Dam Floodplain Nexus

Shayan Rehman, P.E., C.F.M.
Outline

• History and Regulations
• Challenges and Barriers
• Breakout Session Discussion
  – Dam Inundation Maps and Floodplain Mapping
  – Awareness - Information Gap
  – Future Funding
History and Regulations

ST. FRANCIS DAM
- March 12, 1928
- 400+ lives lost
- Formed CA Dam Safety Program in 1929

BALDWIN HILLS DAM
- December 14, 1963
- 5 lives lost
- Began re-evaluation of dams and amended CA Water Code in 1965 to include off-stream dams
History and Regulations

LOWER SAN FERNANDO DAM
- February 9, 1971 Sylmar Earthquake
- 80 thousand people evacuated, close call
- Initiated emergency action
- Understand liquefaction consequences to dams

SENATE BILL 92
- June 27, 2017
- Inundation Maps approved by DSOD
- Emergency Action Plans approved by Cal OES
- Applies to all CA dams except Low Hazard
Challenges

192 EXTREMELY HIGH HAZARD DAMS - Would result in loss of at least one human life and inundate more than 1,000 people or significant threat to public safety.

461 HIGH HAZARD DAMS - Expected to cause loss of at least one human life.

275 SIGNIFICANT HAZARD DAMS - Can cause economic loss, environmental damage, or other significant impacts.

318 LOW HAZARD DAMS - No significant damage and losses expected to be limited to the owner’s property.

Jurisdictional Inventory

- 1,246 Dams
Challenges

• Hazard Creep
• Aging Infrastructure and Climate Change
Hazard Creep

Post Construction

Present Day
Aging Infrastructure and Climate Change

• Dam owners are diverse and have different abilities and resources
  – Some dam owners don’t generate revenue or can’t pass on costs - Prop 218 limitations

• Limited grants available
  – Applications are resource intensive
  – Owner eligibility limited

• Climate change increases chances of spillway flows
Breakout Session Discussion

- Dam Inundation Maps and Floodplain Mapping
  - Should Dam Inundation maps be included in Floodplains maps?
    - Might be misleading, floodplain maps are typically associated with 1% annual chance. What is the probability of a dam failure, 1% or 0.001%?
    - Floodplains maps are primarily a tool for landuse planning, flood insurance, and regulating building permits. How would dam inundation maps be used as a regulator tool?
      » The land development community will demand a standard, which would still lead to development downstream of the dam
Breakout Session Discussion

– Dam Inundation Maps and Floodplain Mapping
  • Should Dam Inundation maps be included in Floodplains maps? (continued)
    – Should the State develop standards for developing downstream of a dam, such as FEMAs Zone AE and Shaded Zone X designations
    – Could dam inundations maps be tied to the safety element of General Plan for making landuse decisions
Breakout Session Discussion

• Awareness – Information Gap
  – Dam Operators / Floodplain Managers / Emergency Managers / CA DSOD
    • Need better communication between professionals
    • Do Floodplain and Emergency Managers know how upstream dams are operated during a catastrophic event?
    • Do Floodplain and Emergency Managers know they can download dam inundation maps (https://fmds.water.ca.gov/maps/damim/)?
Breakout Session Discussion

• Awareness – Information Gap
  – Dam Operators / Floodplain Managers / Emergency Managers / CA DSOD (continued)
    • Federally operated dam have inundation maps but are restricted and are only made available to Emergency Managers
    • Floodplain managers need to understand the condition of the dam to make informed decisions
Breakout Session Discussion

• Awareness – Information Gap
  – Public Outreach
    • Public enjoys the recreational uses from dams and should learn about other benefits (power, flood, water supply, fisheries)
    • Providing dam inundation maps to the public has to be done in an accurate, clear, and effective manner to avoid misinformation
      – Unintended consequences may be lowered property value and exposure to litigation
  • Local Outreach
    – Brochure to downstream property owners
    – School presentations about dams (kids often share with parents what they learned)
    – Integrate dam information in flood preparedness events and creek week
    – Earn FEMA CRS Activity 630 credits
Breakout Session Discussion

• Funding
  – FEMA $10M Dam Rehabilitation Grant (35% non-federal cost share)
  – Consider adding Dam Safety to Silver Jackets where the USACE could assist with evacuation planning, risk assessment, and inundation mapping
Thank you