Developing an Initial Prioritization Tool for California's Dam Safety Program

Kristen Martin, PE, California Division of Safety of Dams

Vojislav Cvijanovic, PE, California Division of Safety of Dams

The California Division of Safety of Dams (DSOD) is planning to enhance the dam safety program by incorporating periodic risk evaluations into regulating its portfolio of approximately 650 high and extremely high hazard dams. In the past DSOD has conducted focused reevaluations of individual structures, including radial gates, spillways, and seismic stability of embankments. Although these reevaluations were helpful to improve dam safety by focusing on a specific structure of a dam system, DSOD plans to perform comprehensive reevaluations to systematically identify dam safety deficiencies across each dam system, and the relative risk of the entire portfolio of high and extremely high hazard dams. Risk analysis involves identifying potential modes of failure at each dam system and evaluating their likelihood and downstream consequences. The results are used to inform which dams are the highest priority, where resources should be focused within each dam system, and evaluate repair alternatives. DSOD's risk evaluations must balance efficiency and sufficiency. Considering the available resources and time necessary to perform risk analyses, DSOD expects that a 15- to 20-year cycle is appropriate to continuously reevaluate risk for the 650 dams. Since the current relative risk is undetermined, DSOD needed a simplified initial prioritization tool to quickly and systematically approximate likelihood of failure and consequences to prioritize the order in which dams will be evaluated for the first cycle. To develop the initial prioritization tool, DSOD decided to use available data, including present condition, year built, capacity, height, dam type, potential downstream hazard, and number of critical appurtenant structures. We found readily available sources for systematically evaluating proxies for loading conditions, including Peak Ground Acceleration and Mean Annual Precipitation. We plotted the data for each category to determine thresholds and bins, with a goal of discretizing the data to develop relative risk screening indices. We then adjusted the weight of each category to balance the contribution it has on overall risk and calibrated the risk screening tool by reviewing failure case history data. The resulting products are an initial prioritization tool and a prioritized list of dams for formal risk study.