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Dissertation Summary

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Globally, the disaster events have become more frequent and deadly over the past last decades which increase the numbers of affected people, however the numbers of people killed due to natural disaster is in decreasing trend. However, the scenario in Nepal is contradictory to global trend as for the past three decades of Nepal shows an increasing trend of occurrence of disaster events as well as reported deaths and injuries from those disasters.

By global standards, Nepal ranks high in terms of disaster-related deaths, lying in 23rd place in terms of total natural hazard-related deaths over the period 1988-2007 and in seventh position for deaths resulting as a consequence of floods, landslides and avalanches alone. According to the Disaster Vulnerability Risk Assessment Report by the UNDP, 11th place in terms of vulnerability to earthquake and 30th in terms of water induced disaster. Nepal is also located at the boundary between the Indian and Tibetan tectonic plates and the entire country lies in a high earthquake intensity belt (MoHA et al.). Nepal suffers 1.14 deaths and twice as many injuries per day from natural disaster events. And on average, Nepal loses 26 buildings per year to different forms of disasters. Natural hazards and the resulting disasters are inflicting growing losses to the global economy- annual direct loss due to disasters of Nepal is estimated approximately at NRs16,120 million (UNDP, 2009). This is a huge and unaffordable loss for Nepal. Disaster risk reduction should, therefore, be mainstreamed into the economic development process and in development activities.

To build resilience of communities to disaster risks and climate change, it's imperative that the investment in local development be critically examined with the lens of climate change and disaster risk resilient frameworks. The current approach of disaster preparedness and climate change adaptation measures are community based initiatives which are usually external intervention with ritual involvement of communities. The current focus on community based disaster risk reduction and climate change adaption are project based activities which are neither sustainable nor are owned by the community. The focus rather should be in community owned initiatives which implies strengthening and supporting the locally owned initiatives by external agencies. As community participation is considered pre-requisite for success of any projects, the external intervention approaches the community with their agenda and ensures communities participation. However, the approach should be such that the external agencies should reinforce community owned activities which are already inbuilt in the local mechanism. The community owned initiatives are more likely to be sustainable and will have larger impact compared with the current practice of community based DRR which have more project focused approach and are erode from memory by the time the project and

funding is over.

Hyogo Framework for Action 2005-2015 (HFA, 2005-2015), acknowledges the fact that efforts aimed at reducing disaster risks should be systematically integrated into policies, plans and programmes of sustainable development and poverty reduction, and should be supported through bilateral, regional and international cooperation, including partnership agreements. "Efforts to reduce disaster risks should be made at community level to national and global political levels in view of integrated actions and policies of numerous stakeholders<sup>1</sup>."

One of the strategic goals of the framework is "the development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards<sup>2</sup>." One of the priorities of actions, according to HFA, is to "promote community participation in disaster risk reduction through the adoption of specific policies, the promotion of networking, the strategic management of volunteer resources, the attribution of roles and responsibilities, and the delegation and provision of the necessary authority and resources."

One of the important approaches for community participation and community owned initiatives is to engage schools in building resilient communities. School based DRR strategies are not only effective in keeping the children safe and disseminating the message to wider community but also in ensuring institutionalization and sustainability of the strategy. The two essential components of school led community based disaster risk reduction are: safer schools and increasing awareness, preparedness, mitigation and response through involvement of school communities. A safer school initiative in Aceh, Indonesia after 2004 Tsunami required schools to be strengthened as some of them were assessed to be of poor quality and vulnerable to disasters. One of the major apprehensions of this approach is that retrofitting is technically difficult at community scale and economically not feasible. Another concern is about success of transferring the know-how to communities by demonstration projects such as school retrofitting and impact of demonstration projects in raising awareness of the communities in disaster risk reduction. One additional concern is expansion of this approach from retrofitting of existing buildings to construction of new buildings. This research work looks at following three important aspect of school led risk preparedness and community based disaster risk reduction approach:

In Aceh, many school buildings constructed after and before the Tsunami disaster have been found of poor quality and standard. In order to solve the dilemma on whether to demolish the buildings or strengthen them according to the standards, a cost comparison was made. It has been found that retrofitting is a cost-effective measure to reduce earthquake vulnerability and save lives.

On-site inspection of the building was carried out to assess the strength parameters and after structural analysis suitable retrofitting measures were recommended. Out of the 19 schools (58 numbers of buildings) surveyed 13 schools (41 buildings), were found vulnerable and required immediate intervention. Although 6 schools (17 buildings) did not require major structural intervention, minor retrofitting and repair works were done and additional measures to make child friendly were installed.

Retrofitting of school buildings demonstrated that the existing vulnerable school buildings can be made safe against earthquake and child friendly using simple methods, tools and equipment and local human resource. Cost of retrofitting is less relative to the cost of demolition and rebuilding and it is time saving also. The retrofitting process and onsite training can also be an effective medium for dissemination of best construction practices in the community. The process also helps the local people to understand the context of risk and raise awareness on disaster risk reduction.

This approach not only reduced the vulnerability of school children to earthquake disaster by constructing safer and child friendly new buildings and retrofitting the existing vulnerable buildings, but it also contributed to preparing the community for disaster risk mitigation by awareness through action.

<sup>1</sup> A GUIDE TO COMMUNITY-BASED DISASTER RISK REDUCTION IN CENTRAL ASIA, UNISDR (2006) available online at <http://www.unisdr.org/we/inform/publications/2299>

<sup>2</sup> Hyogo Framework for Action 2005-2015, UNISDR (2005) available online at <http://www.unisdr.org/2005/wcdr/intergover/official-doc/L-docs/Hyogo-framework-for-action-english.pdf>

Among the 58 school buildings surveyed, 41 buildings were found vulnerable and retrofitting was executed for the vulnerable buildings. Retrofitting of school buildings demonstrated that the existing vulnerable school buildings can be made safe against earthquake and child friendly using simple methods, tools and equipment and local human resource. Cost of retrofitting is less relative to the cost of demolition and rebuilding and it is time saving also.

One of the assumption of the work was that this approach not only reduced the vulnerability of school children to earthquake disaster by constructing safer and child friendly new buildings and retrofitting the existing vulnerable buildings, but it also contributed to preparing the community for disaster risk mitigation by awareness through action. A study was carried out after the retrofitting work to assess impact of retrofitting work on awareness raising and knowledge transfer in the communities.

A survey of respondents who participated in the retrofitting work of school facilities in Aceh, Indonesia was carried out to assess the impact of their participation in awareness raising and knowledge transfer. The survey revealed that there is a positive impact on people who participated in the retrofitting work in raising their awareness of disaster risks and measures for disaster risk reduction. A large number of respondents felt that the retrofitting work has had definite impact on raising their awareness. Increased level of awareness can be instrumental to make decisions in implementing risk reduction measures.

However, the survey also showed that participation of communities did not help to transfer technology of retrofitting to the communities. This may be because of the fact that the retrofitting is new concept and it also requires experience and skill. Although construction is a regular activity in the community and they have traditional knowledge in it, it is confined to new construction and repair and maintenance of buildings. In the light of lack of traditional knowledge in retrofitting, they didn't feel confident about carrying out the activities independently.

Community participation has long been recognized as an effective way for sustainability of projects. The results show that engaging communities in disaster risk reduction activities, such as retrofitting, is effective in raising awareness as well. Technology transfer for activities such as retrofitting that are relatively new to the communities, however, cannot be achieved through community participation alone. Effectiveness in raising awareness also varies among people from different age groups and education background. Therefore, packaging participation in mitigation projects along with other approaches such as training and regular drills can be effective ways to increase awareness among all cross-sections of people. The process also helps the local people to understand the context of risk and raise awareness on disaster risk reduction.

Not only existing schools, the schools being constructed and planned to be constructed are also not safe to disasters. The concern for safer schools is a major concern as many developing countries are gearing up efforts to bring all the school age children in the school. Nepal, like many developing countries, is building about new schools to meet the demand. A community led safer school construction initiative was executed in Nepal.

As the school is common to all in the communities and also the centre of community activities, schools as learning center have potential to spread message for environment friendly, disaster resilient and green house design and construction. In the same time with many environment friendly features the school building can provide a comfortable learning space in itself for the students and communities to grow up with and learn about ecological issues, climate change and sustainable development. Nepal, which is in high earthquake risk zone, needs to building additional 50,000 classrooms in order to meet the Millennium Development Goal of education for all.

Because of high earthquake risk in almost all part of the country, the priority should be given on proper design and construction to ensure the school buildings are safe and disaster resilient. Similarly, most of the places in Nepal have extreme climate condition both cold and hot, there is a need of design and construction technique on cost effective climate responsive structure.

The design and construction of Prototype classroom building is done to provide an alternative to current practices of adding school buildings which are neither comfortable nor disaster resilient. The nature of production and design technology not only address today's global warming issues, but also is instrumental for disaster risk reduction. In particular, by providing the climate responsive and safe school building will help to

increase the attendance and enrollment of children in school. Furthermore, the process helps to create awareness among the communities and spreads the message of culture of safety. The prototype classroom – building with Compressed Stabilized Earthen Block (CSEB), may be the best building type for the school construction as it ensures the basic need of school buildings:

- Climate Responsive
- Environment Friendly and sustainable
- Cost Effective
- Fast to Built
- Safe and Earthquake Resistant

This intervention will help to make schools/houses functional and comfortable in all seasons and in same time contribute lot on green movement. Ultimately this will help to minimize the carbon emission and unhealthy exploitation on earth for getting resources.

Applying the lessons learned from community participation in building new schools and retrofitting existing schools, emergency response preparedness in Nepal with community participation is proposed. The capital city, Kathmandu, houses many vulnerable structures and Nepal lacks institutional, financial and political capacity to deal with a large earthquake of the scale of 1934. The lessons from Aceh - which was poor, lacked institutions from armed conflict and had not experienced a large disaster from long time – has resonances with Nepal. Although the context may be different, the principle of recovery can bear significance for response planning in Nepal.