

Case Studies – Levees

Preliminary Seismic Risk Analysis Associate with Levee Failures in the Sacramento – San Joaquin Delta

In 2005, a preliminary analysis of the effects of seismically initiated levee failures on Delta water quality and export, and the economic consequences of levee failures to the state was completed. The study provided initial insight not only on the level of economic risk, but to risk-reduction opportunity associated with undertaking seismic upgrades of levees on Sherman Island.



The preliminary analysis had two objectives. They were to:

- Obtain initial insights regarding the seismic risks for the Delta in its current condition, including a first, “ball-park” estimate of the water supply disruption and economic risk to the state associated with seismically-initiated levee failures.
- Consider the risk-reduction opportunity (benefit) of upgrading the levees on Sherman Island, one of many options that exist for mitigating the risk.

Due to time and budget constraints, this initial evaluation relied on readily available information, extrapolations and engineering judgments. As a result, many parts of the comprehensive risk analysis that were described in the work plan were excluded from the scope of the study. In this context, the study’s results still provided valuable insight to a response to a major seismic event in the Delta and the impact that water supply disruptions would have on the state’s economy. These insights highlight the need to better understand Delta risks to support decision making on long-term policies and large capital expenditures associated with risk mitigation.

To estimate the seismic risk, a simplified approach was developed that took advantage of available information, the results of previous studies and limited analyses that could be performed. The elements of the analysis included: risk of levee failure; seismic scenario evaluation; hydrodynamic analysis; and economic analysis.

Major assumptions and approximations made in the analysis included: duration of disruptions; in-Delta economic consequences; water supply export disruption; economic consequences; and hydrology.

The study results provided the first quantitative look at consequences to the state in terms of water delivery disruption and economic impacts. Although preliminary, the results show the state to be at considerable risk in the event an earthquake leads to levee failures, with subsequent intrusion of salt water into the Delta and disruption of water export.

Schedule: Completed June 2005 as the predecessor of the Delta Risk Management Strategy.