

SECRETARÍA DE PROTECCIÓN CIVIL

**INSTITUTO PARA LA GESTIÓN INTEGRAL DE RIESGOS DE DESASTRES DEL
ESTADO DE CHIAPAS**

**ESCUELA NACIONAL DE PROTECCIÓN CIVIL CAMPUS UNIVERSITARIO
CHIAPAS**

**RESEARCH PROJECT
UNDERSTANDING THE HAZARDS GENERATED BY DISASTER-CAUSING
PHENOMENA**

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UNDERSTANDING THE HAZARDS GENERATED BY DISASTER-CAUSING PHENOMENA

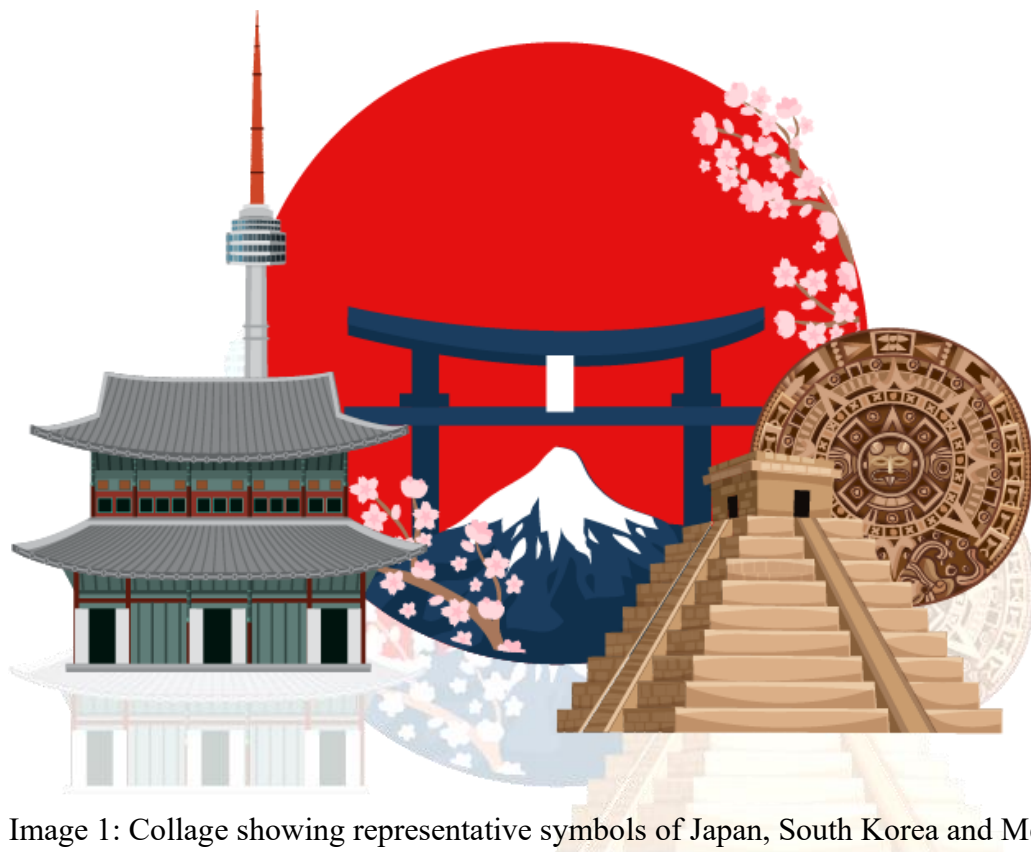


Image 1: Collage showing representative symbols of Japan, South Korea and Mexico.
(Minerva Negroe)

RESEARCH PROJECT IN JAPAN, SOUTH KOREA AND MEXICO.



**ESCUELA NACIONAL
DE PROTECCIÓN CIVIL
CAMPUS UNIVERSITARIO
CHIAPAS**

September 2024



RESUMEN.

Esta investigación se centró en medir el grado de comprensión sobre los peligros y consecuencias de fenómenos perturbadores que causan desastres en Japón, Corea del Sur y México. Mediante la aplicación de una encuesta piloto usando un juego de tarjetas, se evaluó lúdicamente en el público objetivo su conocimiento sobre diversos riesgos naturales o humanos, su susceptibilidad en una escala subjetiva simple, y su preparación frente a una calamidad.

La comparación del nivel de cultura en cuanto a la comprensión de los peligros a través de un juego me permite reconocer la importancia de aplicar las etapas de la gestión del riesgo de desastres (GIRD), entendiendo que el primer paso es la Identificación de los riesgos y notando que la falta de percepción de las amenazas puede provocar que las personas o comunidades no gestionen adecuadamente la posibilidad de sufrir daños cuando el riesgo de desastres se materialice, es decir, al subestimar el riesgo por no entender la amenaza, se aumentará la vulnerabilidad en varios aspectos.

La información generada fue plasmada en estadísticas de comprensión de amenazas, involucrando diferentes riesgos, así como la propuesta en la simplificación de las 8 etapas de la GIRD, en un modelo poblacional más comprensible, que sustenta nuevas perspectivas de investigación, difusión y retroalimentación para brindar un conjunto de recomendaciones a grupos científicos y autoridades interesadas.

Palabras clave.

Peligro 1, susceptibilidad 2, riesgo 3, exposición 4, lúdico 5, Gestión Integrada del Riesgo de Desastres 6.



ABSTRACT

This research focused on measuring the degree of understanding about the dangers and consequences of disruptive phenomena that cause disasters in Japan, South Korea, and Mexico. Through the application of a pilot survey using a card game, the target audience's knowledge about various natural or human risks, their susceptibility on a simple subjective scale, and their preparedness for a calamity were playfully evaluated.

The comparison of the level of culture in terms of understanding hazards through a game allows me to recognize the importance of applying the stages of comprehensive disaster risk management (CDRM), understanding that the first step is the Identification of risks and noting that the lack of perception of the hazards can cause people or communities to not adequately manage the possibility of suffering damage when the risk of disasters materializes, that is, by underestimating the risk due to not understanding the hazard, vulnerability will be increased in various aspects.

The information generated was captured in hazardous comprehension statistics, involving different risks, as well as the proposal in the simplification of the 8 stages of the DRM, in a more understandable population model, which supports new research, dissemination and feedback prospects to provide a set of recommendations to scientific groups and interested authorities.

Keywords.

Hazard 1, susceptibility 2, risk 3, exposure 4, playful 5, Integrated Disaster Risk Management 6.



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JAPAN – SOUTH KOREA - MEXICO PROJECT.

INTRODUCTION

Disasters represent a significant threat to populations, ecosystems and economies worldwide. All consequences and damages are caused by risks that are not managed correctly and in a timely manner.

Understanding the dangers associated with destructive phenomena is truly essential in order to have adequate Integrated Disaster Risk Management (IDRM), whether these are derived from natural or human-generated sources, thereby allowing for the correct identification of risks and their consequences.

Diversity in perspectives on understanding risks and their components can make a big difference in the way people, communities, authorities and scientists face the challenge of engaging in multiple tasks such as risk identification, forecasting, prevention, mitigation, preparation, response and recovery from the devastating effects of disasters.

Risk can be defined as, ***The probability of an event occurring or exposure to a hazard that may cause injury or illness (1). It is also understood as the likelihood of an adverse event or harm occurring over a period of time and the severity with which it will occur (2).***

(1). Source: *Pagina Institucional DANE. (Inducción y Reinducción)*

(2). Source: *Guía metodológica para realizar diagnósticos sobre la percepción local del riesgo de desastres*



Understanding Risk through the formula.

$$\text{RISK} = \text{HAZARD} \cdot \text{EXPOSURE} \cdot \text{VULNERABILITY}$$

The concept of risk is fundamental in disaster risk management and sustainable development planning in civil protection matters.

RISK OF DISASTER

Probable damage or loss to an affected agent, resulting from the interaction between its vulnerability and the presence of a disturbing agent. The formula. ***RISK = HAZARD X EXPOSURE X VULNERABILITY (3)***. Provides a theoretical framework to understand and quantify the risk associated with adverse events, especially in contexts of disasters generated by natural or human-caused phenomena.

It is important to analyze whether people in a population recognize the components of the **RISK formula** and their **INTERRELATIONSHIP** as well as their application in the difficult task of controlling risk.

It must be considered that an affectable system will be damaged by the risks of disturbing agents that may impact it and that regulatory agents have the appropriate tools to safeguard the inhabitants of a community, protect their assets and care for the environment derived from the risks of disasters.

The meaning of hazard is ***any source, situation or act with a potential to produce harm in terms of an injury or illness, damage to property, damage to the environment or a combination of these (4)***.

(3). Source: Centro Nacional de Prevención de Desastres. Presentación. Ciudad de México. 13 de enero de 2020. *Gestión Integral del Riesgo de Desastres, Nueva visión de la protección civil*.

(4). Source: *Página Institucional DANE. (Inducción y Reinducción)*



“THERE ARE NO RISKS WITHOUT DANGERS” this means that the risk matrix can only be calculated by assessing the type of danger to which one is exposed and how susceptible society is, in order to determine the level of preparation and thereby reduce the damage.

That is to say, the basis for assessing the factors to understand the probability of an adverse event occurring and determining whether it is of low, medium or high risk level, is found especially in the appreciation of something “dangerous” in addition to evaluating the degree of exposure combined with the reduction of vulnerability by increasing people's response capacities.

As an example, the safety of the population affected by HURRICANE (TYPHOONS) only applies to those areas that are identified as risk zones, in addition to having plans for prediction, prevention, mitigation, human and material preparation, emergency response, repair and reconstruction when this hydrometeorological phenomenon materializes.

Visitors who come to that affected community during the most active season for that meteor will be more likely to be harmed because they do not recognize the risk. The same will happen if the residents of that area do not correctly perceive the dangers and their consequences or if their interpretation is wrong, underestimating or denying the possible occurrence.

An HURRICANE EMERGENCY PLAN will not be adequate if it is carried out only from the point of view of government responsibility or through the best actions of various Non-Governmental Organizations, when the active and direct participation of the population is essential to investigate and recognize if the area where they live or work is exposed to dangers, consequences and how to protect themselves based on the broad aspects of DRM.



We must improve the way we interpret the dangers to which we are exposed and recognize the level of susceptibility in each type of risk, considering that its frequency is increasing due to uncontrolled urbanization, population growth with limited education on issues of *recognition of dangers and their exposure*, the lack of a correct culture of prevention and preparation for threats *increases the vulnerability* of people and their communities, in addition to the complications generated by climate change and the lack of understanding of scientific research by experts or regulations by authorities regarding disaster risk reduction.

Another key is to reduce the susceptibility or propensity to damage. That is:

$$\text{VULNERABILITY} = \text{EXPOSURE} \times \text{SUSCEPTIBILITY} / \text{RESILIENCE} \text{ (5)}$$

Exposure is the condition of disadvantage due to the location, position or location of a subject, object or system exposed to risk.

Susceptibility is the degree of internal fragility of a subject, object or system to face a threat and receive a possible impact due to the occurrence of an adverse event.

Resilience is the ability of a system, community or society exposed to a threat to resist, absorb, adapt to and recover from its effects in a timely and effective manner, including the preservation and restoration of its basic structures and functions.

(5). Source: Centro Internacional de Investigación sobre El Fenómeno El Niño. Aproximación.



It is imperative that decision-makers, professional and technical experts who carry out research, and society itself, work in a coordinated manner to fully understand the damages resulting from risks, in order to implement effective measures that minimize the impact of disasters and allow for a rapid and sustainable recovery of affected populations.

Through this research project called **UNDERSTANDING HAZARDS GENERATED BY DISASTER-CAUSING PHENOMENA**, it is our wish to join the efforts of academic institutions, government authorities, communities and people interested in disaster risk reduction, promoting a more interactive methodology for the recognition of the dangers to which one is exposed, their consequences and the level of susceptibility.

We consider it relevant to make an appropriate comparison in three countries with a high cultural level, such as Japan, South Korea and Mexico, in order to open up a panorama of possible paths and thus achieve risk management that is more faithful to current reality.

The enthusiastic group of collaborators involved in this research project are undergraduate students at the National School of Civil Protection, Chiapas University campus, and we are convinced that we are planting a seed with the hope that it will provide growth for future projects with great potential.

We have great added value. Thanks to one of our collaborators with hearing impairment (deafness), we can expand our population reach in the development of this project, thus recognizing his valuable effort.

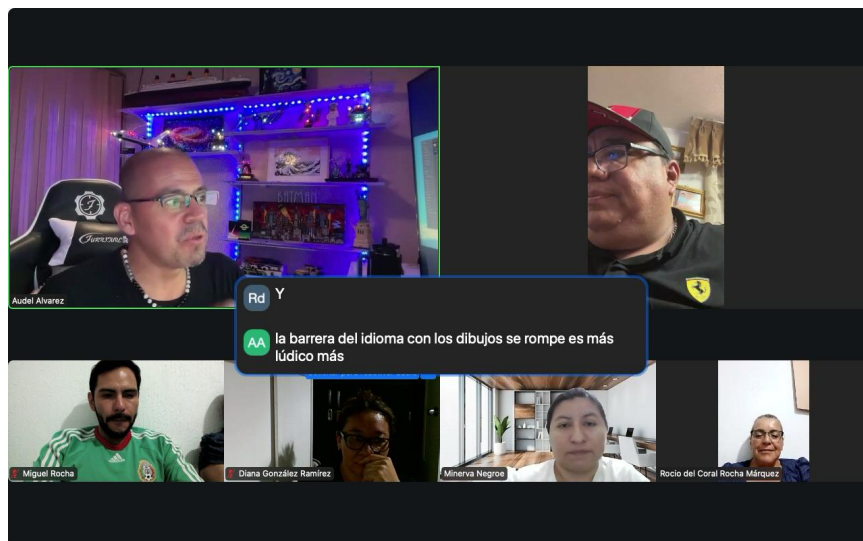


Photo 1: Formal meeting with the members who collaborate in the development and execution of the JCSM project.



Photo 2: Emergency meeting of adjustments and agreements with the members who collaborate in the development and execution of the JCSM project.



OBJECTIVE

To implement a playful research method to compare the level of understanding of the hazards generated by phenomena that cause disasters, through a set of diverse pictographic cards, to be applied to a target audience in three different countries in its first stage, as a pilot test.

At the end of the research, the aim is to collect data to carry out statistics on the perception and preparation of the population under study and to analyze the knowledge associated with the different dangers, consequences, degree of susceptibility, and level of preparation associated with the possible impact of various destructive phenomena of natural or anthropogenic origin in a certain study area selected in advance, these being in "Kyoto Japan", "Seoul South Korea", and various entities in our "Mexican Republic".

This research project seeks to identify gaps in the understanding of the hazards of each destructive phenomenon and to propose an inclusive model that addresses these deficiencies. Obtaining statistical numbers based on the application of the pictographic card game, on the subject of **understanding the hazards generated by disasters causing phenomena** can be summarized in the following points:

1. To verify in a target audience whether they recognize a certain number of disturbing phenomena that may occur in a zone or area with the possibility of impact and that have destructive potential.
2. Identify in a target audience the level of understanding of the dangers and consequences generated by disturbing phenomena.
3. Analyze and trace the estimation of the target audience's vulnerabilities, considering the subjectivity in the responses reflected in a previously developed susceptibility scale.
4. Understand how the target audience perceives activities that may influence their preparedness and response to emergency situations arising from the selected disruptive phenomena.



5. Collect information on the level of preparedness of the population, considering their access to information and resources provided by government authorities or NGOs present in the project implementation area.

At the end of the process, we are interested in providing the statistical data to institutions or entities with decision-making capacity, with the aim of promoting future educational activities for the target audience. This will serve to improve understanding, preparation and adequate response to disaster risks, thus contributing to the construction of more resilient communities.

To achieve this goal, the project will seek to simplify the eight crucial phases of integrated disaster risk management and reduce them to a structure composed of three key aspects. This is necessary since the language commonly used by the population has not adequately incorporated DRM to respond effectively to these devastating events.

Integrating risk elements into development processes “doing what we do better”

Risk governance

It is based on an adequate understanding of risks and their systemic nature. Public Policy instruments must expressly include the DRM, reflecting the multidimensional and systemic nature of risk, in all areas of government. (6)

(6). Source: *Coordinación de Políticas Públicas para la Prevención de Desastres. Presentación. Herramientas de Transversalización de la Política Pública para la Gestión Integral del Riesgo de Desastres. Diciembre 2022*



That is: of these 8 stages based on *the General Law of Civil Protection (LGPC) and the Comprehensive Risk Management (DRM)*. (7)

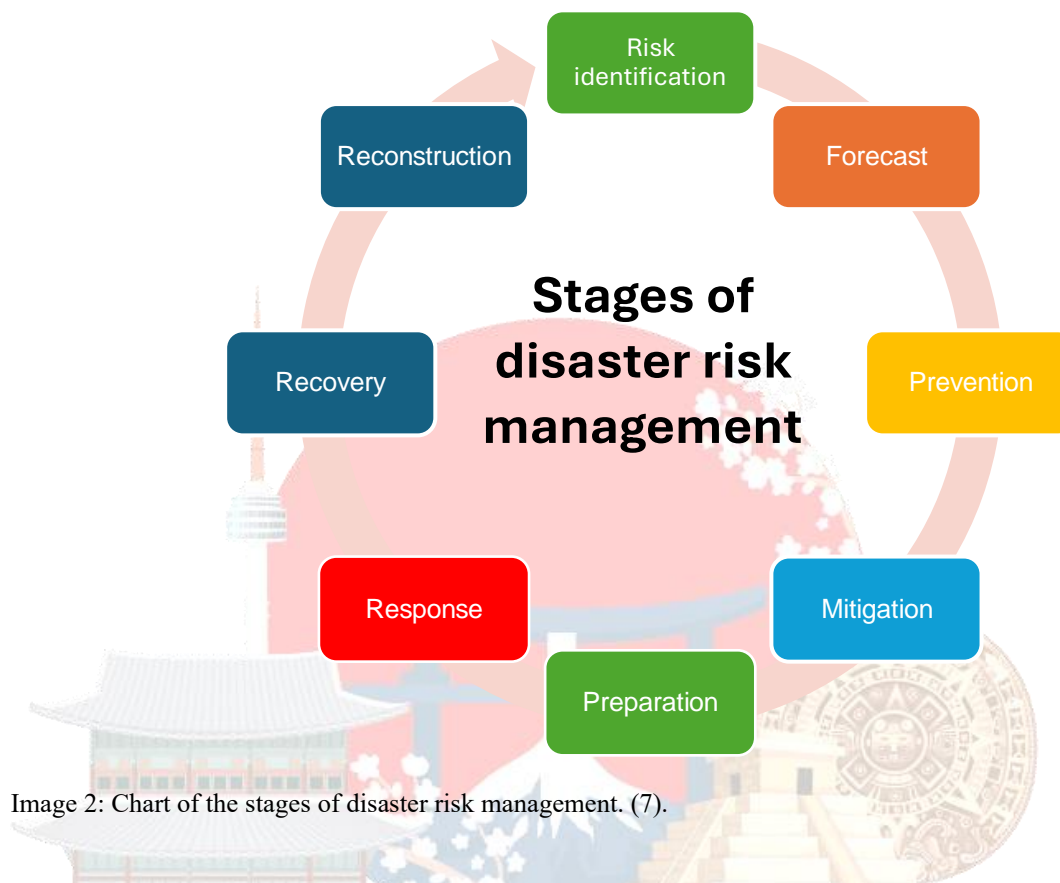


Image 2: Chart of the stages of disaster risk management. (7).

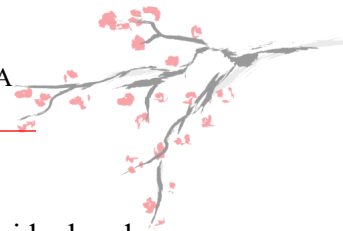
One of several principles of DRM.

It is being inclusive and with full respect for human rights, non-discrimination of people and communities, priority to the most vulnerable groups, as well as gender equality (7).

Note. That is why we use pictograms in this project to support people with hearing disabilities. There is a deaf person in our team who seeks to highlight the importance of his sector in the comprehensive management of disaster risks.

(7). Source. Seminario de Introducción a la Gestión Integral de Riesgos para Responsables Municipales de Protección Civil. Presentación. Los principios de la Gestión Integral de Riesgos. Febrero 2019

https://www.gob.mx/cms/uploads/attachment/file/449065/2._Los_Principios_de_la_Gesti_n_Integral_de_Riesgos.pdf



Simplification of the elements established to analyze the perception of both individual and community actions.

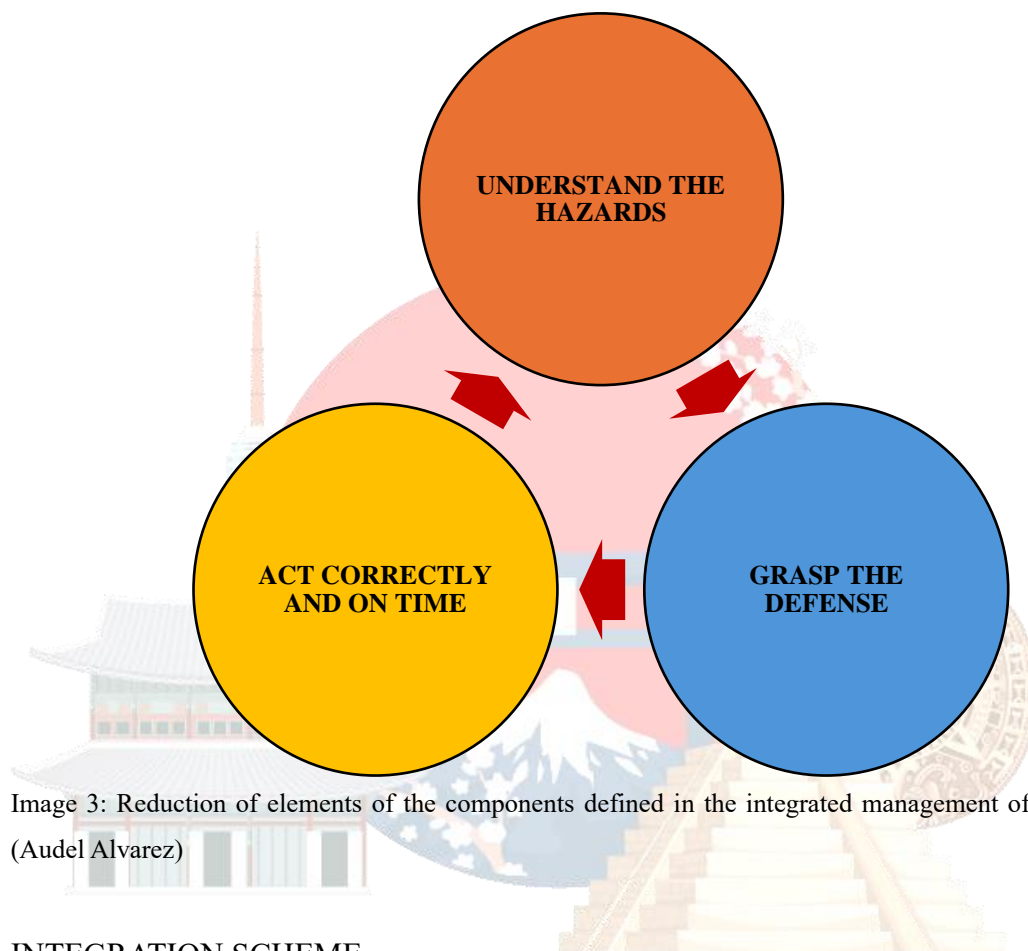


Image 3: Reduction of elements of the components defined in the integrated management of disaster risks. (Audel Alvarez)

INTEGRATION SCHEME.

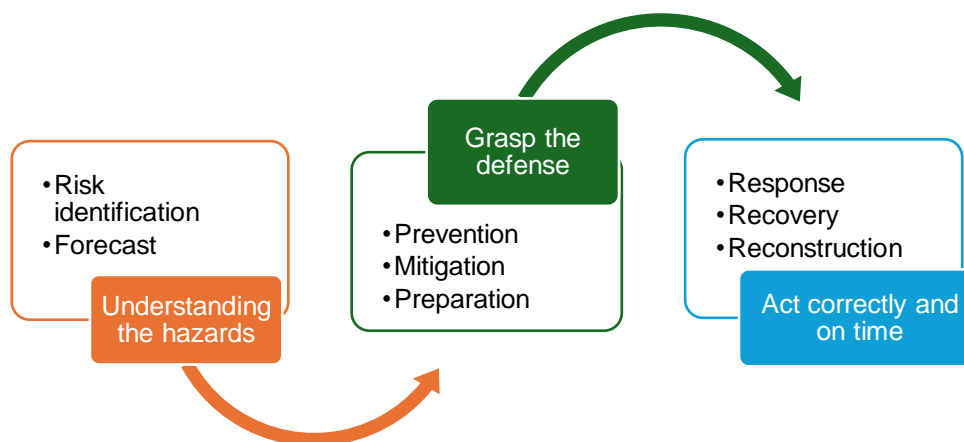


Figure 4: Integration of the defined components of the GIRD and the reduced elements. (Audel Alvarez)



JUSTIFICATION

The increase in the frequency and intensity of disruptive phenomena demands a greater understanding of the dangers they represent.

Lack of information and adequate preparation can result in the loss of human lives and property, leaving communities more vulnerable and unable to respond to these events.

The absence of a culture of prevention and resilience in the population is a factor that increases vulnerability to various types of threats. When people lack the knowledge, skills and resources necessary to recognize, prepare for and respond appropriately to dangers, they find themselves in a situation of greater risk and lack of protection.

The deficiency in adequate risk management manifests itself in several aspects:

- **Lack of awareness of hazards:** People are not sufficiently informed about the different types of hazards that can affect their community, whether of natural, technological or social origin.
- **Low risk perception:** People often underestimate or minimize the probability and impact of disruptive events, leading them to be less prepared.
- **Insufficient preparation:** Communities lack special programs specific to the type of risk detected, without standardized protocols and capacities to effectively deal with emergency situations or disasters.
- **Limited resilience:** People and institutions have a reduced capacity to recover and strengthen themselves from the impacts of adverse events.



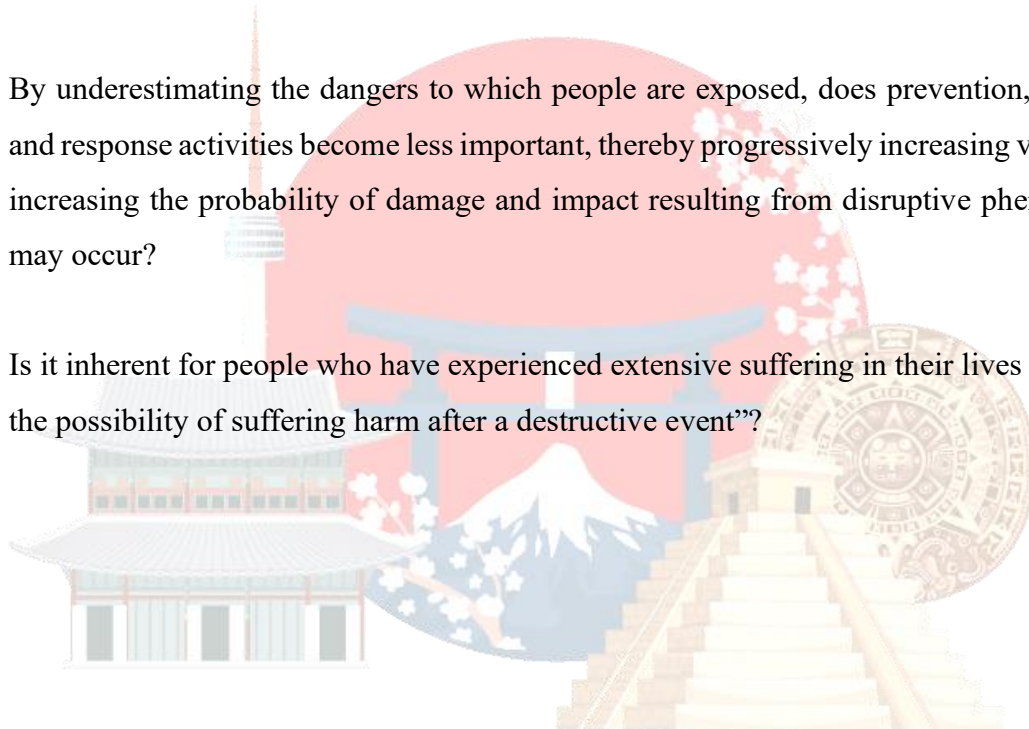
HYPOTHESIS

Does adequate education and training directly influence understanding of hazards and reducing vulnerability in communities?

Is ignorance of hazards an important factor in risk perception and vulnerability reduction in communities in the presence of a disruptive phenomenon?

By underestimating the dangers to which people are exposed, does prevention, preparation and response activities become less important, thereby progressively increasing vulnerability, increasing the probability of damage and impact resulting from disruptive phenomena that may occur?

Is it inherent for people who have experienced extensive suffering in their lives to “deny the possibility of suffering harm after a destructive event”?





PROBLEM STATEMENT

Despite the efforts of institutions and agencies in disaster risk management, many people and/or communities lack a clear understanding of the hazards they face in their respective localities. That is, even with great advances in the prediction and communication of disaster risks, many people remain vulnerable due to the lack of a clear understanding of the hazards to which they are exposed due to some disturbing agent.

Traditional approaches often do not consider the changing particularities of risks due to their own dynamism associated with cultural ideologies and uncertainty in social actions, which limits the effectiveness in risk identification, forecasting, prevention, mitigation, preparation, relief, recovery and reconstruction measures.

Through field research, identifying the level of understanding and ideology about hazards and their consequences, as well as the susceptibility to risks from destructive phenomena in a community or global social sector can reflect its culture. This serves as a reference for evaluating progress or regression in disaster risk management.

Present conclusions accompanied by recommendations addressed to those interested in risk mitigation, scientists specialized in disaster management, civil protection authorities, and educational entities that promote the educational process. This will support a change in the methodological paradigm to identify the level of perception of the risks previously raised.



CONCEPTUAL THEORETICAL FRAMEWORK.

Interrelations between components

The formula “**RISK = HAZARD • EXPOSURE • VULNERABILITY**” illustrates how each component influences the others. (3).

Hazard and Exposure: A significant hazard in an unexposed area may not result in harm. However, in areas with high exposure, the same hazard can have devastating consequences, this link is called **Threat**.

Exposure and Vulnerability: Two communities may be exposed to the same hazard, but their ability to cope may vary. A community with robust infrastructure and disaster education programs may experience less damage than a community vulnerable to such interaction, which we will identify as **the Cumulative Effect**.

Hazard and Vulnerability : Vulnerability can amplify the impact of hazard. A low-intensity natural event can wreak havoc on a highly vulnerable community, while a well-prepared community could handle the same event with minimal consequences, i.e. **Differential Impact**.

“VULNERABILITY = EXPOSURE x SUSCEPTIBILITY / RESILIENCE” (5)

(3). Source: *Centro Nacional de Prevención de Desastres. Presentación. Ciudad de México. 13 de enero de 2020. Gestión Integral del Riesgo de Desastres, Nueva visión de la protección civil.*

(5). Source: Centro Internacional de Investigación sobre El Fenómeno El Niño. Aproximación para el cálculo de riesgo. Definición de riesgo. *Vulnerabilidad = [Susceptibilidad / Resiliencia] • Exposición.



Conceptualizations of DRM and simplification to improve population understanding.

To unify the criteria that integrate the approaches, it is necessary to know some definitions.

Comprehensive Risk Management

- Set of actions aimed at the identification, analysis, evaluation, control and reduction of risks, considering them for their multifactorial origin and in a permanent process of construction, which involves the three levels of government, as well as the sectors of society, which facilitates the realization of actions directed to the creation and implementation of public policies, strategies and procedures integrated to the achievement of sustainable development guidelines, which combat the structural causes of disasters and strengthen the resilience or resistance capacities of society. It involves the stages of: identification of risks and/or their formation process, forecasting, prevention, mitigation, preparation, response, recovery and reconstruction.

Dangers and risks from natural phenomena (8)

- Hazard or threat: probability of occurrence of a potentially damaging phenomenon in a given period. The hazard potential is measured by its intensity and return period.
- Exposure: Number of people, property, assets and infrastructure that are likely to be damaged.
- Vulnerability: propensity of exposed systems (human settlements, infrastructure) to be damaged by the effect of a disturbing phenomenon.
- Risk: probability that a hazard will become a disaster. Combination of the probability of an event occurring and its negative consequences. The factors that compose it are threat and vulnerability.

(8) Source: Servicio Geológico Mexicano. *Peligros y riesgos por fenómenos naturales*
<https://www.gob.mx/cms/uploads/attachment/file/157799/Peligros-y-Riesgos.pdf>



Stages of DRM.

- **Risk Identification:** Recognize and assess the probable losses or damages to the affected agents and their geographic distribution, through the analysis of hazards and vulnerability.
- **Foresight:** Becoming aware of the risks that may occur and the needs to confront them.
- **Prevention:** Set of actions and mechanisms implemented prior to the occurrence of disturbing agents, with the aim of knowing the dangers or risks, identifying them, eliminating them or reducing them; avoiding their destructive impact on people, property, infrastructure, as well as anticipating the social processes of their construction.
- **Mitigation:** Any action aimed at reducing the impact or damage caused by the presence of a disturbing agent on an affected agent.
- **Preparation:** Activities and measures taken in advance to ensure an effective response to the impact of a disruptive phenomenon in the short, medium and long term.
- **Response:** Response to help people at risk or victims of an accident, emergency or disaster, by specialized public or private groups or by internal civil protection units as well as actions to safeguard other affected agents.
- **Recovery:** Process that begins during the emergency, consisting of actions aimed at returning the affected community to normality.
- **Reconstruction:** The temporary action aimed at achieving the normal social and economic environment that prevailed among the population before suffering the effects produced by a disturbing agent in a certain space or jurisdiction. This process should seek to reduce existing risks as much as possible, ensuring that new risks are not generated and improving pre-existing conditions.



Below is a simplified version of the DRM stages for proper population understanding, considering that summarizing them will be more easily assimilated by the target audience, which increases preparation to reduce the consequences of a disturbing phenomenon.

- 1) **UNDERSTANDING THE HAZARDS:** Examining the individual, family or collective perception about the main component of risk identification and the additional prevention measures, influences people's behavior in the face of a possible disaster.
- 2) **GRASP THE DEFENSE:** This stage covers the stages of prevention, mitigation and preparation for the risks associated with each phenomenon.
- 3) **ACT CORRECTLY AND ON TIME:** The importance of improving the immediate response and prompt recovery as well as the reconstruction of an affectable agent is highlighted , based on efficiently and effectively facing possible damage when the risk materializes.

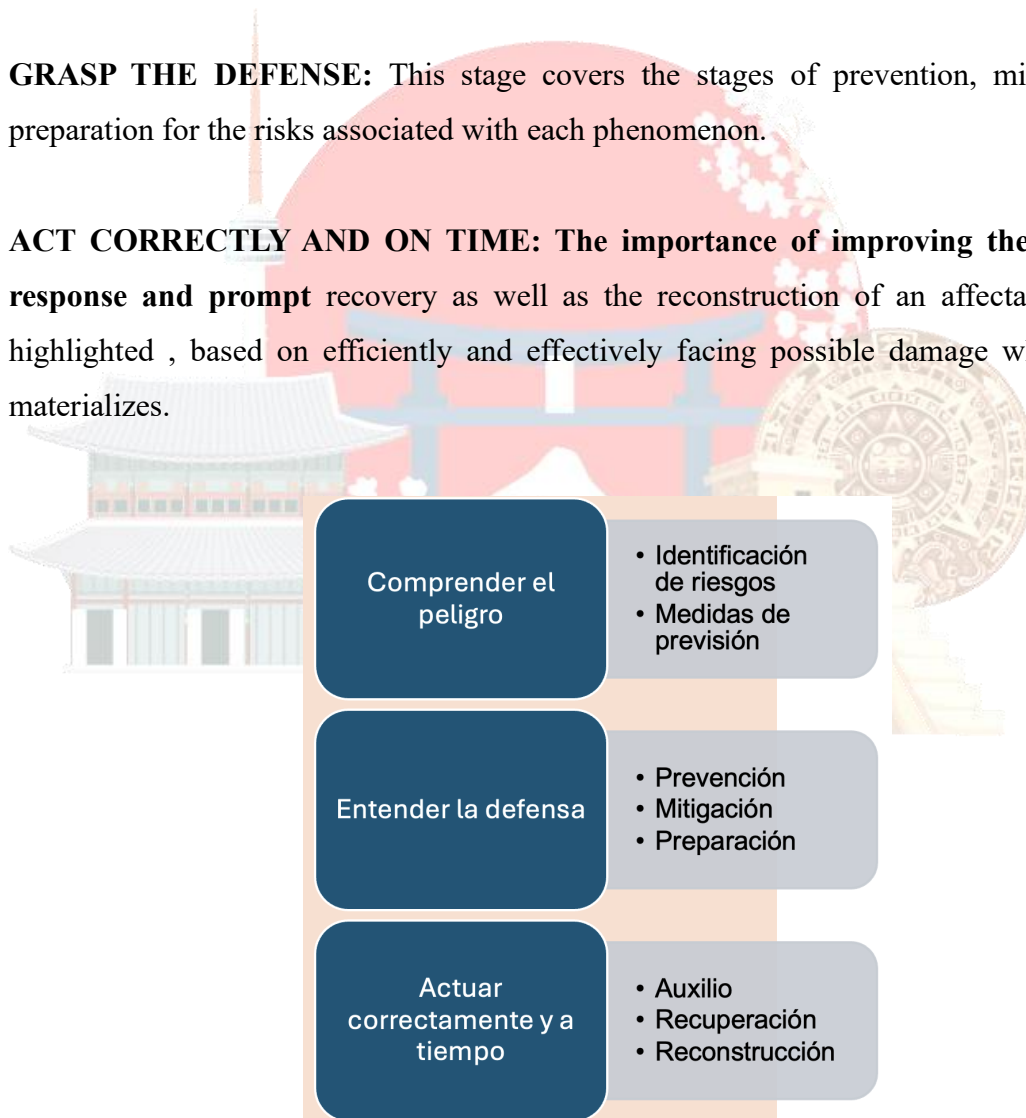


Image 5: Reduction of elements of the 8 components of the GIRD. (Audel Alvarez)



Complement of the definitions.

Resilience (9)

- Capacity of a system, community or society potentially exposed to a hazard or after having been exposed to it to resist, assimilate, adapt to and recover from its effects in a short period of time and efficiently, through the preservation and restoration of its basic and functional structures, achieving better future protection and improving risk reduction measures.

Disturbing phenomena.

- **Geological:** Earthquakes, volcanic eruptions, tsunamis, slope instability, flows, falls or landslides, subsidence and cracking.
- **Hydrometeorological:** Tropical cyclones, extreme rainfall, pluvial, river, coastal and lake floods, snow storms, hail, dust and electricity, frost, droughts, heat and cold waves and tornadoes.
- **Chemical - Technological:** Fires of all types, explosions, toxic leaks, radiation and spills.
- **Sanitary - Ecological:** Epidemics or plagues, air, water, soil and food contamination.
- **Social-Organization:** Demonstrations of social discontent, mass concentration of population, terrorism, sabotage, vandalism, air accidents.
- **Astronomical:** Solar storms, meteorite impacts

(9) Source: Ley General de Protección Civil. Cámara de Diputados. Nueva Ley publicada en el Diario Oficial de la Federación el 6 de junio de 2012. TEXTO VIGENTE. Última reforma publicada DOF 21-12-2023



INTERNATIONAL PROTOCOL

SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION 2015-2030

Resolution adopted by the General Assembly on 3 June 2015

[without prior referral to a Main Committee (A/69/L.67)] 69/283.

The Sendai Framework was the first major agreement of the post-2015 development agenda and offers Member States a set of concrete actions that can be taken to protect development gains from the risk of disasters.

The Sendai Framework goes hand in hand with other agreements of the 2030 Agenda, such as the Paris Agreement on Climate Change, the Addis Ababa Action Agenda on Financing for Development, the New Urban Agenda and the Sustainable Development Goals. This framework was endorsed by the UN General Assembly following the third World Conference on Disaster Risk Reduction (WCDRR) in 2015 and promotes the following:

The substantial reduction of disaster risk and losses caused by disasters, both in lives, livelihoods and health and in economic, physical, social, cultural and environmental assets of individuals, businesses, communities and countries.

The Sendai Framework also recognises that the primary role of reducing disaster risk falls on the State, but this responsibility must be shared with other actors, such as local governments, the private sector and other interested groups.



IV. Action priorities (10)

20. Taking into account the experience gained with the implementation of the Hyogo Framework for Action , and in pursuit of the expected outcome and goal, States should take specific actions across all sectors, at the local, national, regional and global levels, with respect to the following four priority areas:

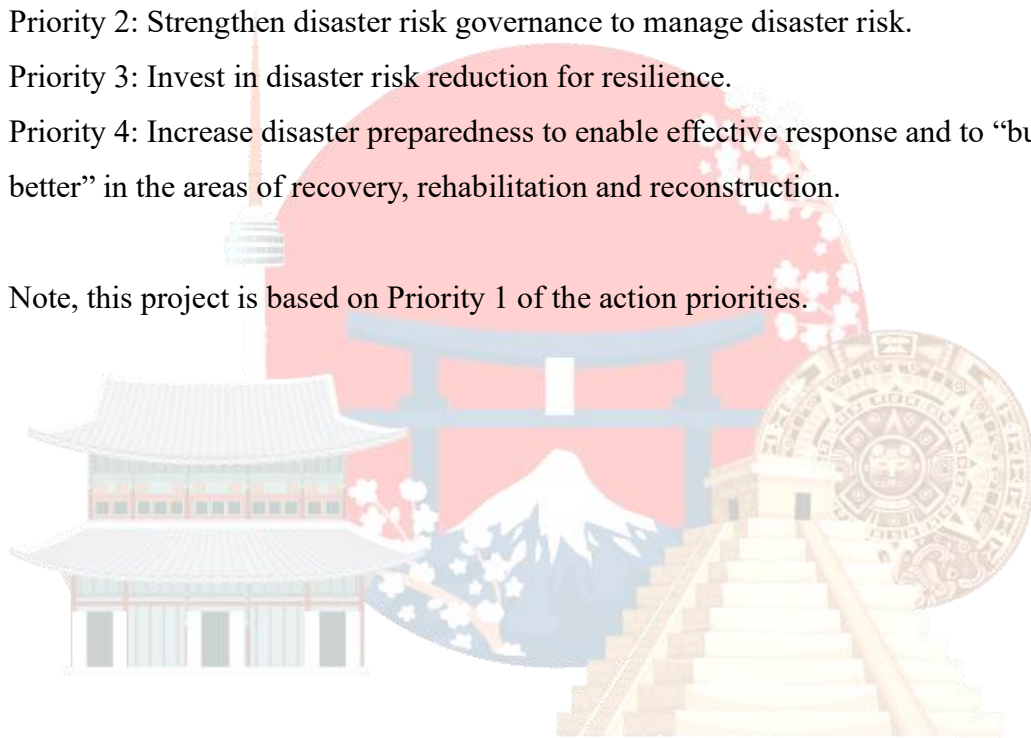
Priority 1: Understanding disaster risk.

Priority 2: Strengthen disaster risk governance to manage disaster risk.

Priority 3: Invest in disaster risk reduction for resilience.

Priority 4: Increase disaster preparedness to enable effective response and to “build back better” in the areas of recovery, rehabilitation and reconstruction.

Note, this project is based on Priority 1 of the action priorities.



(10) Source: Marco de Sendai para la Reducción del Riesgo de Desastres 2015-2030
https://www.unisdr.org/files/43291_spanishsendaiframeworkfordisasterri.pdf



NATIONAL LEGAL FRAMEWORK

GENERAL LAW OF CIVIL PROTECTION

New Law published in the Official Gazette of the Federation on June 6, 2012

CURRENT TEXT

Last reform published DOF 12-21-2023

Chapter I. General provisions.

Article 2. For the purposes of this Law, the following definitions apply:

XXVIII . Comprehensive Risk Management: The set of actions aimed at the identification, analysis, evaluation, control and reduction of risks, considering them for their multifactorial origin and in a permanent process of construction, which involves the three levels of government, as well as the sectors of society, which facilitates the realization of actions directed to the creation and implementation of public policies, strategies and procedures integrated to the achievement of sustainable development guidelines, which combat the structural causes of disasters and strengthen the resilience or resistance capacities of society. It involves the stages of: identification of risks and/or their formation process, prediction, prevention, mitigation, preparation, assistance, recovery and reconstruction;

Fraction traveled DOF 03-06-2014

Article 4. Public policies on civil protection shall be in accordance with the National Development Plan and the National Civil Protection Program, identifying the following priorities:

- I.** The identification and analysis of risks as a basis for the implementation of prevention and mitigation measures;
- II.** Promotion of a culture of social responsibility aimed at civil protection with an emphasis on prevention and self-protection with respect to the risks and dangers posed by disruptive agents and their vulnerability;



IV. Promoting social participation to create resilient communities, and therefore capable of resisting the negative effects of disasters, through solidarity action, and recovering their productive, economic and social activities in the shortest possible time;

V. Incorporation of comprehensive risk management as a fundamental aspect in the planning and programming of the country's development and organization to reverse the process of risk generation;

Article 10. Comprehensive Risk Management considers, among others, the following phases in anticipation of the occurrence of a disturbing agent:

I. Knowledge of the origin and nature of risks, in addition to the processes of their social construction;

II. Identification of hazards, vulnerabilities and risks, as well as their scenarios;

III. Analysis and evaluation of possible effects;

IV. Review of controls for impact mitigation;

V. Actions and mechanisms for risk prevention and mitigation;

VI. Development of a greater understanding and awareness of risks, and

VII. Strengthening the resilience of society.

REGULATIONS OF THE GENERAL CIVIL PROTECTION LAW

New Regulation published in the Official Gazette of the Federation on May 13, 2014

CURRENT TEXT

Last reform published DOF 09-12-2015

Chapter III. Comprehensive Risk Management

Article 6. Comprehensive Risk Management must contribute to the comprehensive understanding of Risk for the development of ideas and principles that will outline decision-making and, in general, public policies, strategies and procedures aimed at reducing it .



Chapter VI Of the National School of Civil Protection

Article 22. ENAPROC is an administrative body dependent on the National Coordination, through the National Center, with academic functions and certification of capabilities in matters of Civil Protection and Disaster Prevention within the framework of the National Competence System.

ENAPROC will provide educational services in terms of the applicable legal provisions and within the framework of the coordination bases subscribed by the Ministry of Public Education and the Secretariat. Likewise, certification by standards will be carried out through the Trust of the Standardized Systems of Labor Competence and Certification of Labor Competence. (11)

Paragraph amended DOF 09-12-2015



(11) Source: <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGPC.pdf>



FIRST STAGE

DEVELOPMENT

1. Research and Bibliographic Review.

Review of previous studies on disaster risk perception and risk management.

1.1 Research into historical background of disasters that have occurred in the selected region.

1.2 List the hazards associated with each disturbing phenomenon that give rise to the damage generated by exposure in a given region.

1.3 Develop a susceptibility scale that is perceived by the people surveyed for this project.

2. Development of recreational materials for the survey.

2.1 Create brochures explaining the interview methodology. Have pictogram cards and infographics.

2.2 Develop a survey using digital resources that explains the types of hazards. The estimation of risk due to exposure. Susceptibility according to the disturbing phenomenon and possible preparation for a disaster.

2.3 Design a matrix based on the data obtained in the field.



SECOND STAGE

DEVELOPMENT

3. Field Analysis

3.1 To approach members of the target community authorities and experts in risk management to present the model of recreational material for the survey and carry out pilot applications for its improvement and adaptation in accordance with the project objectives and the application methodology.

3.2 Evaluate the results obtained at the interview site and cross-reference the information based on the susceptibility scale.

4. Conclusions of the first and second stages.

4.1. Establish a list of monitoring indicators that allow the effectiveness of the recreational material to be evaluated, as well as the evaluation matrix for understanding hazards and their influence on disaster risk management, considering the actions and resources implemented in this project.

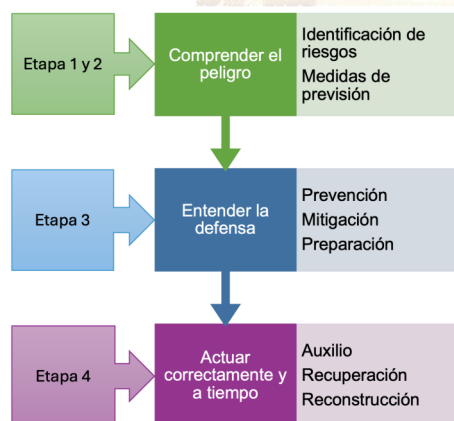


Image 6: Stages established for. Progress of the reduced elements. (Audel Alvarez)



THIRD AND FOURTH STAGE

DEVELOPMENT

5. Workshops and awareness workshops

5.1 Develop a website with the survey's recreational material to have access to a greater number of participants who interact virtually at an international level. This platform will provide recommendations from government institutions, non-governmental organizations and agencies with experts in the field of disaster risk management.

5.2 Organize community workshops to apply the recreational survey and, through in-person application, provide reliable information to educate and raise awareness about the dangers posed by destructive phenomena, learn to identify them and encourage active participation in risk management.

5.2. Promote the actions of foresight, prevention and mitigation of the selected people and communities and at the end of the training, the survey will be applied again using the recreational material of this project to identify the change in the level of knowledge of the dangers of destructive phenomena and the identification of the risks, consequences and control actions.

5.3 Promote rapprochement between the selected community and the group of experts for the appropriate exchange of information using simplified language and provide disaster risk management strategies that benefit the population in emergency situations.



6. Implementation of the Action Plan

6.1 Establish a training program for first responders and train community leaders who will organize to face the challenges of an emergency based on disaster risk management and/or the summary proposed in this project.

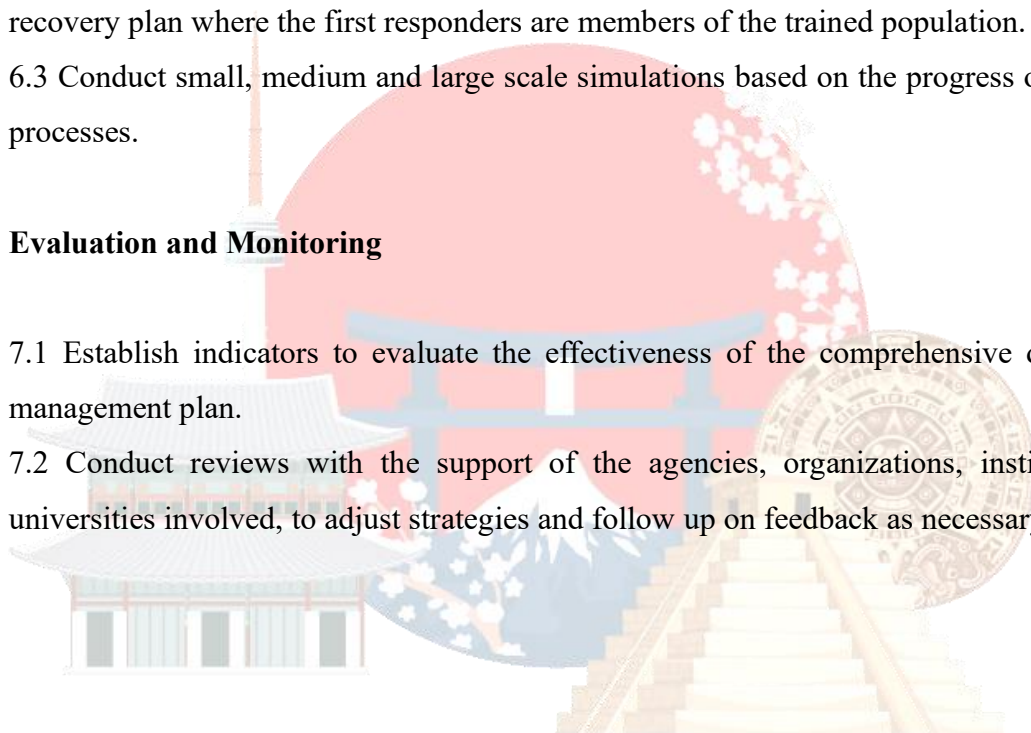
6.2 Collaborate with local authorities to implement the community disaster response and recovery plan where the first responders are members of the trained population.

6.3 Conduct small, medium and large scale simulations based on the progress of the GIRD processes.

7. Evaluation and Monitoring

7.1 Establish indicators to evaluate the effectiveness of the comprehensive disaster risk management plan.

7.2 Conduct reviews with the support of the agencies, organizations, institutions and universities involved, to adjust strategies and follow up on feedback as necessary.





METHODOLOGY

Methodological breakdown.

Methodology of Playful Activity

Goal: To identify disaster risks in the target audience, breaking down their components: hazards, exposure and vulnerability, through an interactive activity using flashcards.

Selection of disturbing phenomena.

- Knowledge of the dangers and consequences of each phenomenon.
- Vulnerability rating of each phenomenon.
- Selection of control or preparation measures for the selected phenomena.

Preparation

CARD DESIGN:

Create a set of cards (at least 40) containing illustrative drawings of different natural and human phenomena as well as their dangers and consequences, as well as a susceptibility scale.



CARD TYPES

A) Primary cards.

Eight primary cards were designed, these represent various destructive phenomena.

It is considered that in some regions of the communities where the survey will be applied through recreational activity, they are affected to a greater or lesser extent by all the disruptive agents of card selection. Therefore, in some provinces of Japan, South Korea and Mexico, more than four cards will be selected, according to the impact analysis of each locality.



Image 7: example of the primary cards that will be used to select people regarding the destructive phenomena that may affect them according to their criteria (Audel Alvarez – Miguel Rocha).



VISTA FRONTAL



VISTA POSTERIOR

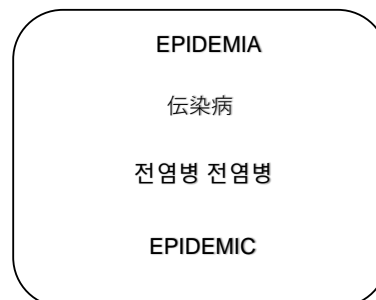


Image 8: example of the epidemic card (Audel Alvarez – Miguel Rocha).

VISTA FRONTAL



VISTA POSTERIOR



Image 9: example of the flood card (Audel Alvarez – Miguel Rocha).



VISTA FRONTAL



VISTA POSTERIOR

HURACÁN

台風

태풍

HURRICANE

Image 10: example of the hurricane card (Audel Alvarez – Miguel Rocha).

VISTA FRONTAL



VISTA POSTERIOR

TERREMOTO

地震

지진

EARTHQUAKE

Image 11: example of the earthquake card (Audel Alvarez – Miguel Rocha).



VISTA FRONTAL



VISTA POSTERIOR

ERUPCIÓN VOLCÁNICA

ヴァルカニズム

화산 폭발

VOLCANIC ERUPTION

Image 12: example of the volcanic eruption card (Audel Alvarez – Miguel Rocha).

VISTA FRONTAL



VISTA POSTERIOR

TSUNAMI

津波

쓰나미

SEAQUAKE

Image 13: example of the tsunami card (Audel Alvarez – Miguel Rocha).



VISTA FRONTAL



VISTA POSTERIOR

GRANIZADA

雹

빗발

HAILSTORM

Image 14: example of the hail card (Audel Alvarez – Miguel Rocha).



VISTA FRONTAL



VISTA POSTERIOR

INCENDIO

火

불

FIRES

Image 15: example of the fire card (Audel Alvarez – Miguel Rocha).



Activity with primary cards.

The basic idea is that the target audience selects the primary cards, choosing the disruptive phenomena that they consider may impact their community. This is regardless of whether the Risk Map or Atlas indicates which disruptive agents actually represent a significant risk.

With this we can estimate the level of knowledge about the identification of risks at an individual or collective level.

Participants will be instructed to choose from the 8 cards those that they can identify as having a direct impact.

Estimated rating.

For each card correctly selected by the target audience, one point will be added.

For each mistake in the selection, one point will be subtracted.

The results will be placed on an evaluation sheet.

To determine which cards really affect a community, research will be conducted using the Risk Atlas from a reliable source, for example, a government authority.



B) Secondary cards.

Various coin-shaped cards were designed to represent the dangers and consequences of the most basic threats of each disruptive phenomenon. This classification is based on the damage observed in emergencies and disasters worldwide.

Note: The dangers and consequences presented below **do not contain text**, as they are a representation of the potential harm expressed by the target audience.



Image 16: coins of consequences due to **earthquake risk** (Audel Alvarez).



Image 17: coins of consequences due to **fire risk** (Audel Alvarez).



Image 18: coins of consequences due to risk of **volcanic eruption** (Audel Alvarez).



Image 19: coins of consequences due to **hurricane risk** (Audel Alvarez).



Image 20: coins of consequences due to **flood risk** (Audel Alvarez).



Image 21: coins of consequences due to **epidemic risk** (Audel Alvarez).



Image 22: coins of consequences due to **tsunami risk** (Audel Alvarez).



Image 23: coins of consequences due to **hail risk** (Audel Alvarez).



Activity with secondary cards.

The participant will place the secondary cards (**coins**) in the space of the primary card that he considers corresponds to him.

Consider that each coin is equivalent to an intrinsic danger of each disturbing phenomenon and will be those that represent the most value for the present research project, that is, the understanding of the dangers generated by phenomena that cause disasters.

Estimated rating.

For every 3 coins correctly placed on the primary card, 6 points will be added, considering 2 points for each coin.

For each coin omitted or incorrectly placed on a different primary card, 2 points will be deducted, the results will be placed on the evaluation sheet for later weighting.

The participant will not be given guidance or encouraged to change their mind during the assessment exercise.

In the event that the target audience requests feedback on this stage, it will only be commented on at the end of the entire game dynamic; no modifications will be made to the result of the evaluation even with the feedback provided.



Image 24: Set of consequence coins used in the JCSM project (Audel Alvarez).



C) Tertiary Susceptibility Scale Card.

Measuring vulnerability is complicated by the changing dynamics of each phenomenon and the degree of risk perception in each individual, as well as factors such as prior preparation and decision-making. However, the target audience will be asked to use the susceptibility scale, in order to provide a numerical value in a simplified way. In this system, the lowest number represents an estimated sense of security, while the highest number indicates a higher degree of vulnerability to each identified risk.

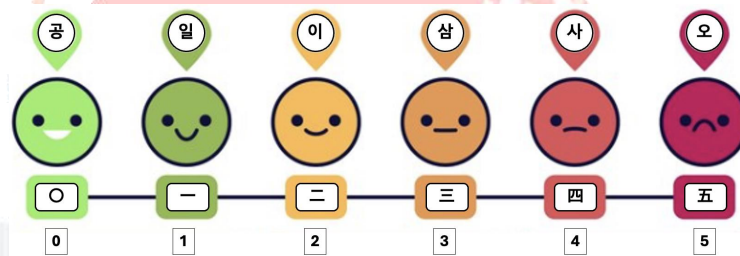


Image 25: Facemeter, Scale for the subjective assessment of susceptibility to risks. (Audel Alvarez - Raúl Trujillo).

Simplified overall weighting.

0. No risk.
1. Minimal impact.
2. Low impact.
3. Moderate involvement.
4. High affectation.
5. Severe affectation.



A qualitative case design was used, selecting a target group through playful-participatory sampling, that is, through semi-structured interviews with community members in order to explore their perceptions and experiences.

To assess the perception of insecurity or susceptibility to a destructive phenomenon, a scale from 0 to 5 was used. In addition, a qualitative scale was used that contemplates different aspects of risk perception, serving as a guide for the rating.

Rating Scale

0 - No perception of insecurity, (impossible).

The target audience of the study does not perceive any risk of disasters. The person feels completely safe, lacks knowledge about the possibility of an impact or does not show concern about possible disasters.

1 - Very low perception of insecurity, (unlikely).

The target audience of the study may have a slight awareness of the existence of disasters, but do not perceive a real risk. The person feels mostly safe and, although they recognize that events can occur, they do not consider them a threat.

2 - Low perception of insecurity, (possible).

The target audience of the study recognizes some potential risks, but does not feel threatened. There is a basic understanding of disasters, but concern is minimal. Preparedness measures are scarce or non-existent.

3 - Moderate perception of insecurity, (occasional).

The target audience has a clear recognition of the risks and feels some vulnerability. The person may be somewhat concerned and has taken some basic preparedness measures, although not in a systematic or exhaustive manner.



4 - High perception of insecurity, (probable).

The target audience feels a significant risk and a clear vulnerability to disasters. They are concerned and have taken active steps to prepare, although there may be doubts about the effectiveness of these measures.

5 - Very high perception of insecurity, (frequent).

The target audience has a sense of impending danger. The person is extremely concerned and has taken multiple preparedness and mitigation measures. They may experience significant anxiety or stress related to the possibility of disasters.

Things to consider:

To assess the perception of insecurity, the following aspects can be considered:

- Degree of information that the person has about the types of disasters and their consequences.
- A person's previous experience, considering whether they have experienced a disaster before, can influence their perception of insecurity.
- Recognize whether the person has taken proactive measures to prepare for disasters (emergency kit, evacuation plans, etc.).
- How a person assesses their own vulnerability and that of their environment in the face of disasters, which modifies the perception of susceptibility.
- The influence of the media, social networks and shared experiences on risk perception.



Evaluation Process

Scoring: Assign a score to each response based on a scale of 0 to 5, accumulating a total score.

For each primary card selected, the value will be equal to or greater than 1, considering 5 points as a maximum for each destructive phenomenon.

The participant will not be given guidance or encouraged to change their mind during the assessment exercise.

Should the target audience request feedback on this stage, it will be provided at the end of the entire game dynamic. No modifications will be made to the evaluation result, even if feedback is received.

Interpretation of Results.

Analyze the total score to determine the person's perception of insecurity, using the levels defined above.

This method allows for a subjective assessment of the perception of susceptibility to disaster risks, providing a clear framework for understanding how people perceive their level of vulnerability.

The results could be useful for designing disaster communication and education strategies, as well as for community planning and preparedness.



Monochromatic cards (complementary).

The following monochrome cards will be provided to assess the participant's level of disaster preparedness or controls . **The facilitator will not provide any pre-arranged solutions.**

The target audience will select the care and relief activities for each threat, depending on the level of risk detected. In this process, they are encouraged to choose as many controls as they can adopt, in order to complete the exercise.

These cards do not have an evaluative grade, since they are not intended to measure the degree of preparation of the target audience for this project.



Image 26: set of complementary monochrome cards (Audel Alvarez).

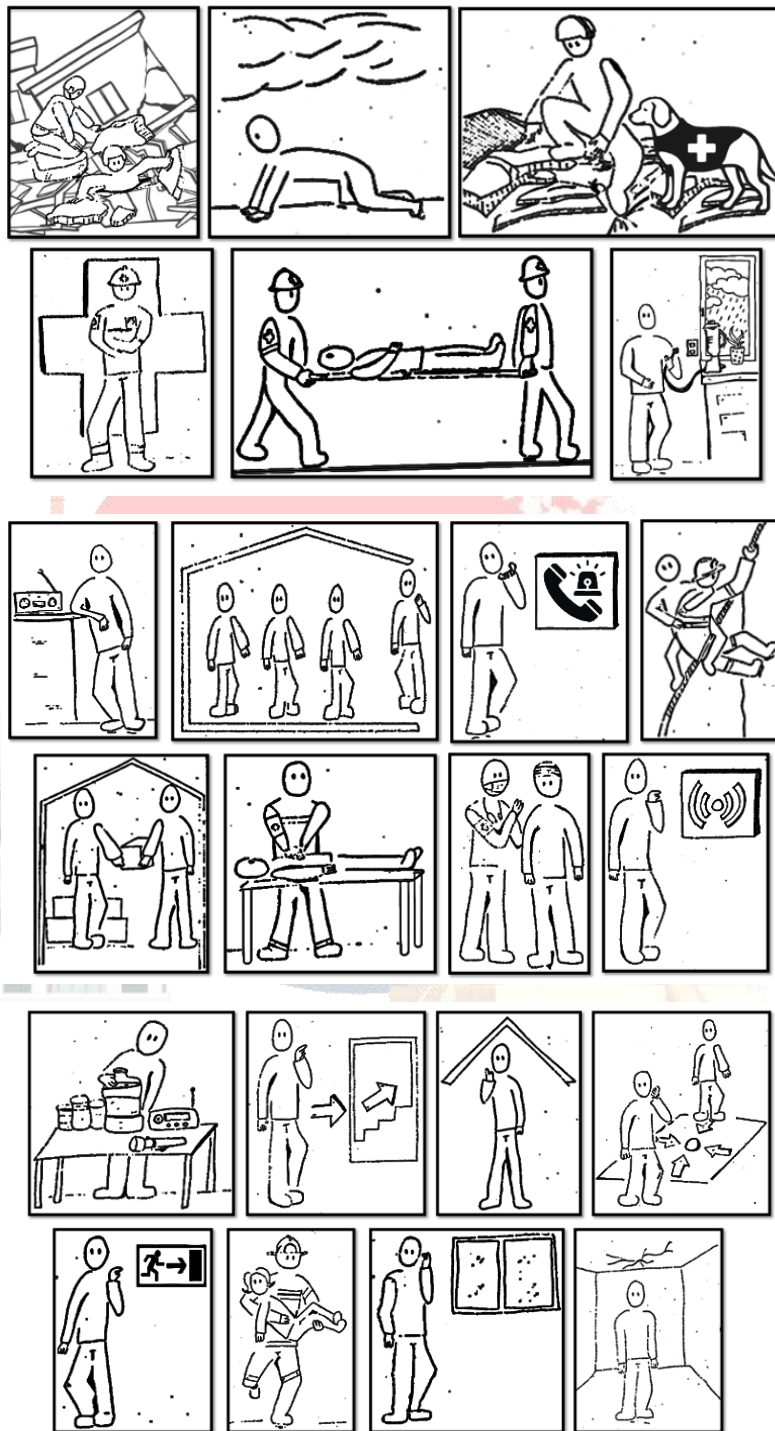


Image 27: Set of complementary monochrome cards. Continued (Audel Alvarez).



Wheel of susceptibility.

Another way to incorporate this playful activity is through a game board to assess the understanding of the hazards and consequences of the phenomena that cause disasters, expressing the 8 eligible phenomena, space for coins of hazards and consequences, and an area to measure the level of susceptibility. In this case, only the coins, an erasable ink marker and monochrome cards will be provided, following the same game rules previously described.

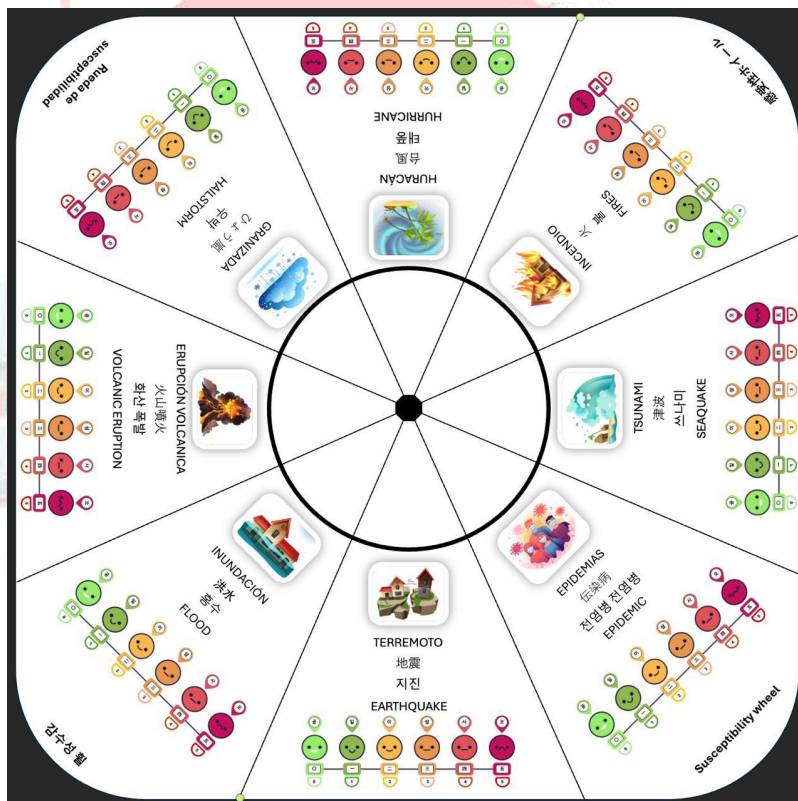


Image 28: example of the game board for the recreational activity. (Audel Alvarez.).

As can be seen, it is designed to provide specific context for each disturbing phenomenon chosen for this dynamic, considering that in many countries several of these threatening events may occur.



MATERIALS TO BE USED IN THE DYNAMICS:

Printed cards (with drawings on one side and text on the back in four languages: English, Spanish, Korean and Japanese).

A table or similar space to arrange the cards openly so that the target audience can interact.

A fugitive (erasable) ink marker

An evaluation sheet of the target audience divided by team or participant.

DEVELOPMENT OF THE ACTIVITY

1. Introduction (10 minutes):

Introduce the objective of the activity and the importance of understanding the dangers of disaster risks.

Explain how the activity will work and what is expected of participants.

2. Playful Game

Individual (1 minute)

- The participant will receive a set of cards to play individually.

Team Building (5 minutes):

- Divide participants into small teams of 3-5 people.
- Each team will receive a set of cards



3. Game with the Cards.

A) Identification Round (10 minutes).

Each person or team will take the **PRIMARY CARDS** (destructive phenomena) and select those that **DO** affect them in their community according to their belief.

You will separate those that you consider **do NOT** affect you.

The primary cards will be placed openly on the table or in the space designated for the dynamic, thus allowing the choices to be visualized and facilitating the transition to the second part of the game.

If the activity is carried out in teams, each group should discuss what phenomenon the card represents that affects them and how it relates to the risks in their area or community.

After 10 minutes, each participant or team will present the selected cards.

The facilitator will write down the numbers of the assertive and incorrect cards in the results notebook.

Note: It does not matter if the target audience selects the cards incorrectly, i.e. if they do not identify the phenomena that **DO NOT** affect them or if they omit those that **CAN** harm them. This incorrect selection is essential for the initial identification of risks. It will not be allowed to modify the initial choice once the time allotted for the selection has elapsed.



B) Selection of hazards and consequences (15 minutes).

SECONDARY CARDS which are shaped like coins, will be handed out . The target audience will be given 10 minutes to select the dangers and consequences associated with each disturbing phenomenon.

Each person or team will take the **SECONDARY CARDS** (danger and consequence coins) and select those that they believe will cause specific harm. They will place these coins on each previously chosen card of the disturbing phenomenon that affects them, and set aside the coins that they believe will NOT affect them.

These secondary cards will be placed openly on the primary cards of the dynamic to visualize the choice and give way to the third part of the game.

If the activity is carried out in teams, each group must discuss what dangers and consequences do affect them and cause possible damage to their community or population.

After 15 minutes, each participant or team presents their selected cards.

As in the previous example, the selection time will be timed, and once it ends, the selection made will not be allowed to be modified.

The facilitator will write down the numbering of the assertive and incorrect cards in the results notebook.



C) Assessment of the level of vulnerability (10 minutes).

TERTIARY CARDS will be distributed in the form of a numerical scale, known as **FACEMETER**. The person or team to be assigned will be given 10 minutes to identify the range of susceptibility or insecurity in the face of dangers generated by natural or anthropogenic phenomena.

Using erasable ink markers, the target audience will be able to mark on a qualitative scale how they feel about the selected disruptive phenomena and their level of vulnerability to disaster risks.

The **TERTIARY CARDS** will be placed visibly above the **PRIMARY CARDS** of the game to show the subjective evaluation and start the last phase of the game.

If the activity is carried out in teams, each group should discuss what degree of insecurity they may experience in their community or town.

After 10 minutes, each participant or team will present the result of their evaluation.

As in the previous example, the selection time will be timed and, once finished, no modifications will be allowed to the selection made.

The facilitator will write down the numbering of the qualitative susceptibility scale cards in the results notebook.



D) Round of preparatory measures (10 minutes).

In this round, the participant or team must select other **MONOCHROMATIC CARDS** that contain preparation, prevention or response measures.

Each team will have 10 minutes to choose the cards without generating a debate before the group. In addition, the moderator will not be able to suggest answers to avoid influencing the decisions made.

4. Final reflection.

There will be time for questions and reflections. (10 minutes).

It is essential to promote a clear and respectful dialogue that takes into account individual beliefs and values regarding risk perceptions and their level of preparedness to face them.

In conclusion, additional resources and details on where to access more information on disasters will be suggested. It is recommended to use the official information and cultural channels of each country, whether through NGOs, institutions, local governments or volunteers.

5. Data collection for statistics

To collect, analyze and classify the results of the variability in the choices of primary, secondary and tertiary cards which are the key to the activity of this project.

Highlight the importance of disaster preparedness and knowledge by the number of cards chosen in the activity.

Data analysis will be performed at the end of the project, at a different time than implementation.



Additional Considerations

Adaptation: Adjust the content of the cards based on the demographics and context of the participants (for example, adapting the risks to the specific region).

Inclusivity: Ensuring the activity is accessible to all participants, considering different levels of understanding and abilities.

RESULTS

- ✓ **Pilot the research method** through the use of the pictographic card game, in order to evaluate its acceptance in various target audiences and improve both its design and application .
- ✓ **Expected results:** An increase in knowledge and awareness of disaster hazards in participating communities is anticipated.
- ✓ **Clear diagnosis:** A clearer diagnosis and overview will be provided on understanding the risk, as well as the threats and vulnerabilities related to disasters in the selected region.
- ✓ **Cultural comparison:** Comparisons will be made of the statistical results of the three countries of initial application to determine the cultural differences in the understanding of the dangers generated by phenomena causing disasters, which will allow for the establishment of specific conclusions and recommendations.
- ✓ **Awareness raising:** A new phase of the project will be supported with the aim of promoting greater community awareness and perception of the dangers of risks and the need to act.

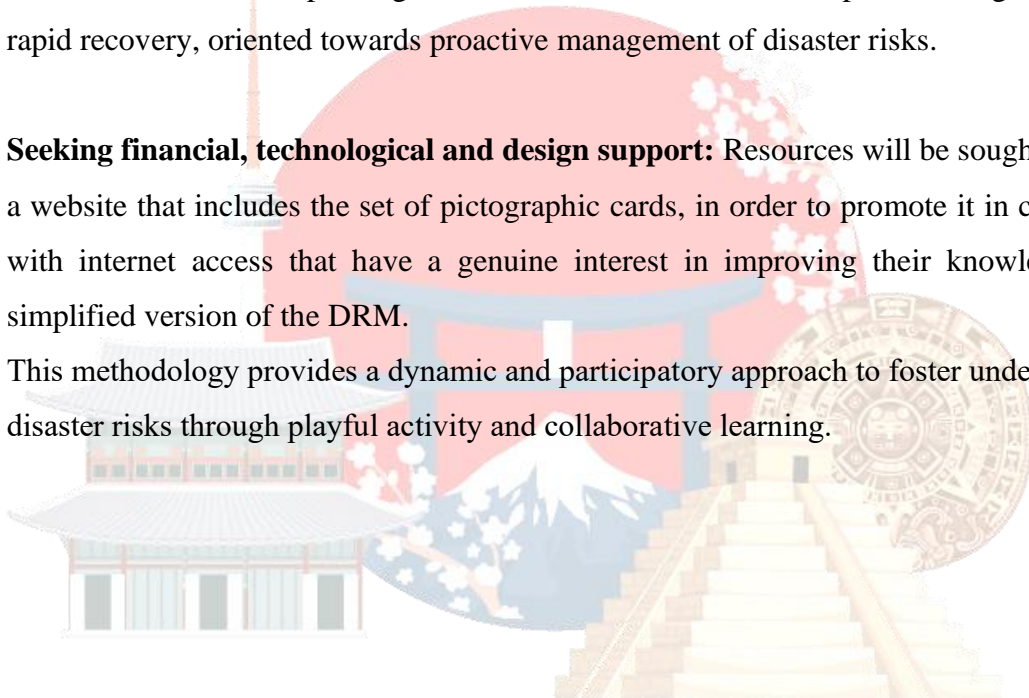


- ✓ **Establish an Emergency Response Plan:** This plan should include the participation of scientists who use simplified language that is easy to understand for both the community and the authorities.

- ✓ **Implementation of workshops and educational materials:** These activities are expected to improve understanding of the causal phenomena of disasters, as well as strategies to identify risks, make adequate forecasts and apply prevention, mitigation and preparedness measures for each disruptive agent. This will include effective response during the event and rapid recovery, oriented towards proactive management of disaster risks.

- ✓ **Seeking financial, technological and design support:** Resources will be sought to develop a website that includes the set of pictographic cards, in order to promote it in communities with internet access that have a genuine interest in improving their knowledge of the simplified version of the DRM.

This methodology provides a dynamic and participatory approach to foster understanding of disaster risks through playful activity and collaborative learning.





PROPOSED ACTIVITIES (SCHEDULE)

Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
	September	October	November	December	January	Feb
Research and bibliographic review	X					
Development of recreational materials for the survey	X					
Field analysis		X				
Data collection for statistics			X			
Conclusions of Stage 1 and Stage 2			X			
Workshops and awareness workshops				X		
Implementation of the Action Plan					X	
Evaluation and Monitoring						X



BUDGET

Stage 1

Research and analysis: Time invested by all collaborators \$20,000.00

Educational materials: Preparation of playful cards with pictograms and development of a digital survey \$40,000.00, to obtain 10 sets of cards and a susceptibility wheel to deliver 2 sets to each facilitator.

Total, stage 1: \$60,000.00

Stage 2

Field analysis: trip for application in “Seoul South Korea”, “Kyoto Japan” and towns such as CD. De Mex, Querétaro, Yucatán, Edo. De Mex and BCS. in “Mexico”. \$160,000.00

Total, stage 2: \$160,000.00

Stage 3

Workshops/Talleres: \$Not estimated yet

Implementation of the Action Plan: \$ Not estimated

Evaluation and Monitoring: \$ Not estimated

Total, stage 3: \$Not Estimated

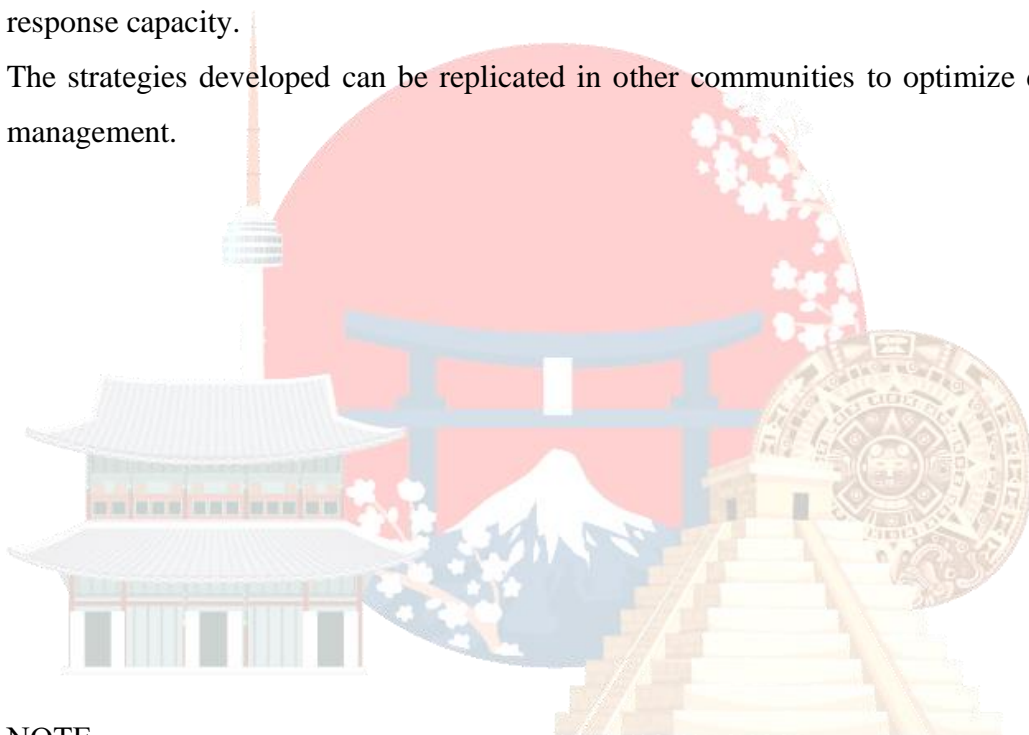


Conclusions

Understanding the dangers generated by phenomena that cause disasters is crucial to understanding how to defend oneself in the event that the risk materializes, allowing one to act correctly and in time in the event of emergencies.

This project aims to demonstrate that education and communication are effective tools to empower communities, improving their risk perception and increasing their resilience and response capacity.

The strategies developed can be replicated in other communities to optimize disaster risk management.



NOTE.

This project can be adapted and expanded according to the specific context in which it is implemented, considering the cultural and social particularities of each target community.

Please mention the copyright to the team of collaborators of the National School of Civil Protection, University Campus of Chiapas and to the institution that adopts this research project UNDERSTANDING OF DANGERS GENERATED BY PHENOMENA CAUSING DISASTERS



Annexes.

Image 29: Vulnerability analysis by region to apply the research project to understand the hazards generated by phenomena causing disasters. (Diana González)





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List of information sources:

- (1). Source: DANE Institutional Page. (Induction and Reinduction)
- (2). Source: Methodological guide for carrying out diagnoses on the local perception of disaster risk
- (3). Source: National Center for Disaster Prevention. Presentation. Mexico City. January 13, 2020. Comprehensive Disaster Risk Management, New vision of civil protection.
- (4). Source: DANE Institutional Page. (Induction and Reinduction)
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- (6). Source: Coordination of Public Policies for Disaster Prevention. Presentation. Tools for Mainstreaming Public Policy for Comprehensive Disaster Risk Management. December 2022
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