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# Use of volunteers' information to support proactive inspection of hydraulic structures

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Proactive management is particularly important to deal with the increasing occurrence of hydro-meteorological hazards in mountain areas were threats are often caused by multiple and sudden onset hazards such as debris flows. Citizen volunteers can be involved in supporting technicians on inspecting the structures' functional status. Such collaborative effort between managing organizations and local volunteers becomes more important under limited resources. To consider volunteers' information in support of proactive inspection of hydraulic structures, we developed a methodology applicable in day-to-day risk management. At first, in collaboration with technicians-in-charge, a data collection approach was developed for first level or pre-screening visual inspections that can be performed by volunteers. Methods comprise of a data collection exercise, an inspection forms and a learning session based on existent procedures in the FVG region and neighbouring regions.

To systematically evaluate the individual inspection reports, we designed a support method by means of a multi-criteria method with fuzzy terms. The method allows the technicians-in-charge to categorize the reports in one of three levels, each corresponding with a course of action. To facilitate the evaluation of inspection reports, we transformed the decision support method into a prototype Web-GIS application. The design process of the Web-GIS framework followed a user-centred approach. The conceptual design incorporates four modules for managing the inspection reports: 1) Registered users, 2) Inspection planning; 3) Available reports and 4) Evaluation of reports. The development of the prototype focused on the evaluation module and was implemented based on standard and interoperable open source tools. Finally, we organized a workshop with technicians in the study area to test the decision support method and get insights about the usefulness of the Web-GIS framework. Participants that took part of the workshop included technicians that were not involved in previous research activities. The involvement of new technicians was important due to their fresh perspectives. We looked at the effect of the quality of the input reports on the output of the decision support method. In addition, we compared the differences in the participants' advice during the inspection and the output from the decision support method. Participants' feedback led to a set of suggested improvements in the decision support method and the web-GIS application.

We hope that the knowledge, theory and concept behind this decision support method can be developed into a full-scale web-GIS application. The advantage of using this decision support method is that it allows inspections to be carried out by either skilled volunteers or technicians while ensuring technicians-in-charge that they can systematically evaluate the collected reports. Volunteers can become skilled inspectors by teaming up with technicians for the inspection of hydraulic structures. Technicians can become more aware about local impacts and changes in the structures' status by teaming up with volunteers.