I. Background

The National Action Plan for School Earthquake Safety has been formulated as a commitment of the Royal Government of Bhutan to reduce future losses of life and property in schools throughout Bhutan due to earthquakes and other natural hazards. GeoHazards International facilitated the formulation of this action plan, in collaboration with the Department of Disaster Management and the Ministry of Education, with funding from the Global Facility for Disaster Reduction and Recovery.

This document provides guidance to the concerned governmental departments regarding actions to take, policies to put into place and projects to undertake in the short, medium and long-term, to ensure that all schools in Bhutan are safe from the impacts of future earthquakes and other natural hazards. The authors recommend that this plan receive regular updates and that progress toward implementing the plan's Priority Areas be reviewed annually.

Schools have proven to be vulnerable in previous earthquakes around the world, resulting in loss of lives, injuries and damage to infrastructure. Recent earthquakes have shown that Bhutan's schools are also vulnerable. Both the M6.1 earthquake of 21st September, 2009in Eastern Bhutan and the M6.8 earthquake of 18th September, 2011 in Sikkim, which principally affected Western Bhutan, caused extensive damage to school buildings. The damage to some buildings was severe enough that students would have been injured or killed, had they been in the buildings at the time of the earthquake. These two earthquakes disrupted normal school functions in the affected areas, and school officials reported traumatic impacts on students due to the earthquake damage.

Table 1 - Estimates as per the Joint Rapid Assessment Report (2009, 2011)

Earthquake Event	Schools Damaged	Estimated Loss (Nu. Million)	Estimated cost for Recovery and Reconstruction (Nu. Million)
2009	117	593.6	653
2011	36	50.18	82.96
Total	**153**	**643.78**	**735.96**

The foremost responsibility of school management is to ensure a safe environment for both school children and the public, since schools also host important community functions and provide shelter during disaster response. It is therefore urgent and imperative to improve seismic safety and enhance safety and preparedness levels in all schools in Bhutan. Developing and implementing the National Action Plan for School Earthquake Safety is an important initiative towards this end. This initiative fits into the overall National Disaster Risk Management Framework, 2006, which calls for proactive risk reduction and for integration of

disaster concerns into national programs and policies. The National Disaster Management Bill requires each notified department or agency to prepare contingency/action plans for disaster management, while the National Planning Guidelines for the 11th Five Year Plan by the Gross National Happiness Commission identifies "mainstreaming disaster resilience" as one of the 16 National Key Result Areas and "disaster risk reduction" as a cross cutting theme. The Action Plan can therefore be used as a tool to integrate disaster risk reduction measures into other programs, and to help sectors set priorities and incorporate risk reduction and preparedness initiatives/actions into their own five year and annual plans.

a. Natural hazards in Bhutan

Bhutan is vulnerable to earthquakes and several other natural hazards due to its location in the eastern Himalayas, which, in addition to being one of the most seismically active regions of the world, has landslide-prone slopes, potentially dangerous glacial lakes, and a climate conducive to flooding, windstorms and wildfires. Among the hazards that Bhutan faces, earthquakes have the potential to cause the most severe and widespread damage, because the entire country lies atop or near the major earthquake fault that divides the Indian tectonic plate from the Eurasian tectonic plate. Though recent earthquakes have been moderate in size, geologic evidence shows that the fault is also capable of breaking under most of the country in a single massive earthquake; scientists postulate that such a massive earthquake may have last occurred circa 1100 A.D.[1] Bhutan's two recent, moderate earthquakes (21st September, 2009 and 18th September, 2011) caused13 deaths, many injuries and losses of approximately Nu. 3698.63 million[2]. The much larger earthquakes that the fault is capable of generating would cause unprecedented damage.

Another major natural hazard that Bhutan faces, especially due to effects of climate change, is the risk from glacial lake outburst floods. Bhutan has 2,674 glacial lakes, 25 of which have been identified as potentially dangerous. However, the threat of glacial lake outburst floods is increasing due to climate change and rising temperatures, as glaciers melt and retreat at record rates[3].In October 1994, a massive glacial lake outburst flood from LuggyeTsho in the headwaters of Pho Chhu River damaged the Punakha Dzong, causing numerous casualties. Earthquake shaking can also trigger a glacial lake outburst flood, by causing the natural dam holding back the glacial lake to crack and fail.

[11]Kumar, S. Wesnousky, S.G., Jayangondaperumal, R., Nakata, T., Kumahara, Y. and V. Singh (2010). Evidence for surface rupture along the northeastern Himalayan front, India: Timing, size, and spatial extent of great earthquakes. Journal of Geophysical Research, 115 (B12422), 1-20.

[2] Joint Rapid Assessment Report (JRAR), 2009 and 2011

[3] Second National Communication, NEC, 2011

In addition to these two major natural hazards, Bhutan is vulnerable to recurring and seasonal hazards that include landslides, flooding, wind and hail storms. These hazards are increasing, with changes in temperature and precipitation levels and patterns. The effects of Cyclone Aila, which hit the Bay of Bengal in May 2009, were felt in all twenty Dzonkhags of Bhutan, disrupting power and water supplies, damaging roads, irrigation channels, bridges and other infrastructure, including schools.

Bhutan is also susceptible to fire in both settled and forest areas. The country's rugged terrain, highly combustible forests, erratic wind conditions and shortage of trained fire-fighters and equipment increase the risk of forest fire outbreaks, especially during the dry winter months. Fires in the human settlements of Wamrong, Trashigang and Chamkhar, Bumthang in 2011 and 2012 have had devastating effects on those communities.

In addition to shaking damage, earthquakes can also trigger many of these other hazards, including glacial lake outburst floods, landslides and rock falls, and fires.

b. Relevant national and education sector policies

Bhutan has always given education high priority, along with the other social sectors. Through consecutive five year plans, the government has tried to make education accessible to all of its citizens. As of 2012, the education system comprises553schools (including private schools), which serve more than 170,000children[4]. In addition to these schools, the Royal University of Bhutan (formed in 2003) consists of eleven member colleges.

Figure 1 - Education Statistics, 2012

Primary Schools – 353 ***NER* (PP-VI) – 96%***
Lower Secondary Schools- 94 ***GER** (PP-VI) – 118%***
Middle Secondary Schools – 58NER (VII-VIII) -39%
Higher Secondary Schools – 48GER (VII – VIII) – 107%
Early Childhood Care and DevelopmentCentres– 96NER (IX – X) – 29%
Special Institutes – 9 GER (IX-X) – 80%
Private Schools – 26NER (XI – XII) – 20%
Extended classrooms – 108GER (XI-XII) – 53%
Non-formal Centres – 953
Teachers in Schools – 7,932
Teachers in Institutes – 1,186
Teachers in Non Formal Centres – 949
Teachers in Early Childhood Care and Development– 229
Tertiary Institutes under Royal University of Bhutan – 11
Vocational Institutes under Ministry of Labour and Human Resources – 8
Sanskrit Patshala – 1
Continuing Education Centres - 21

Net Enrollment Ratio**Gross Enrollment Ratio

Source – Annual Education Statistics 2012, Ministry of Education

[4]Annual Education Statistics 2012, PPD, Ministry of Education

Several national and education sector policy documents summarized in this section were especially relevant to the development of the National Action Plan for School Earthquake Safety. These are the National Disaster Risk Management Framework; the National Disaster Management Bill; Bhutan 2020: A Vision for Peace, Prosperity and Happiness; the Education Sector Strategy; and Education Without Compromise.

The ***National Disaster Risk Management Framework*** of Bhutan, endorsed by the Cabinet in 2006, outlines eight components.

Table 2 - Components Outlined in the NDRMF, 2009

	National Disaster Risk Management Framework Component
1	Institutional, legislative and policy framework
2	Hazard, vulnerability and risk assessment
3	Early warning system
4	Disaster preparedness
5	Mitigation and incorporation of disaster risk reduction in development sectors
6	Public awareness and education
7	Capacity development
8	Communication and transportation

The Framework's Component 4, disaster preparedness, requires the formulation of disaster preparedness and response plans at national and local levels, including for important sectors such as Education. Component 6, public awareness and education, notes another important role for the Ministry of Education to introduce modules on disaster management into school and college curricula.

The draft ***National Disaster Management Bill 2011*** requires each notified ministry or agency to formulate and implement its own disaster management and contingency plans. The Ministry of Education, being a key ministry, would be required to formulate such plans.

Bhutan 2020: A Vision for Peace, Prosperity and Happiness outlines a strategy for Bhutan's development. Its vision for the education sector is to develop a full range of educational and vocational institutions that will instill cultural, ethical and moral values in children. Vision 2020 targets the full attainment of enrollment levels at Class X by 2012 and the realization of full adult literacy levels by 2017.Important educational goals in the 10thFive Year Plan have been to achieve near 100 percent enrollment through various strategies -to build community schools and extended classrooms; to introducing mid-day meals, student living stipends, and inclusive education; and to achieve gender parity at higher and tertiary levels of education.

The ***Education Sector Strategy*** outlines six strategic objectives: improving the quality and relevance of holistic education; expanding basic education; developing a motivated and competent teaching cadre; increasing access to and quality of education; encouraging establishment of private schools; and establishing a national university.

Education Without Compromise, a comprehensive review conducted by the Education Sector Review Commission in 2008, recommends priority initiatives to improve the quality of education, through implementing various strategies. One important recommendation is to enhance Early Childhood Care and Education, in order to help achieve enrollment of the final10-15% of children who are now out-of-school and who are hardest to reach, due to persistent poverty at the household level and to other specific policy needs to ensure their enrollment and retention.

The Education Without Compromise report also reviews factors that influence learning achievements in primary education; these include the socio-economic background of students, the education level of parents, and physical factors such as school infrastructure quality and location, instruction quality, and the availability of books and other materials. The report also highlights that many schools were found to be in a "state of disrepair" and that "the maintenance and refurbishing of old schools were neglected."

c. Impact of previous earthquakes on the education sector

The losses attributable to the two moderate earthquakes of 21st September 2009 and 18th September 2011 demonstrate Bhutan's high level of risk in future earthquakes.

1. Impacts of September 21, 2009 earthquake

The Department of Disaster Management consolidated a Dzongkhag damage assessment report that stated that 117 schools were damaged in the September 21, 2009 earthquake; of those, 8 were damaged beyond repair, 26 required major repairs, 37 required partial repairs, and 46 required minor repairs. The Joint Rapid Assessment Report estimated re-construction costs in the education sector at Nu.653 million.

The report observed that the 21 community schools suffered the most extensive damage, as their constructions were non-engineered and lacked "structural integrity."However, the report also noted with concern that major damages were also found in government-built, "engineered" schools, which pointed to an "urgent need to improve school construction practices throughout the country."

The Ministry of Education carried out a rapid assessment after the earthquake in the six affected Eastern Dzongkhags and found that 37 schools were severely damaged, 23 schools had major damages to classroom blocks, 14 schools required major repairs to principal and staff quarters, and 5 schools had hostels with major damages which made them highly risky for students to occupy.

2. Impact of September 18, 2011 earthquake

The Dzongkhag and Ministry of Education damage assessment reports indicate that a total of 36 schools were damaged in the September 18, 2011 earthquake. The community primary and the primary schools again suffered the most extensive damages. The Joint Rapid Assessment Team for Recovery, Reconstruction and Risk Reduction estimated the total loss due to earthquake damages to schools at Nu. 50.18 million.

The assessment team also tried, in the limited time that it had, to assess the psycho-social impacts of the earthquake on children. Team members found that the children were "affected by shock and anxiety during and immediately following the earthquake." Children who witnessed damages in their homes and schools were more frightened than other children, although there did not appear to be "any long-term trauma as a result of the earthquake."

The team also noted the need to build counseling and emergency skills capacities among teachers and staff, and to enhance general preparedness of all schools in the country to deal with such disasters and emergencies.

II. School Earthquake Safety Action Plan

The main focus of the Action Plan is to enhance earthquake safety in schools. Wherever possible, the plan integrates safety measures for other natural hazards.

a. Action planning process

The Earthquake Safety Action Plan for Schools represents the combined effort of the School Safety Working Group, formed with representation from key Ministries, Departments, and relevant Donor Agencies (***Annexure I – School Safety Working Group Members***), facilitated by GeoHazards International.

At a National Stakeholder Workshop on 6th March 2012, working group members and other participants endorsed the Terms of Reference (***Annexure II***) and a Guidance Note on Development of Action Plan (***Annexure III).***The School Safety Working Group met on numerous occasions, and its work was also facilitated via e-mail and other communication tools. The second National Stakeholder Workshop was held on 21 May, 2012, at which time the working group presented the action plan development progress, draft action plan matrix, and

immediate priorities and recommendations for incorporation in the Ministry of Education's 11th Five Year Plan.***(Annexure IV – Second national stakeholder workshop documents/ presentations*****).**

b. Action plan objectives

The National Action Plan for School Earthquake Safety has the following objectives:

1. Make school children and teachers safer from earthquakes and other natural hazards;
2. Make buildings safer and more earthquake-resistant;
3. Enhance earthquake and emergency preparedness in schools; and
4. Build overall capacity and awareness about earthquakes and other natural hazards.

c. School earthquake safety framework

The School Safety Working Group first worked to finalize the School Earthquake Safety Matrix or Framework (***Annexure V***). The framework identifies 5 priority areas that cover all aspects of strengthening natural disaster management in the education sector.

Table 3 - Priority Areas

Priority Area I	Strengthening earthquake safety and disaster management institutional and policy framework in the education sector
Priority Area II	Education and awareness
Priority Area III	Risk reduction and mitigation
Priority Area IV	Preparedness and response
Priority Area V	Capacity building

III. Priority Areas and Outcomes

Priority Area I – Strengthening earthquake safety and disaster management institutional and policy framework in the education sector

The objectives of this priority area are to formulate and implement various policies, guidelines, and ministerial directives to improve earthquake safety and disaster preparedness in schools; and to strengthen disaster management institutions within Bhutan's education sector.

Table 4 - Priority Area I

Priority Area I	Outcomes	Baseline	Recommended Interventions	Timeline *	Performance Indicators	Responsible Agencies
Strengthening earthquake safety and disaster management institutional and policy framework in Bhutan's education sector	1.1 Policies, guidelines, ministerial directives supporting earthquake safety and disaster management in schools are in place	- School Disaster Management Planning guidelines drafted and disseminated in 2008 - School Disaster Management plan part of school performance assessment since 2010 - Facilitators' guide for Workshop on Disaster Preparedness and Response for Safe School developed in 2011 - Information on earthquakes, other hazards and risk reduction incorporated into the non-formal education curriculum	- Review School Disaster Management Planning Guidelines, including budget and monitoring mechanisms - Formulate guidelines to identify and abate hazards from building contents, equipment and furnishings - Adopt safety standards to be observed/maintained in all schools/educational institutions (including tertiary/vocational institutes, special institutes and day care centers) - Issue Ministerial Directives for implementation of school plans, safety standards, disaster management policies and guidelines - Review school and college academic curricula for incorporation of earthquake science, information on other hazards and safety materials	Short Short Medium Short Medium	- School Disaster Management Planning guidelines reviewed and adopted; all schools have functional plans - Guidelines to identify and abate hazards from building contents, equipment and furnishings adopted and implemented in schools	***Lead**: Department of School Education, Ministry of Education* ***Supporting Agencies:*** 1. *Policy and Planning Division, Ministry of Education* 2. *Department of Curriculum, Ministry of Education* 3. *Royal University of Bhutan* 4. *Department of Disaster Management, Ministry of Home and Cultural Affairs* 5. *Gross National Happiness Commission* 6. *Dzongkhag/ Thromde Administrations*
	1.2 Strengthen Disaster Management institutions within the education sector	- Disaster management unit mandated to be formed in the Ministry of Education - School disaster management committees and teams formed as per guidelines	- Appoint/ Identify disaster management focal persons in all schools - Strengthen disaster management unit in the Ministry of Education - Monitor, review and support formation of disaster management committees and teams in schools - Encourage formation of disaster management clubs in schools	Short Short & Medium Short Short		***Lead:** Department of School Education, Ministry of Education* ***Supporting Agencies:*** 1.Human Resources Division, Ministry of Education 2. School Principals 3. Department of Disaster Management, Ministry of Home and Cultural Affairs 4. Dzongkhag/ Thromde Administrations

Short (1-5 yrs.), Medium (5-10 yrs.), Long (More than 10 yrs.)

The Department of Disaster Management formed the School Disaster Management Planning Guideline in 2008. Based on this guideline, almost all schools in Bhutan have developed their own School Disaster Management Plans. The Ministry of Education has reviewed the formulation of these plans as part of its performance assessment for schools since 2010.

In addition to these efforts, the Department of Disaster Management has worked with the Ministry of Education to incorporate information on earthquakes and other natural hazards and risk reduction materials in the non-formal education curriculum.

The action plan framework specifies two outcomes and eight key interventions to build upon these earlier actions and further strengthen disaster management institutions and policy framework in the education sector.

Outcome 1.1 – Policies, guidelines, ministerial directives supporting earthquake safety and disaster management in schools in place

a. Review school disaster management planning guidelines, including budget and monitoring mechanisms

Since adoption of the School Disaster Management Planning guidelines in 2008, schools have gained a lot of experience in formulating and implementing their plans. The existing guideline should be reviewed to incorporate these experiences, to foster greater ownership by schools and the Ministry, and to ensure implementation in practice in all schools. The revised guideline should include procedures and guidance for budget requirements to implement the mitigation and preparedness measures in the plan and address tertiary/vocational institutes, special institutes, day care centres, extended classrooms and other such places of learning. The Ministry of Education, in collaboration with the Department of Disaster Management, should institute a procedure for monitoring the formulation and implementation of school disaster management plans.

b. Formulate guidelines to identify and abate hazards, from building contents, equipment and furnishings

Falling hazards cause most injuries during earthquakes. Students and teachers, inside the school buildings, could become injured by objects falling on them. Equal importance should therefore be given to instituting and pursuing the fixing and abating of falling hazards (including the fixing of poor electrical wiring that could lead to fire hazards, etc.) besides structural measures. To support this emphasis on falling hazards, standard guidelines should be formulated, adopted formally and implemented in all schools.

c. Adopt safety standards for the design and construction of all schools/educational institutions to be earthquake-resistant

Schools are densely populated places that function as community nodes during normal times and as evacuation areas during disasters. School buildings should be built to meet higher standards and levels of safety. School buildings have not performed well in previous

earthquakes for many reasons, which include poor workmanship, use of sub-standard building materials, lack of construction quality control, monitoring and supervision, etc. It is therefore crucial that the Ministry of Education adopt and formulate higher safety standards and guidelines for school construction and plan to address capacity building needs for construction personnel, in order to enforce the new standards.

d. Issue ministerial directives to implement disaster management plans, safety standards, policies and guidelines

The Ministry of Education should issue directives mandating the adoption and implementation of safety and disaster management related guidelines, standard and policies in all schools, day care centres, special institutes, tertiary/vocations institutes, etc. with fixed timelines.

Outcome 1.2 – Disaster management institutions within the education sector strengthened

a. Appoint/ Identify disaster management focal persons

All schools have school disaster management plans and a disaster management focal person. However, focal persons keep changing, making it difficult for them to provide and sustain capacity development and facilitate disaster management activities in schools. Formally designating focal persons would support facilitation and coordination of disaster management related activities in schools and help to ensure that capacity building activities are sustainable.

b. Strengthen disaster management unit in the Ministry of Education

The School Liaison and Coordination Division holds responsibility for coordinating disaster management activities within the education sector. The division presently has one dedicated official working on disaster management. Considering the number of schools and the important role of the Ministry of Education, it would be advantageous to establish a small disaster management functional unit. The unit should work with a multi-sector disaster management committee and report to the Secretary, Ministry of Education to ensure that it is integrated and to facilitate mainstreaming of risk reduction measures into the Ministry's plans and programs.

c. Form school disaster management committees and teams

Per the school disaster management planning guidelines, all schools are required to form school disaster management committees that are responsible for emergency planning for the school, as well as for developing and implementing preparedness, response and recovery measures for the school in coordination with local authorities. However, in most schools, institutional preparedness for disaster management exists only on paper, with most of the work being conducted by one focal person or the Principals. There is a need for schools to form the school committees with representation not only from teachers but also from parents and

students. The committee members should be responsible for providing direction, decision-making and coordinating with the Dzongkhag, Ministry and other agencies. The committees should also direct formation of the various school teams, as required.

d. Encourage formation of disaster management clubs in schools

Schools have various clubs that help to increase awareness and capacities related to various subjects. Disaster Management Clubs should be formed in schools to increase awareness about risks from natural hazards, to promote student involvement in risk reduction activities, and to enhance the preparedness level of students and their families.

Table 5 – Priority I – Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
1.1 Policy guidelines and ministerial directives supporting earthquake safety and disaster management in schools in place	a. Review planning guidelines, including budgetary and monetary mechanisms	1. Stakeholder meeting to compile and analyze lessons learned
		2. Review of guidelines and incorporation of lessons, financial mechanisms
		3. Set up of formal monitoring mechanisms
	b. Formulate guidelines to identify and abate hazards from building contents, equipment and furnishings	1. Assessment of falling hazards in pilot schools
		2. Formulation of standard guidelines for identification and abatement of falling hazards
		3. Dissemination of guidelines to all schools
	c. Adopt safety standards to be observed and maintained in the design and construction of all schools/educational institutions	1. Review of needs, gaps, current standards, etc.
		2. Stakeholder consultations
		3. Formulation of, and agreement on, safety standards
		4. Dissemination to all schools/ educational facilities
	d. Issue ministerial directives for implementation of plans, standards, policies and guidelines	1. Stocktaking of activities and requirements for formal directives
		2. Dissemination to all schools/ education facilities
1.2 Disaster management institutions within the education sector strengthened	a. Appoint/identify disaster management focal person in all schools	1. Terms of Reference finalized
		2. Ministerial directives
	b. Strengthen the disaster management unit in the Ministry of Education	1. Assessment of human resource needs, detailing of responsibilities, etc.
		2. Discussion and submission to Royal Civil Service Commission
	c. Form school disaster management committees	1. Terms of Reference, per guidelines
		2. Ministerial directives
	d. Establishment of disaster management club in schools	1. Establishment of need and rationale for disaster management club in schools
		2. Identification of Club activities, materials, resources etc.
		3. Ministerial directives

Priority Area II– Education and Awareness

The objective of this priority area is to enhance knowledge and to share information related to earthquake safety and emergency preparedness in and among schools, and to increase

awareness and education about earthquakes, other natural hazards and the importance of preparedness and risk reduction in schools and communities.

Table 6– Priority Area II

Priority Area II	Outcomes	Baseline	Recommended Interventions	Timeline	Performance Indicators	Responsible Agencies
Education and Awareness	2.1 Enhanced knowledge and information sharing management system created	- Knowledge and information shared through past and ongoing trainings programmes	- Form a knowledge sharing network among schools for earthquake science, engineering, risk reduction and safety - Share information with communities	Medium Short	- Mechanism for information sharing developed - No. of knowledge sharing activities - No. of community campaigns, etc.	***Lead**: Department of School Education, Ministry of Education* ***Supporting Agencies:*** 1. *Policy and Planning Division, Ministry of Education* 2. *Dzongkhag Education Officers* 3. *School Principals* 4. *Department of Disaster Management, Ministry of Home and Cultural Affairs*
	2.2 Awareness and Education increased	- Workshop on disaster preparedness and response for safe schools conducted in 19Dzongkhags - International Day for Disaster Reduction observed since 2008 - Existing information and education materials - School safety day observed in few schools since 2012	- Conduct awareness activities on a prioritized basis, including youth programs, awareness through media and media management - Observe International Day for Disaster Reduction (or commemoration of past earthquake events) and carry out an earthquake drill in all schools as a National event - Develop information and education materials (Risk Communication, Dos and Don'ts, hazard specific, family preparedness etc.) - Incorporate safety information on earthquakes and other hazards in school curricula and teacher training institute curricula - Carry out awareness on Family Preparedness for all school/ education staff	Ongoing Ongoing Ongoing Medium Short	- Increased awareness of disaster management among teachers and students - Development of a comprehensive awareness strategy for education sector - No. of awareness activities carried out at various levels - Information and education materials formulated and disseminated in all schools - Risk reduction materials incorporated in school and teacher training curricula - All school /education staff with family disaster management plans	***Lead**: Department of School Education, Ministry of Education* ***Supporting Agencies:*** 1. *Policy and Planning Division, Ministry of Education* 2. *Department of Curriculum, Ministry of Education* 3. *Royal University of Bhutan* 4. *Dzongkhag Administrations* 5. *Dzongkhag Education officers* 6. *School Principals* 7. *Department of Disaster Management, Ministry of Home and Cultural Affairs*

Outcome 2.1 – Enhanced knowledge and information sharing management

a. Form a knowledge sharing network among schools

Forming a network for disaster management focal persons and school disaster management committees would enable sharing of knowledge, experiences and joint implementation of activities and programs. A website would serve as a virtual platform for interested education personnel to access related information, discuss common issues and challenges, and foster solidarity and motivation.

b. Share information with communities

Schools can play an important role in informing and educating and spreading awareness about natural hazards and the need for risk reduction and preparedness in their immediate communities/neighborhoods. Schools can undertake awareness campaigns, as well as preparedness and risk reduction programs, especially through school awareness teams and school disaster management clubs.

Outcome 2.2 – Increased awareness and education

a. Conduct awareness activities

There is a need to conduct awareness activities and programs, including youth programs and awareness programs disseminated through local media channels, on a prioritized basis. Awareness programs and activities should be tailored to specific audiences, such as decision-makers, school disaster management committees, focal persons, teachers, students, etc. A key priority is to educate and raise awareness about earthquake safety and disaster preparedness for children with special needs and for day care centres.

b. Observe International Day for Disaster Reduction

Bhutan has observed the International Day for Disaster Reduction since 2008, with celebrations in different Dzongkhags, involving a few schools at a time. In addition to observing this day, Bhutan should also mark the anniversary of past earthquake events that have affected the country; these are significant days on which to share earthquake safety and risk reduction messages. Observing these days would allow schools to reflect on their safety and level of preparedness. In addition, all schools across Bhutan should conduct a national earthquake drill, or "shakeout" awareness-raising event, along with other awareness activities.

c. Develop awareness materials

Easy-to-use and -understand educational materials should be developed for the disaster management committees, teams, focal persons, school disaster management clubs, teachers,

special needs children, young children, and youth. These materials should provide basic information on various hazards, dos and don'ts, family preparedness, risk information including maps showing hazard zone areas (for glacial lake outburst floods, areas at high risk of flood inundation or landslides, etc.) and other relevant topics.

d. Incorporate safety information on earthquakes and other hazards in school curricula and teacher training institute curricula

Incorporating grade-appropriate material on earthquake science, information on other natural hazards and on disaster risk management issues into school and academic curricula will help to create a culture of preparedness and resilience. This represents a long-term investment in risk mitigation. The curricula of relevant vocational institutes like the College of Science and Technology and other higher tertiary institutes should also incorporate appropriate information on natural hazards and methods to mitigate risk and improve resilience.

e. Raise awareness on family preparedness

School management and teachers are responsible for ensuring the safety of their school's children. To fulfill this responsibility, both school personnel and their families need to be prepared for natural hazard events and emergencies. Schools must place a high priority on sensitizing staff on the need for family preparedness. Such programs help school personnel and their family members to fulfill their responsibilities to the school during emergencies, help to change attitudes, and help families to prepare their own emergency plans.

Table 7 – Priority II – Outcomes, Activities and Sub- activities

Outcome	Activity	Sub-Activity
2.1 Enhanced knowledge and information sharing management	a. Develop knowledge sharing network among schools	1. Development of suitable information technology platform and other coordination mechanism
		2. Knowledge and experience sharing activities (quiz, exhibitions, news letters, etc.)
	b. Share information with communities	1. Community based awareness activities by schools (dramas/ concerts, street plays, awareness materials, etc.)
		2. "Families for disaster management" program
		3. Dissemination of the school plan
2.2 Increased awareness and education	a. Conduct awareness activities	1. Needs assessment and planning activities per target audience
		2. Implementation of activities
	b. Observe International Day for Disaster Reduction and past earthquake events	1. Participation in National Shakeout
		2. Remembrance of past events and other awareness activities
	c. Incorporate earthquake science and awareness materials on other hazards and risk reduction in school curricula and in teacher training institutes	1. Review of existing curricula
		2. Formulation of appropriate materials
		3. Capacity building
		4. Incorporation into curricula

	d. Raise awareness on family preparedness	1. Formulation of materials
		2. Sensitization programs

Priority Area III – Risk Reduction and Mitigation

The objectives of this priority area are to reduce loss of lives and property damage in the event of an earthquake or other natural hazard event. Specific risk reduction and mitigation measures differ, depending on the hazard. For earthquakes, risk reduction and mitigation involve ensuring that school buildings are structurally sound, located on stable ground and able to withstand the expected level of earthquake shaking, and that furnishings, decorative finishes and parts of the building are anchored or braced to prevent them from falling onto students. For glacial lake outburst floods, risk reduction measures might include shifting schools outside of high risk zones and lowering the water level in dangerous glacial lakes upriver from schools in low-lying areas. The table below focuses on risk reduction and mitigation measures for earthquakes, but similar measures can and should be delineated for the other hazards that Bhutan's schools face.

Table 8 - Priority Area III

Priority Area III	Outcomes	Baseline	Recommended Interventions	Timeline	Performance Indicators	Responsible Agencies
Risk Reduction and Mitigation	3.1 Structural measures implemented	- Vulnerability assessment checklist training conducted for more than 75 participants in 2012 - Existing School Planning and Building Division's designs include earthquake resilient features	**New Construction:** - Prepare standard earthquake-resilient school designs - Review existing guidelines for school construction and incorporate risk reduction concerns, including identification of sites outside of hazard zones - Institute quality control and monitoring mechanism for construction materials and adherence to standards and designs **Existing Buildings:** - Conduct vulnerability / safety assessment of existing school buildings - Cary out recommendations for replacement or repair/retrofit of existing buildings	Short to Medium Short to Medium Short to Medium Short to Medium Medium to Long	- All new schools constructed per earthquake resilient design - Schools constructed per guidelines outside of hazard zones - Quality and standards of all new constructions ensured - All schools assessed and strengthened accordingly	***Lead:*** *School Planning and Building Division, Ministry of Education* ***Supporting agencies:*** 1. *Department of School Education, Ministry of Education* 2. *School Principals* 3. *Dzongkhag Administrations* 4. *Dzongkhag Engineers* 5. *Department of Disaster Management, Ministry of Home and Cultural Affairs* 6. *Ministry of Works and Human Settlement*
	2.3 Falling hazards	- All Dzongkhag Education Officers	- Explore and institute insurance coverage for school	Medium to Long	- School buildings	***Lead:*** *Department of School*

	are abated and insurance coverage in place	and selected principals trained on falling hazards and preparedness measures in 2010 - Facilitators' guide for Workshop on Disaster Preparedness and Response for Safe School includes component on fixing and bracing of falling hazards - Anchoring and bracing of falling hazards carried out in pilot schools	buildings - Carry out fixing, bracing and other non-structural measures in all schools (e.g. electrification, proper use of electrical appliances etc.)	Short to Medium	insured on a prioritized basis - Falling hazards in schools are identified and abated	*Education, Ministry of Education* ***Supporting Agencies:*** 1. *Royal Insurance Corporation and other insurance companies* 2. *School Principals* 3. *Dzongkhag Education Officers* 4. *Department of Disaster Management* 5. *Ministry of Finance*

Outcome 3.1 – Structural Measures

For New Construction

a. Prepare standards for earthquake-resilient school designs

School buildings house children and teachers, serve as important community nodes and can function as safe emergency shelter during disasters. For all of these reasons, it is vital to prepare and maintain higher performance standards for school buildings, especially with regard to earthquake safety.

b. Review existing guidelines for school construction

Existing school construction guidelines and procedures should reflect the higher standards of construction that are now in place, and should ensure that potential natural hazards are considered at all levels. Consideration should include building schools outside identified hazard zones (e.g., glacial lake outburst flood red zone areas, flood zones or landslide prone areas).

c. Institute quality control and monitoring mechanisms

Past assessments and experiences from previous earthquake events illustrate the importance of ensuring *quality*- materials, workmanship, construction per the design drawings- during actual construction. It is therefore very important to institute a quality control and monitoring mechanism for the construction of school buildings.

Existing Construction

d. Conduct Vulnerability/ safety assessment of existing schools buildings

There are many old school buildings across Bhutan; in the 2009 and 2011 earthquakes, older and community-built buildings suffered more damage than did other buildings. It is therefore essential to assess the earthquake vulnerability of existing school buildings, to develop a clear understanding of the level of risk and the possibilities for strengthening or replacing structures in order to reduce and mitigate that risk. The vulnerability assessment should also indicate the school's exposure to floods, wildfires, landslides and glacial lake outburst floods, to help identify cases in which the site itself is unsafe, and the school may need to be relocated.

e. Carry out recommended measures

Vulnerability and safety assessment recommendations for strengthening, replacing, or relocating old school buildings should be carried out in a prioritized and phased manner.

Outcome 3.2 – Falling hazards abated and insurance coverage in place

a. Explore and institute insurance coverage for school buildings

Insuring school buildings (on a prioritized/selective basis) can ensure transfer of risk and a way to fund recovery and reconstruction activities, if required. Insurance can also be a way of ensuring and encouraging buildings to be constructed per design.

b. Carry out fixing, bracing and other non-structural measures in all schools

In most earthquakes, falling objects inside and immediately outside of buildings cause more injuries than structural damage does. Simple measures that keep objects from falling during earthquakes can prevent most of these injuries. The Ministry of Education should formulate guidelines for fixing and abating falling and other non-structural hazards (including electrification and fire hazards), train appropriate personnel and implement required measures.

Table 9 - Priority III - Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
3.1 Structural Measures Implemented	a. Prepare standards for earthquake-resilient school designs	1. Review of existing designs and gaps
		2. Inclusion of non-structural elements (fixtures, ceilings, partitions, equipment, etc.)
		3. Formulation and dissemination of enhanced standards and designs
	b. Review existing guidelines for school construction and incorporate risk reduction concerns	1. Review of existing guidelines
		2. Inclusion of seismic considerations, site assessment and other safety concerns
		3. Updating and dissemination of guidelines

	c. Institute quality control and monitoring mechanisms	1. Review of existing monitoring mechanisms
		2. Formulation and mandating of quality control and monitoring mechanisms
	d. Conduct vulnerability/safety assessment of old school buildings	1. Formulation of vulnerability assessment checklists/ guidelines
		2. Training of engineers/assessors
		3. Consolidation of assessment report and presentation to decision makers
	e. Implement recommended measures	1. Prioritized recommendations and plan implementation
		2. Implementation of measures in phased manner
3.2 Falling hazards abated and insurance coverage in place	a. Explore and institute risk transfer mechanisms for school buildings	1. Exploration of risk transfer and insurance options
		2. Mechanisms in place
	b. Carry out fixing, bracing and other non-structural measures in all schools	1. Formulation and adoption of guidelines for fixing and bracing and carrying out non-structural measures in schools
		2. Dissemination and training of maintenance and other staff
		3. Implementation measures

Priority Area IV – Preparedness and Response

The objectives of this priority area are to strengthen planning for preparedness and to enhance natural disaster response capacities.

Table 10 - Priority Area IV

Priority Area IV	Outcomes	Baseline	Recommended Interventions	Timeline	Performance Indicators	Responsible Agencies
Preparedness and response	4.1 Preparedness planning strengthened	- School disaster management plans in place for all schools - Awareness on preparedness planning and need to enhance preparedness initiated through past and ongoing training programs	- Develop guidelines for disaster management and contingency plan for the education sector - Carry out table top/simulation exercises for the contingency requirements and arrangements - Develop education sector contingency plan - Sensitize all departments, divisions, agencies in the education sector and all education sector personnel at national and local level on plan and contingency arrangements	Short Short Short to Medium Short to Medium	- Functional education sector contingency plan in place - All schools, Dzongkhags, education sector agencies aware of the contingency plan	***Lead:*** *Department of School Education, Ministry of Education* ***Supporting agencies:*** 1. *All Departments, Ministry of Education* 2. *Dzongkhag Education Officers* 3. *School Principals* 4. *Other agencies working in the education sector* 5. *Department of Disaster Management*

	4.2 Response capacities strengthened	- Basic disaster risk reduction and search & rescue training for 200 Scout masters conducted in 2012 - Education in emergency trainings conducted in 19 Dzongkhags - Distribution of standard safety materials to 128 pilot schools	- Establish clear chain of command and communication flow - Maintain stockpile of materials required for emergency response and recovery - Establish/institute pre-arrangements for emergency requirements - Standardize equipment/ materials requirements at school, local government and national level - Continue delivery of workshop on disaster preparedness and response for safe schools and conduct refresher/additional courses and targeted courses as required	Short Medium Short to Medium Short to Medium Ongoing	- An effective communication and command system in place for emergencies - Stockpile of emergency materials and pre-arrangements in place and pre-positioned for effective response and recovery - Schools equipped with basic disaster management equipment and materials	**Lead:** Department of School Education, Ministry of Education **Supporting Agencies:** 1. School Principals 2. Dzongkhag Administrations 3. Dzongkhag Education Officers 4. Department of Disaster Management

Outcome 4.1 – Preparedness planning strengthened

a. Guidelines for disaster management contingency plan for Education sector developed

As a very important sector, Education should develop a comprehensive emergency response and contingency plan that would specify emergency arrangements, emergency communication protocols, and responsibilities. This contingency plan would also provide the necessary guidance for school level emergency planning.

b. Conduct table top/simulation exercises for contingency requirements and arrangements.

A number of simulation/table top exercises should be conducted at various levels, to help formulate the education sector emergency response and contingency plan and to test the emergency arrangements being put into place.

c. Sensitize all departments, divisions, agencies on the contingency arrangements

Once the emergency response and contingency plan is formulated and the emergency arrangements and procedures are put into place, all departments, divisions, agencies at various levels should be sensitized on the plan, arrangements, and their specific responsibilities.

Outcome 4.2 – Response and immediate recovery capacities strengthened

a. Establish clear chain of command and communication flow

Formulating and instituting a clear chain of command and information flow during emergencies will facilitate effective response. A clear communication flow should be established between all levels.

b. Maintain stockpile of materials required

Effective emergency preparedness and response require maintaining a stockpile of emergency materials at various levels. Materials that should be stockpiled include basic emergency response materials (first aid kits, fire extinguishers etc.)at the schools level, and emergency recovery materials (CGI sheets, tarpaulin, education materials etc.) at Dzongkhag or regional levels, to ensure swift recovery and resumption of school function at the earliest possible time.

c. Establish/ institute pre-arrangements for emergency requirements

Effective emergency management requires that the necessary arrangements be put into place well in advance. Per the education sector contingency plan, pre-arrangements and procedures (related to command and control, manpower, communications, and transportation, for response and immediate recovery among others) should be instituted and tested regularly.

d. Standardize equipment/materials requirements at all levels

Disaster response and immediate recovery equipment and materials for the education sector should be standardized at the school, Dzongkhag/region, and national levels.

e. Continue ongoing training programs and institute other emergency and response management trainings

Safe School Initiative, Education in Emergency campaigns, and the workshop for disaster preparedness and response for safe schools are a few of the ongoing training programs that the Department of Disaster Management and the Ministry of Education carry out, in collaboration with various agencies. So far training programs have provided sensitization to district education officers and teachers on various natural hazards in Bhutan, underlying vulnerabilities and risks, and the need for the education sector to reduce risks and be prepared. ; The training programs also facilitated the formulation of school disaster management plans and conducted mock drills in pilot schools. Refresher training programs and programs tailored to target audiences such as principals, disaster management teams, focal persons, etc. could reinforce and expand existing training agendas.

Table 11 - Priority IV - Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
4.1 Preparedness planning strengthened	a. Develop education sector guidelines for contingency disaster management planning	1. Formation of core group to identify scope, objectives, outline
		2. Discussion at various levels and with various stakeholders
		3. Formulation of guidelines
	b. Conduct table top/ simulation exercises and develop education sector contingency plan	1. Development/design of scenarios
		2. Table top and simulation exercises conducted at various levels. Standard procedures developed
		3. Formulation of contingency plan
	c. Sensitize all departments, agencies on contingency arrangements	1. Dissemination of contingency plan and guidelines
		2. Sensitization at all levels
4.2 Response capacities strengthened	a. Establish clear chain of command and communication flow	1. Identification of need and gaps
		2. Formulation of standard communication procedures at various levels
	b. Maintain stockpile of materials required	1. Identification and standardization of materials required to be stockpiled for response and immediate recovery
		2. Stockpiling on prioritized basis
	c. Establish/ institute pre-arrangements for emergency requirements	1. Identification of gaps and requirements
		2. Discussion and formulation of pre-arrangements to be put in place
		3. Pre-arrangements established as required

Priority V – Capacity Building

The education sector must develop human and material capacities at various levels, in order to reduce risk and increase preparedness. Carrying out a capacity needs assessment and implementing capacity building programs to build technical, managerial and emergency skills on a prioritized basis, will help the sector to implement risk reduction and action plan priorities effectively.

Table 12 - Priority Area V

Safe Schools – Action Plan (2013 – 2023)						
Priority AreaV	**Outcomes**	**Baseline**	**Recommended Interventions**	**Timeline**	**Performance Indicators**	**Responsible Agencies**
Capacity building	5.1 Capacity building for risk reduction	- Vulnerability assessment forms training conducted for more than 75 engineers in 2012	- Build capacity of engineers and maintenance staff to assess building for vulnerability and safety of school buildings	Short to Medium	- Engineers/ technical personnel trained in the use of vulnerability assessment tools and procedures and equipped with capacity to retrofit/strengthen existing school	***Lead:*** *School Planning and Building division, Ministry of Education* ***Supporting Agencies:*** *1. Department of School Education,*
			- Build capacity of engineers and architects for retrofitting and seismic risk reduction techniques for buildings	Medium to Long		

			- Conduct comprehensive training on how to abate falling hazards - Raise awareness and capacity of policy and planning personnel and other relevant Ministry of Education personnel on mainstreaming earthquake safety and risk reduction concerns	Short Short, Medium	buildings School personnel, especially maintenance staff, trained in carrying out non-structural measures	*Ministry of Education* 2. *School Principals* 3. *District engineers* 4. *Dzongkhag Administrations* 5. *Department of Disaster Management, Ministry of Home and Cultural Affairs* 6. *Ministry of Works and Human Settlement*
	5.2 Capacity building for preparedness and response	Workshop on Disaster Preparedness and Response for Safe Schools conducted in 16 Dzongkhags (includes Mock Drill, EIE, first aid and fire safety) Basic disaster risk reduction and Search and Rescue training for Scout masters	- Provide Emergency Management training for Education. Personnel (Disaster Management Unit, Dzongkhag Education personnel, Principals, School Disaster Management Committee, Focal persons) - Train School Disaster Management Teams, Principals, focal persons in conducting mock drills, Search and Rescue, First Aid, emergency logistics psycho-social/trauma care, fire safety and other capacity requirements - Develop and deliver comprehensive disaster management training developed for Scouts/ youth volunteer groups	Short to Medium Ongoing Medium	- Ministry and education personnel equipped with knowledge on emergency management - School disaster management teams and focal persons have enhanced capacity in carrying out their responsibilities - Scouts/ youth groups trained in disaster risk reduction and emergency skills and have ability to aid in immediate response	***Lead:*** *Department of School Education, Ministry of Education* ***Supporting Agencies:*** 1. *School Principals* 2. *Department of Youth and Sports, Ministry of Education* 3. *Department of Disaster Management, Ministry of Home and Cultural Affairs*

Outcome 5.1 – Capacity building for risk reduction strengthened

a. Build capacity of engineers and maintain staff to assess vulnerability/ safety of school buildings

Bhutan has 553 schools today (not including day care centres, extended classrooms, and special institutes). It is very important to assess the safety of the old and community-built schools, which proved to be more vulnerable than other schools in previous earthquake events. The Ministry of Education should invest to formulate tools to carry out vulnerability and safety assessments of school buildings and train engineers to use it.

b. Build capacity of engineers and architects for retrofitting and seismic risk reduction techniques

Engineers should receive training in retrofitting and seismic risk reduction techniques so that, after conducting vulnerability and safety assessments, they are able to provide recommendations on how to replace or strengthen school buildings.

c. Conduct comprehensive training on how to reduce hazards from falling objects

School maintenance staff or other relevant personnel should receive training on an urgent basis on how to fix or brace objects that can fall during earthquake shaking, and on other non-structural hazards, such as poor electrification that could lead to fire hazards.

d. Raise awareness and capacity on mainstreaming earthquake safety and risk reduction concerns

Both the National Disaster Risk Management Framework and the Bill require Ministries and Agencies to mainstream disaster management risks and concerns into their plans and programs. The 11th Five Year Planning Guidelines identify "mainstreaming disaster resilience" as one of 16 National Key Result Areas and "disaster risk reduction" as a cross cutting theme. It would therefore be important to raise awareness and build capacity of policy, planning and other relevant personnel in the Ministry of Education, in order to enable them to carry out mainstreaming of risk reduction concerns into their plans and programs.

Outcome 5.2 – Capacity building for preparedness and response strengthened

a. Emergency management training for education personnel

Training in emergency management is required for principals, disaster management focal persons, district education officers and other key people in the Ministry of Education.

b. Training of committees, teams, focal persons

School disaster management committee members, the focal persons, and members of the various school teams should receive appropriate sensitization and skills development training. Trainings would include emergency fist aid, search and rescue techniques, trauma management, and fire-fighting techniques.

c. Comprehensive disaster management training for scouts and youth volunteers

There are morethan18,000 scouts registered with the Bhutan Scouts Association, and thousands of youth are graduating from schools and colleges in Bhutan every year. It would be worthwhile to harness their potential and to provide them with a comprehensive disaster

management and first responder training. Scouts and youth volunteers could help to spread the message of risk reduction and prove an immense support to communities during emergencies. They could also assist emergency agencies and first responders in delivering effective response and relief.

Table 13 - Priority V - Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
5.1 Capacity building for risk reduction strengthened	a. Build capacity of engineers and maintenance staff to assess building vulnerability and safety	1. Formulation of tools. Training of engineers and assessors
		2. Planning and resource provision for actual assessment
		3. Related skill enhancement and mentoring/training programs/ activities
	b. Build capacity of engineers and architects in retrofitting and seismic risk reduction techniques	1. Capacity need and gap assessment
		2. Training and mentoring programs
		3. Pilot projects for skill development
	c. Conduct comprehensive training on fixing and abating of falling hazards	1. Development of guidelines, manual. Training provided
		2. Conduct fixing of falling hazards in pilot schools as a demonstration and skill development project
	d. Raise awareness and capacity of policy and planning and other relevant personnel on mainstreaming risk reduction	1. Awareness and sensitization activities
		2. Facilitation of mainstreaming earthquake safety and risk reduction into Ministry of Education's plans and programs
5.2 Capacity building for preparedness and response strengthened	a. Emergency management training for education personnel	1. Capacity and training needs assessment at various levels – Disaster management unit, District education officers, Principals, School committee and teams
		2. Implement prioritized capacity building plan
	b. Training of committees, teams, principals, focal persons	1. Prioritizing of capacity requirements
		2. Formulation of plan and strategy for school level capacity building
		3. Implementation of prioritized plan
	c. Comprehensive disaster management training for scouts/youth volunteer groups	1. Review of existing scout programs
		2. Assessment of need and opportunities for training scouts and youth volunteer groups in emergency and disaster management
		3. Incorporation into existing scout programs and development of youth volunteer training programs

IV. Implementation, Review and Monitoring Arrangements

Mainstreaming disaster risk reduction is an important theme in the 11th Five Year Plan. As is true for other cross-cutting themes, the Gross National Happiness Commission and the Ministries and Agencies would be required to monitor their progress and achievements in mainstreaming these concerns.

Through the National Action Planning Process, the working groups have succeeded in incorporating their immediate priorities into the upcoming 11th Five Year Plan. However, the plan takes a long-term view (over more than 10 years) and has identified priorities and activities that would extend beyond the 11thFive Year Plan. In addition, as needs and priorities change over time, the plan requires continual review and monitoring.

The Department of School Education should ensure, as the key agency, that the national action plan is reviewed in conjunction with the annual and five yearly plan reviews. The Review Committee, which would be co-chaired by the Department of School Education and the Department of Disaster Management and involve the working group members, would carry out annual reviews of the action plan. The annual review meeting would take stock of the progress made in implementing the action plan, gaps, support and resource requirements and also plan for current priorities to be included in the upcoming annual and five yearly plans.

V. Annexure

Annexure I – School Earthquake Safety Working Group Members

Annexure II – Terms of Reference for the Working Group

Annexure III – Guidance Note on Development of Action Plan

Annexure IV – Second National Stakeholder Workshop Presentations

Annexure V – School Earthquake Safety Action Plan Matrix