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THE ROLE OF EDUCATION IN NATURAL DISASTER RISK REDUCTION[115]

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Abstract: Having in mind that the number of natural disasters is constantly growing, and it produces more serious consequences for the humans and their material goods, it is essential all the preventive measures to be taken in order to reduce the risk of natural disasters to a minimum. In the XXI century, the role of this type of education has become unequivocally clear and recognized. The importance of education for that purpose has been recognized and confirmed at numerous international conventions and conferences, with a clear emphasis that schools, the families and the local communities play a decisive role in reducing the severity of consequences caused by natural disasters, through the process of developing awareness and knowledge of natural disasters.

Considering the importance of education in order to reduce the riscs of disasters, in the paper the role of schools that represent major entities in playing a key role in providing basic information about the natural disasters is explained. Besides the schools, in the developing of the awwareness for the natural disasters a significant role also have the higher education institutions and therefore it is very important of considering the current trends in this field as well as the future development of their role in the education and developing awareness about. Finally, a particular attention is dedicated to the role of the family and the community in this process.

Key words: education, natural disaster, reduction of risk, emergency situations, security.

INTRODUCTION

Natural Disasters are undermining the world development as never before. Only in 2011th , there were 332 natural disasters that is less than the

[115] review scientific paper

average number fot the period from 2001 to 2010th which was 384[116] During 2011 , the natural disaster killed 30,773 people, and the economic losses were the largest since the registration started being estimated at 366.1 billion dollars.[117]

Nearly every day in the newspapers, on radio, on TV and other media we hear reports on natural disasters that affect different parts of the world.[118] For reasons of better understanding of the phenomena, it should be noted that the term disaster comes from the French word, desatre ", which consists of the word, des", meaning bad and 'Astere "meaning star.[119] Thus, the term refers to 'bad or evil star. "The very term, a disaster "has a multiple meanings, and its many-angle (divergent) of the definition of the term exists in the literature as hazards (dangers).[120] There is a widespread debate about its meaning. The etymology of the term disaster refers to a specific threat to the humans and their material goods. Generally speaking, the disasters are adverse events with negative consequences that cannot be overcome without outside help or support resources, including state and national governments, or even other states.[121] One of the earliest definitions was given by Charles Fritz. He defined the disaster as: Event, focused (concentrated) in time and space, which causes heavy losses to the society or some parts of it where its members and material values in which the Society or parts of him threats are endangering the social structures, as well as some of the basic functions of the prevention.[122] Generally speaking, all disasters can be classified in three frame types: natural, disasters that are related (directly or indirectly) to the humans (called also anthropogenic, technological, technical -

[116] Debby, S., Femke, V., Regina, B., Sylvain P.: *Annual Disaster Statictical Review: The numbers and trends*. Brussels, Belgium: Centre for Research on the Epidemiology of Disasters (CRED) Institute of Health and Society (IRSS), 2011.

[117] Edward, B.: *Natural hazards, second edition.* Cambridge: University Press, 2005.

[118] Cvetković, V.: Interventno-spasilačke službe u vanrednim situacijama. Beograd: Zadužbina Andrejević, 2013.

[119] Mijalković, S., Cvetković, V.: Vulnerability of Critical Infrastructure by Natural Disasters. Belgrade, International Scientific Conference, National Critical Infrastructure Protection, Regional Perspective, 2013.

[120] Mesjasz, C.: *Economic vulnerability and economic security*. In Coping with Global Environmental Change, Disasters and Security: Threats, Challenges, Vulnerabilities and Risks (eds H.G. Brauch et al.). New York: Springer, 2011.

[121] Bimal, P.: *Environmental Hazards and Disasters Contexts, Perspectives and Management.Kansas*, State University, Wiley - Blackwell, 2012. godina.

[122] Bimal, P.: *Ibid.*

technological, social) and hybrid (a combination of interaction of natural forces on one and human impact on other side.[123]

According to Daegu, the Natural disasters are the result of the spatial interactions between hazardous environmental processes (i.e., extreme natural events), and the population that is being irritated of such processes. The Natural disasters appears as a result of combination of hazards, vulnerability and insufficient capacity or measures to reduce the probability of the potential risks. A natural disaster occurs when a hazard hits vulnerable populations causing damage, fatalities and disorders. Any hazard - floods, earthquakes or cyclones - representing the activating event with greater vulnerability (inadequate access to resources, the sick and the elderly, lack of awareness, etc.), leads to disaster, causing great loss of life and property. For example, the earthquake in an uninhabited desert cannot be considered a disaster, regardless of its intensity.

The role of education through the past in some way has been ignoring the importance of the need for education in the area of disasters. The reasons are several:[124] disasters have always been considered to be rare events, appearing in many different shapes, bringing a variety of different causes and consequences. These considerations lead to the conclusion that it is almost impossible to standardize the forms of action.

On the other side, the practice has shown that children who are familiar with the phenomenon of natural disasters and how to react in such situations are capable of promptly and properly respond in order to protect themselves and others alerting to potential dangers. One of the classic examples of the power of knowledge and education is the story about the 10-year-old girl from Britain, Tilly Smith, who warned tourists to flee before the tsunami reaches the shore.[125] In this way she has saved more than 100 tourists during the 2004th. She recognized the signs of an approaching tsunami, after a lesson in geography had been introduced to this phenomenon in her school, just a week before she visited Thailand.[126] Also, it is important to remember that the UK is not the country where such

[123] Mlađan, D., Cvetković, V.: Classification of emergency situations. Beograd: Medjunarodni naucni skup ,,Dani Arcibalda Rajsa“, тематски зборник радова међународног значај, organizacije Kriminalisticko-policijske akademije, март 2013. godine.

[124] Lidstone, J.: *Disaster education: Where we are and where we should be.* In: Lidstone, J. (Ed.), International perspectives on teaching about hazards and disasters (p. 3). Philadelphia, USA: Channel View Publications, 1996:34.

[125] Rajib, S., Koichi, S., Yukiko, T.: *Disaster education*. United Kingdom, Emerald Group Publishing, 2011.

[126]UN/ISDR.: *World disaster reduction campaign. Disaster risk reduction begins at school.* Available at http://www.unisdr.org/eng/public_aware/world_camp/2006-2007/pdf/WDRC-2006-2007-English-fullversion.pdf,2006 (Accessed on January 10.04. 2013).

phenomena occurs, and that she had no previous experience, making only the knowledge gained in the classroom contributing for saving many lives.

In addition to the above said, there are also other examples for the importance of knowledge, such as the case of generational transfer of knowledge that has been repeatedly affected the rescue of a large number of lives. During the Indian Ocean tsunami on the coast of Sumatra, which is only 100 km away from the epicenter of the earthquake that caused the tsunami, only a few people were killed by the total number of 83 000 people who were present.[127] However, the inhabitants of Sumatra have had previous experience in 1907. , and this experience has been passed on from generation to generation through songs and poems (e.g. if you feel tremors caused by the earthquake you should immediately move away from the coast). From the given example, we can easily see how the formal and informal education about the natural disasters assists in improving the awareness of individuals, helping them to protect their own and others' lives.

The role of schools

When it comes to risk reduction of natural disasters, we have the right to say that schools are unavoidable entities having an increasingly important role. They play a crucial role in providing basic information on natural disasters in the local community. Sivaki states that the importance of school education about natural disasters has increased rapidly, accounting for the following reasons: children are the most vulnerable categories in the society: They represent the future, the school is a center of education and the results of the educational process are transmitted to their families as well as the Local community; the schools are recognized as centers of culture and education.[128]

Experience has shown that access to quality educational programs on natural disasters is crucial in the child protection and their families. It was also noted that instead of considering women and children as the most vulnerable (victims), they can be recognized as contributors to a recovering community before assuming that they have acquired a solid knowledge about natural disasters and elimination of their consequences. In addition, the women play an important role in the process of education of children and in this respect it is necessary to include the mothers and fathers more extensively in the education process about natural disasters, since they will transfer this knowledge on to their children. Many researchers and officials employed in the respective UN bodies during the consideration of disaster

[127] Degg, M.: Ibid.
[128] Lindstone, J.: *Ibid, str 45.*

risk reduction, emphasied on the Safety of the school buildings and the education about disasters.[129] However, the safety of school buildings is useful for disaster risk reduction within a short period, and the education about natural disasters has much more important role in developing a culture of risk reduction on the long run. Shaw & Kobayashi (2001) emphasize that schools have an important role in increasing the awareness of students, teachers and parents. UNISDR has conducted a campaign based on the observation that children are the most vulnerable populations during natural disasters, starting with the fact that education on disaster risk reduction to a large extent increases the level of awareness in the community also.[130]

Only the education about risks related to natural disasters can be represented through specialized or through the implementation of the elementary teaching programs. Furthermore, such an education can be accomplished through curricular and extra-curricular activities (such as. Various workshops, games, etc.). Although the education of young people for life, health and the environment has its roots in family and preschool education, the school is irreplaceable of achieving that goal. The school is obligated to develop the knowledge, the awareness and the habits in prevention of danger, in fact, in its function it is mandated to provide the knowledge for the man's 'mastery' over the nature, and on the other, the protection from hazards that may befall, also coming from their nature."[131] We cannot escape the catastrophes but we can prevent them by being aware, informed, educated having habits in their prevention and reducing the damage when they happened. During the education we can develop people with sense of responsibility, truthfulness, humanity and justice that in the end is going to result by the people having the ability to protect themselves and the others in such cases. In addition, the education for active and passive protection of self and others,

The role of education in the disaster risk reduction is often directly or indirectly regulated by the state legislation and by the competent strategic documents of the Country. For example, the Law on Emergency Situations of the Republic of Serbia in Section 6 with a title training in Section 119

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[129] Petal, M.: *Education in disaster risk reduction*. In: R. Shaw, R. R. Krishnamurthy (Eds), Disaster management: Global challenges and local solutions (pp. 285–320). India: Universities Press, 2009.

[130]UN/ISDR. (2007). *Building disaster resilient communities. Good practices and lessons learned*. Available at http://www.unisdr.org/eng/abouty/education-good-practices.pdfwww.unisdr.org/eng/abouty/education-good-practices.pdf (Accessed November 17, 04 2013).

[131] Kuroiwa, J. A.: *Peru's national education program for disaster prevention and mitigation (PNEPDPM*). Training and Education for Improving Earthquake Disaster Management in Developing Countries, UNCRD Meeting Report Series, 57, 95–102, 1993.

says that in order to acquire the necessary knowledge in the field of individual and collective protection, the citizens are trained and qualified for prevention and rescue. This provisions are also the case in Macedonia. We are all being submissive to protect and rescue during disasters and catastrophes. It further stipulates that the training is being conducted in the framework of primary and secondary education in order to gain knowledge about the dangers of natural and other disasters and protect them in accordance with specialized legislation and the corresponding programs.[132]

The educational activities that are carried out through the the curricula in schools are effective measures to emphasize the importance of reducing the risk of natural disasters, because working with children, the knowledge is being spread to their families also. Climate change and measurable increase in the number of natural disasters around the world can change that perception, especially because they cause significant damage to the infrastructure, and even represent a threat to national security.

During 2006-2007 UN has conducted a campaign, 'Disaster risk reduction begins at school'. "Both campaigns have emphasized the impact of an integrated education to reduce the risks of natural disasters. UN / ISDR has not only emphasized importance of integrating the risk reduction of natural disasters in the formal education, but at the same time emphasized the importance of engaging the entire community in preventing them. In addition, the school buildings in the provision of education can serve as a temporary asylum within which are consider various prevention topics, as well as the importance of buildings in reducing the risk of natural disaster, and taking into account where the process of education takes place.[133] Lessons from the experience include the following: The education process is very important and could be very effective in the natural disasters risk reduction. At the same time the knowledge, the perception (awareness, performance), the understanding and the activities represent four important steps. The schools and formal education also is playing a very important role in the development of knowledge; the families and the local communities are important to a comprehensive education and awareness of the importance of natural disasters risk reductionIn response to the invitation of the campaign carried out by the UN / ISDR 2006-2007, various international and regional conferences and workshops were held, and the countries have developed action plans that provide implementation of the risk reduction from natural disasters in educational programs, but also deal with issues regarding the

[132] Zakon o vanrednim situacijama Republike Srbije, *Službeni glasnik Republike Srbije*, broj 111/2009.
[133] UN/ISDR.: *World disaster reduction campaign*. Disaster risk reduction begins at school.: Ibid.

school buildings safety in such situations.

The International Conference for school safety, which was held in January (18-20) in 2007, Ahmadabu, India, has recognized the importance of providing education for every child in order to achieve the ultimate goal – living in safety Environment so we could:[134],, having Zero percent mortality rate caused by natural disasters. "To achieve this goal, the priority areas are being established: The Education related to disasters is going to be implemented in schools; The school buildings and the other infrastructure must be resilient to disasters; We must enhance the education of the members of the local community so that it can become more resilient to disasters; making the schools safer."

THE ROLE OF HIGHER EDUCATION INSTITUTIONS

When it comes to education about natural disasters, usually its attention is on the school, the family and on the community. However, we think that the higher education related to natural disasters is crucial, but at the same time underdeveloped in countries around the world. The development of an appropriate higher education related to natural disasters is very important for the countries. Thus, the Council of Europe through its document recommends guidelines for developing appropriate education about natural disasters.

The educational process related to natural disasters refers to multidisciplinary subject of scientific interest.[135] In this context, lessons about the Environment and sustainable development can result in a positive effect on the risk reduction from natural disasters. In order to develop appropriate curricula's in higher education related to natural disasters, significant support can be found within the already stable state higher education system. In reality, higher education about natural disasters is implemented through various departments at universities, ranging from engineering, architecture, agriculture, economics, social sciences.

Therefore, the future development of higher education on natural disasters would be: comprehensive instructional programs (what kind of natural disaster, help, recovery, prevention, mitigation and preparation, all in the context of socio-economic status, technical competence and the political

[134] Chhokar, B.: *Higher education and curriculum innovation for sustainable development in India*. International Journal of Sustainability in Higher Education, 11(2), 141–152, 2010.
[135] Chhokar, B.: *Ibid*.

priorities of the society[136]; theoretical focus (the curriculums should be focused on the segments to reduce the risks of natural disasters and the prevention, mitigation and preparedness; defining the field of interest (curriculum will be focused only on theoretical knowledge, but also on research related to risk reduction disaster; multidisciplinary approach (management and preparation for natural disaster has essentially the approach must take into account many factors in actions. Different subjects such as geography, environmental science, geology, sociology, psychology, medical science, civil engineering, regional planning, architecture, agriculture contributes to the development of scientific field of disaster management. However, it is necessary to keep the focus on cycle to reduce the risk of natural disasters, with a special focus on specific areas of interest and research. Program on disaster risk reduction should be looked at all of the items that contribute to the development of risk reduction, improving skills (learning should be based on the experience gained from the previous case study).

THE ROLE OF THE FAMILY AND THE COMMUNITY

In the events of a natural disasters, there is an inverse relationship between the level of community development and the human losses. About 85% of the casualties caused by natural disasters occur in the less developed countries, where are living the majority of the world population.[137] The greater loss of lives in the developing countries occur for several reasons: the low quality of construction, the lack of standards in the construction and the application, construction in hazardous areas as a result of not having planned construction, the low level of awareness and preparedness for natural disasters, imprecise or non-existing early warning systems, the lack of evacuation planning and lack of people encharge for rescue and medical assistance. So if the risks associated with additional investment can not be removed, increasing awareness among citizens with minimal investment certainly could be realized.

The family as a basic cell of society, usually bears serious consequences due to various natural disasters. When considering the vulnerability of the families and the local communities it is very important to

[136] Fortuin, J., Bush, R. (2010). *Educating students to cross boundaries between disciplines and cultures and between theory and practice.* International Journal of Sustainability in Higher Education, 11(1), 19–35, 2010.

[137] In 1993 4.7 billion people live in Countries categorized as less developed. Kuroiwa, A.: *Peru's national education program for disaster prevention and mitigation (PNEPDPM). Training and Education for Improving Earthquake Disaster Management in Developing Countries*, UNCRD Meeting Report Series, 57, 95–102, 1993, 35 str.

consider the different characteristics of the population affected by the natural disasters: past experience, the belief that a natural disaster will occur and it is necessary to take measures for protection, personal qualities.[138] In addition, there are significant demographic characteristics of the population - gender, age, education, income, ethnicity, marital status, family size. Improved health and educational status helps to reduce the vulnerability and the limit of the loss of life during natural disasters. The fact is that the better-educated population - including women and children - is better suited to the warnings and generally it behaves properly in accordance with the evacuation orders. This discovery led to the creation of a more practical design of educational campaigns. Nate, for example, suggests that:,, What do people really need to know in order to change their behavior in relation to risks, how best to achieve the transfer of the best scientific information to the lay population, and which is the best way to take advantage of the opportunities before disaster events."[139]

The Increased frequency and severity of natural disasters and their consequences indicates that the problem has to be in the focus of the international community in the years to come. In the IDNDR (International Decade of Disaster Risk Reduction 1990-1999) and also in other organizations that were created during the past year, the reduction of the impact of natural disasters and becoming more important. The first step towards this reasoning is to develop a culture of participation in prevention without waiting for something to happen in order to act among the people and the competent authorities of the importance. It also should be noted that the regions around the world, that are more prone to natural hazards in recent years have become more resistant as opposed to regions that are not faced with the same.

Every individual has the right and obligation to be informed of the potential risks that exist in the area where he lives or works, and if is necessary to enable easy and efficient access to this type of information. There is also the important role of the media. The media must be responsible and accountable for the community informing for the adverse effects of natural disasters present at the lowest levels (individual and community), not always and exclusively being accountable to the state and its institutions. The principle of subsidiarity should be clear and all the rights and obligations according to this principle, should be respected. And the community and local authorities should be empowered to manage and

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[138] Victoria, P.: *Community capacity and disaster resilience.* In: R. Shaw, R. R. Krishnamurthy (Eds), Disaster management: Global challenges and local solutions (pp. 338–351). India: Universities Press, 2009.
[139] Petal, M.: Ibid, str.76.

reduce the risk of disasters, and to at all times be available all the necessary information, resources and authority to implement actions to reduce risk.

There is clearly a need to improve the international as well as the regional cooperation and assistance in disaster risk reduction, especially through: The transfer of knowledge, technology and expertise for capacity building in order reducing the risk of natural disasters; exchange of research findings, lessons learned and best practices; compiling information of the impact of natural disaster risk scale for all hazards in a way to be informed about sustainable development and the risk reduction from natural disasters; provide adequate support to improve risk management through awareness-raising initiatives and measures for capacity building at all levels, in order to enhance the resilience of natural disasters in developing countries; financial assistance to reduce existing risks and to avoid the creation of new risks.[140]

In general, families and communities are well resisting to natural disasters by using their knowledge and experience gained in dealing with previous similar situations. The education regarding natural disasters for families and communities is directed towards development of competences to recognize the characteristics of such phenomena, to protect themselves and others, and to respond appropriately in a given moment.[141]

In the past, the role of people in the local communities was different and made it possible of daily exchange of experience and knowledge of natural disasters. That allowed them to becoming more prepared. In order families and the local community to be prepared, we need to acquire certain knowledge on such events and the measures for protection of them. The education of family members and the local community could be both externally and internally. The Internal education is based on the mutual exchange of experience among family members and the local community, such as it is retold, while the external is based on the exchange of experiences between the states.

The education about natural disasters should not be limited only to schools, where the education is provided, but it should be apart both within the family and in the community.[142] The Importance of the association between school education, the Families and the local communities, are gradually recognized and is being currently implemented in several countries.

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[140] Shaw, R., Shiwaku, K., Kobayashi, H., Kobayashi, M.: *Linking experience, education, perception and earthquake preparedness. Disaster Prevention and Management,* 13(1), 39–49, 2004, 135.
[141] *Ibid.*
[142] Nimpuno, K.: *Ibid.*

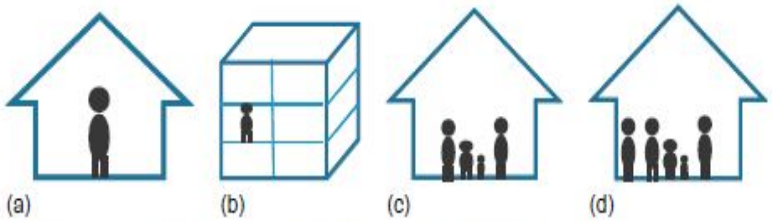

Fig. 1. Various Types of Individuals and Members within a Family and Community.

Family education about natural disasters is related to the education gained through mutual influences between family members in daily activities and conversations. The education at the local level can be gained through participation in local public and voluntary activities, trainings, seminars, and other public activities.[143] Seniors (Figure 1a) who live alone, separated from the local community are not in a position to assist themselves in the case of natural disaster.[144] Older persons can be prepared with the necessary knowledge from past experiences, however, as a result of the very poor social contacts, this knowledge will not be transferred. Figure 1 (b) displays the students of the University and the employees who live alone in a room or apartment. Such a group of individuals should have the capability to provide assistance to itselfand to help others during natural disasters. However when we get into such a situation, they might not be able to participate in activities on the local level or to help their neighbors, the reason why they do not lack the social contacts and maybe they will not even feel the need to help someone in that situation. Figure 1 (c) explains the common household where family lives, in most cases consisting of parents and their children.[145] Source: Rajib, S.: *Ibid:79.*

In addition, the parents will have the ability to help themselves and to assist others when should the need arise. In families where parents have accumulated experience regarding natural disasters, they will be able to share their knowledge and experiences with their families. The picture 1 demonstrates a household where three generations of families are living. The children, their parents and their grandparents.[146] In these situations, when we are talking about domestic education, we must not forget that, grandparents

[143] Viktoria, P.: *Ibid.*
[144] Rajib, S.: *Ibid.*
[145] *Ibid.*
[146] *Ibid.*

", will also be capable to share their experiences and lessons learned from the previous natural disasters.

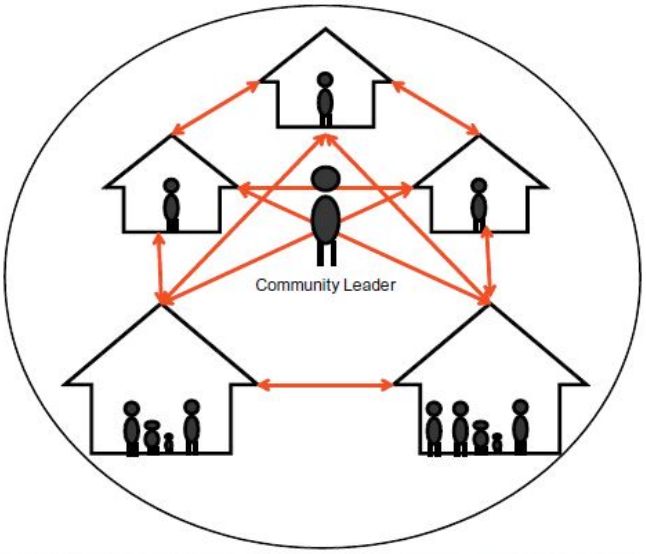

Fig. 2. Individuals and Characters within a Family and Community in Rural Area.

Source: Rajib, S.: *Ibid:80.*

Figure 2 shows the families that constitute the local community in the rural areas. The key elements that have impact on the educational process of natural disasters are definitely the level of information related to environment, traditional that is innate knowledge, the social networks and the past experience.[147] Generally speaking, the rural areas have leadership who probably have confidence on all citizens who represent integrating factorsand which play a key role in disseminating information and mobilization of resources during natural disasters.

Figure 3 shows the household before and after the 1970s. Before the 1,970th , a common feature of all households was the common life of multiple generations (ie, living together the grandparents, their children and their grandchildren). The older members, who had the experience from previous natural disasters, implemented the direct contact with other family members and were able to transfer knowledge on a daily basis to the younger generations. Unfortunately, with the industrial development and modernization of life, individuals are increasingly estranged from their older

[147] Viktoria, P.: *Ibid.*

family members, living alone in their own homes, forming their own families. At that moment, the process of transfer of knowledge was absolutely stopped.

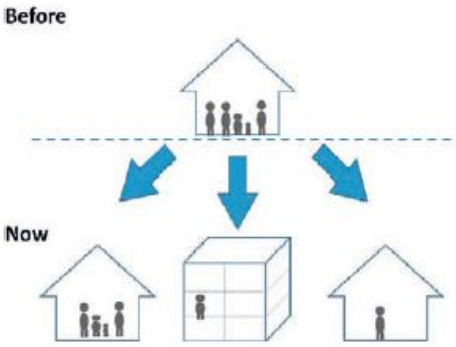

Fig. 3. Living Condition of Family in a Community in Japan Before and After the 1970s.

Source: Rajib, S.: *Ibid:90.*

Figure 4 shows the ideal situation of education about natural disasters between families and local communities.[148] There would be three types of education about natural disasters between the family members: between the parents, between the parents and their children and between older and younger family members.[149] It also would include the communication within the local community, the older members could share their experiences and passed them on to younger generations, who would pass on to their peers in schools.

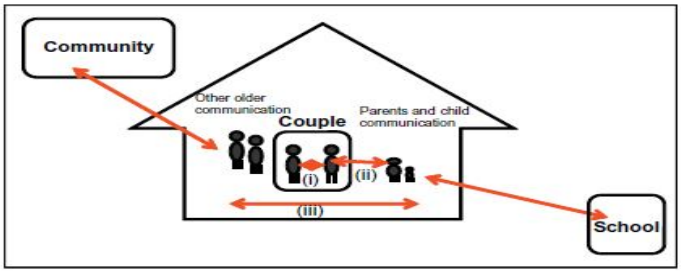

Fig. 4. Disaster Education Linkage in a Family to the Community.

Source: Rajib, S.: *Ibid:93.*

[148] Rajib, S.: *Ibid.*
[149] Nimpuno, K.: *Ibid, 65.*

CONCLUSION

Disaster risk reduction can reduce the unwanted effects of natural disasters but it can not ensure 100% protection because that is unfortunately impossible. Still need to take measures to reduce the risk of disasters in order to bring the risks in acceptable "frames that would when natural disasters occur, have minimal effects on people and their property.

This is why the citizens should be systematically, timely and professionally be informed on all potential hazards and risks that could endanger their life and being learned how to protect themselves , how to behave in emergency situations. We need to encourage their active participation so that they are the first line of defense in the event of an unwanted effect.

The implementation of the theoretical research of the role of education in disaster risk reduction, has crystallized the following conclusions: 1 The number of natural disasters is increasing; 2. There is a change of the focus from “recovery from natural disasters” to “risk management and mitigation of the effects”; 3. The education represents the most significant measure to mitigate the consequences from natural disasters“; 4. The education on natural disasters can be accomplished in schools, families and local communities, and stillbeing underdeveloped and not having the adequate importance; 5. The education could be achieved through formal and non-formal education; 3. Since the children are the most vulnerable category of citizens, schools have a significant role in development of awareness about the consequences and safeguards against disaster; 4. The families and the local communities can influence the overall mitigation, development of awareness about natural disasters by using their knowledge and experience that they gained during elimination of consequences of previous disasters; 5. The education about disasters should not be limited only to schools; 6. The importance of education to reduce the risk about natural disasters is highlighted at numerous international agendas, frameworks, conferences; 7. In many countries around the world in educational curricula are already implemented activities related to natural disasters; 8. Internet and modern technological developments significantly facilitate the exchange of knowledge and experience on natural disasters; 9. Through education of members of the local community, the same community is more resistant to the consequences of natural disasters; 10. In the strategic and legal documents all over the world the significance of education is being recognized in order to minimize the risks of natural disasters.

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