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Artículos científicos

Análisis prospectivo-educativo del impacto del huracán Max en una comunidad de Guerrero

Prospective and Educative Analysis of the Impact of Hurricane Max in a Guerrero Community

Análise prospectivo-educacional do impacto do furacão Max em uma comunidade de Guerrero

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Resumen

El huracán Max ocurrió en septiembre de 2017. En una comunidad de Costa Chica, Guerrero, causó efectos negativos en lo ambiental, económico y social. El objetivo de este trabajo fue analizar el impacto social de dichas afectaciones para identificar medidas de prevención o mitigación ante eventos futuros considerando la adaptación de la cultura del riesgo y la Educación Ambiental para la Sustentabilidad (EAS). Se aplicó una entrevista no estructurada a ciudadanos afectados que contempló variables relacionadas con el ambiente, la economía, la sociedad, la percepción del riesgo y la EAS. Los resultados de este análisis evidenciaron daños en el ambiente: caída de árboles, desbordamiento e inundaciones; en cuanto a lo económico, la población perdió bienes materiales, animales y afectaciones en sus casas; en cuanto a lo social, las personas sufrieron daños físicos y emocionales; hubo afectaciones en los servicios de agua y de electricidad, y, por ende, falta de alimentos. También quedó al descubierto la desvinculación que existe entre sociedad y autoridad gubernamental en situaciones de emergencia. Experiencias como estas vuelven necesario fomentar en la población la cultura de riesgo ante eventos naturales y promover la EAS con miras a desarrollar habilidades y actitudes de cuidado y preservación del medio ambiente.

Palabras clave: cultura de riesgo, educación ambiental para la sustentabilidad, huracanes, medio ambiente.

Abstract

Hurricane Max occurred in September 2017. In Costa Chica, Guerrero, it caused negative environmental, economic and social effects. The objective of this work was to analyze the social impact of said affectations to identify prevention or mitigation measures in the face of future events, considering the adaptation of the risk culture and Environmental Education for Sustainability (EES). An unstructured interview was applied to affected citizens that considered variables related to the environment, the economy, society, the perception of risk and the EES. The results of this analysis showed damage to the environment: falling trees, overflowing and flooding; economically, the population lost material goods, animals and some damages in their houses; as for the social, people suffered physical and emotional damage; there were impacts on water and electricity services, and, therefore, lack of food. The disconnection that exists between society and government authority in emergency situations was also exposed. It is necessary to foster a culture of risk in the face of natural

events in the population and promote EES with a view to developing skills and attitudes of care and preservation of the environment.

Keywords: risk culture, environmental education for sustainability, hurricanes, environment.

Resumo

O furacão Max ocorreu em setembro de 2017. Na comunidade de Costa Chica, Guerrero, causou efeitos ambientais, econômicos e sociais negativos. O objetivo deste trabalho foi analisar o impacto social destes efeitos para identificar medidas de prevenção ou mitigação face a eventos futuros, considerando a adaptação da cultura de risco e educação ambiental para a sustentabilidade (EAS). Uma entrevista não estruturada foi aplicada aos cidadãos afetados que considerou variáveis relacionadas ao meio ambiente, à economia, à sociedade, à percepção de risco e ao EAS. Os resultados desta análise apontaram danos ao meio ambiente: queda de árvores, transbordamento e inundação; economicamente, a população perdeu bens materiais, animais; e afetações á casa; quanto ao social, as pessoas sofreram danos físicos e emocionais; houve impactos nos serviços de água e eletricidade e, portanto, falta de alimentos. Também foi exposta a desconexão que existe entre a sociedade e o poder público em situações de emergência. É necessário fomentar uma cultura de risco face aos acontecimentos naturais na população e promover a EAS com vista ao desenvolvimento de competências e atitudes de cuidado e preservação do meio ambiente.

Palavras-chave: cultura de risco, educação ambiental para a sustentabilidade, furacões, meio ambiente.

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Introduction

Natural meteorological phenomena such as hurricanes or cyclones have given rise to effects that negatively impact cities or communities due to the fact that they cause material damage of great magnitude. Like other states of Mexico, due to its geographical location, Guerrero is particularly vulnerable to these phenomena. The most recent was Hurricane Max, in 2017. The municipality of San Marcos was severely affected. Las Vigas, a community belonging to said municipality, was one of the places where its effects were felt most strongly: there were environmental, economic and social impacts.

The objective of this work was to analyze the environmental, economic and social impact suffered by the Guerrero population due to the passage of Hurricane Max. Likewise, determine the effects caused by the flood and, with this, determine prevention and mitigation measures in the event of damages that may occur due to a similar event in the future, with the support of the culture of risk perception and environmental education for the sustainability.

The causes and effects were organized into three main categories: those related to the environmental, the economic and the social. These three categories were transcribed into four main variables. This quadripartite organization determined the design of the interview, which was applied to some people in the affected area, in order to inquire about the experience they had lived.

The most affected population was the one located on the edges of the town, due to the situation of the soil relief, the presence of an irrigation canal and the main stream in this place. To be more precise, the places, or colonies as the population usually calls them, El Aterrizaje, la Tabiquería, El Canal, La Colonia Santa Cruz and El Charco, without losing sight of the fact that there were other areas of the community that were also affected.

The result of this analysis allowed us to know, with regard to the environmental aspect, that people perceived intense rains, strong winds, falling trees (mainly coconut palms); the overflow of the Las Vigas “stream”, the irrigation canal, the pond or lake (located in the colony of the same name), the outflow of its waters, and the extreme currents contributed to the flooding of vulnerable places or colonies significantly and this will affect the material assets of the population that lives there.

Regarding the economic impact, they mentioned that they lost white goods and other household goods, furniture, beds and wardrobes, among others; There were also damages in

the structure of the houses, mud dragging into the houses, damage to their plots or orchards, as well as loss of animals, cows, horses, poultry, which the current took from them.

On the social side, some people suffered from physical and emotional health problems, for example skin diseases and colds; There were also people who showed feelings of sadness due to the loss of their property, fear and nervousness due to what happened during the hurricane. Regarding the electricity, telephone, water and transport services, these were interrupted because roads and poles collapsed due to the strong air and water currents, therefore, the tortillerías and community stores suffered from shortages. Some commented that the solidarity support of some members of the community was observed to remove from their homes people whose houses had been flooded. The help of the municipal authorities and the state government came after the event. After a few days, the arrival of pantries, clothes, mattresses, mats was observed by some governmental and non-governmental institutions, as well as some individuals, who supported with goods and cash, mainly from countrymen living in the United States. United or civil society groups, from Mexico City, above all, that organized to support its people. The support of the community's Sagrada Familia parish and some educational institutions in other municipalities, mainly from Acapulco, was also highlighted. Some higher-level schools of the Autonomous University of Guerrero supported with pantries, clothing and providing free health services.

Other aspects that contributed to the understanding of the causes and effects of the disaster and the impact that occurred was the lack of an environmental culture in the population, that is, many people are not aware of the care of natural resources and the preservation of the environment. Some problems were identified, such as the hauling of sand from the Las Vigas stream, lack of desoiling of residues that clog the water outlets, accumulation of residues or garbage in inappropriate places and near or within channels and streams, modification to the terrain relief and an insufficient perception of risk by some people in the face of hurricanes or cyclones.

Many natural phenomena usually happen at unexpected times. These are associated with the alteration that humans make to the environment through anthropogenic activities and that, in some way, affect the planet's climate. When referring to a natural phenomenon, reference is not exclusively made to hurricanes, but also to tsunamis, hailstorms, snowfalls, all of which can cause disasters and effects on the population; However, what happened to the population of Las Vigas was a hurricane and, therefore, this experience sets the tone for prospectively thinking about ways of dealing with impacts from this particular type.

Undoubtedly, a very important tool is to foster a risk culture and promote environmental education for sustainability. Through this education, it is possible to promote knowledge, skills and attitudes about the care and preservation of the environment, which is essential for human subsistence.

Environmental education has the purpose that people become aware of their environment and can make changes in their values, behaviors and lifestyles, as well as expand their knowledge to promote the processes of prevention and resolution of present and future environmental problems (Olaguez and Espino, 2013). When investigating the relationships between society and nature from an environmental education perspective, the need arises to propose alternative ways that allow the construction of sustainable development. The prospective attempts to show the relationships between possible futures and certain decisions of the present, in order to mobilize social efforts towards constructive change (Tréllez, 2004).

Environmental education must refuse to be reduced to a set of nature practices, to focus exclusively on pollution and the tragic futures that await us, to become the last voice crying out before disaster. Environmental foresight, in particular, could gradually become a way to build environmental rationality. “Environmental prospective thus implies the deconstruction of the dominant rationality and the construction of a new rationality” (Leff, cited in Tréllez, 2002, p. 10). Environmental education processes, with their contributions to critical thinking, become a way for the construction of alternative futures from the perspective of society-society and society-nature relations. The alliance between foresight and environmental education can give us one of the routes to achieve it (Tréllez, 2002).

When we use the notion of risk to observe a phenomenon like climate change, we turn it into something that has not only been generated by human action, but can also be avoided through it. Talking about risk implies, then, talking about contingency. Risk implies confronting with the construction of futures (Galindo, 2015).

The prospective orientations of this study allude to the fact that risks, and therefore, effects of any kind caused by some natural phenomenon, can be prevented and faced with responsible actions, as long as a critical environmental thinking is promoted in society. analytical and reflective.

Background

Similar studies related to the present refer to the fact that natural phenomena end in disasters and that they are linked to the vulnerability of the area and of the people. Santiesteban, Castro, González and Sánchez (2010) conducted a study during the last week of November 2008, three months after the province of Pinar del Rio, Cuba, was affected by hurricanes Gustav and Ike. The community chosen for the study was Bacunagua, which belongs to the municipality of Los Palacios, in which considerable material damage and one affected area were reported. Rodríguez, Gelis, and Fornaris (2013) established that the eastern region of Cuba, unlike the western region, has been hit less frequently by tropical storms and hurricanes. The Santiago de Cuba province, due to its geographical position, located in the southeast of the island of Cuba and in contact with the Caribbean Sea, has been impacted by different phenomena, with disastrous results due to the high vulnerability of this territory. According to Ramos (2009, cited in Rodríguez et al., 2013), "disasters are not natural, since their origin is related to human activity" (p. 12). Among them are extreme hydrometeorological conditions, such as hurricanes. Hurricane Isidoro, which impacted the Yucatan coast in September 2002, caused Chabihau to be divided into two sections by an arm of water that communicated the sea with the swamp; To this was added the amount of water in the form of rain that accompanied the hurricane and that resulted in the flooding of a vast area of mangroves, which overflowed and the excess water formed a large body over the port, Chabihau, and the roads that connect it with the municipal seat and neighboring ports. Many houses were damaged and some were even destroyed, as well as coconut plantations and dozens of boats. (Guzmán y Rodríguez, 2016).

In the case of Mexico, due to its location, it is exposed to the occurrence of natural disasters such as earthquakes, floods, droughts and frosts (Mansilla, cited in Ordóñez, Montes and Garzón, 2018). The government institution in charge of environmental education initiatives is the Center for Education and Training for Sustainable Development (Cecadesu) of the Ministry of the Environment and Natural Resources (Semarnat). Mexico, through Semarnat and the Ministry of Public Education (SEP), signed, in March 2005, a National Commitment for the Decade of Education for Sustainable Development. It was the first country in Latin America and the Caribbean to implement actions within the framework of the decade (Regional Office of Education for Latin America and the Caribbean [Orealc / Unesco Santiago], cited in Ordóñez et al., 2018). The mission of this strategy is to establish public policies at the national and local level in environmental education for sustainability

that “favor the construction of an environmental culture, the increase in the quality of life of the population, the strengthening of citizenship and the multiple cultural identities of the country, and the protection of ecosystems and their biodiversity ”(Semarnat, cited in Ordóñez et al., 2018, p. 9).

The voices that made up this work affirm that various storms and hurricanes have occurred in the municipality of San Marcos, Guerrero, and neighboring municipalities such as Acapulco, however, the latter was the one that most surprised the inhabitants of that town, and mainly to the inhabitants of Las Vigas. Paulina, in 1997, is the one most remembered by the population. Although this phenomenon affected San Marcos, including the Las Vigas community, Acapulco is where the most damage occurred. Hurricane Paulina impacted the Mexican Pacific coast, causing human and material losses (Toscana, 2003). This hurricane caused more disasters in the neighboring municipality, Acapulco; in San Marcos, on the Costa Chica, the damage was minor. Another hurricane that adversely impacted with severe flooding and other damage was Storm Henriette in 2007. Henriette had severe impacts in Acapulco. During Henriette, the port of Acapulco reported an intense rain of 213.5 mm, which caused flooding in the Miguel Alemán coast and the landslide of rocks that caused the death of at least six people (Hernández, 2007). Environmental education for sustainability is a necessary strategy to cement an environmental culture in the population that influences the perception of risk and measures to be adopted in the event of disasters caused by phenomena such as hurricanes.

The integration of the risk management approach in the education sector is crucial to increase awareness about the effect and cause of disasters. Schools that include risk management actions contribute to a culture for prevention, essential for the sustainable development of countries. These actions reduce disaster risks and strengthen the capacities of the most vulnerable communities to respond to emergencies (Orealc / Unesco, cited in Ordóñez et al., 2018). Really, it is important to design and implement programs and projects supported by educational and awareness-raising processes that promote changes in people's attitudes and allow them to identify, prevent and act upon the occurrence of a natural phenomenon, minimizing vulnerability and socio-environmental impact. (Ordóñez *et al.*, 2018).

Problem Statement

The environmental crisis in the world is getting worse; it seems that the human being does not want to understand. Many activities that are carried out directly or indirectly affect the environment. Deforestation, the use of pesticides, soil contamination, the irrational use of energy, among others, are some of the problems that increase the environmental crisis that is being experienced, the results of which are reflected in phenomena that range from increased heat , droughts and lack of production to diseases, intense hurricanes, storms and snowfalls, and ultimately, societies themselves are the ones who suffer their effects. Santiago (2009) considers that the behaviors of environmental conditions in the contemporary world are originated by the transformations derived from the use of the potentialities of nature at different moments of historical evolution. Since man appeared on the face of planet Earth, he already used to make use of these practices, however, they differ from those of today since, currently, the technology that he uses is more aggressive with the environment. The technology may have benefited production, but it also has its disadvantages: the damage it does to the Earth and the environment when using chemical materials or when investing in machinery without conducting environmental impact studies. The degradation of the environment manifests itself with an increase in the use and scarcity of oil, water scarcity, pollution of the oceans, the extinction of animals and plants. To this is added deforestation, global warming and climate change (Díaz, 2012). The implementation of environmental impact studies and environmentally friendly technologies would contribute in some way to minimizing environmental problems.

When addressing the terms global warming and climate change, it is important to analyze the concept of the greenhouse effect. The greenhouse effect is the retention of gases that the soil retains by solar radiation, this causes the Earth's atmosphere to heat up and produce steam, which is vital for the planet. This phenomenon is altered or modified when gases such as carbon dioxide (CO2) and methane are produced by anthropogenic activities. The reason for this increase in atmospheric CO2 may be linked to natural processes, however, there is also a significant human component, given that the cutting of forests and the burning of fossil fuels such as coal and oil have caused an increase in the amount of atmospheric CO2, which results in an increase in the greenhouse effect and a boost to global warming (Caballero, Lozano y Ortega, 2007).

Human intervention in nature has generated impacts that negatively affect the integrity of ecosystems, on which the well-being of humanity largely depends, and which, in some cases, have come to threaten the integrity of life itself in our country. planet, as evidenced in a dramatic way with global warming (Rodríguez, 2007). Global warming, according to the researchers, has many consequences, not only for the planet, but also for the living beings that inhabit it. Proof of this has been the constant change of the climate, the natural phenomena that have come to affect a large number of people around the world, most of the cases unprotected people (Fula and Ayala, 2007). Various studies suggest a higher frequency of hurricanes due to global warming and rising ocean temperatures. Warmer water means more energy available for tropical cyclones, thermal energy is transformed into wind. Higher temperatures mean greater evaporation, which, in turn, leads to more intense precipitation (Cárdenas, 2010). Global warming alters the temperatures of the planet, leading to changes in temperatures, which is commonly known as climate change. Global climate change refers to modifications in any aspect of the planet's climate, such as temperature, precipitation and intensity and the routes of storms (Miller, cited in Díaz, 2012).

The effects of climate change are already occurring: those climatic phenomena, of great intensity and little frequency, that have adverse environmental and social effects, either regionally or locally. Examples of them are hurricanes, tornadoes, droughts, frosts or hailstorms. Intense storms that cause floods, as well as material losses and human lives (Semarnat, 2009). According to Definition ABC (2010), a tropical storm is a characteristic meteorological phenomenon of the tropics that evolves from a tropical cyclone and in which the winds are very strong and abundant rainfall. Extreme weather events result in great economic losses, damage to health and, in many cases, disasters and deaths (Murray and Murray, 2012). The low social development, as well as the high risk of the populations, increase the vulnerability of the region before the impact of these events. Therefore, the approach to the dynamics of tropical cyclones must be linked to studies of the impacts they cause on society to understand under what circumstances their effects are greater. (Amador y Bonilla, citados en Alfaro, Quesada y Solano, 2011).

The passage of Hurricane Max through some municipalities on the small coast of the state of Guerrero, as is the case of Las Vigas, severely affected its inhabitants, mainly those who live in vulnerable areas, environmentally, economically and socially .

The questions that guided this work are the following:

- Is there a relationship between anthropogenic activities, environmental pollution and hurricanes with the disasters they cause?
- Is there vulnerability in the inhabitants of Las Vigas in terms of the social perception of hurricane risk and its effects?
- What was the environmental, economic and social impact caused by the flooding, heavy rains and other effects of Hurricane Max on the inhabitants of Las Vigas?
- Does education for sustainable development promote knowledge, skills, values in the population about the preservation of the environment and thus develop strategies for perception of risk, prevention and mitigation in the presence of hurricanes and the effects it causes?

Objective

The objective of this work was to analyze the environmental, economic and social impact suffered by the population affected by Hurricane Max. Likewise, determine the causes and effects that caused the flood and, with it, determine prevention and mitigation measures against damages that may occur due to a similar event in the future with the support of the culture of risk prevention and environmental education for sustainability.

Theoretical justification

This study was based on the assumptions of sustainable development, risk perception and environmental education for sustainability. Sustainability refers to a strong link between the environment and other aspects such as social and economic. The perception of risk focuses on explaining the cognitive perception of threats that may present a risk. The population, in some cases, does not have a culture of perception, so they are even more vulnerable to the effects produced by natural phenomena. Regarding environmental education for sustainability, it is responsible for promoting knowledge, skills and values in people to be responsible in the care and preservation and to be able to relate the environmental issue with social topics such as economic and social to contribute in the same way to the sustainability that needs to be achieved.

The effects produced by hurricanes cause economic damages in the people who are affected, due to the fact that they suffer losses of various types, including material goods.

The Government in its three areas, municipal, state and federal, activates its emergency protocols to serve the population and infrastructure that suffered damages. The latter has an impact on the stagnation of sustainable development. Quiroz, del Amo and Ramos (2011) define development as a concept that is used in all spheres and countries and whose first meaning is 'growth, change or improvement in a certain period' and they use the word sustainability to qualify development and economic growth, especially referring to developing countries, sensitive to environmental problems. The concept of sustainable development is the result of the growing awareness of the global links between environmental problems and socio-economic issues. Strongly links to environment and socio-economic issues (Hopwood, Mellor y O'Brien, 2005).

Man continues to affect nature and the environment, polluting soils, polluting waters, making irrational use of chemicals, deforesting areas, destroying ecosystems, affecting biodiversity, solid waste in the environment and other practices and aspects that can be adhered to, such as and as acts of corruption, concessions for buildings in areas not suitable for construction, for example, conservation areas, animal trafficking, overpopulation, among others; all of this is influencing environmental deterioration and is the reason why there is no equitable sustainable development. Hydrometeorological phenomena are of a natural type, yes, however, their intensity is associated with the excessive problems that man makes on the environment. The effects and disasters that they cause impact the sustainable development of a community and, therefore, of its inhabitants in various ways: economically, socially, health, etc.

Regarding the perception of the population about hydrometeorological phenomena and their repercussions in the social and personal sphere, it is of the utmost importance that people develop cognitive processes in the face of the repercussions and social effects that could be produced by natural events. In qualitative research, opinion and details from cognitive processes about the image and representation that subjects have about something are essential. Psychology defines, in general terms, perception as the cognitive process of consciousness that consists in the recognition, interpretation and significance for the elaboration of judgments about the sensations obtained from the physical and social environment (Vargas, 1994). Learnings, joys, dangers, risks can be perceived: people assimilate them and give them meaning. There are some environmental events that usually happen and become threats (a hurricane, an intense storm, etc.), which can affect the physical

and emotional integrity of people, however, in some cases, the perception that is made of them it is not adequate and this can have repercussions in damages and disasters.

When there is the presence of a hurricane, it is automatically an event that may affect the conditions of the community, or the integrity of the people. From the moment information about this event emerges, people should already have perceptions of risk about it. Early warning represents a very useful element, by informing the authorities who must make decisions well in advance. Alerting about what may happen raises concern about the growing perception of possible danger. The interaction of forecasters with the National Civil Protection System is very important (Rodríguez, Berro, Valdez y Quintana, 2012).

Risk perceptions are based on images built from information from the environment and previous experiences in a risk situation. These assessments (of the danger of the phenomenon and of the conditions of vulnerability) differ, not only individually, but also collectively (Ferrari, 2012). The concept is also associated with a variety of probability measures of a generally unfavorable outcome, the expected number of human losses, injured persons, damaged property and interruption of economic activities as a result of particular natural phenomena and, consequently, of specific risks and elements of risk.

The environmental crisis is justified by the lack of perception of its existence (Sganderla, Rodrigo and Rosado, 2010). Humans do not perceive that pollution contributes to global warming. Currently, society's concern for risk is closely related to the complexity that exists. The acceleration of social, economic and political changes, globalization and progressive industrialization bring environmental pollution, the scarcity of vital natural resources such as water, industrial accidents that have undermined public safety, the proliferation of certain diseases (both in humans as well as animals and plants), irreversible transformations of the environment, among others (Echemendía, 2011). What Beck (cited in Novo, 2005) called the risk society is, today, the scene of the environmental crisis. Building knowledge and helping the emergence of guiding environmental thinking is undoubtedly a great challenge (Beck, cited in Novo, 2005).

Regarding environmental education for sustainability, its work is essential in the development of knowledge, skills, attitudes and values in the population so that they form a responsible sense to care for and preserve the environment, taking into account that their care and protection contributes to the sustainability to be achieved. Since its inception, environmental education aims to promote attitudes of curiosity, respect and appreciation towards all components of the natural heritage. Very soon it expanded its field of action to

all environmental problems (pollution, urban agglomerations, consumption, waste, climate change, etc.), including socio-economic aspects (1980s), but it remained close to the mechanisms that govern ecosystems natural and continues to proclaim the value and affective and formative interest of contact with nature (Alcántara and Bourrut, 2006). The United Nations Organization for Education and Diversification, Science and Culture [UNESCO] (2005) states that education for sustainable development allows each human being to acquire the knowledge, skills, attitudes and values necessary to forge a sustainable future. Educating for sustainable development means incorporating the fundamental issues of sustainable development into teaching and learning, for example, climate change, disaster risk reduction, biodiversity, poverty reduction and sustainable consumption.

Method

Type of study

This study used the qualitative paradigm for its realization. In qualitative research there are different data collection techniques, the main purpose of which is to obtain information from the participants based on perceptions, beliefs, opinions, meanings, and attitudes, so the interview is a valuable technique (Vargas, 2012). Among the techniques to collect information from the population, the one selected was the unstructured interview. The unstructured interview can provide a greater breadth of resources than other types of qualitative interviews. According to del Rincón (cited in Vargas, 2012), who speaks about this type of technique, the question and sequence scheme is not predetermined; the questions can be open and the interviewee has to construct the answer; They are flexible and allow greater adaptation to the research needs and the characteristics of the subjects, although it requires more preparation on the part of the interviewer, the information is more difficult to analyze and requires more time. The bibliographic documentation was essential for the description of the analysis. This study was carried out in 2017.

Population and sample

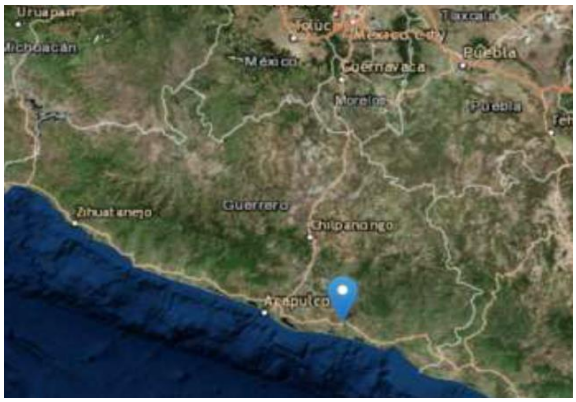
The town of Las Vigas belongs to the municipality of San Marcos, Guerrero, Mexico. According to the Catalog of Localities of the Ministry of Social Development [Sedesol] of 2013, the degree of marginalization of the town until 2010 was very high, the code of the town is 0067 and the name is Las Vigas. It is also stipulated that in 2005 there was a

population of 4,296 inhabitants, of which 2,026 were men and 2,270 women. In 2010, there were 4504 inhabitants, of which 2,187 were men and 2,317 women. In 2005, there were 988 occupied dwellings and in 2010, 1082. The degree of social backwardness of the community is low in both periods and there is a shortage in the dwellings because many of them present lack of access to services basic. In 2005, 355 (36.49%) had no drainage; in 2010 they were 174 (16.14%). In 2005, 23 (2.33%) did not have electric power service; in 2010 only 3 (0.28%). Regarding homes without piped water, in 2005 there were 167 (17.15%) and in 2010 there were 239 (22.21%). And in terms of homes without a toilet, in 2005 there were 283 (28.64%) and in 2010, 177 (16.36 %).

Figura 1. Las Vigas Municipio de San Marcos Guerrero en el contexto nacional

Fuente: PueblosAmerica.com (s. f.)

Figura 2. Las Vigas, municipio de San Marcos, Guerrero, en el contexto estatal



Fuente: PueblosAmerica.com (s. f.)

In relation to the study sample, a statistical procedure was not applied. Within the qualitative paradigm, it is established to collect data without necessarily being representative of the universe or population being studied (Angulo, 2011; Hernández, 2007). The subjects

considered in this study were selected according to the time available, at random, that is, by chance and convenience. In qualitative research, convenience sampling is used when a population is chosen and it is not known how many subjects may have the phenomenon of interest, here the subjects found are used (Mendieta, 2015). Lines above mention the total of inhabitants in the years 2005-2010, currently the community has grown in extension and inhabitants, due to the fact that new colonies are emerging and, therefore, the population is increasing.

The community is organized in neighborhoods and popular places, however, there were some neighborhoods or places more affected than others by the hurricane. The most affected areas were those on the shores of the community, those near the stream and the irrigation canal to be more specific (El Aterrizaje, La Tabiquería, El Canal, La Colonia Santa Cruz and El Charco). The selection criterion for deciding which neighborhoods and inhabitants would be taken into account in this study was the following: neighborhoods that were more affected and, consequently, inhabitants to whom Hurricane Max caused a considerable impact when suffering some damage. 100 people were randomly chosen among young people and adults who live in the colonies or places already mentioned. It should also be clarified that people from other sites or neighborhoods in the same community participated and are represented in the sample presented.

Techniques and instruments used

The trajectory of the hurricane was reviewed in official sources to determine its path and the point or community where it made landfall. For this, the official website of the National Water Commission [Conagua) (2017) was consulted. This information was necessary to determine the distance that exists from the community of Las Vigas and where the eye of the hurricane was.

An unstructured interview was applied to the people who made up the sample of this study. In relation to the interview, although it was unstructured, there was a script, that is, the variables considered and dimensions were respected with regard to environmental, economic, social, culture and risk perception. The procedure to analyze the interview was through a qualitative analysis for each dimension. Finally, the description method was used to present results.

Tabla 1. Operacionalización de variable para la entrevista no estructurada a los habitantes afectados por el paso del huracán Max en Las Vigas, Guerrero

Categoría	Variable	Dimensión	Indicador	Instrumento (entrevista estructurada y no estructurada). Preguntas realizadas
Aspecto medio ambiente	Residencia en la calle o colonia. Nivel socioeconómico y cultural.	Pobladores oriundos y recientes.	Tiempo.	¿Cuánto tiempo lleva radicando en este lugar? ¿Desde cuándo se percató que las lluvias fuertes causan afectaciones? Ocupación, nivel escolar, vivienda, ingresos.
	Causas de las afectaciones.	Características del terreno.	Suelo.	¿Qué cree usted que causó la inundación?
	Percepción del huracán Max en la comunidad de Las Vigas.	Lluvias en la zona.	Intensidad de la lluvia.	¿Cómo percibió las lluvias originadas por el huracán Max?
Aspecto económico	Afectación económica.	Pérdida de bienes materiales.	Encharcamientos Camino, carretera, casa, etc. Electrodomésticos, animales, muebles, etc.	¿Qué problemas económicos presentó por las afectaciones producidas durante el huracán Max?
Aspecto social	Afectación social.	Salud. Servicios públicos.	Enfermedades. Servicio de luz, agua y telefonía Despensa familiar	¿Presentó algún problema en cuestión de salud, en los servicios públicos como luz, agua,

		Solidaridad social.	Apoyo gubernamental, de instituciones y particulares.	teléfono y abastecimiento de productos de la canasta básica? ¿Recibió apoyos por parte del Gobierno, de alguna institución o de algún particular?
Percepción del riesgo y Educación Ambiental para Sustentabilidad	Aplicación de estrategias ante fenómenos hidrometeorológicos y sus afectaciones o desastres. Actividades antropogénicas y promoción de conocimientos, habilidades, actitudes y valores para preservar el medio ambiente.	Percepción de riesgos ante amenazas y las afectaciones que pueden ocurrir. Comprensión de la relación que hay entre contaminación ambiental y cambio climático.	Medidas a tomar en caso de presentarse un fenómeno natural como lo es un huracán Afectación al medio ambiente y adquisición de saberes ambientales	¿Cómo percibe usted la presencia de un huracán?, ¿qué medidas conoce e implementa? ¿Contribuye en la contaminación ambiental a través de prácticas que deterioran el medio ambiente como dejando residuos sólidos en lugares no indicados, utilización de sustancias químicas, entre otros? ¿Conoce usted, tiene la habilidad y la actitud de contribuir en el cuidado del medio ambiente en el lugar donde vive?, ¿qué

				hace para cuidar el medio?

Fuente: Elaboración propia

Results

According to Conagua (2017), Hurricane Max in the Pacific Ocean developed between September 13 and 15, 2017. On September 13 at 10:00 a.m., tropical depression 16-E was formed 165 km to the south from Zihuatanejo, Gro., and 205 km west-southwest of Acapulco, Gro., with maximum sustained winds of 55 km / h, with a displacement to the northeast at 7 km / h and minimum central pressure of 1006 hPa. The system favored potential for rain, strong winds and high waves over Michoacán, Guerrero and Oaxaca. The antecedents of the depression in question, according to this organization, were formed 300 km south of Puerto Ángel, Oax. which was followed up from September 10 at 7:00 p.m. to July 13 at 7:00 a.m. At 4:00 p.m., on September 13, tropical depression 16-E developed into a tropical storm called Max, with maximum sustained winds of 65 km / h and gusts of 85 km / h, located 170 km to the south from Zihuatanejo, Gro., and 185 km west-southwest of Acapulco, Gro. On September 14, at 7:00 a.m., Max intensified and became a category one hurricane on the Saffir-Simpson scale, very close to the coast of Guerrero, 85 km southwest of Acapulco. At approximately 4:00 p.m. on the same day, the eye of hurricane Max, category one, impacted on the coastline near the town of Pico del Monte, south of Laguna de Chautengo, Gro., 15 km to the west from Copala, Gro., and 90 km east-southeast of Acapulco, Gro.

The distance in time that exists between the community of Las Vigas in the municipality of San Marcos and the community of Pico del Monte, in the neighboring municipality of Florencio Villarreal, is approximately 20 minutes by road. Due to this fact, the effects were similar and, consequently, the intense rains, airs and floods caused environmental effects and, in some cases, economic and social effects on inhabitants living in vulnerable areas, as it was with the people of the community of Las Beams

Socioeconomic and environmental variable: "Location in the place, socioeconomic level, perception of heavy rains and causes of flooding"

An interview was applied to 100 people of adult age. For the most part, they were housewives, farmers or farm workers, some young people who spent their time in some work, there were some merchants, some (a small part) professionals; some people without school level, others with grades of primary, secondary and even high school. Some live in houses of material, others in houses of adobe or other material. Some homes of the interviewees have drainage and electricity services; in others the drainage service is irregular. This information is related to the Sedesol Localities Catalog (2013), where it is stated that the degree of social backwardness of the community is low.

Most of the people interviewed commented that they are from the Las Vigas community; very few said that they had arrived from another place: some that they were some years old, others that their arrival was recent. The people interviewed live in the colonies or popular places known as El Aterrizaje, La Tabiquería, Colonia Santa Cruz (Calle Niño Perdido), La Dicha (Center), Canal, El Charco and El Tanque, these were the places where they presented with more force the affectations. Most answered that it was the first time that a hurricane or heavy rains caused damages and mostly floods; there were some people who commented that in previous hurricanes there had been rains, but not as strong as those registered during the passage of Max. Also, there had been floods, but not of this magnitude. Some recall the effects caused by the Paulina rains in 1997, however, they commented that they were less severe.

With regard to the causes of the flood, they commented that they were naturally, because they were rainy seasons; However, before it rained in June, July and August, and in September the rains were less. In recent years, it seems that the weather has changed, now the rains are in September, October and November. The disasters left by the hurricane was because it rained and the air was very strong. Due to a lot of water, the roads and highways were flooded, rivers became rivers and dragged garbage, mud, caused flooding, sinkholes, demolished bridges, such as the one in San Marcos. The rivers and streams overflowed because it rained a lot; This was the case with the San Marcos river and the Las Vigas stream, whose waters flooded the town's colonies. The causes of damage to the roads and highways occur because the authorities do not maintain the communication routes. In Las Vigas, people dump their waste in canals, puddles, the town stream; Furthermore, weeds grow around them. Nothing is done to keep this area clean. There is no suitable place or space for people to carry

their waste and most of the neighborhoods dispose of it in their surroundings, for example in the Santa Cruz neighborhood, in La Parota. Some commented that they know that there is a sanitary landfill on the side of the Sepudo, a place belonging to the community in question, but, even so, there are people who do not take their waste there because it is somewhat removed, therefore, they prefer to take it to the banks from town. El Charco, a body of water located in the colony that bears this name, serves as a deposit for waste, dead animals and other wastes on its banks, especially when it is dry season and water levels are at a minimum. Apart from being muddy, it does not have a drain, that is, the water has no outlet, it is dammed and in the rains this causes it to overflow. With respect to the Las Vigas stream, it also decreases in the dry ones and on the banks and in the interior part you can see waste of different types. It is silted, the weed grows in its vicinity and within it. Its sands have been removed by inhabitants and outsiders who make a profit. At first glance, it is observed that the sand has disappeared and in its place there has been mud or mountains of accumulated earth, which generates obstructions of water flows, which, in turn, in times of rain, implies a risk of leakage of its waters. What caused the overflow and, therefore, its departure to the neighboring colonies of the town, were not only the heavy rains, but also what people did by affecting this natural resource.

In relation to the irrigation canal that runs through the banks of the Las Vigas community, it is severely silted, weeds grow and garbage accumulates. In addition, it is canceled or completely covered in some sections. The interviewees commented that the water was piped in a section that crosses Las Vigas, the tubing made it possible for the canals to be canceled and the spaces to be filled with dirt and debris and, therefore, the characteristic of the land underwent modifications. In some other parts, the tubing was to one side of it, leaving the channels for the water to flow, however, these have been filled with rubble and waste that the people of the community take to deposit. With the fillings of earth and rubble that were made when the canal water was piped, the channels that had been left for the water to flow were closed. These fillings have prevented the water from entering the canals and the buffers caused the rise and return of the water to the homes of the affected colonies. Some people comment that Conagua personnel tell the inhabitants that the irrigation canals were not made to give fluidity to the water and that it enters Las Vigas, but that they were to irrigate the peasant fields of crops, however, the canal it had channels and these were canceled. The waters that accumulate in the El Panteón neighborhood accumulate and finally flow through channels that lead to the stream of happiness that runs along Plan de Ayala Street (market,

Benito Juárez Federal Elementary, until it reaches the channel). The outlet of this stream was also closed and this wastewater is distributed among the areas surrounding the canal.

Economic variable: "Loss of material goods due to floods and heavy rains"

Regarding material losses, some affected expressed that those who have orchards or planting plots had trees taken from them due to strong winds and water currents. These trees include lemons, mangoes, and palm trees. Also, some people who had coconuts for (sale) also lost them to strong currents. All the interviewees commented that they had material losses in their belongings, for example, furniture and white goods (refrigerators, washing machines, beds, living rooms, mattresses, beds, etc.), among others. There are people who lost animals they had for breeding: pigs, chickens, ducks, turkeys and cows, as well as dogs, cats and horses.

They all said that Hurricane Max brought a lot of rain, too much. That other hurricanes have passed but that this one felt strong. The streets were filled with water at considerable levels. They also commented that it was very airy, they called it gale. The heavy rain and the air together caused devastation on the roads and damaged the services, the telephone, the drinking water, the electricity, etc .; This meant that people who had businesses spoiled their products. Max's rains caused flooding in various parts of the town, although there were colonies that suffered more, where the water levels almost covered the houses: the El Charco neighborhood, in the Santa Cruz neighborhood, El Aterrizaje, in the Center, for the market street (the area known as La Dicha), also by the Pantheon area and the secondary one (near the stream). The floods damaged the structures of the houses and the belongings that were inside. Some people reported that strong currents took away cash from their homes and other valuables. There were isolated roads (highways): from Las Vigas to San Marcos, to Acapulco; and from Las Vigas to Cruz Grande. The water level made the road vulnerable. They flooded, they fell apart, trees that impeded the passage also fell, so the trade stopped completely. Some interviewees said that the losses in all areas were material and that there was no loss of human life, at least in the Las Vigas community.

Social variable: "Health, public services, social solidarity"

In terms of health, some people were physically and psychologically affected. In specifically physical terms, there were skin diseases, hives and rashes, in addition to colds. There was also the proliferation of flies (Aedes aegypti). In terms of emotional health, many people panicked about the rains (they did not sleep thinking that, if it rained, the water would reach them); they went to sleep in places that were not completely affected. Many also cried and lamented the losses they had, they did not assimilate having lost everything they achieved in years ago in a matter of hours.

Other problems that arise with the rains was the lack of water service. The whole year is irregular and in rainy seasons it is cut completely. Likewise, the electric power service, which takes days to be restored and the Federal Electricity Commission (CFE) takes time to appear to provide a solution to this service, however, the payment of the service is punctual. Lastly, television, the internet, and the telephone fail because they do not have electricity and this prevents communication with family members in disaster situations.

During the hurricane, with the floods, civil society was the one that organized to rescue people from their homes. Community groups of neighbors, family and friends supported to get people out of their flooded houses and into safe places. After the phenomenon, the disaster was still perceived: houses flooded, with mud, without furniture, without clothes, with broken appliances, dead animals; many people lost their belongings (clothes, pantry, money, etc.), they were carried away by the current and those that remained were useless; There was no electricity, telephone or internet service; food was scarce, tortillas were scarce because there was no light and firewood was wet; no drinking water; People could not be transferred to the municipal seat because the roads were cut off. At that moment, people shouted for help. The community suffered this situation for more than 15 days. As time passed, the situation normalized, however, there are families that took longer to overcome that moment.

From the second day and until almost a month later, help was arriving (pantries, clothes, mattresses, beds, bottled water and financial support for the most vulnerable families who had lost their assets completely). This help came from the contributions of civil society groups, the Government and some organizations or institutions. In the case of the Government, the National System for the Integral Development of the Family (DIF) provided some food pantries and clothing. Some interviewees commented that Civil Protection supported them with cleaning materials, although others mentioned that they did not realize

it. Many individuals and civil society groups supported those affected with pantries and clothing. The countrymen who are in the United States organized and supported the families who lost everything with financial resources. An institution that it supported at all times was the Church, through its priest, who supported in psychological matters, also in managing clothes, pantries, mattresses, etc. Other institutions that supported were schools. The schools of the Autonomous University of Guerrero came to provide support with pantries, clothing and medical services. Other schools supported, however, participants could not remember the name.

Variable: "Perception of risk and environmental education for sustainability"

The interviewees commented that they are not prepared or organized in the face of a contingency like the one that occurred with Hurricane Max. They commented that it is not fair to lose everything overnight, all their savings, everything they have bought based on their work so that a disaster occurs and takes it away in a matter of hours. However, they are grateful that the phenomenon that led to this situation was at times when people were awake, otherwise it would have been a major catastrophe, because many people would have drowned, because the currents would have surprised and, without electricity, they would not have seen where to walk or go out. They consider that what happened leads them to think and rethink the situation and that they should organize. They suggest identifying the causes of the underlying issue, and they wonder "why did this not happen before when a hurricane occurred or the rains were intense?" They comment that in the community there is a dependency of the Conagua and that they should request an explanation for what happened, since they consider that the rains affected the town due to some works that they carried out; For this reason, it is necessary to integrate a committee made up of inhabitants of the neighborhoods that were affected. They also reported that the flows and bodies of water such as the stream and the pond near the community influenced the flooding because they were the ones that overflowed, despite this, they have always been and their waters have never reached the colonies like now; There were some people who commented that in past torrentials the stream and the puddle had overflowed, but not like now. There is a lack of risk culture in the sense that the measures to deal with disaster situations caused by heavy rains and floods due to a natural phenomenon are unknown. Communication of environmental risks is necessary and must be provided to the community as a measure for the prevention

and mitigation of damages of various types. There is no coordination between citizens and responsible institutions that alert the population for these purposes.

In addition to the insufficient perception of risk, it is considered essential to promote an environmental culture with programs, courses or workshops on environmental education for sustainability, with themes aimed at the perception of risk, environmental problems, disasters caused by floods, climate change, global warming, greenhouse gases, hydrometeorological phenomena, so that the inhabitants of the communities, through non-formal perspectives of environmental education, form knowledge, skills and values for the care and preservation of their environment. Some actions that concern sustainable environmental education and that would impact on the care of the natural resources that the Las Vigas community possesses would be to form environmental committees that oversee the control and disposal of urban solid waste, prevent people from extracting considerable amounts of sand from the stream, avoiding littering, to name just a few. Another function of the committee would be to design a plan that involves representatives of neighborhoods vulnerable to floods with local and municipal authorities to design prevention actions and during the presence of disasters. There are endless actions that can be achieved through environmental education for sustainability.

Until the end of the 1960s, disasters caused by earthquakes, volcanic eruptions, hurricanes and floods were considered as extreme events in the physical or natural world, endowed with an "unpredictable" character, before which man and societies had little chance of Act. There are a series of social characteristics that can constitute factors that increase exposure to damage caused by geological, hydrometeorological or technological alterations, such as low income, age structure, type of families, as well as the lack of education of the population. population. This situation has posed a serious challenge for those responsible for planning and attending to emergencies. It can contribute significantly (through information, training and education) to prevention, mitigation and adjustment in disaster situations (Dettmer, 2002).

Discussion

This study has many similarities to the studies by Santiesteban et al. (2010, Rodríguez et al. (2013) and Guzmán and Rodríguez (2016), who refer to social and environmental impacts that resulted in damage to the community, the population and the environment caused by extreme hydrometeorological phenomena. In relation to the conditions of the place

and with the people who live in the community under study, significant levels were perceived in issues of vulnerability, low environmental culture and perception of risk. The foregoing finds a parallel with that mentioned by Rodríguez et al. (2013), who concluded that the disastrous results of the hurricane that hit the Santiago de Cuba province were due to the high vulnerability of this territory.

Vulnerability is framed on the premise that disasters are a complex mixture of natural hazards and human actions, so that the social, political and economic environment is a cause of disaster at a level of importance similar to the natural environment (Blaikie, cited in Angelotti, 2014). The intense rains and the strengthening of Hurricane Max were perceived by the entire community and mainly by the inhabitants of the selected neighborhoods. Hurricane Max was very strong and brought a lot of water, to such a degree that they compared hurricanes from previous years with this one and concluded that before they had not had as many effects as now. Many people still do not understand that human beings are the ones who alter the weather conditions with the harmful actions they cause to the environment. The modification of the climate implies raising or lowering temperatures, which influences the occurrence of droughts or intense rains and others.

Human intervention in nature has generated impacts that negatively affect the integrity of ecosystems (Rodríguez, 2007). Various studies suggest a higher frequency of hurricanes due to global warming (Cárdenas, 2010). In the community under study, Hurricane Max brought damage and disasters, damage to infrastructure and interruption of basic services. Likewise, the population suffered environmentally, economically and in other social aspects. These claims are also similar to the results of studies conducted by Santiesteban et al. (2010), Rodríguez et al. (2013) and Guzmán and Rodríguez (2016). Disasters caused by hydrometeorological phenomena cause severe damage and, at the same time, to repair them, they require heavy investments. This implies a setback or social stagnation; the authorities and society in general must be prepared to face such a situation. Disasters tend to be “more and worse” due to the confluence of the impacts of the action of world elites on the environment (Mitlin and Satterthwaite, cited in Rodríguez, 1996); there is a chain of disasters of natural origin with technological disasters and with urban growth that generates complex spatial patterns of vulnerability (Rodríguez, 1996). A hurricane, due to weather conditions, occurs naturally, however, its intensity is associated with human activities and other factors.

The participants in this study consider that heavy rains have occurred in other times and have not caused damage like now. The damage or damage is associated with what the target population commented in the sense that there were some factors that influenced these areas of the community to be affected. Thus, it is understood that the effects were not only due to excessive rainfall, but also due to anthropogenic activities carried out by the population, lack of desoiling of streams or channels, even due to the inadequate disposal of solid waste, among others. Also included in the equation is the pollution that occurs daily, due to which the climate has changed.

The effects that occurred in the community were due to the overflow of the stream, the pond and the irrigation channels, also because the levels of land were modified in the areas where they are located, consequently, a section of the irrigation channel was piped , this on the shores of the Santa Cruz neighborhood and the Tabiquería. The presence of solid waste in the affected area, in the puddle and water tributaries, the cancellation of canals that served as water drains, heavy rains and winds contributed to this situation. With this it is understood that there were other factors involved. The causes appear to be similar to the reference studies in this study. The government agencies finally provided pantries and other materials, such as cleaning supplies, for example; The population was not supported in repairing damages, however, some say that some support was received.

Regarding the perception of risk, neither the people nor the authorities are organized to face situations like these, there was no plan to investigate and correct some causes that originated the problem. Undoubtedly, citizen participation, from civil society groups, supported from the moment of the contingency, to get people out of their houses when they were being flooded, and later some people and institutions supported with clothes, pantries, medicines, among other actions. The support of institutions such as the parish of the same community and schools was also observed, mainly from the Autonomous University of Guerrero.

With regard to the lack of coordination between the Government and society to act in cases like these, the need arises to propose prevention and action strategies in the face of contingencies like these. According to Rodríguez (1996), it is considered necessary to discuss the modalities, scope, limitations and perspectives of citizen participation in disaster prevention, closely related to the necessary autonomy of civil society with respect to public powers, as well as to the still distant decentralization of fundamental decisions (that have to

do with life itself) towards society and local levels of government, especially in underdeveloped countries.

Various studies have found that calamities of natural or human origin tend to affect the poorest and most vulnerable socially, economically and culturally groups. Several countries frequently exposed to disruptive events (such as Japan, Australia, the United States and Colombia) have developed preventive strategies supported by formal and informal education, training and the wide dissemination of information (with the help of schools, social organizations, social organizations, companies and the media), thanks to which material and human losses caused by natural and technological disasters have been significantly reduced (Dettmer, 2002). This assertion positions education as a fundamental tool for people not only to acquire prevention strategies, but to minimize the risks and problems (disasters) caused by natural phenomena.

Conclusions

Natural disasters place people to live moments of anxiety and to raise concerns about what happened. Tensions become needs where those affected request to cover them. At that time, social solidarity is of utmost importance where individuals, institutions or civil society groups support the adverse situations that these people suffered.

This study served its purpose and answered the questions raised about the impact caused by the effects that some people suffered in the passage of Hurricane Max in the community studied.

In relation to the above, it was identified in the revised bibliography that there is a relationship between anthropogenic activities, environmental pollution and climate change and, therefore, hurricanes. Although the hurricane is a natural phenomenon, in some cases its effects are complicated by the social vulnerability and the area where they represent, also because the people who live there are unaware of the measures or of acting in the face of the risks that it implies, as well as because of the environmental culture they possess, it is insufficient.

In Las Vigas, Hurricane Max had environmental impacts, rains and strong winds, which caused falling trees and overflowing bodies of water, which caused immense currents and floods and this, in turn, led to damage in road infrastructure, housing, loss of material

goods, among others. In parallel, other internal and social problems arose, as described in the results and discussion of the analysis presented.

In Las Vigas, many people unconsciously affect the environment with their harmful practices, with the inadequate handling and disposal of the waste they produce, which can contaminate the soil and the air, for example. In some cases, local farmers irrationally use pesticides and agrochemicals to eliminate pests, or also as a fumigation method to eliminate the grass in their gardens and even in their homes. Examples like these make it possible to understand the impact on the environment. It was also found that inhabitants extract sand from the stream, leave residues inside the pond and stream of the town, modify land structures without conducting environmental impact studies, this leads to making the area vulnerable and, therefore, the inadequate perception of risk is reflected in the inhabitants.

Thus, the vulnerabilities of floods in the area are for two reasons, the natural ones and the effects and modifications made by people. Some citizens commented that previously it was flooded, but not to a great extent. With Max the limits were exceeded, then, the natural thing is the heavy rains and the other part was the effects that people make to the environment and to the modification of the areas.

Undoubtedly, it is important that local people promote knowledge, skills and values through environmental education for sustainability to develop prevention and mitigation strategies for environmental risks that affect the integrity of the community in general.

Due to global warming, in these times and those to come hurricanes will be of great magnitude and, due to this fact, more devastating; correspondingly, people living in communities with characteristics such as those described in this study should be prepared, although there are some factors that prevent this from being achieved, among them obviously social vulnerability, poverty, lack of education, environmental thinking and risk perception culture. The aforementioned is related to Dettmer (2002) when he affirms that there are indeed factors that prevent people from responsibly facing the effects produced by said phenomena, however, he does not fail to mention education and the very important role it plays. Education must incorporate the importance of the environment with a sustainable approach, that is, make people understand that the preservation and conservation of the environment is extremely important to achieve the social sustainability that is required.

Future lines of research

This study is a reference for future research taking place within the field of environmental sciences, environmental education for sustainability and studies on the perception of environmental risks. As in similar investigations carried out in other parts of Mexico and in some countries, this sets the standard to understand what were the causes and effects caused by floods and others in the passage of Hurricane Max. It is a direct reference for studies carried out in this community or area and mainly in the state of Guerrero. When phenomena of this nature usually occur, floods and environmental effects are seen in various parts, together with economic and social effects. It is suggested to guide lines of research in the identification of causes that originate disasters and provoked floods. There is the uncertainty of knowing the origin of the causes when a flood occurs. People commonly comment that it is due to the passage of the hurricane or the intense rains, however, excessive practices for affecting the environment and the modifications made to the land also influence this. The result and analysis understood set the tone to suggest that the population promote the culture of risk prevention and the environment through environmental education for sustainability in order to help promote knowledge, skills and values in the care and preservation of the environment in inhabitants of the community under study.

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