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A challenge for land and risk managers: how to manage in multi-risks and multi-vulnerabilities contexts, where different actors are in competition for priorities and risk solutions?

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Abstract

This paper analyses a post disaster case study from San Cristobal Altaverapaz, Guatemala where a large landslide named "Los Chorros (6 millions cubic meters of rock) affects several communities and one of the country's main East-West access highways.

Risk managers, starting from their own assessment, decided to respond in a way that does not correspond to the interests of the population. Local communities assessed the risk disaster situation and established an other solution from a different conception of risk. The social conflict and competition for priorities and solution for risk management reveal that disaster risk is not unequivocal but a complex and holistic concept, constituted by a large set of components.

From a social constructivism approach, where disaster risk is considered as the result of social, political, economic and historic processes, this paper evaluates other modes of interpreting, shaping and managing risk that can help to improve methods of institutional management. Studying the logic of action of actors, who mobilize to establish a solution, enables to identify what constitutes a disaster. For this reason, this study focuses, in particular, on the analysis of practices (practical science) implemented by all actors in San Cristobal Altaverapaz.

Finally, it proposes an integrative approach for policy experts, seeking compromise between different conceptions of risk in order to obtain a solution acceptable to all those involved.

Introduction

In Guatemala, the population is subject to multiple risks and vulnerabilities, including economic, social and physical risks. In addition, institutional risk managers (outsiders to the

disasters) face even greater challenges than those in developed countries due to a lack of resources and technology. In this context, risk managers are compelled to choose which risks to address because of insufficient resources, poor development, while acknowledging that risk cannot be totally reduced. Moreover, disaster risks are also managed by affected populations (insiders to the disasters). In fact, insiders to the disasters perceive disaster the risk situation considering criterias which are not included by risk managers. They also establish their own risk solution. By consequence, insiders and outsiders to the disasters are in competition for priorities and solutions for risk management. This social conflict could be considered as an opportunity (Gamarra 2003; Melé 2013; Hurtado Paz y Paz 2006) to identify what constitutes a disaster risk and to help improve methods of risk assessment and management.

Aims and objectives

My research focuses on the challenges that risk managers face when seeking solutions. The risk manager is asked to propose appropriate measures, considering his knowledge and his expert experience. To give the correct solution, in terms of satisfaction and scientific quality, is not an easy task; especially when the decision must be made in a context where many risks, vulnerabilities and actors are involved in risk management.

A situation with these characteristics invite to think in terms of measures relevance and management as well as on the process and approaches choosen to address disaster risks.

The risk manager has to consider his practice in the assessment and analysis process. How to evaluate a multirisks situation? What elements must be considered? From which approach does the risk manager work? And finally, how to propose adequate mesures and effective solutions?

This paper aims, based on the case study of Los Chorros, to report issues related to risk management procedure, in order to provide tracks that could facilitate the work of risk managers.

I present the challenge associated with the task dedicated to risk assesment and estimation.

Questions and hypothesis:

The assessment phase consists of discovering a problem and analyzing a disaster risk situation. Then, the risk manager can design measures and proposals in accordance with the problem defined and/or identified. During the risk assessment step, measurement systems, assessment tools and access to data are the essential elements to take into account. But in the end, risk assessment will depend on the manner which the expert is posing the problem. That is to say, in terms of (Gilbert 2009), the appreciation of risk depends on the risk

managers' understanding, and more largely on his own risk representation. By consequence, risk assessment depends on the risk manager framing (measures systems model, available data and risk representation).

In order to improve the understanding of a disaster risk situation, risk managers must broaden their risk representation. This point is essential to increase the number of criterias that needs to be included in the risk assessment task. To obtain a global and braoder view of the risk disaster situation, risk managers need to incorporate a large set of risk components; that is, not only natural hazards and exposed elements, but also a large set of vulnerabilities. In this sense, the challenge of risk managers is to recognize the representations of all risk involved actors, in order to identify other criteria being part of the risk situation. They also need to keep in mind criterias and arguments mobilised by affected populations. In this way, risk managers should be able to broaden his own risk definition and propose more comprehensive and holistic solutions.

The hypothesis refers to criterias choosen by insiders to the disasters. At the moment of risk evaluation, insiders to the disasters select elements linked with their territory and prioritize elements needed for the operation of their territory system. In other words, they take into account elements considered important for the continuity or improvement of their standards of living. This hypothesis is based on the territorial issues and vulnerabilities proposed by (D'Ercole et Metzger 2009).

Conceptual risk approach

Holistic approach and social constructivism approach (Cardona 2003; Maskrey 1989) consider that the risk is a social product composed by multiple factors: natural hazards, exposed elements and vulnerabilities. These two last factors are the result of the combination of economic, social, political and historic processes. Vulnerabilities are generated *by* and *in* the society. The vulnerability appears as a social condition, resulting from processes, forms of change and transformations of the society, largely explained by unequal access to economic, social, organizational resources and power (Wilchex-Chaux 2006; Gellert 2003). For this reason, these approaches focus on the conditions of vulnerabilities generation. This implies analysing both development model and politic systems (Blaikie 1994; Baird 1975) as well as behaviour and perceptions of population (Burton, Kates, and White 1968).

Case study

The Guatemalan case shows all the positions and differences (almost caricatured) that may occur during risk management processes. Indeed, the interest of this study is that Guatemala is a country with a multitude of actors, which are mobilized and often take over the management of territories and risks. A case study like this could invite to conceive a different manner to look at risk management, considering a wide range of parameters related to the vulnerability of the territories.

Guatemala is located in Central America and its border countries are Mexico in the North, Honduras and Salvador in the South. Guatemala is also situated between Pacific and Atlantic oceans.

Most of the dangers in Guatemala are associated to the encounter (meeting) between the bottom of the Pacific Ocean and the continental tectonic plate underneath Guatemala. The intersection of these tectonic plates leads to frequent earthquakes and forms volcanoes.

This work focuses on the management of natural hazards in Guatemala, in the city of San Cristobal Verapaz, located along an active fault called Polochic. This fault and the Motagua fault form the boundary between the Caribbean and North American tectonic plates (Authemayou 2011). The area of fault intersection is very mountainous. It has formed a series of river valleys and a corridor. Throughout the corridor, an asphalted road (RN-7W) was built to connect Eastern and Western Guatemala, causing a significant densification and urbanisation. This area is interesting for scientific research on natural hazards because both rural and urban populations are in a vulnerable position, highly exposed to landslides and earthquakes.

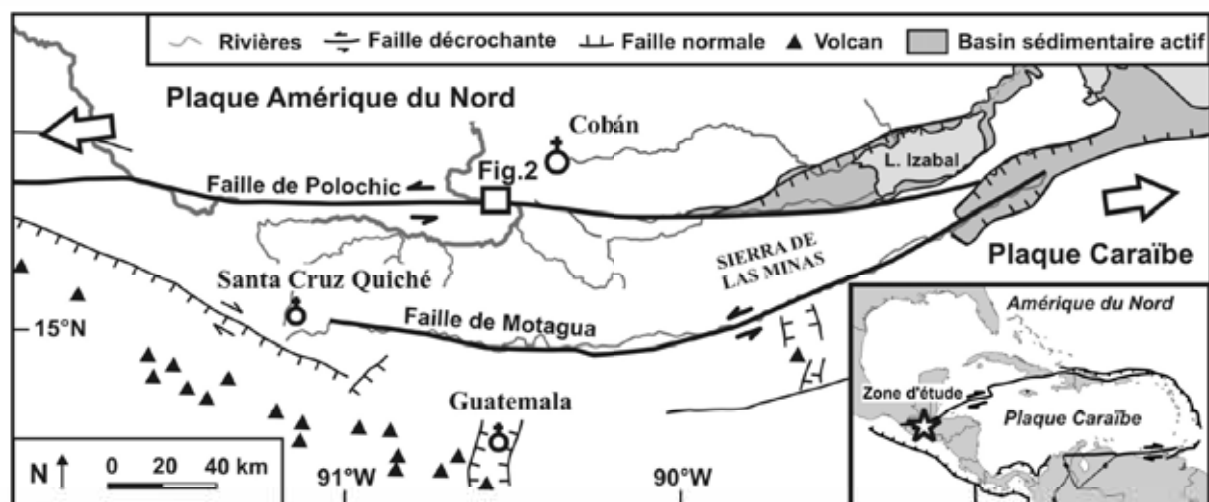


Figure 1: Map of faults forming the boundary between the tectonic plates in Guatemala. According (Suski 2010), modified by the author.

Precisely, this paper analyses a post disaster case study from San Cristobal Altaverapaz, Guatemala where a large landslide named "Los Chorros" (6 millions cubic meters of rock) still affects several communities and has damaged one of the country's main East-West access highways (RN-7W). Local societies, risk managers and stakeholders are concerned with both the implementation of risk management and the development of the country itself. A significant number of solutions were implemented at the individual and local level in parallel with national proposals, well structured but not implemented.

In this case, the "primary" hazard (the landslide) as evaluated by the authorities was not perceived as such by the local community, who prioritized economic risks (due to the destruction of the road) by creating their own road through the landslide area in defiance of the authorities. Institutional actors, starting from their own assessment, decided to respond in a way that does not correspond to the interests of the population. A social conflict for priorities and solutions for risk management has then taken place. These differing responses by official and non-official actors highlight the need to address other, non-physical vulnerabilities that increase the risk for populations.

Methodology

This work is based on the analysis of practices (Practical Science) in order to understand how different stakeholders prioritize various types of vulnerabilities and risks, leading to a number of social conflicts in a given territory. Through the observation of what actors do when they are facing disaster risk situations, it is possible to identify what is important for them and what are the elements that constitute a disaster.

I based my data collection on semi-directed interviews of main actors concerned by the Los Chorros Landslide in order to recognise vulnerabilities, risks and priorities for the functioning of this society.

The analysis of the case study of Los Chorros

Road 7 W is being converted from a dirt road into a major asphalted road, in order to handle larger and faster traffic. Upon completion, the road will become a major East-West circulation axis in Guatemala, thereby relieving the congestion of Guatemala City. The effective redesigning between San Miguel Uspantán and San Cristobal Verapaz started in 2005-2006, progressing from West to East (Road [1] on figure 2). Slightly before its completion, however, a series of rockfalls started to hit an unfinished segment of the road in a place known as 'Los Chorros', near San Cristobal Verapaz. In December 2008, these rockfalls became so frequent that the road was closed. Eventually, on January the 4th of 2009, a large collapse occurred. During 10 minutes, a series of large blocks detached from the mountain flank, mobilizing about 4-6 million cubic meters of rock. The rock falls occurred between 1300 and 2020 m in elevation. The collapsed material moved at high speed in the form of a rock avalanche and spread over 2 km, down to an elevation of 950 m, halfway along the Agua Blanca stream valley (Fig.2). Road 7W traversed this area near the base of the collapsed face, and was thus destroyed over 800 m of its length (road [2] on Fig.2).

Following the collapse, two provisional dirt roads were hastily constructed in order to quickly reestablish communication across the damaged area. An emergency road [see number 4 on figure 2] was opened by institutional risk managers, across the Agua Blanca valley at a much lower elevation (referred as "institutional road" in this work). It connected an existing dirt road in the West to road in the bottom of the Chixoy River valley. This road connects the Pueblo Viejo reservoir power plant aqueduct in Agua Blanca. The provisional road proposed by the institutions did not suit the communities because this road requires to spend more time than the precedent RN-7W and also poses a significant risk for trucks, due to its narrowness. By consequence, local communities financed themselves the construction and maintenance of a new road and installed a toll to recover the money invested. This route (road [3] on figure 2) was constructed directly on top of the avalanche deposit, slightly below the location of the initial road segment (referred as "community road" in this work). They have chosen to restrict the transition during nighttime; they also monitor the state of the road and prohibit its access during the rain period. Thus, these groups of actors appear in the arena of risk management, taking control of not only the construction of the road but also its monitoring.

As follows, two solutions are located in the same territory. Almost all users of the RN-7W (traders, farmers, transport groups, regular and casual travelers) prefer to go through the

road proposed by local communities because it is faster and the toll is cheaper compared to the cost of petrol that they would pay if they take the institutional road.

Moreover, the coexistence of these two roads was not easy; on the contrary the two solutions came into confrontation for specific reasons. Risk officials managers in the case of Los Chorros have banned the use of the road to the community, primarily for safety reasons. On their side, despite the prohibition of official entities, the communities continue to use their solution and keep the road in good condition. Therefore, the institutional route became not competitive facing the community road and quickly fell into disuse.



Figure 2: Destruction of the main road by the 4th January 2009 Los Chorros rockslide and alternative roads realized or proposed. (Fernandez 2013).

1- Main road (7W), 2- destroyed segment, 3- alternative dirt road funded by the communities, 4- alternative dirt road funded by risk managers (institutional road), 5- other proposed alternative, 6- secondary road, 7- road acces to communities, 8- private dirt roads (large farms), 9- road destroyed by mudflows, 10. Road flooded by damming of the main river, 11- rockslide scar, 12- rockslide deposit, 13- mudflows, 14- deposits of 2 older rockslide events of same magnitude.

Author: (Fernandez 2013).

Although the institutional route was the correct answer according to the hazard assessment and physical vulnerability, it was not adequate, considering the criteria put forward by the local communities. Indeed, the construction of this route contributed in some way to increase the *global vulnerability* (Wilches-Chaux 1989) of populations. For example, from the economic point of view, because local communities could not afford using the institutional road. The price of basic products increased and the possibility to acces to the main market (at

Cristobal city) became limited. Educational vulnerability also increased because people stopped sending their children to school due to transport costs and, in other cases because classes were stopped (teachers could not move to rural schools). Furthermore, health vulnerability rose due to isolation from public health centers. Conversely, the community road allows community to access to the basic needs, but it was dangerous given its exposure to natural hazard.

This case shows that each solution is partial, considering what is important to the society and the elements necessary for the functioning of a territory. Individually, each solution is not sufficiently complete to integrally face the risk disaster situation. Risk managers' solution was valid from the scientific point of view but was not an effective measure considering the essential elements of the territory and all of components that constitute a disaster risk situation.

Results and conclusions

Based on the case study, this work asserts that the risk is not unequivocal. On the contrary, for the Los Chorros case, the "first" risk (landslide) took a different course when it was apprehended and evaluated by stakeholders. Certain attributes and characteristics defining risk will be emphasized by some actors over others. Local communities considered mainly economic, educational and health vulnerabilities while institutional risk managers considered physical vulnerability as a priority.

In this sense, it is possible to consider that risk is not uniform but a complex and holistic concept composed by several criterias. It depends its implications on the territory and on the risk definition made by actors. Risk assessment is variable. It is the result of a choice, linked with selected vulnerabilities by actors in their territories.

The challenge for managers of natural hazards is to move from risk management in the strict sense, which focuses mainly on hazards, to a broader management, taking into consideration societal priorities and essential elements for the operation of territories systems.

In a context where risk and risk management are produced and managed by both formal and informal stakeholders, the main issue is to involve the all the stakeholders and evaluate different priorities of risk in order to determine which actions are best suited for a more balanced approach to risk management.

Learning experiences

Studying the logic of action of actors, mobilised for the establishment a solution, enables to identify what constitutes a disaster. This method could help policy experts to find the balanced compromise between different conceptions of risk and therefore propose appropriate responses, in order to be acceptable to all those involved.

Futhermore, this example shows that experts should not persist in their own conception of the problem, but may work from a position of recognising the interests of others actors, in order to produce an effective solution. In this sense, an integrative approach requires to abandon certain criterias and to incorporate others.

Thus, the challenge for managers of natural hazards is to move from risk management in the strict sense, which focuses mainly on hazards, to a broader risks management, taking into consideration what is important for society and for the functioning of systems. This balanced approach to risk management will engage all stakeholders to evaluate risk priorities and to determine an appropriate risk management strategy.

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