrying out an activity of this nature, a common problem faced is that either
- The information available is not adequate or
- The available information is not even throughout the area under study and, the information available would not adequately describe the risks in the community.

Using an informal ranking scheme helps to sort risks to determine where additional information should be collected to better describe the risk and to determine which risks should be addressed in the work plan. Steps in preparing the work plan are as follows:

#### **Define the risk management program goals and objectives**

Then risk control options can be selected that best help achieve plan objectives. For example, if the primary objective is to reduce loss of life, then based on the risk analysis carried out in the exercises above, the first priority would be to identify risk control options related to managing the given hazard

#### **Develop an implementation schedule**

Initial tasks may focus on those risk control options that can be implemented without an increase in existing budgets. These options may focus on relatively low cost tasks such as improved maintenance and inspection procedures

Other relatively low cost tasks include the development of information for specific target groups, such as construction practices to lower risk for contractors

More expensive prevention and mitigation measures may require multiple years to plan, obtain funding, and implement.

### **The Methodology**

The methodology for the risk based mitigation planning adopted was to have

- 1) a reconnaissance field visit by the consultant,
- 2) a study of the analysis of hazard identification workshop (which was held prior to the above visit) and
- 3) conducting a two-day workshop by the consultant.

### **Preparatory Activities**

- Hazard and risk identification workshop
- Hazard mapping carried out by the SLUMDMP and the Map workbook
- Field reconnaissance by the consultant

### **Hazard and risk identification workshop**

At the initial stage of the project in order to have continuous dialog with political leadership, administrators, planners other govt. officials of agencies providing services in the area and representation of NGO's and CBO's a disaster management steering committee has been established based on the Ratnapura MC area. The committee was headed by the Mayor of Ratnapura MC. The risk identification workshop was held with the above committee members. At the workshop the hazards, vulnerabilities/risks in the area and the capacity of various organizations were identified using a specially designed questionnaire which were filled by the participants (Refer Annex I). An analysis of the workshop results gave the types, frequency and probability of hazards, intensity and area coverage (Refer Annex II). Based on this analysis, the hazards to be considered in identifying the risks for mitigation planning were selected.

### **Hazard Mapping and Map Work Book**

The mapping had been undertaken by the NBRO (Landslide hazard zonation) and UDA (Flood zonation and infrastructure maps). The resulting map workbook was available for the workshop. During the workshop only a few wards were taken for the sample study. The Map Workbook comprised of:

- Hazard maps for selected hazards including relevant details
- Human settlement maps
- Infrastructure maps
- Present land use map
- Maps with details of wards, population, public utilities etc.
- Details of environmental and archeological importance etc.
- Revised land use map

### **Field reconnaissance by the consultant**

Any professional who is involved in the spatial planning is required to obtain first hand information about the actual site conditions. Through this it is possible to study the historical events, limitations in implementation and the aspirations of the community. Therefore, the consultant did a field reconnaissance to Ratnapura MC area prior to the workshop. Places visited were:

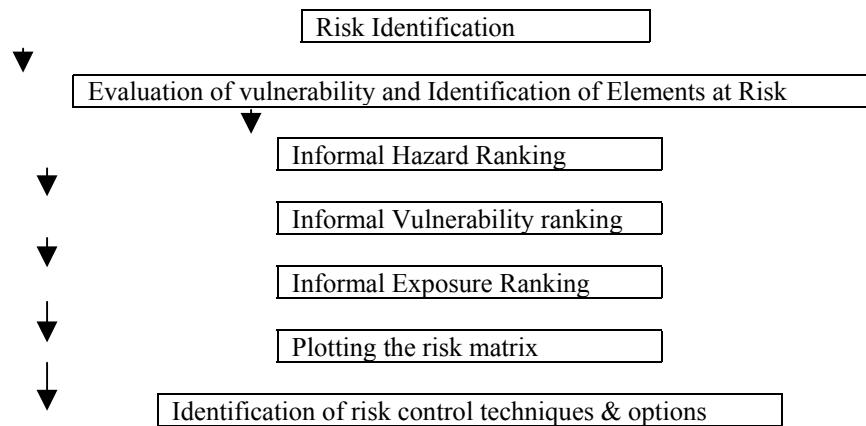
- The Municipal Council Office
- A site of previous land sliding and housing resettlement
- Areas of the community vulnerable to flooding and a flood resettlement area;
- Gem mining operation
- Sand mining operation
- The confluence of two major water ways near the center of Ratnapura responsible for major flooding
- Rubber and tea estates
- Transportation system
- It is always advisable to record the impressions after the field study. Any planning methodology should incorporate the solutions to some of the critical issues observed during the field study.



## The Risk Based Mitigation Planning Process

The risk-based mitigation planning process may be represented in a flow chart as given below:

### Risk Based Mitigation Planning



### The Workshop

The workshop was attended by planners, municipality officials, representatives of the partner organizations (NBRO, CHPB, UDA) and other professionals. The format of the workshop was as follows:

- Presentations by the consultant
- Discussion
- Group exercises by participants followed by group presentations (5 working groups)

### Workshop Purpose

The purpose of the workshop was to provide a risk-based approach to developing a plan to manage hazards that impact the Ratnapura Municipal Council. An informal risk ranking system was used to provide a methodology to identify risks to be included in the hazard management plan and to help identify possible risk control options. A section on evaluating the effectiveness of selected risk control options provides a methodology to assess the social and political viability of proposed risk control options. The effectiveness assessment also helps identify issues that will need to be addressed to improve the likelihood of successful implementation of proposed risk control options.

The workshop agenda

#### Day 1

- Introductions
- Training Objectives
- Key Risk Concepts
- Definition of Risk
- Basic Risk Management Process
- Risk Analysis Methods
- Identify and Analyze Risks
- Exercise 1: Hazard Likelihood
- Exercise 2: Vulnerability Assessment
- Exercise 3: Exposure Assessment
- Exercise 4: Plotting the Risk Matrix

#### Day 2

- Examining Risk Management Techniques

- Exercise 5: Identifying Risk Control Options for Selected Risk Management Techniques
- Assessing Effectiveness of Proposed Risk Control Options
- Exercise 6: Completing the Effectiveness Checklist
- Preparing a Risk Control Work Plan
- Hazard Management Planning Goals and Objectives

**Workshop Exercises**

The first three exercises focused on the identification and analysis of risks using an informal risk analysis methodology as follows:

- Exercise 1: Informal Hazard Ranking
- Exercise 2: Informal Vulnerability Ranking
- Exercise 3: Informal Exposure Ranking
- Exercise 4 was to plot the results of the first three exercises on a Risk Matrix to graphically demonstrate the variation of risks within the selected wards.

**Exercise 1: Informal Hazard Ranking**  
Definition

Hazard is the source of potential harm or damage. Hazards may be grouped by origin, such as, Natural hazards (cyclone, flooding or landslide) and Human-induced hazards (construction hazards related to road building and operational hazards related to gem mining or estate management).

The impacts of most hazards can be lessened through appropriate risk control options.

**Task**

Exercise 1 ranked the likelihood of occurrence of major hazards within each of five wards (1,4,5,6, and 14) selected from the fifteen wards in the municipal council. The wards were selected to represent diverse types of hazards within the municipal council based on review of the Map Book and on the consultant's field trip to the demonstration area. Participants were directed to rank each hazard on a scale of 1 to 5 using the following values for the recurrence interval of an event capable of causing a major impact within the ward.

**Frequency Scale**

1.	Very Low	Event occurs about once every 500 years
2.	Low	Event occurs about once every 100 years
3.	Moderate	Event occurs about once every 50 years
4.	High	Event occurs about once every 500 years
5.	Very High	Event occurs about once every 500 years

Frequency values may be adjusted to better separate the distribution of hazard frequencies. In addition, the hazard frequency values may be determined using a formal risk analysis method involving a probabilistic analysis and expressed as return periods for events of specific size (e. g. return period of major flooding likely to impact a significant area of the municipal council) or as average annual probabilities.

**Results**

Participants prepared a list of hazards for each of the following wards: 1,4,5,6 and 14 and ranked the likelihood of occurrence for each using the frequency scale. All wards had erosion-related hazard, including erosion along stream margins causing bank failures. Landslides were only noted as a significant hazard in Ward 6 and 5. Flooding impacted ward 4 and 5 most frequently. Ward 1 noted lightning occurrence frequently. No other ward indicated lightning as a significant hazard.

After reviewing the results of the workshop exercises, more time should have been spent on this exercise, which could not be done due to the time constraint. Each of the hazards identified in the small groups should have been plotted on a graph showing frequency of occurrence versus Ward. This would more

clearly demonstrate the purpose of the frequency axis on the risk Matrix table (Table X) to distinguish spatially how often identified major hazard events occurs within the Wards of the MC. By plotting the frequency of the hazard events separately, there would be less confusion between frequency of occurrence and possible consequences.

Exercise 2: Informal Vulnerability Ranking

Definition

Vulnerability is the likelihood of a category of community elements sustaining damage or harm related to the occurrence of a specific hazard event.

Task

Exercise 2 ranked the vulnerability of community elements to selected hazards using an informally defined scale for each of the following categories: people, buildings, building contents, transportation, site involvement, critical facilities, industry. Values of relative vulnerability defined for the exercise were:

1	Extreme vulnerability
2	Significant vulnerability
3	Slight vulnerability

Results

A review of work group results suggest that participants were able to identify potential vulnerability of the categories of community elements using the informal scale defined for the purpose of the workshop. For example, note that

**Building contents** in Ward 5 would have an extreme vulnerability to flooding due to their location on the first floor of homes and businesses that may be entirely inundated by flood waters (**V<sub>bc</sub> = 1**).

**People** would have only a slight life safety vulnerability to flooding due to the slow rise and slow rate of current flow, which provides ample warning for evacuation (**V<sub>p</sub> = 3**).

**Buildings** could sustain slight (**V<sub>b</sub> = 3**) to significant (**V<sub>b</sub> = 2**) damage due to the impact of standing water.

Note the contrast of the above flooding example of estimated vulnerability ranking in Ward 5, to the estimated vulnerability ranking for landslides in Ward 6. People, buildings, and building contents would have an extreme vulnerability to landslide damage (**V<sub>p</sub> = 1, V<sub>b</sub> = 1, V<sub>bc</sub> = 1**). This means that the occurrence of a landslide may result in fatalities, destruction of the structure, and severe damage to building contents.

The following should be noted:

If the likelihood that the specific hazard will occur in the Ward is zero (e.g. flat areas would not have a landslide hazard), then that should be noted and the consequences (vulnerability and exposure) need not be identified relative to that specific hazard.

If the hazard only effects a portion of the ward, the vulnerability to the elements in that portion only should be ranked relative to the potential impacts of the hazard event.

This exercise could be repeated using hazard specific damage functions to determine the vulnerability of each category in a formal probabilistic analysis. Such an analysis would require sufficient data on factors related to casualty and damage under specific hazard conditions to produce reliable results, such as, data on the amount of damage to specific building types caused by various levels of wind speed.

The number of people, buildings, etc. in the impact area will be addressed in Exercise 3, in which exposure is informally ranked.

The exercise could be improved by enhancing the informal scale with more detailed information pertaining to expected impacts of various hazards on specific community elements. For example, identifying characteristics of building types to sustain various levels of damage to help guide the assessment.

#### Exercise 3: Informal Exposure Ranking

##### Definition

Exposure is a measure of the number or value of items in each category of community elements that are likely to be impacted by a specific hazard.

##### Task

Exercise 3 ranked the exposure as follows for each of the same categories used in Exercise 2:

1	Extremely high exposure to hazard
2	Significant exposure to hazard
3	Slight exposure to hazard

##### Results

The Map Book provided data on the population density by ward, the location of critical facilities, and transportation routes. Land use classes, such as urban settlements, were used to estimate the density of building construction.

For example,

The exposure of people to flooding in Ward 5 would be significant because the population density reported in the Map Book is 26-50.

The exposure of people to flooding in Ward 10 would be extreme because the Map Book indicated a population density of over 100.

To use a probabilistic analysis method to determine exposure would require the collection of sufficient data of expected losses to produce reliable results. Such data would need to include factors such as the replacement costs of potentially damaged inventory and data collected on previous losses. Additional inventory data, including replacement costs for construction, could provide additional detail to guide the informal ranking of exposure. Exposure provides a measure of the scale of impact, which can assist in assigning risk control priorities.

#### Exercise 4: Plotting of Risk Matrix

##### Task

Exercise 4 combines the results of the previous three exercises to rank the hazard, vulnerability, and exposure on the Risk Matrix (Table 3) to demonstrate the range of risks from a number of hazards over the selected wards. The Risk Matrix may be completed using a simple average over all categories of community elements or can be disaggregated to focus on selected categories contributing to the risk, such as life safety or property loss. A separate risk matrix may also be prepared that shows the range of risks posed by an individual hazard. For example, a risk matrix for landslides will vary for each ward based on the likelihood that the hazard will occur, the variations in vulnerability of community elements, and the variation of exposure. Higher cost risk control options may be more appropriate in wards with the highest risk. In lower risk wards, lower cost risk control options would be more appropriate to the level of risk. The risk matrix can help develop a focused risk-based hazard management plan.

Results: Exercise 1-3

Risk Matrix

5 Very High < 1 year		Ward 1: Bank erosion Ward 5: Flooding Ward 6: Landslides Ward 14: Subsidence (Gem mining)	
4 High 1 in 10 yrs			
3 Moderate 1 in 50 yrs		Ward 5: Landslides	
2 Low 1 in 100 yrs	Ward 4: Landslides		
1 V. Low 1 in 500 yrs			
Frequency  <b>Vulnerability</b> & <b>Exposure</b>	<i>Slight</i> (V1/E1)	<i>Significant</i> (V2/E2)	<i>Extreme</i> (V3/E3)

Review of the workshop results for Exercise 4 suggests that the methodology helped to separate risks by ward throughout the municipal council. However, the plotted risks should be reviewed further to determine if the data fits with what is known about each ward. For example,

- Is the frequency of occurrence of landslides significantly lower in ward 4 than the frequency of occurrence in ward 6 as the plot suggests?
- Why is the vulnerability and exposure for landslides in ward 6 not higher since extreme losses are likely to occur to those community elements located in landslide areas?
- Does this indicate that within ward 6 the exposure to potential landslide damage is considerably lower resulting in less extreme consequences?

**Risk Control Techniques and Options**

Exercise 5: Identifying Risk Control Techniques and Options

Task

Exercise 5 focused on identifying specific Risk Control Options under each of the three categories of standard risk control techniques, viz., *Avoidance, Loss prevention and Loss reduction*.

For a specific hazard, each workgroup were to identify at least three risk control options for each of the three risk control techniques (avoidance, loss prevention, and loss reduction).

For each option, the work group was to identify the target group to whom the risk control option would apply and the organization/agency that would be responsible for implementing that option.

The workgroups were to complete this exercise for both existing development and for future development.

A list of typical municipal risk control options was provided for guidance.

Results

Risk Control Techniques need to have additional examples to help clarify differences. In particular, loss prevention and loss mitigation were difficult concepts to separate.

**Loss prevention** focuses on risk control options designed to reduce the frequency of occurrence of a specific hazard. Typically prevention programs focus on breaking a cycle that leads to hazard related losses. For example,

Fire prevention program focus on eliminating one of the three basic requirements for a fire to occur: *ignition, fuel, and oxygen*.

Typical fire risk control options include: removal of fuel sources such as discarded paper through maintenance action; forbidding smoking in areas where flammable materials are stored; and storage of flammable materials in fire safe cabinets.

**Some hazards cannot be prevented from occurring.** For example, the frequency of occurrence of earthquakes, wind, and rain is not generally controlled by human actions. Risk control options related to these hazards are typically either avoidance or loss reduction. For example, Not locating in regions known for severe winds or designing buildings to better resist expected wind forces.

Hazards that are more localized, such as potential land sliding, may be avoided through the implementation of zoning ordinances that restrict building to areas outside defined hazard zones.

The prevention of land sliding (reduce the frequency of occurrence) may be achieved through risk control options to improve drainage on steep slopes, stabilize slopes with vegetation, and using construction practices that do not destabilize the slope.

Risk control techniques and options were identified for existing development and future development, for each selected hazard type. This resulted in 6 tables as follows:

- Flooding hazard – Existing development
- Flooding hazard – Future development
- Bank failure hazard – Existing development
- Flooding hazard - Future development
- Landslide hazard – Existing development
- Landslide hazard - Future development

**Evaluation of Risk Control Techniques and Options for Effectiveness Task**

This exercise focused on the evaluation of the potential effectiveness of identified risk risk control measures. The following four areas were assessed to determine effectiveness:

- Implementation feasibility
- Community context
- Cost evaluation
- Application impact

The purpose is to get the participants to appreciate the need to go beyond risk assessment and begin to address issues related to selecting risk control options that are likely to be implemented and will be the best use of available resources.

**Results**

The checklist is given in the table below. The more yes answers are given to the questions, the greater the likelihood of implementation. The checklist provides a systematic, consistent approach to the evaluation of proposed risk control measures.

**Checklist for Evaluation of Effectiveness of Risk Control Options**

<b>Hazard:</b>			
<b>Risk Control Technique:</b>			
<b>Risk Control Option:</b>			
<b>Implementation Feasibility - Adoption</b>	<b>Yes</b>	<b>No</b>	<b>Comment/Actions</b>

Is the technical information needed to adopt the risk control option available? For example, to adopt a zoning ordinance it would be necessary to be able to delineate the hazard. Is the technical information available to enable hazard zones to be specified?			
Are the financial resources available to develop the technical information needed to adopt the risk control option?			
Is the authority that has responsibility for implementing the risk control option willing to do so?			
Does the staff have sufficient knowledge to prepare a regulation for adoption? For example, can the staff write the requirements for a zoning ordinance to restrict development in hazard zones?			
<b>Implementation Feasibility - Compliance</b>			
Is non-compliance with the proposed regulation likely to be detected?			
Is there a penalty for non-compliance?			
Is there a benefit for compliance with the regulation? For example, tax credits.			
<b>Implementation Feasibility - Enforcement</b>			
Is adequate staff available to enforce the regulation?			
Does staff have sufficient knowledge to enforce? For example, if the building code is amended to include wind load requirements, will staff be able to review construction plans to ensure that the code has been addressed?			
<b>Community Context</b>	<b>Yes</b>	<b>No</b>	<b>Comment/Actions</b>
Are hazardous areas in the community undeveloped or have low-density development? Implementation of a risk control option that requires relocation, for example, will be more difficult in areas of intense development			
Is the community growth rate slow? Areas with rapid growth rates may face additional pressure to develop in hazardous areas or to reduce building requirements to speed development.			
Are alternate sites available outside of the hazardous areas in which to encourage or relocate development?			
Is needed technical capability available in the community?			
<b>Cost Evaluation</b>	<b>High/ Medium /Low</b>	<b>None</b>	<b>Comment/Actions</b>
Estimate the cost to adopt the risk control option? For example, the cost to develop a hazardous areas map can be considerable. However, NBRO has prepared the map for Ratnapura. So, the cost to the MC is low to adopt an ordinance based on that map.			
Estimate the cost to ensure compliance with the selected risk control option. Will incentives be needed?			
Estimate the cost of enforcement. Will inspectors be needed? If so, how many? Will new staff to be			

hired?			
<b>Application Impact</b>	<b>%</b>	<b>?</b>	<b>Comment/Actions</b>
How much of the total area at risk will be covered by the selected risk control option? For example, a zoning ordinance that prohibits development in all landslide areas addresses 100% of the area at risk. A building code that only applies to new construction may address a fraction of the area at risk.			
What would be the potential reduction in risk if the risk control option were 100% implemented? For example, if new drainage were installed in all landslide areas by how much would that reduce the potential risk?			
Estimate how likely is it that implementation of the selected risk control option will be successful? Subjective estimate.			



# MANAGING URBAN DISASTERS THE NAGA CITY EXPERIENCE ON MITIGATION AND PLANNING

**Ernesto T. Elcamel, Naga City Disaster Mitigation Project**

## **Introduction**

Disaster Management has evolved somewhat over the past decades with a shift from response to prevention and preparedness to mitigation. The United Nations International Decade for Natural Disaster Reduction (1990-2000) and the AUDMP of ADPC saw many governments and institutions, including Naga City adopt four specific disaster management concepts, namely;

- ❑ The all hazards Approach
- ❑ The Comprehensive Approach (incorporating prevention, preparedness, mitigation, response and recovery)
- ❑ The all agencies approach
- ❑ The prepared community (Building Resilient Community)

Natural and man-made hazards, such as typhoons, flooding land instability, urban fires and conflagration, power failure, dam failure have the potential to cause significant environmental, social and economic loss through damage to people, communities, lifeline facilities and infrastructure.

Land uses that fail to recognize areas prone to hazard risks are not sustainable and can cause communities and the environment unnecessary harm or damages. communities need to be developed in a sustainable manner by insuring a close linkage between hazard mitigation and land use planning.

This study focus on how Naga, small city in central Philippines, crafted a number of effective responses to hazards and environmental degradation that helped uplift the quality of urban life. Specifically, it will center on the Naga City Disaster Mitigation Project or the NCDMP, and how it helped evolve the city's risk reduction initiatives.

## **The setting**

A riverine city in southern Luzon, Naga is located in the province of Camarines Sur, the biggest province in Bicol peninsula. It is about 450 kms south of Manila and about 100 kms north of Legaspi City.

As a city, Naga is one of the country's oldest. Originally called Ciudad de Nueva Caceres, It was one of the five cities created by royal Spanish decree in the late 16<sup>th</sup> century. The "Heart of Bicol", Naga has established itself as the religious, educational, and business center of Bicol, one the country's administrative regions.

The Naga City Disaster Mitigation Project (NCDMP) is a program implemented by the Asian Disaster Preparedness Center (ADPC) under the Asian Urban Disaster Mitigation Program (AUDMP). The major concern of the project is to identify mitigating measures that will help the Nagueños, while promoting the importance of awareness and city planning for all potential hazards. As the first model city in the Philippines, Naga City's project focused on the need to mitigate disasters particularly typhoons and flooding. The project helped strengthen the capacity of City to develop and implement disaster mitigation standards and practices.

From this brief profile, we can identify the disasters that threaten the city, its inherent vulnerabilities and weaknesses and better appreciate the mechanisms it has in place to mitigate their impact and speed up recovery.

## Mitigation Planning and Implementation

Much of the losses in lives and property could be avoided through proper planning to locate specific settlements and centers of economic activities in safer areas as well as in the construction of resident structures. Towards this end, the following measures have been undertaken by the city government.

***Maximizing the use of the city's Geographic Information System (GIS) as basis for disaster mitigation planning.*** – Naga City's GIS has proven to be an effective tool for anticipating which part of the city will most likely be flooded. Through community survey and hazard mapping, coupled with data provided by the Weather Bureau's Flood Forecasting Division, specifically the rate of increase in water level, the city is given the capability to forecast with a greater degree of accuracy which part will go underwater giving city officials the capability to target specific households for evacuation. On a longer-term basis, GIS provides the information for systematic land use planning and urban planning. It has also helped identify critical areas of Mt. Isarog, which should be prioritized for watershed development.

***Shifting the center of economic activity from high risk lowlands to relatively elevated areas of the city.*** – Under its successive five years development plans and its comprehensive land use plan, the city government has gradually shifted the focus of economic activity from the flood prone central business district to less risky areas of the city. These new areas are being developed into growth centers where incentives are being given to attract locators. Among them are the Panganiban-Divresion Growth Triangle where the city's alternative Central Business District is now under construction, the Conception Growth Corridor where service establishments are being encouraged to locate, Market Development Areas which are within the different residential districts of the city to make residents less dependent on the main public market, and the South Highland Agro-Industrial Center for processors and fabricators.

While the existing CBD will never be abandoned, dependence and concentration on this area has now been lessened such that even if it is paralyzed by disasters, the city will continue to operate with minimal dislocation. This thrust towards deconcentration is likewise reflected in the opening and upgrading of new roads towards rural communities, the establishment of service facilities outside the urban area, and the establishment of housing project across multiple growth nodes.

***Empowering the city to enforce at its level critical provisions of the national building code.*** – The Building Code of the Philippines has more than enough provisions to ensure that buildings withstand typhoons as well as other natural and man made disasters. The problem is that enforcing a national law calls for the intervention of several levels of national offices. To expedite enforcement and the application of punitive action on violators, the Naga City Government has drawn up its own building ordinance picking up key components of the national code and supplementing it with regulations unique to the situation in Naga City. As a result, the city government, on its own, can prosecute violators with dispatch without need for the intervention of any national bureaucracy. This has dramatically improved compliance with building regulations and the safety of these structures and in compliance with UN-HABITAT Guidelines on Settlement Planning on flood prone communities. .

***Implementation of the Naga Kaantabay sa Kauswagan Program (Partners in Progress)*** – This is the socialized housing program of the city which, among others, relocates informal settlements from high risk areas provide with basic amenities and facilities, to site an example two of the eight (8)8 relocation sites has its own elementary school. To date more than 12,500 households have been transferred to the city's resettlement sites keeping them safe and far from known hazards.

***Metro Naga Development Council*** – Mitigating floods within Naga City calls for solutions well beyond its boundaries as the Bicol River snakes through two provinces and dozens of municipalities. A wealth of data and recommendations have been generated by ten previous studies on flood control within the Bicol River Basin Area. Some of their recommendations have been implemented but many more remain to be done. Through Naga City's partnership with 14 neighboring municipalities, collectively known as the Metro Naga Development Council, funds could be sourced and the project implemented on a basin-wide basis.

Probably of greater importance in the role of Metro Naga in promoting balanced and sustainable growth within the area. Growth by Naga City and its neighboring municipalities will mean local government and

people better to cope with disaster, will mean less migrants flocking to the city and dwelling in high risk areas, will mean more money for better structures and safer places to live in.

***Naga River Revetment*** – This involves placing a concrete armor along the sides of the Naga River and constructing a concrete pathwalk with railings along its length. The purpose is to check river erosion, control the throwing of garbage into the river, and prevent informal settlement along the banks. This project is being implemented within the high-density urban section of the Naga River, wherein one portion is developed into a café and a boulevard.

***The River Revival Project*** – With technical assistance from the USAID, this seeks to restore the watershed of the Naga River and integrate the protection of the river’s ecosystem with the development of its riverine communities. Recently the World bank implemented its new project dubbed as the Bicol River Basin Watershed Management project which will provide new strategies in safeguarding the watersheds with in the basin area where Naga city is located.

***Urban Water management Project*** – With the assistance of the Metro Naga Water District and the USAID as co-partner, this project aims to rehabilitate the upper Naga River to de-silt and dredge dead creeks and other tributaries of debris from previous flooding and soil erosion. This includes include building of new water impounding system to minimized excessive water run off from the slopes of the Mt. Isarog.

***Depopulation and Elevation-*** This concept is actually and innovation the city government introduced, It involves relocation and acquisition of frequently flooded areas and elevate it to become commercial or recreational facility. The city provided relocation site for the displaced residents and they were given housing assistance from the City Social Welfare and Development Office. This strategy was tested by the city government to be effective in a long run mitigation strategy. The example of this is the Panganiban Upgrading and Beautification project wherein the property is owned by the Philippine National Railways (PNR), and the Central Business District II (CBD II) where we relocate the residents, elevate the land by almost 20 meters and constructed a central bus terminal and sports coliseum and commercial establishments.

***Naga City Integrated Emergency Management System (NCIEMS)*** – This will be the standard methodology for comprehensive emergency management which had been developed by the Naga City Disaster Mitigation Office (NCDMO) and will be broad-based in the respect that it covers activities that could occur before, during and after emergency operations. To implement the NCIEMS concept the NCDMO will conduct a periodic hazard inventory , followed by a capability assessment and a medium term development plan which will be known as the Capability and Hazard Identification Program. The capability assessment will measure the total resources, both internal and external to the City government, that could be made available to counter discerned threats and to optimize the use of the aggregated (and intergovernmental) resources to fulfill the phases of disaster management. The system further includes the best possible interim alternatives for identified capability shortfalls. Ultimately, however, final resolution of these limitations is expected to be addressed, in programmed manner—in the medium term development plan.

These disaster mitigation measures are actually part and parcel of the growth with equity development program of the city government. They are implemented by its departments as part of their regular mandate.

While the occurrence of floods and typhoons cannot be stopped, losses in lives and property could be minimized through appropriate counter measures. The specific activities undertaken by the city government are detailed below.

***Disaster Mitigation Planning-*** In areas where Natural hazards occurs. Like the perennial typhoon and floods in Naga City, the major concern for the city to become safer and livable is the safety and protection of some major sectors, such as the population, shelter, food/agriculture, lifeline facilities and the lifeline infrastructure. The lifeline facilities are the communication, electricity, hospitals/clinics, airports, evacuation centers, warehouses, etc., while the lifeline infrastructures are roads leading to lifeline facilities, levees , drainage, etc. This became the basis for the formulating the Naga City Disaster

Mitigation Planning/Implementation Framework. Under this strategy, we must break the disaster—rebuild—disaster cycle and strengthen existing development to better withstand the next disaster. We must ensure that all future development takes the natural hazard threat into account, and is planned for and carried out to avoid the hazard, or significantly lessen its impact.

### **Conclusion**

Disaster management concepts have been implemented successfully in several developing countries. This study has proposed that they are also relevant in developing countries like the Naga city experience although the issue of poverty alleviation must be considered when interpreting the concepts of disaster management.

The Naga City Experience highlights the fact the need not to dissociate disaster mitigation with development. While disaster may set back development efforts, its mitigation and the eventual rehabilitation effort should always be viewed as part and parcel of a locality's overall development program. To isolate disasters from development is to aggravate its impact and indeed, truly set back development itself.

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**Opening Ceremony**



**Registration**



**Plenary Session**



**Networking Lunch**





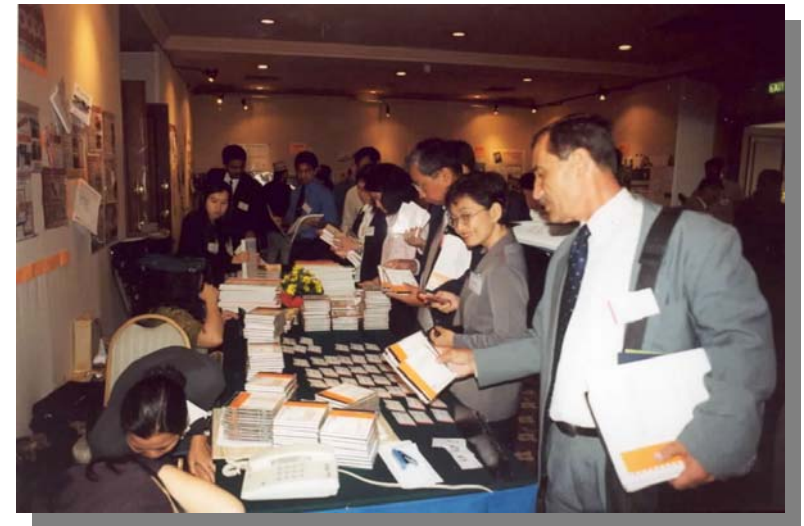
**Panel Discussions**



**Participants Share Lessons**



**Visit to Display Area**



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