



Social Resilience : Earthquake Consequences to an Intense



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Abstract

Disclosed generally the impact they have caused to the life of society intense seismic activity in the area, especially the tectonic situation of Ecuador and particularized on stage at the coastal territory, given its proximity to the Ring of Fire. A balance of the most intense earthquakes occurred during the twentieth century and at the time of this century and is particularized in the consequences resulting therefrom for society is shown. An analysis related to the vision deployed by the UN related to resilience as a capacity to prevent disasters and crises are addressed, as well as to foresee natural disasters, minimize them, take them into account or recover from them on time and in an efficient and sustainable including protection. The results of an assessment of the resilience evacuees at Camp "Los Tamarindos" Portoviejo city where the SV-RES scale methodology that evaluates twelve dimensions developed offered.

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1. Introduction

The consequences of the occurrence of an earthquake on the people and activities can be direct or indirect affect resilience at all angles of society: Directly causing death; wounded; house destructions; public and industrial facilities; etc. Furlong-Estrada *et al.*, (2015), Indirectly they cause landslides; fires; floods; tsunamis; epidemics; and the economic ruin of the region where it effects.

The occurrence of natural disasters can override years of development in a few hours or even seconds. Populations around the world are increasingly exposed to natural hazards to which the crises caused by man are added. That is why complex situations need to be handled with prevention, without improvisations, with resources and capabilities available in the above, not on during, or after. These assumptions can make the difference between a resilient society and other not be able to recover from the destructive consequences of the impact of an earthquake.

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Earthquakes are natural phenomena which represent a major concern for threatened areas, given its extraordinary impact on all levels of society. Their study is as old as humanity itself. There are written records in China three millennia ago in which the impact of seismic shocks described as perceive today. Japanese records and Eastern Europe in 1600 years old, described in detail the effects of earthquakes on the population. In America, it has Mayan and Aztec codices, which refer to this natural phenomenon. There are also documents in colonial times (Archives of the Indies) that detailed the major events that affected American regions.

Earthquakes are random natural phenomena that occur instantly and simultaneously shaking a large area causing serious damage; [Habitat \(2015\)](#), this makes them one of the most destructive and most feared natural phenomena that can pose a tough challenge for the homeostasis of society. Its intensity may be able to shake the earth 10,000 times more violently than the Hiroshima bomb. More than 500,000 earthquakes take place each year.

The seismic factor is a characteristic of Ecuador's geology, especially in the coastal area because of its proximity to the so-called Ring of Fire and therefore the best way to ensure resilience to this natural event, is that the population and social infrastructure they are prepared to reduce its effects and achieve within a short time regain functional and operational stability of society [Henriquez et al., \(1973\)](#), which is often a complex process that takes a long time.

2. Research Methods

Analysis-synthesis method in the study of bibliographical material available, which allowed the analysis of the problems under study from previous years and in different countries and the influence it can operate resilience in the social stability of the territory was used.

The historical method to reach precise considerations logic of behavior of social resilience to the occurrence of natural disasters, from previous years internationally and in Ecuador, as well as the method of induction and deduction, which led from the existence of the content of the object of study, obtaining own conclusions, thereby allowing deducing the essences, [Quiroz & Femat \(2007\)](#), the causes and why the final conclusions also takes into account the statistical analysis to present the results of the investigation. The results and context of an investigation carried out by applying a test to measure the degree of resilience of people with the methodology of the twelve dimensions "scale SV-RES" created [Meza et al., \(2010\)](#), analyzed , fifty people affected by the earthquake of April 16 in the city of Portoviejo.

All of the above was applied to know the essence of the scientific problem in processing information and the definition of the system of central and operational categories effects. In addition to reaching their conclusions, which may be useful for plotting a suitable policy to ensure the resilience of society in disaster situations.

3. Results and Analysis

As far this century there have been about twenty-two strong earthquakes worldwide, including seven of a magnitude between six and seven degrees on the Richter scale; tenfold between 7.1 and 8 degrees of magnitude; five above eight degrees. Fifteen of the strong earthquakes occurred in Asia, one in Oceania and six of them in the Americas. The balance of deaths resulting in more than eight hundred twenty-nine thousand people, more than one and a half million wounded and a figure of over six million victims.

In the Americas records Indies realize that has been plagued throughout history by major earthquakes, among the largest are the earthquake in Lima on October 28, 1746, which according to descriptions of the time lasted several minutes or "more than three faiths prayed wrong." A tsunami swept through the neighboring port of Callao, killing five thousand people and disappearing thousands more. Prior Lima was destroyed in 1534; on July 2, 1581; November 27, 1630; and 20 October 1687. Other earthquakes that hit cities like Arica and Concepcion in Chile. In Mexico in 1985, a major earthquake hit the capital so that was thought to have disappeared.

Meanwhile Ecuador tectonic processes are dominated by the effects of the subduction of the Nazca plate beneath the South American plate. The high degree of coupling on the edge of the plates where the ridge is being subducted under Carnegie northern Ecuador produces an unusually intense intraplate deformation. This situation implies that Ecuador corresponds to a major seismic zone in South America, especially its coastal areas due to the proximity saved with the Ring of Fire.

In the last 475 years, there have been 40 earthquakes of considerable magnitude, which have reported significant damage to the infrastructure of Ecuadorian society. [Saavedra et al., \(2008\)](#), between 1541 and 2016 Ecuador has had on average an earthquake for every 11.9 years.

3.1 The consequences of strong earthquakes

In Figure 1, the date, location, and magnitude of earthquakes from 1900 in Ecuador, noting that the highest intensity occurred on April 16, 2016, are shown.

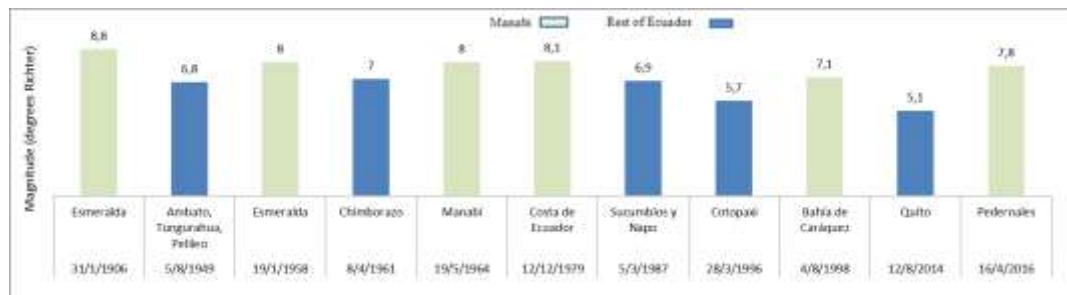


Figure 1. Place and magnitude of earthquakes reported

In analyzing the 11 intense seismic events recorded in the country in June (more than fifty percent) they have occurred in the coastal territory, where at least two of them tsunamis intensified the destructive potential of these natural phenomena were generated. Seismic events two had a magnitude between 5 and 6 degrees; three between 6.1 and 7 degrees; three between 7.1 and 8 degrees; three with a magnitude greater than 8 degrees. Among all ten caused more deaths in 1300; tens of thousands wounded and more than three million homeless. Table 1 shows by territory the damage occurred

Table 1
Damage occurred as the affected area

Territory	Damage occurred
Esmeralda	1600 dead, thousands injured, and economic damage
Ambato, Tungurahua, Pelileo	6000 dead. 100,000 Homeless
Costa norte ecuatoriana (Esmeralda)	111 dead, 45 injured
Chimborazo	10 dead y 28 injured
Manabí	44 dead y 86 injured
Costa de Ecuador y Colombia	800 dead y 1000 injured
Sucumbíos y Napo	1000 dead y 1000000 dollars in losses
Cotopaxi	70 dead
Bahía de Caráquez, Manabí	El 10% de las edificaciones colapsaron.
Quito	4 dead y 10 injured
Pedernales, Ecuador	661 dead, more of 6000 injured. Three billion dollars in damages.

Some technicians and specialists of the Geophysical Institute argue that although Ecuador has a long history of seismic activity that has caused the destruction of entire cities and the death of more than sixty thousand people, does not exist in the country a real awareness of seismic hazard. Each new earthquake brings victims, [Sánchez \(2004\)](#), the same that would have been avoided if they had assimilated the lessons left by these telluric events.

Moreover, we can see that there is no relationship between the magnitude of earthquakes and the damage reported. It can influence many variables such as population density existing at the time of occurrence of the earthquake; the time it happened the phenomenon; especially the elements of vulnerability that may present the territory and society based on the hazard of disaster; among others.

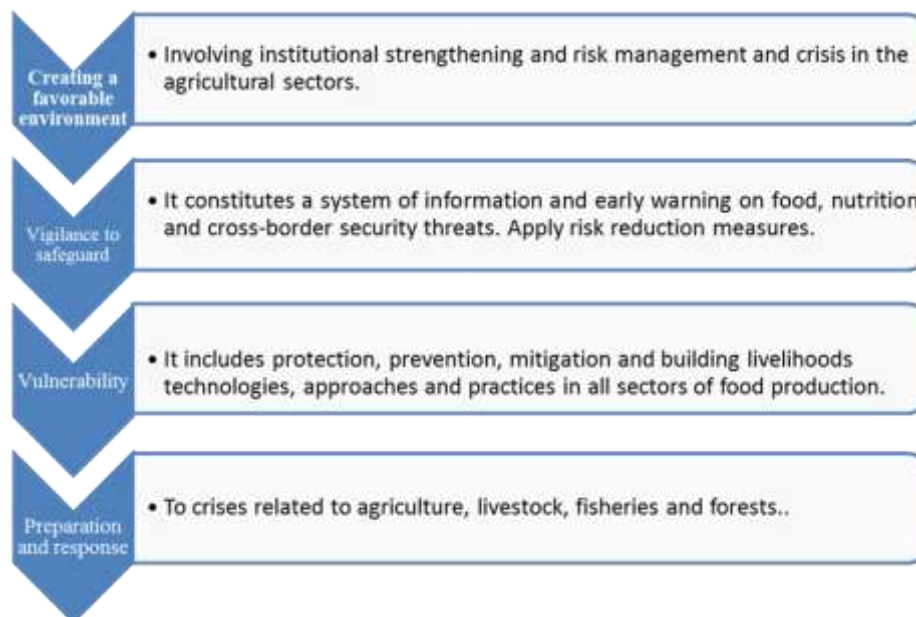
The threat factor in these phenomena cannot be changed, it depends on the behavior of nature, and even in the case of an earthquake is virtually impossible to accurately predict the time of occurrence; but the vulnerability is perfectly changeable according to foster social resilience to face phenomena of this nature.

3.2 The United Nations (UN) and its vision of resilience

Some people consider that resilience comes into play only when resilience is implemented after the impact of adversity and really that vision can be part of the concept, but it is not essential. The United Nations for the food and Agriculture Organization, known worldwide as FAO defines resilience as the ability to prevent disasters and crises, as well as anticipate, minimize them, take them into account or recover from them time efficiently and sustainable, including protection, restoration and Vidal (2008), improvement of living systems against threats affecting agriculture, nutrition, food security and food safety.

Resilience is the capacity of individuals, communities or systems facing disaster or crisis to be preserved from damage and recover quickly, therefore, it is to improve the ability of society and institutions to protect people and livelihoods through measures to avoid (prevention) or to limit (mitigation and preparedness) the adverse effects of hazards and prevent reliably and timely.

The vision of the resilience strategy Food and Agriculture Organization of the United Nations (FAO) is based on four pillars;



From this perspective the concept FAO has been working as a cycle that includes the before, during and after the crisis and achieved just as well as consolidate and strengthen the resilience of society to crises caused by natural disasters; but when analyzed that resilience includes the ability to quickly return to the previous stable situation, then it adopts an approach to multiple threats, according to UN-Habitat.

3.3 Resilience in evacuees at Camp "Los Tamarindos" Portoviejo city

After the occurrence of the earthquake on April 16 in the province of Manabi, Portoviejo city ranked among the most affected. Some people were given the task of fighting adversity and have been able to overcome the difficulties, while others are filled with gloom and despair. These differences in coping can only be explained by the existence of differences in social, cultural, previous group relations or different sociopolitical conditions, which come to influence the resilience of people and communities on a larger scale when it manifests.

In disaster situations such as occurred in the province of Manabi on April 16 last, resilience has been supported by national and international solidarity, surfacing in many positive qualities that even believed ignore, rush to the reconstruction of the city and selfless service delivery, willing to act for the collective benefit and this is a positive situation that can wake capabilities in affected and increase community resilience.

In the city of Portoviejo quickly they fitted out several evacuation camps, managing to avert the danger to the most affected people Who had lost everything and this has made it possible to extend the solidarity to help these people. One of the camps evacuated refers to "Los Tamarindos" located in the city of Portoviejo. Table 2 shows the general data of the evacuated camp exposed.

Table 2
General information evacuee camp "Los Tamarindos"

DATOS GENERALES	
Hostel name	"Los Tamarindos"
Place	Portoviejo
Total families	57
Total persons	130
Boys and girls	Por seguridad no se dio esa información
Population	130 personas
Sample	50 personas
women surveyed	32
Women 18-40 years	24
Women of 41-100 years	8
Men surveyed	18
Men 18-40 years	11
Men 41-100 years	7

Source: [Quiroz & Femat \(2007\)](#)

During the survey twelve items that match the dimensions considered in the scale methodology deployed by SV-RES [Meza et al., \(2010\)](#), were applied. Then he exposed each:

- a) Identity: (I am condition basis). Refers to general judgments taken of cultural values that define the subject of a relatively stable manner.
- b) Autonomy: (I am vision of himself). They are judgments that refer to link the subject establishes himself to define their particular contribution to the socio-cultural environment.
- c) Satisfaction: (I am view of the problem). Refers to the particular judgments that reveal how the subject interprets as a problem.
- d) Pragmatism: (I am a resilient response). Refers to judgments that reveal how to interpret the actions taken.
- e) Links: (I have conditions bases). Trials that highlight the value of primary socialization and social networks with roots in personal history.
- f) Networking: (I have a vision of himself). Judgments that relate to the emotional link that person with your close social environment.
- g) Models: (I have a view of the problem). Judgments referring to the conviction of the role of close social networks to support new overcoming problematic situations.
- h) Goals: (I have a response). Judgments that relate to the contextual value of goals and social networks on the problematic situation.
- i) Affection: (I can base conditions). Judgment refers to the possibilities of himself and the link with the environment.
- j) Self-efficacy: (I can vision of himself). Judgment on the chances of success that the person recognizes itself to a problematic situation.
- k) Learning: (I can view of the problem). Judgments that relate to assessing a problematic situation as a learning opportunity.
- l) Generativity: (I can answers). Judgments that relate to the possibility of asking others for help to solve problematic situations.

In this case, resilience is the development of twelve factors which standardizes, however, it is likely that resilience factors are grouped into one of the levels or areas of the subject's responses. It is expected then that many qualified resilient behaviors are bounded to the repertoire of actions and interpretation of responses that the subject has built-in

socialization, while other behaviors require sustained in an interpretation that the person performs itself or its own certainties in life, opening the possibility of transformation as an opportunity for growth.

As a result of the work, it was found that people in the camp evacuated "The Tamarinds", where there are about 57 families have an average level of resilience 32.4, which means people willing to move forward despite the adversities that they have then presented them to the earthquake of April 16. Many of these people feel unsafe in their homes and therefore they prefer to live in the camp. Others, however, have lost everything and that place is the only shelter for your family. Cases and stories are different for each person, but all share a feeling of wanting to overcome this episode and soon return to the normality of their lives.

4. Conclusion

- a) It was found that the Manabi province where is located the city of Portoviejo, has considerable seismic risk, which determines the systematic implementation of measures and preparedness activities at all levels of society, so that conditions respond to ensuring a high level of resilience to the impact of a massive earthquake.
- b) It was demonstrated that the methodology designed by the dimensions [4], can be applied as a model to determine the resilience of society to the impact of a strong earthquake, found in people who are protected in the evacuated camp "Los Tamarindos", city of Portoviejo, have been able to maintain resilience despite the hard impact caused by the earthquake of April 16, 2016.

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Statement of authorship

The author(s) have a responsibility for the conception and design of the study. The author(s) have approved the final article.




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