

SCENARIO MODELS AS A LINK BETWEEN HAZARD MAPPING AND CONTINGENCY PLANNING

Diethard Leber¹, Ingo Schnetzer² and Stefan Kollarits³

INTRODUCTION

Within the disaster management cycle contingency planning (CP) plays a major role in the preparedness as well as in the response phase. The main goal of CP is to define measures (including organisational responsibilities and communication) in case of disaster until SOP (Standard Operation Procedures) of intervention forces are taking place. When dealing with natural hazards the quality of the contingency planning procedure strongly depends on appropriate process and scenario information. During hazard assessment a detailed standard procedure based on technical codes and regulations is usually followed by hazard mapping experts, leading to the delineation of hazard zones, the information resulting can satisfy contingency planner's need only to a limited extent. Contingency planners need additional answers to key questions, which often have been generated during hazard assessment (like definition of hazard processes, process development and possible event scenarios). This information should be provided as simplified scenario models and by the definition of "hot spots" in the process, damage and intervention domain.

KEY PROCESS-, DAMAGE- AND INTERVENTION-RELATED INFORMATION TO CP

A more "process oriented approach" of contingency planning requires as input from advanced hazard mapping answers to very basic questions about the development of hazard processes and about possible actions and measures, concerning the observation and/or the transformation of processes.

Tab. 1 Key information on hazard processes required by contingency planners

Basis questions about hazard processes	Information required
WHAT CAN HAPPEN?	Standardized process description including scenario models
WHERE CAN IT HAPPEN?	Standardized description of source, transport and impact area of the process
HOW OFTEN CAN IT HAPPEN?	Description of the expected frequency (recurrence interval) of an event
HOW FAST WILL IT HAPPEN?	Standardized description of process development in time scale
HOW SUDDENLY WILL IT HAPPEN?	Standardized description of process initiation in time scale
PROTECTION MEASURES INSTALLED AND KEY FUNCTIONALITY?	Standardized description of protection measures and functionality including information on protection, failure conditions and residual risk
EXPECTED IMPACT OF HAZARD EVENT AND AREA AFFECTED?	Description of key impact parameters like flow velocity or impact energy, and of area affected
IS IT POSSIBLE TO FORECAST EVENT'S INITIATION AND EVOLUTION?	Standardized description of possible triggers and process activation. Definition of warning stages
IS IT POSSIBLE TO OBSERVE OR MONITOR EVENT'S INITIATION AND EVOLUTION?	Definition of observation points and of standard operation procedure(SOP)
IS IT POSSIBLE TO OBSERVE/ MONITOR KEY PROTECTION STRUCTURES AND OBSTACLES?	Description of key protection structures, function and of failure conditions. Description of obstacles. Standard operation procedures for observation(SOP)
IS IT POSSIBLE TO UNDERTAKE ANY INTERVENTION BEFORE AND/OR DURING FULL PROCESS DEVELOPMENT?	Definition of intervention points and appropriate measures to be defined in standard operation procedures(SOP)

¹ Dr. Diethard Leber, Geoexpert Research and Planning GmbH, Brunhildengasse 1, A-1150 Wien, Austria (e-mail: Diethard.Leber@geoexpert.at)

² DI Ingo Schnetzer, Austrian Torrent and Avalanche Control Service, Vienna, Austria (ingo.schnetzer@die-wildbach.gv.at)

³ Dr. Stefan Kollarits, PRISMA solutions GmbH, Klostersgasse 18, A-2340 Mödling, Austria (stefan.kollarits@prisma-solutions.at)

SCENARIO MODELS

Scenarios and scenario models are defined as a description of a course of future hazard events and of their impacts, based on a consistent and plausible set of assumptions about future conditions. To link hazard mapping and contingency planning, simplified scenario models must be included in the hazard maps and in tools like a “scenario manager” in Continuous Situation Awareness (CSA) systems. Besides the visual representation of the scenario models in the form of pictograms short texts in a condensed, standardized and formalized way using a defined ontology must be provided to contingency planners (see Figure 1 and 2). In addition to the description of the course of events, situations and identification parameters (e.g. threshold values etc.) must be indicated in the scenario description.

A major advantage of scenario modeling is that this will enable contingency planners to decide which scenario/situation is actually evolving and links to alternative scenarios (or sub-scenarios) can be activated. In addition the communication of complex hazard processes to the non-hazard experts will thus be substantially facilitated and a common information model for operational use can be defined.

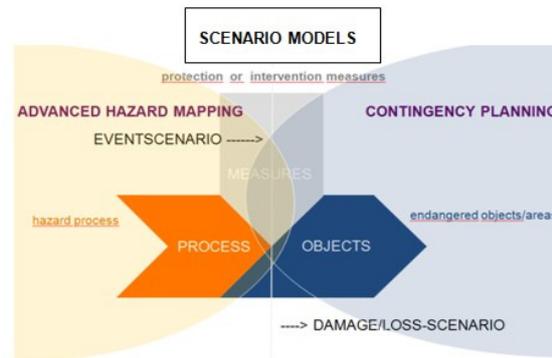


Fig. 1 Scenario models as a link between advanced hazard mapping and contingency planning

DEFINITION OF “HOT SPOTS” FOR PROCESS, DAMAGE AND INTERVENTION DOMAIN

The co-operation of hazard experts and contingency planners leads to the definition of “hot spots” in the process (p), damage/loss (d) and intervention (i) domains. These “hot spots” (information points, critical points, observation points and intervention points) are indicators for standardized information linking the hazard/process- and the contingency/intervention field by providing key process information or indications of required measures (see Figure 2).

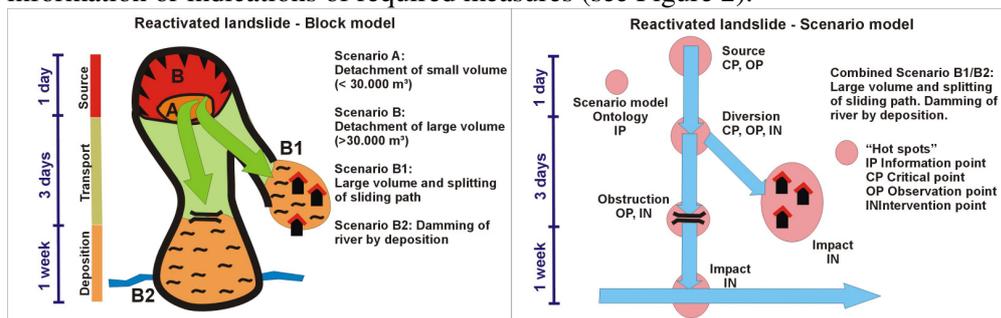


Fig. 2 The concept of scenario models and “hot spots” shown for a sliding event

REFERENCES

KOLLARITS S., LEBER D. and A. CORSINI et al. (2011): MONITOR II. New methods for linking hazard mapping and contingency planning. Brochure of MONITOR II WP3 (methodology) work package. – Vienna (in press).

Keywords: disaster management, hazard mapping, contingency planning, scenarios, scenario models