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Natural Hazards and Risk Communication Strategies Among Indigenous Communities

Shedding Light on Accessibility in Mexico's Mountains

Attempts to improve risk communication strategies in order to prevent and mitigate disasters caused by natural hazards have been made worldwide. However, most such strategies target non-indigenous populations, while vulnerable communities located in remote mountain areas in the least developed countries lack information in their native language.

Awareness of risks associated with flooding and rainfall-induced landslides increased as a result of the tragedy in autumn 1999 in the Sierra Norte de Puebla, Mexico, where floods and landslides devastated dozens of municipalities, claiming more than 200 lives. Consequently, a booklet and a radio message focusing on awareness and preparedness in the event of landslides were produced in Nahuatl, the Aztec language, as an accessibility tool to help prevent and mitigate disasters in indigenous communities. Findings from a preliminary acceptance evaluation undertaken in a local community are analyzed and discussed as an initial approach to developing a sound risk communication strategy based on local knowledge.

Access to risk prevention strategies

A few years after the inauguration of the International Decade for Natural Disaster Reduction (IDNDR, 1990–2000), the International Decade of the World's Indigenous Peoples was launched on 10 December 1994. These programs have similar spatial dimensions, as most of the world's indigenous people live in developing countries, where the consequences of disasters are undoubtedly most severe. Much has been done in terms of applied research concerning the development of adequate strategies for risk communication. However, little effort has been directed towards bridging the gap between the needs of indigenous communities and civil protection systems. Language is a key issue in this regard.

In autumn 1999, floods and landslides devastated a mountainous area of Mexico known as Sierra Norte de Puebla. The

FIGURE 1 View of a valley in the Sierra Norte de Puebla. (Photo by Irasema Alcántara-Ayala)



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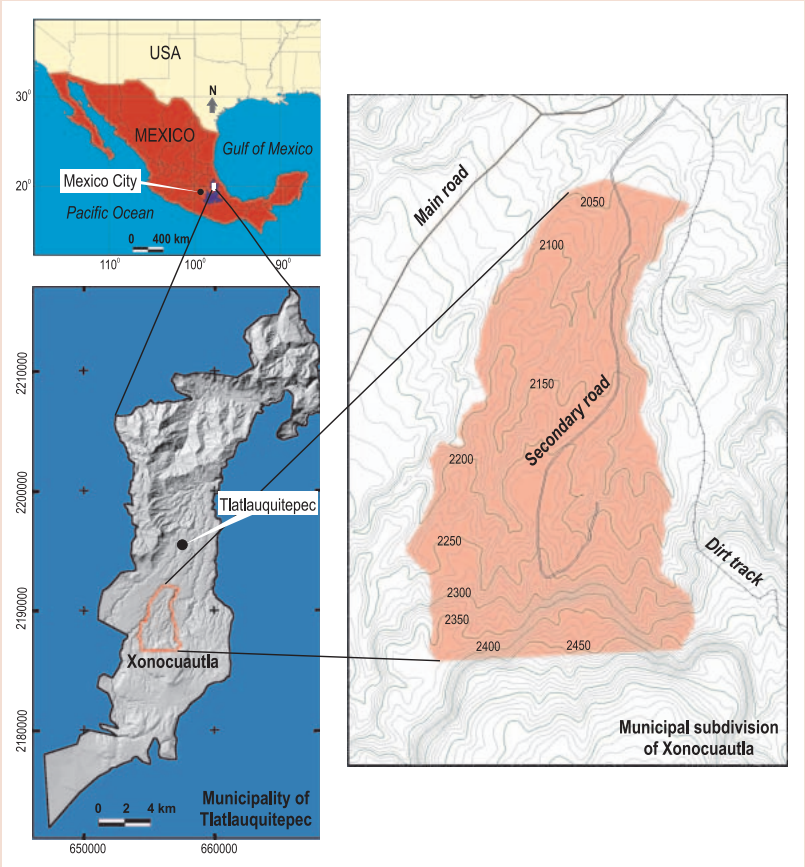


FIGURE 2 Location of Xonocuautla, municipality of Tlatlanquitepec, Puebla Province, Mexico. (Map by Roberto C. Borja-Baeza)

consequences were so stunning that this event was considered the disaster of the decade. Most damage occurred in remote medium-size and small villages inhabited by a significant percentage of indigenous communities, who suffered fatalities, destruction of lifelines, and substantial economic loss. From the perspective of civil protection, awareness of the risks associated with these types of natural hazards increased as a result of this tragedy. Consequently, the civil protection authorities of Puebla Province, in a collaborative effort with hazard specialists, produced a booklet and a radio warning message in Nahuatl, the language of the Aztecs, to raise awareness and preparedness in the event of landslides.

These outputs, along with other actions, were intended as tools for use in preventing and mitigating disasters. The aim was two-fold: 1) to provide indigenous communities—the most vulnerable groups confronted by disasters in mountain areas—with access to information; and 2) to establish a starting point for development of a comprehensive and sound risk communication strategy based on local indigenous knowledge. This article presents a preliminary evaluation of acceptance of the booklet by the residents of the Xonocuautla community, located in the Tlatlauquitepec municipality in Puebla Province (Figures 1 and 2).

The Nahuas of the Sierra Norte de Puebla

Twelve million indigenous people live in Mexico, representing 13% of the total national population. Indigenous communities speak more than 60 languages, including Spanish. Although the indigenous-speaking population increased 2.5-fold from 1950 to 2000, it decreased in proportion to national population growth. This change can be associated with lower fertility levels and a higher rural-to-urban migration rate. In the case of Puebla Province, the total population recorded in the year 2000 was 4,337,362, of which 565,509—or 13%—speak an indigenous language. However, in the municipality of Tlatlauquitepec, the proportion of indigenous speakers was as high as 21% of the total population, or 40,483 inhabitants.

Ethnic groups, including Nahuas, Totonacos, Otomies, and Tepehuas, live on the steep hillslopes of the Sierra Norte. The Nahuas inhabit the region of north Puebla, whereas the western sector of Hidalgo Province is occupied by Otomies, and the east—a part of Veracruz state—is home to the Totonacos and the Tepehuas. The Nahuas mainly live in 2 regions of the Sierra Norte de Puebla: a belt rising from 200 to 1500 m, and a strip called "Bocasierra," composed of a region with altitudes varying from 1500 to 2500 m, comprising communities such as the Chignahuapan, the Huauchinango, the Tetela de Ocampo, the Teziutlán, the Tlatlauquitepec, the Xicotepec de Juárez, the Zacatlán, and the Zacapoaxtla.

The cosmovision of the Nahuas is based on the principle of duality to explain the diversity, order, and transformation of the cosmos. The universe is considered to consist of a duality of natural and non-natural elements such as day–night, cold–hot, male–female, etc. Nature possesses power, according to which gods and goddesses are the owners of the hills, water, fire and winds, with rituals and offerings used to preserve the

"We cannot read this easily… we do not practice reading Nahuatl. We speak Nahuatl; listening is very easy, but not reading."
(Manuel Hidalgo, male, peasant, aged 73)

"I can speak and read Nahuatl; drawings helped me to understand the booklet, it is easier and funny."
(Lucero Faustino, female, student, aged 11)

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"I speak Nahuatl but I cannot read it. I like the booklet because drawings help me to understand what I need to look for in the hills to know if a landslide might occur." (Asunción Alberto Córdova, male, peasant, aged 35)

order of their cosmos. Consequently, natural hazards are commonly associated with such traditions and beliefs. This, combined with lack of access, increases the vulnerability of the local people.

Like other ethnic groups, indigenous communities in the Sierra Norte face poverty, and vulnerability strongly correlates with high levels of marginality. Some Nahua communities still lack lifelines such as roads, water supply and sanitation systems, electricity, telecommunication, transportation, hospitals, health centers, etc. The poorest families are forced to improvise, constructing housing from local materials, while economic activity focuses mainly on agriculture, fishing, and handicrafts.

Awareness, preparedness, and risk communication

Awareness, preparedness and risk communication processes in Mexico, and particularly in the province of Puebla, require the design, development, and application of different actions and strategies to prevent disasters of all types, including landslides. As a result of the catastrophic consequences of the rainfall-triggered landslides in the Sierra Norte de Puebla (Figure 3), a special information booklet in Nahuatl—*nahuatl* means "one who speaks with authority or knowledge"—was prepared by specialists and local civil protection authorities.

FIGURE 3 Landslides are a common hazard in the Sierra Norte de Puebla. (Photo by Irasema Alcántara-Ayala)



A new risk communication tool in Nahuatl

The booklet covers 4 main topics. The first part gives a general but simple explanation of the occurrence of landslides in terms of processes and mechanisms. General guidelines about what to do and what not to do before, during, and after landslides take place, are presented next, while an explanation of differences and relationships between the terms "hazards," "vulnerability," and "risks" is provided in the third section. Finally, the booklet underlines the importance of maps in delineating areas of risk by using examples of hazards (landslides), vulnerability, and risk maps elaborated for one of the villages of the Sierra Norte. The concluding section urges the population to learn about the existence of such maps in their own community and to support their preparation, distribution, and use.

The contents of the booklet were also used to produce a radio warning message to inform people about the causes and consequences of landslides. This message was distributed to the main radio stations in the region for dissemination among indigenous communities.

Assessment of the tool

In order to obtain feedback from the community about the usefulness and suitability of both the booklet and the radio warning, a preliminary assessment was undertaken in Xonocuautla, one of the indigenous communities in Tlatlauquitepec municipality. The assessment involved the application of a survey to determine the level of acceptance and the difficulties encountered in understanding the content of the announcement. The results of the evaluation indicated the following:

1. People were very interested in having written material to help them under-

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FIGURE 4 A page from the disaster preparedness booklet in Nahuatl, produced by the project.

stand a phenomenon that caused great distress in the region in 1999.

2. Although the booklet included new information about actions to be taken before, during, and after landslides, people considered it difficult to read, particularly adults.
3. Although Nahuatl is the most widely spoken language in the Sierra Norte, differences in pronunciation were found, but fortunately these did not lead to misunderstandings.
4. Drawings were a great help in understanding the process itself as well as the recommended actions (Figure 4).
5. The warning message was very well received, as it included attractive sound effects and background.
6. Inhabitants provided ideas and local knowledge about the occurrence of natural phenomena, and showed interest in combining scientific and local experience to develop written and audio tools to inform people about the importance of understanding landslides.

Different words, understandings, beliefs

It is important to remember that landslides are referred to in the scientific literature in terms of the type of movement as well as the scientific approach. In Spanish such terms can be confusing, depending on the mechanisms and processes involved. Similarly, indigenous populations use different words to refer to these processes, commonly referring to the occurrence of *taxitinilis* (falls) and *paxolauilis* or *taltapanilis* (slides). Undoubtedly, language is an important issue in communication about risks in indigenous communities. The local language is often not considered when information is developed, and written material cannot be accessed by everyone due to lack of education.

Indigenous populations and nature are part of a strong duality that enhances understanding and provides feedback concerning interaction between hazards and societies. Even when the impact of natural disasters on communities is expressed only in terms of vulnerability, and despite tragic consequences, people still have respect for and make offerings to nature. In terms of communication about risks, culture also plays an important role, given local beliefs and knowledge. In the town of Xonocuautla, for example, some local people believe in traditional warning signs provided by nature.

"We were told there was a strange noise coming from inside the hill, like rumbling, so people moved to this side (of the town) and nothing happened to them" (Panfilo Alvino, male, peasant, aged 40). Similar statements concerning specific types of noise lasting a few seconds or minutes prior to a landslide have been reported worldwide. Nonetheless, decision-making is difficult and frequently influenced by religious beliefs or reluctance to leave personal belongings behind.

The complexity and beauty of nature offer an opportunity to those who are closer to it, such as indigenous populations, to understand expressions or warning signs of natural phenomena, to relate behavior to events, and to become part of a natural performance in which each performer knows the play and the order of actors.

"I liked the booklet because it is nice and I could understand what happened with the soil during the rainfall of 1999. I wonder why such intense rainfall takes place here." (Yanet Julian López, female, student, aged 19)

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"I have a cousin who has a **zarzo** *[a wooden container used to keep food or domestic tools]… and she says that when maize grains fall from the* **zarzo**, *it means there will be a lot of rain. Most of the people here relate things that happen at home with climate." (Virginia Guerrero, female, student, aged 20)*

"When the turkey sings, it is for sure we'll have hail falling from the sky." (Virginia Lopez, housewife, female, age 44)



FIGURE 5 A local resident using the project booklet in Nahuatl to inform herself about risk prevention and landslides. (Photo by Marlene López-Mendoza)

Accessibility: a realistic utopia?

Although indigenous communities possess local knowledge of natural phenomena, the impact of natural disasters is determined by lack of access to education, information and resources, owing to the way regional pressures work through localities. The experience shared with the Xonocatlán community in terms of providing accessibility to disaster prevention information (Figure 5) suggested that tools and strategies to mitigate the effects of disasters need to be developed using a horizontal approach, in which equal participation is required from local inhabitants and specialists. Experience also showed that it is a challenge to develop a risk communication strategy based not only on scientific but also on local indigenous community knowledge.

Few steps have been taken to provide access to information on landslide disaster prevention in Nahua mountain communities. Even efforts by international agencies are far from fully considering the needs and characteristics of indigenous populations. Providing access to information and decision-making is insufficient if language becomes an obstacle nullifying possibilities of participation, even in a forum on indigenous issues organized for indigenous people. Accessibility for mountain indigenous communities can therefore be regarded either as a realistic utopia or as a utopian way of facing reality.

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