

Part I

Background

Chapter 3

Evacuation Planning

This chapter presents a synthesis of information related to evacuation planning. In particular, we present the information related to volcanic emergency management. We are interested in volcanic emergency plans because we have information about the Popocatepétl volcano and we have tested some of our results using this information. Then, we present a list of desired elements to develop volcanic emergency plans. This list of elements is recommended by the UNESCO and published in 1985. Finally, we present the information about the Popocatepétl volcano that we have.

3.1 Volcanic emergency management

The UNESCO presented in [30] the *development of volcanic emergency plans*. The purpose of the information in [30] is to distill from past experience in various parts of the world some general principles of organization and practice which, hopefully, may prove to be of universal validity. [30] also mentioned that mass evacuation and other protective measures are more effective if they are planned and organized before an emergency arises. The UNESCO assumes that in any community exposed to volcanic hazards there is a general awareness of the hazard and a general desire to take collective action

to reduce these risks; that a legislative framework exists within which it is possible to plan, organize, and put into effect, at the national and at the local level, the appropriate protective measures; that scientific knowledge of the potentially dangerous volcanoes is sufficiently advanced to permit the elaboration of “scenarios” of possible eruptions, their destructive effects and their social and economic consequences; that it will be possible to have some warning about eruptions, and that this warning will be given in time for appropriate actions to be taken; that, if the above conditions are fulfilled, an emergency plan of action in case of eruption will be prepared for each potentially dangerous volcano.

The main elements of pre-emergency planning are identified and discussed in [30] and they are the following:

- Identification and mapping of the hazard zones;
- Register of valuable movable property (excluding easily portable personal effects);
- Identification of safe refuge zones to which the population will be evacuated in case of a dangerous eruption;
- Identification of evacuation routes, their maintenance and clearance;
- Identification of assembly points for persons awaiting transport for evacuation;
- Means of transport, traffic control;
- Shelter and accommodation in the refuge zones;
- Inventory of personnel and equipment for search and rescue;
- Hospital and medical services for treatment of injured persons;
- Security in evacuated areas;
- Alert procedures;
- Formulation and communication of public warnings; procedures for communication in emergencies;

- Provisions for updating the plan;
- Time scales: The interval between the onset of an eruption, or of significant precursory phenomena, and a violent climax, eruption, may range from a few hours to several days, weeks or months. In practice, it will usually be appropriate to plan for two types of action: (1) Phased response to a gradually developing volcanic crisis, during which one may expect to have warning of potentially dangerous volcanic events at least 24 hours before they occur; (2) Immediate response to a situation calling for the fastest possible evacuation of people by whatever means are immediately available.

3.2 Emergency management in the Popocatépetl volcano

In this work, we have tested part of our results using fragments of the information about the Popocatépetl volcano risk zone. Hence, in this section we present a short overview about the current evacuation planning problem in the Popocatépetl volcano.

Popocatépetl (smoking mountain in náhuatl language) stands at the Southern end of an 80 km-long chain that trends North-South and divides the basin of Mexico to the West from the basin of Puebla to the East. Popocatépetl is only 60 km Southeast of Mexico City and 40 km West of the city of Puebla. The combined population of these two metropolitan areas exceeds 30 million inhabitants. This volcano covers three different states: Estado de Mexico, Morelos and Puebla. There are several cities that are under risk. Printed maps indicate the danger around the volcano. We have some of the maps of Puebla. They have been provided to us by CENAPRED, (National Center for disaster's prediction) the organism which is responsible of monitoring the volcano

[42].

Puebla's government works based on the Plan Operativo Popocatepetl office to coordinate the actions of evacuation in case of danger.

Nowadays, Plan Operativo Popocatepetl office in Mexico has defined *ten evacuation routes* in Puebla. Each evacuation route starts in a set of towns in risk, traverses other towns in risk and arrives to a town where a shelter is located.

3.3 Conclusion

In this chapter we presented a synthesis of information related to evacuation planning. In particular, we presented a list of desired elements to develop volcanic emergency plans. This list of elements is recommended by the UNESCO and published in 1985. Finally, we presented the information about the Popocatepetl volcano that we have. In Chapter 7 we are going to present how we can combine the information related to evacuation planning presented in this chapter, in order to model evacuation plan problems and in particular for volcanic emergency plans.