RISK MANAGEMENT AND SUSTAINABILITY IN EDUCATIVE SECTOR EXPERIENCE OF BOGOTA, COLOMBIA

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General aspects

Disasters are closed related to unbalances between economical, physical, ecological and social fields; those unbalances increase vulnerability conditions and exposure to different kind of natural, socio natural and anthropogenic hazards. Pressures on natural and built environments are the result of founding and urbanization patterns, population growth, consumption and production models, among other aspects. Also weak development policies in terms of environmental, sectoral and territorial management contribute to urban unsustainability. Educative sector is not outside those systematic social, physical, ecological and economical losses in which a radical effect on the increasing vulnerability conditions have been influenced are clear evidences of unsustainability; making patent human life real conditions in which poverty, inequality and incongruent process of planning and knowledge appropriation and/or recognition of local and global context. In this sense, overcome those contradictions between sustainability, economic growth, and social equality, taking into account community needs, constitutes the main structural axle to advance in the way to more sustainable cities (Murillo, 2004: 653).

Local context

Bogotá is located in eastern mountain branch which belongs to the complex system of Los Andes mountain range. It has an urban area of 300 squared kilometers approximately and a density population of 3.529 per km². The city has the mayor population concentration of Colombia. According to 2005 census estimations from National Statistic Department; 2007 projections are overhead seven millions of inhabitants. The population rate has been increased due to social conflict migrations and because of the economic development that represents work opportunities and services supplies. From the administrative level point of view Bogotá has a central government which is the Bogota Capital District, but also has 20 decentralized prefectures. Bogota´s disaster risk management has been handled by the Directorate of Prevention and Attention of Emergencies that coordinates at least 41 entities that belong to the Distrital System of Prevention and Attention of Emergencies. This Directorate has been in charge of technical and scientific knowledge on disaster risk, risk reduction and emergency response. Bogota is located in moderate seismic zone; in fact has been affected by several earthquakes in 1785, 1826, 1827 and 1917. It is important to take into account that physical vulnerability conditions were dramatically increased since 1950`s decade due to massive migration and due to at least 75% of the city grew in a disordered way and without earthquake resistant standards. Because of the same reasons and due to the bad use of territory there are socio-natural hazards such as floods and landslides. There are more than 450 unstable hill-side zones that have been occupied. In the same way, due to drainage deficiency and river bed overflowing there are flooding zones especially in the South and the East of the city. On the other hand, as a result of several economic activities, that involve transportation, storing, industrial process of hazard materials, chemical substances and fuels, there exist anthropogenic hazards. In Bogota occur approximately 180 structural fires and a few forest fires in the hills of the city every year. Finally, because of the high level of cultural development a lot of mass events such as concerts, sports, festivals and religious celebrations are presented.

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Risk management mainstreaming in the planning process has been implemented in the different development sectors; without doubt these policies have allowed the reduction of accumulated vulnerabilities product of many years without intervention. These efforts constitute important advances in searching the urban sustainability and the educative sector is one of the best examples for showing as an experience that must be reviewed and reply in different contexts.

The educative experience

According to abovementioned vulnerability reduction is fundamental, specially related with seismic hazard. In this sense before to describe the experience of Bogota it is important to review at least a case in which educative sector was affected by this hazard in another national context. Detailed analysis of socio economical effects of a disaster on this sector has not been made; in the best cases ex-post methodologies of physical losses in terms of infrastructure have been applied. That is not the same case with social losses such as how much lose the state for example in terms of its investment in the human capital which is one of the most important social assets.

In Colombia, coffee-growing-area earthquake occurred on the 25th of January of 1999 caused around of 1,185 deaths, 8,500 injure people and the losses were estimated in USD$1.285 (Cuervo, 2002:19). Just in Armenia, one of the most affected cities, 22 schools were destroyed. The event occurred during the school vacations, reason why at least 9,335 students, 3% of population of the city, were not directly affected. The unavoidable question is arisen: ¿which would be the political, institutional, social and economical implications if the students were been inside of these schools?

On the whole, the historical process of schools development is similar all countries of Latin America; most of them had an informal and communitarian origin. Very often, they were located in those lands that nobody wanted to use; but at the same time it is very difficult to convince people about risk in and outside them because community participated in its construction. Nowadays, public investments on education, health, public services and social inclusion are about 66% of the total public budget. In spite of important social policies advances, 17% of population still has unsatisfied social needs. Nevertheless, in the formal education field it is important to take into account that there is coverage of 92,5% from the total school population. This population estimated in 1,650,000 students represents the 25% of the whole city; more than one million are attended and located in 760 public schools and at least preschool and primary education is free. In order to understand how this policy of risk management arose from this sector at the end of 1990's, first of all, it is fundamental to point out that there are a lot previous efforts of public management process as well as scientific, technical and normative developments.

In 1997 Directorate of Prevention and Attention of Emergencies from Bogotá published the Seismic Microzonation of the city which was the result of a technical study performed by Universidad de Los Andes and the national institution son geology, Ingeominas. This study established, among other aspects, seismic design and earthquake resistant parameters in infrastructure. In 1998, a new Seismic Resistant Building Code for Colombia was adopted, NSR 98. One of the most important requirements of this new code was the seismic vulnerability evaluation and rehabilitation of essential buildings. At the same time, the seismic code also pointed out a period of time for doing it; initially the period was of 6 years but since 2001 this time was extended up to 12 years. According to this requirements a study was contracted by Education Secretariat of Bogota in 2000 to identify the structural conditions of the public schools. In that moment, there were 710 schools and most of them were constructed in 1960's without taking in to account earthquake resistant requirements and appropriated learning habitat concepts. This study showed that 434 of these schools had a high seismic vulnerability index, 3 were in flooding areas and 20 were prone to be affected by landslides.

In 2004, with the support of World Bank, the program "Fiscal Vulnerability Reduction to Natural Disasters" was formulated at national level. In the framework of this program the city administration of Bogota promoted the initiative to reduce the seismic vulnerability of the public schools and supported it in the city Council, that constitutes the main administrative authority for financial resources management. The main purposes of this project were emphasized from the perspective of the rights of citizens, particularly on the children's life right and the high quality level of education right for them.

Due to high costs that implied vulnerability reduction and relocation for the whole 434 vulnerable schools, the most critical 201 were declared as a priority. In this sense, the project "Improvement and Structural Reinforcement and Risk Management in Public Schools" were formulated and incorporated in the Development Plan of the city denominated "Bogota without indifference" 2004–2008. The objective of the program was, and still continues, the reinforcement and improvement of schools from an integrated point of view. That is to say, the purpose was not only to complying the earthquake resistant construction requirements for existing buildings but also to organize the educative infrastructure, according to the minimal habitat standards, and to follow the Distrital Master Plan of Educative Equipment (2006-2019). In addition, this program was based on the implementation of a pedagogical strategy to incorporate risk management in the culture. Both structural and non structural objectives were related to get a good, comfortable and safe school environment, high educative service quality and to extend the coverage in the most of cases.

Pedagogy on disaster risk topics were directly taken in to account by Education Secretariat. One of the most important initial actions was related to children risk perception in 20 schools. This survey showed children hazard concepts and how day by day they have to face intentional anthropogenic hazards that become "invisible" natural and socio natural hazards. These findings implied new strategies for a more integrated approach to risk that included the social dimension. Curriculum tools, instruments, methodologies and didactic materials were designed to make easy teachers pedagogic work on cultural vulnerability reduction and therefore on life self-protection (Cardona, 2004). In general, Education Ministry, at national level, is in charge of the standard academic curriculum for preschool, basic and secondary education in the different knowledge areas. Those are organized in structural axels, thematic fields and certain kind of competences or capacities per each grade. In this sense, a second important action developed through Education Secretariat of Bogota was the review and redesign of the curriculum thematic guide on risk and disasters according to the national standards.

This guide was organized both from a theoretical and practical point of view. It was focused taking into account a constructive learning process according to the needs of the context in terms of hazards and vulnerabilities. In this way it constitutes an important methodology and also an instrument to improve teachers work on the incorporation of the topic in the fundamental areas such as Mathematics, Language, Social and Natural Sciences. The pedagogic sequence of the curricular guide content was structured on four basic steps: natural phenomena or event knowledge, identification of human beings actions that become in hazards and it is necessary to avoid, reduce or mitigate and, finally, self-protection and emergency response. Consequently, from preschool up to secondary grades competences in terms of knowledge, aptitudes and attitudes have been identified. Complementary, a self-protection campaign has been implementing from the communication perspective: "Prevention is my tale: Disasters… I do not run risks!" (Prevenir es mi cuento… Desastres… ni de riesgos!). The campaign has supported materials such posters, video clips, a risk calendar, stories and games that help teachers in their cultural work on the topic.

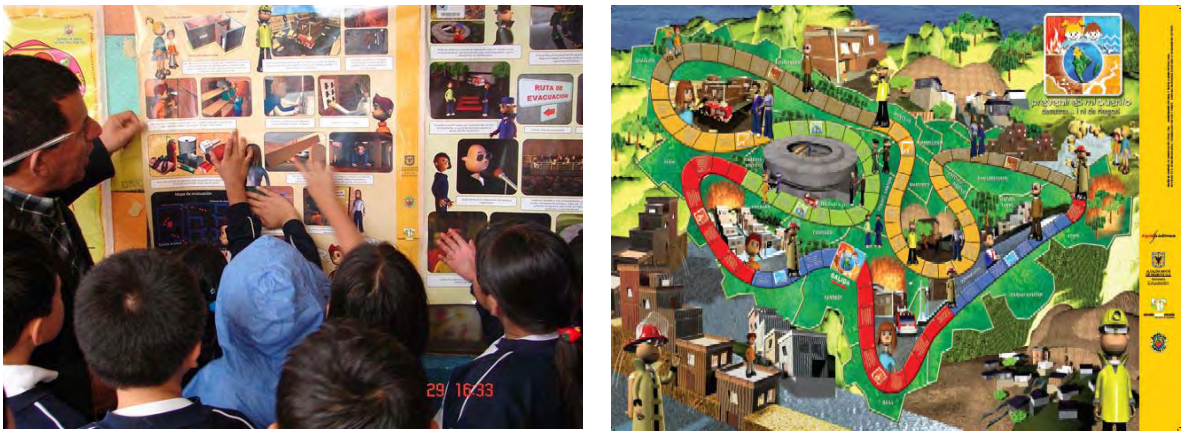

Figure 1. Posters and games for disaster self-protection

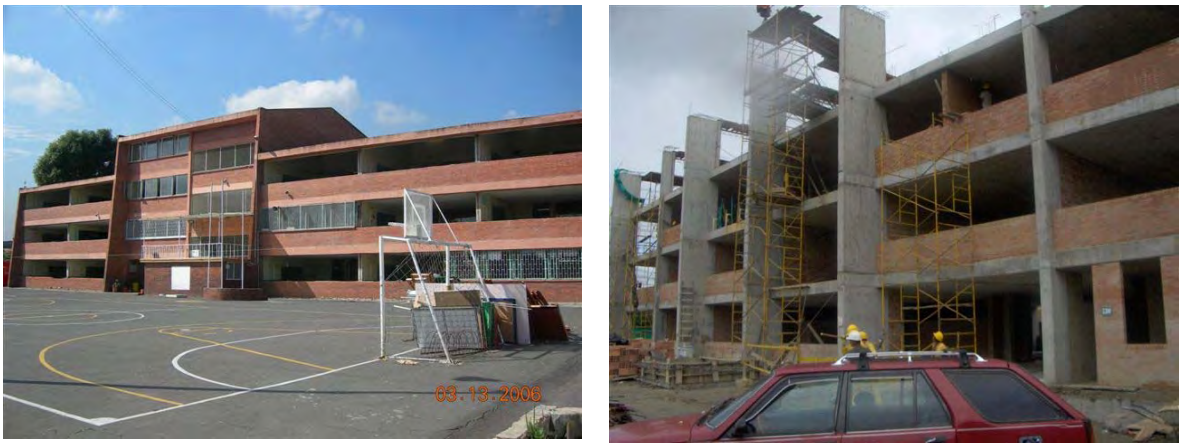

Figure 2. Republic of China school before and after the structural retrofitting

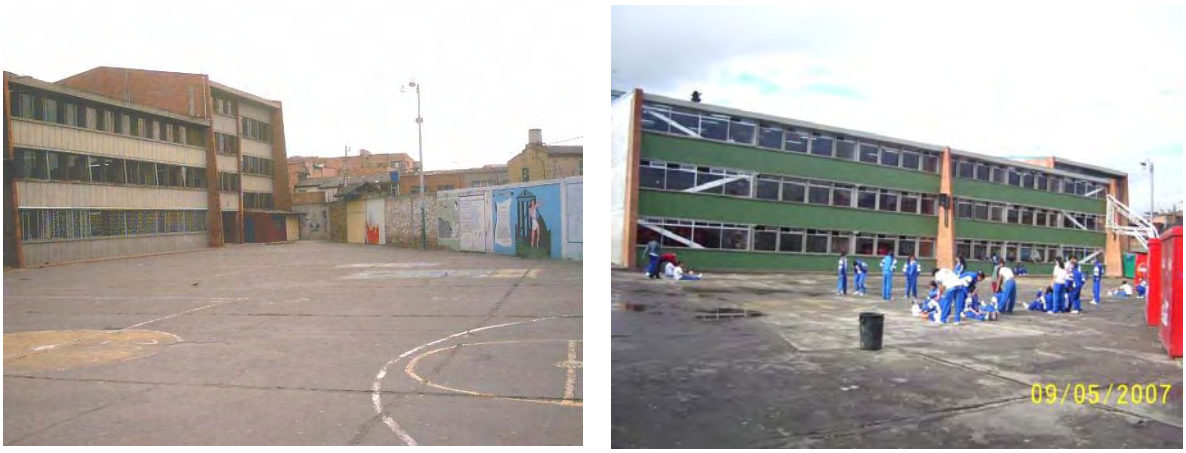

Figure 3. Nuevo Kennedy school before and after the structural retrofitting

Figure 4. Structural reinforcement and other interventions of a school to improve security

Results of the policy

From the financial point of view the investment regarding the structural retrofitting and improvement of the schools has been about Col$ 349.904 million pesos (US$ 162.7 million dollars) and the total beneficiary population has been more than 300,000 students. It is necessary to point out that this previous figure does not include the new 50 mega-schools which have comply the present earthquake resistance requirements and also optimal school habitat conditions. The total amount of both projects is Col$ 998.000 million pesos (US$ 464.2 million dollars)

According to Bogota inventory in 2003 there had 1,430,000 squared meters of school infrastructure. 680,000 squared meters of this infrastructure have been reinforced and in some cases the buildings have been replaced; the general results of the program from engineering point of view are: 172 structural reinforced schools, 326 non structural improved schools, and 54 enlarger schools. On the other hand, 1,045 teachers have been trained on risk and disaster curriculum and on the design and implementation of school risk management plans. 73 schools already have formulated and implemented their internal plan. At least young students of 110 schools have been working on projects on natural and social hazards, 9 schools received financial support for the implementation of these projects. 11,352 children worked through painting the ideas “My school is reinforced and resists earthquakes” and “In my school, I learn about prevention and attention of emergencies”. This idea was advocated mainly by ISDR and UNICEF, among other international agencies, and coordinated by Education Secretariat of Bogota. Finally, a School Risk Management Information

System (SIGERSED) was designed and recently has being tested. The main objective of this system has been to provide real time information on the state of public schools, in terms of general hazards and vulnerabilities that have made their risk analysis, their risk management plans and designed and implemented pedagogic projects. In this sense, a process of pursuit and evaluation is going to be possible.

Conclusions

Direct impacts are relatively clear but there are some others that have being analysed by the author. That is the case of employment, ecological impact, territory reordering and, mainly, how much the state avoids or reduces losses and contributes to urban sustainability. Certainly, this kind of project has no a precedent in Latin America and must be considered not only as a simple case of risk management mainstreaming into a socio-economical development plan. It is a very interesting sectoral experience that involves other aspects related to social and educative vulnerability reduction such as the access, sustainability, security and quality of education. It means that breaches between public and private schools have being reduced in terms of comfort, spatial qualities, area per student, water reserves, sports spaces and physical access for people with disabilities.

This summary attempts to show how important is the real contribution of vulnerability reduction in urban contexts especially in south countries, badly called "third world" and how public management contributes to local sustainability and therefore sustainable cities. These cities must be understood as those human settlements that offer well-being and life quality to its inhabitants through education, health, culture, participation and entering. Thus, educative quality improvement in physical and pedagogical aspects constitutes one of the fundamental structural bases for generation, improvement and preservation of material and non material assets such as social capital, human capital, physical capital and natural capital. Then local sustainability long-dated will contribute to global sustainability which also must be guarantee from other geopolitical context.

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Seismic retrofitting and rehabilitation of schools in Bogota, Colombia From the political will to the political feasibility of a risk management policy

Twenty years ago, as a positive heritage of the Nevado del Ruiz volcanic eruption and Armero disaster, the National System for Disaster Risk Management of Colombia was created. This interinstitutional and multisectoral organization, based on administrative, fiscal and political descentralization, was the framework to think what, who and how to encourage the seismic reinforcement of essential buildings and lifelines as a key activity of disaster risk reduction policy. The financial investment in the last years, close to 460 million dollars of the city administration of Bogota, to improve, rehabilitate, retrofit schools, build new ones, and promote risk management –through awareness, curricula adaptation, preparedness– in elemental and secondary education (see above paper) is the product of the wide involving of urban and socio-economic development local actors and stakeholders; as the political principles of the National System stipulated it from the beginning. Clearly, the decision of a credit with the World Bank of 80 million dollars and the remaining notable budgeting counterpart of the city administration were guided not only by the Mayor's desire to rehabilitate beams, columns and foundations but to give to the children better school habitability and educational quality.

Taking into consideration that disaster risk management is not a discipline, sector or institution, but a strategy of development and quality of life, not only cities as Bogota but also Manizales and other cities of the country are, indeed examples, of the feasibility of disaster risk management; encompassed by clear development public policies of risk perception and analysis, risk reduction, disaster preparedness and management, and risk transfer and financing. Schools but also hospitals, bridges, fire stations, governmental key buildings, to mention a few cases, have been reinforced in those cities to reduce their structural vulnerability. These outstanding outcomes, and not isolated good practice, of the public policy and governance at the local level, with the support, concurrence, complementarity and subsidiarity of national government, signify that disaster risk management it is not an utopia, but it could be a reality in developing and poor countries.

Twenty years ago, to speak about the seismic retrofitting of the essential buildings by some of us was considered an impossible task not affordable, but the comprehensive framework and coherent conceptualization of disaster risk management from the development perspective was the point to departure of the nowadays results. We required, first of all, to strength the interinstitutional and interdisciplinary work by continuing training and public information. We updated our seismic building code to include structural vulnerability intervention requirements. Appropriate evaluation of hazards,

resilience and vulnerability assessments from different perspectives, microzoning, and land use planning were necessary and they implied the law updating. Scenarios of probabilistic losses and environmental social and economic cost-benefit analysis were made to identify effective risk mitigation, transfer and financing measures. Community participation, preparedness and public information were achieved to conclude that risk management is not possible with out the convergence of the scientific and technical knowledge, the administrative political will and the community acceptance and demand for the territorial security.

For people, as the author of this introduction to the case study of Bogota (see above paper), that has had the opportunity to be involved in several of these activities from the beginning of the process, to observe the effectiveness of a good risk management theory and performance is very recompensing. Notwithstanding, it worth to say that the still several safety deficiencies, the development shortcomings to resolve and the guarantee of sustainability are, indeed, remaining challengers for the present and new generations regarding effective disaster risk management performance.

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