

# SAFE SCHOOL FACILITIES AND RELATED COUNTERMEASURES FOR EL SALVADOR

## CONCEPT PROPOSAL

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### I. Background

Disasters have a major impact on children, youth and education systems. Studies of disaster trends and the likely consequences of climate change suggest that each year 175 million children are likely to be affected by natural hazard related disasters alone<sup>1</sup>. In January 2010, some 38,000 students and 1,300 teachers and education personnel<sup>2</sup> died in Haiti. The Ministry of Education offices were destroyed along with 4,000 schools – close to 80 % of educational establishments in the Port-au-Prince area. During the Sichuan earthquake in May 2008, approximately 10,000 students were crushed in their classrooms and more than 7,000 school rooms collapsed.

During the second session of the United Nations International Strategy for Disaster Reduction (UNISDR) Global Platform for Disaster Risk Reduction in June 2009 participating countries expressed commitment to “national assessments of the safety of existing education and health facilities should be undertaken by 2011”. During the third session in 2011 the commitment was reiterated: “By 2015, concrete action plans for safer schools and hospitals should be developed and implemented in all disaster prone countries.



A comprehensive education sector safety contains three overlapping areas of focus: Safe School Facilities, School Disaster Management and Disaster Prevention Education. Each of these involves a significantly different (though sometimes overlapping) set of decision-makers, developers, stakeholders and implementers as well as indicators, activities and actors responsible for implementation. Enveloping these three pillars are education policies and plans at the government level, ideally undertaking systematic analysis of threats to school and system safety and developing policy and plans that address each of these three areas.

Safe School Facilities involves education authorities, architects, geologist, engineers, builders and school community members in safe site selection, design, construction and maintenance (including safe and continuous access to the facility).

Recognizing that school age children spend majority of their waking hours at school, there is always a high possibility that a natural hazard struck while they are at school. Therefore, school facilities need to be protected from disasters as they save life of children and they can also help to work as shelter in post disaster scenario. Safer schools are necessary to prevent lives of children during natural hazards events. The concept of school safety, however, is not limited to

<sup>1</sup> This estimate is based on data from the International Federation of the Red Cross and Red Crescent Societies World Disasters Report 2006. “Legacy of disasters - The impact of climate change on children” Save the Children.

<sup>2</sup> UNESCO HAITI, June 2010.

preventing the collapse of school buildings in disasters, and safety of teachers and students, but rather extends to meet the broader goal “disaster risk management”.

Moreover, resilient schools are effective medium for disseminating disaster risk reduction awareness in the communities, can act as center of learning, can be instrumental in transfer of technology to the communities and have significant role to build disaster resilient communities. The activities like retrofitting of school and new construction with safety measures can spread message to the community of the importance of resilient buildings to reduce disaster impact.

## II. El Salvador Context

Due to its geographical location and geotectonic characteristics, El Salvador is exposed to a variety of natural hazards, including hydro-meteorological and geophysical. El Salvador, along with the rest of Mesoamerica, is one of the most seismically active regions on earth, situated on three tectonic plates. El Salvador is the most densely populated country in Central America and also one of the most disaster-prone in the world. The number of natural disasters in El Salvador dramatically increased during the period of 1997-2007. Disasters are becoming more complicated in El Salvador. A total of 21 events were recorded, representing 53 percent of all natural disasters of the last 100 years. Five events (23 percent) had a geophysical origin, while the remaining 16 (76 percent) were hydro-meteorological.

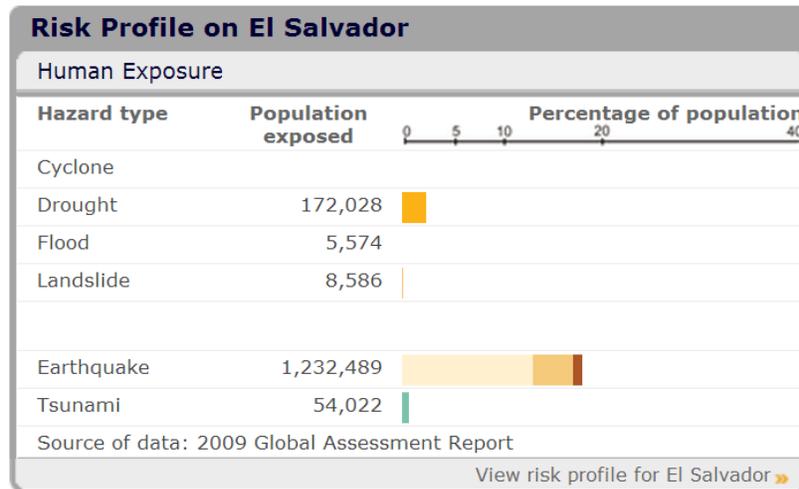
The subduction of the Cocos Tectonic Plate under the Caribbean Plate created the deep Middle America Trench that lies off the coast of El Salvador and generates frequent earthquakes near the coast. The friction of the westward-moving North American Plate against the northern edge of the Caribbean Plate in southern Guatemala is the source of earthquakes in northernmost of El Salvador. During January and February 2001, two large earthquakes struck El Salvador, causing major destruction mainly due to widespread landslides and collapse of non-engineered structures. The 7.7 MW first event occurred on January and the second event on February 13, 6.6 MW affecting more than fifty thousand people, killing around 1100 people, leaving 108,226 homes destroyed and more than 150,000 buildings damaged.

Also, floods and landslides are a huge threat in the hurricane season, because the small, overcrowded country has been virtually stripped of trees. In 2005 Hurricane Stan left behind considerable damage. El Salvador was seriously affected by flooding and landslides that left complete structures collapsed and entire communities under mud. Overflowing rivers left communities without any means of communication. In the same year Stan was not the only disaster to hit El Salvador, the volcanic activity of the Llamatepec volcano also exacerbated the situation.

Disaster Statistics on El Salvador			
Top 5 Natural Disaster reported			
Disaster	Date	Affected	(no. of people)
Earthquake*	2001	1,334,529	
Earthquake*	1986	770,000	
Drought	2001	400,000	
Earthquake*	2001	256,021	
Storm	2009	90,000	

Source of data: OFDA/CRED International Disaster Database  
 Data version: v11.08 \* : Including tsunami  
 Data displayed does not imply national endorsement.

Natural disaster data from El Salvador published on the Prevention-Web website reported 41 natural disaster events for the period 1982 to 2007, with total economic damages estimated at US\$4.57 billion. El Salvador has the second highest economic risk exposure to two or more hazards . According to the Ministry of the Environment and Natural Resources (MARN)'s Division of the National Service of Territorial Studies (D-SNET), economic losses directly linked to catastrophic events during the last 30 years amounted to almost \$US4 billion (equivalent to the total cost of building 33,000 new primary schools).



The importance of each building in natural disasters' point of view is determined based on some parameters, such as functionality, serviceability of the building after a disaster event, and the possible human and economic losses due to a natural disaster. Many schools in El Salvador are vulnerable to natural disasters and are susceptible to severe damages often killing the students and teachers during an earthquake, landslide or any other natural hazards event. In addition to the already existing vulnerable schools, many schools are being constructed without proper compliance to earthquake safety standards.

Public administrations are facing a complex problem and they often need to answer the following questions: what school must be adequate first? Why? What typologies of intervention are necessary? What level of safety is it possible to reach? How much is the cost of retrofitting? How many interventions can be managed with the available resources? How to manage/treat the most critical cases? How to communicate the level of risk to people? These questions point out that the definition of a rational and effective strategy for the mitigation of natural hazards risk implies the necessity to know the level of risk and the criticalities together with the required countermeasures and their costs. All this knowledge permits to carry out an evaluation of the needed economical effort in terms of necessary global financial amount and, consequently, the definition of the practicable strategies for risk mitigation. These problems have been addressed already in other countries, such as Italy in the ASSESS project. This experience and others around the world would facilitate the implementation of this project.

<b>Number of Schools and Students</b>					
	<b>Department</b>	<b>Population (total) (2008)</b>	<b>Population (7-17) (2007)</b>	<b>Schools (2005)</b>	<b>Students (2005)</b>
1	Ahuachapán	377,141	89,409	282	68,846
2	Usulután	464,883	96,344	421	86,521
3	Cabañas	214,150	47,801	244	42,772
4	Cuscatlán	229,260	65,164	195	54,675
5	San Salvador	2,233,696	364,572	891	324,990
6	Santa Ana	606,773	132,178	474	107,980
7	San Vicente	230,205	46,841	212	42,443
8	San Miguel	546,022	115,542	474	103,262
9	Sonsonate	518,522	119,124	322	96,936
10	Chalatenango	274,878	59,149	335	51,334
11	Morazán	181,285	50,768	288	41,480
12	La Unión	372,271	67,652	370	62,469
13	La Paz	318,107	85,853	288	72,343
14	La Libertad	842,624	167,992	448	137,232
<b>Total</b>		<b>6,090,646</b>	<b>1,508,389</b>	<b>5,244</b>	<b>1,293,283</b>

Ministry of Health, El Salvador

[http://www.salud.gob.sv/archivos/pdf/TUBERCULOSIS\\_DOC/Investigaciones/Informe\\_RAIT.pdf](http://www.salud.gob.sv/archivos/pdf/TUBERCULOSIS_DOC/Investigaciones/Informe_RAIT.pdf)



### III. Objectives

- To protect children and education workers from death and injury in schools
- To plan for educational continuity in the face of expected hazards
- To safeguard education sector investments
- To strengthen a disaster resilient citizenry through education and capacity building

### IV. Expected outcomes

- Development of a multi-hazard risk assessment for School Safe Facilities.
- Assessment of school sites and identification of high risk schools for any kind hazard.
- Develop, strengthen, implement and enforce disaster-resilient design and construction codes to assure that every school is a safe school. Including the reduction of non-structural and infrastructural risks from all sources of the building and school facilities, together with the design and interior layout and furnishings safe for survival and evacuation. Disability access in these considerations will be included.

- Definition of specific decision-making supports in order to facilitate public administrators in the management of rational natural hazards risk mitigation strategies.
- Prioritization schema designed for retrofit and replacement (including relocation) of unsafe schools.
- Selection of schools which could be used as temporary community shelters (even if is not recommended), and reinforce their physical capacities to meet these special needs.
- Ensure that access to schools is free from physical risks (pedestrian paths, road and river crossings).
- Ensure that local/national schools count with water and sanitation facilities adapted to potential risks.
- Local and National Public awareness increased in the most urgent countermeasures for reducing the losses of human lives in schools as a consequence of natural hazards.
- Implementation of climate-smart and early warning interventions such as rainwater harvesting, solar panels, renewable energy, school gardens, and alarms.
- Identification and planning of financing and human resources that allow and oversight ongoing facilities maintenance at local level (policy level).
- Capacity building provided to local architects, engineers, geologist, builders and school community members.
- Production of technic guidelines for the assessment of school facilities.

## V. Activities

### *1. Collection, assessment and analysis of already existed data and policy, and identification of gaps.*

1. Assess the multiple risk threatening school facilities in El Salvador
  - 1.1 Identify, review and map already existing, and previous risk assessments (multi-hazard) in El Salvador, including potential disaster loss information.
  - 1.2 Integrate all risk assessments in El Salvador.
  - 1.3 Generate and/or update risk maps for El Salvador by hazards (Seismic, landslide, volcanoes, floods, droughts, hurricanes and tropical cyclones)
  - 1.4 Elaborate a Geo-spatial inventory of schools and a comprehensive school-mapping of El Salvador.
  - 1.5 Combine the multi-hazards risk threatening maps of El Salvador with the comprehensive geo-spatial inventory of schools in El Salvador.
2. Advanced survey, investigation and development of data and maps on:
  - 2.1 Geo-morphology of land
  - 2.2 Typology and characteristics of buildings, and other related classification of buildings, such as Seismic classification.
  - 2.3 others
3. Identify and map national, regional (department) and local organizations mandated to work on DRR – including climate related risks -.
4. Review already existing supporting policies, tools, mechanism and institutional capacities to identify possible synergies, overlaps and gaps.
5. Revise and updated the building code of El Salvador and provide specific guidelines for school facilities and buildings, including structural and non-structural elements, and functionality aspects, in a multi-hazards perspective.

*II. Elaboration of a holistic strategy aiming to guarantee safe school facilities in El Salvador, including the preparation of technical documents for assessing school facilities, characterization, prioritization of intervention, estimation of cost, and certification of schools.*

6. Elaboration of technical guidelines for the multi-hazard assessment of school facilities in El Salvador (site, global structural, local structural, non-structural and functionality).
7. Definition of a congruence index (ratio between the resistance of the structure to a natural hazard –capacity– and the design acceleration –demand–)
8. Elaboration of a characterization list and signs standards related to the vulnerability of the school to natural hazards.
9. Preparation of a prioritization of intervention based in the characterization and standards.
10. Elaboration of a web platform base checklist for the assessment.
11. Identification and valuation of economic costs for different types of intervention.
12. Design of a safe school facility certification based in the characterization and standards.

*III. Capacity building of local engineers, architects, geologist, etc., that will perform assessment of school.*

13. Training of trainers on the technical guidelines, characterization and standards for the multi-hazard assessment of school facilities in El Salvador.
14. Training to the teams that will perform the assessment at the school level.

*IV. Performance of the general assessment of schools, and determination of schools that would need a deeper investigation (assessment).*

15. Elaboration of a plan and a calendar for the implementation of the assessment by geographical localities and number of teams.
16. Implementation of the assessment by university students in the last year of their university career.
17. Selection of schools that will need further and deeper assessment investigation.
18. Implementation of a more detailed assessment to the previous selected schools which will be performed by particular specialists.

*V. Analysis of the assessed information, definition of a strategy for intervention, and intervention.*

19. Analysis of the assessed information and production of school safety certifications (including an individual characterization of the school).
20. Identification and maps of the schools, areas, regions, localities; which will need urgent intervention.
21. Definition of a strategy for intervention.
22. Intervention.

*VI. Evaluation of the Safe School Facilities and Related Countermeasures for El Salvador Project*

23. Establishment of an oversight group in charge of evaluate the project (Internal Audit, Evaluation and Investigation)
24. Development of the internal audit, evaluation and investigation of the project

## VI. Duration

3 Years

## VII. Main Partners

### El Salvador

- Permanent Delegation of El Salvador to UNESCO – (to be discussed)
- Dirección General de Protección Civil, Prevención y Mitigación de Desastres – (to be discussed)
- Ministerio de Salud Publica y Asistencia Social – (to be discussed)
- Universidad del Salvador – (confirmed partner)

### Abroad

- International Institute of Seismology and Earthquake Engineering (IISEE), Japan
- Centro Nacional para la Prevención de Desastres (CENAPRED), México
- Centro de Coordinación para la Prevención de los Desastres Naturales en América Central UNESCO office in San Jose, Costa Rica

## VIII. Potential Donors

- United Nations Trust Fund on Human Security
- European Commission's Humanitarian aid and Civil Protection Directorate General (DIPECHO)
- Japanese International Cooperation Agency (JICA)
- Norwegian Agency for Development Cooperation (NORAD)
- World Bank
- UNDP

## IX. Budget

<i>Collection, assessment and analysis of already existed data and policy, and identification of gaps.</i>	
<i>Elaboration of a holistic strategy aiming to guarantee safe school facilities in El Salvador, including the preparation of technical documents for assessing school facilities, characterization, prioritization of intervention, estimation of cost, and certification of schools.</i>	
<i>Capacity building of local engineers, architects, geologist, etc., that will perform assessment of schools.</i>	
<i>Performance of the general assessment of schools, and determination of schools that would need a deeper investigation (assessment).</i>	
<i>Analysis of the assessed information, definition of a strategy for intervention, and intervention.</i>	
<i>Evaluation of the Safe School Facilities and Related Countermeasures for El Salvador Project</i>	
<b>Supporting Cost (7%)</b>	
<b>TOTAL COST</b>	