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Monitoring As A Helpful Means In Forensic Analysis Of Dams Static Instability Events

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Monitoring is a means of controlling the behavior of a structure, which during its operational life is subject to external actions as ordinary loading conditions and disturbing ones; these factors overlap with the random manner defined by the statistical parameter of the return period.
The analysis of the monitoring data is crucial to gain a reasoned opinion on the reliability of the structure and its components, and also allows to identify, in the overall operational scenario, the time when preparing interventions aimed at maintaining the optimum levels of functionality and safety.
The concept of monitoring in terms of prevention is coupled with the activity of Forensic Engineer who, by Judiciary appointment for the occurrence of an accident, turns its experience -the "Scientific knowledge"- in an "inverse analysis" in which he summed up the results of a survey, which also draws on data sets arising in the course of the constant control of the causes and effects, so to determine the correlations between these factors.
His activity aims at giving a contribution to the identification of the typicality of an event, which represents, together with "causal link" between the conduct and events and contra-juridical, the factors judging if there an hypothesis of crime, and therefore liable according to law.
In Italy there are about 10,000 dams of varying sizes, but only a small portion of them are considered "large dams" and subjected to a rigorous program of regular inspections and monitoring, in application of specific rules. The rest -"small" dams, conventionally defined as such by the standard, but not for the impact on the area- is affected by a heterogeneous response from the local authorities entrusted with this task: there is therefore a high potential risk scenario, as determined by the presence of not completely controlled structures that insist even on areas heavily populated.
Risk can be traced back to acceptable levels if they were implemented with the necessary uniformity of procedures usually adopted for major works, and, therefore, is intended to emphasize the importance to have a more complete cognitive picture of the issues affecting the dams, especially so-called "minor" and their relationship with the embedding territory.
This contribution consists of a brief digression on dams, their characteristics, functions performed by them and their relationship with the territory in terms of risk and benefit. After, it is discussed the concept of risk factors that characterize the importance of monitoring extended to the crisis management with a focus to the fast verification of structural reliability after a crisis event.
A case study of the vulnerability of a dam under seismic action by "Event tree analysis" is presented, based on data acquired in the course of constant surveillance and control.
Some considerations about the monitoring actions related specifically to earthquakes and weather events are presented in order to emphasize its function with regard to risk mitigation through early warning procedures.
Finally, the results of a survey on the main accidents involving Italian and USA dams are presented even as a factor pushing to improve the national regulatory framework .
Finally, we will discuss some anomalies in the regional rules, leading to interruption in the technical management of the dams by the Public Authority, holding the function of supervision and control over these works and the role of reference for the management of flood mitigation for the hydraulic system.
Several hints are provided to contribute towards overcoming the problems that emerged, necessary and urgent to provide answer to the question of security of civil society.