

# The Next Step in Central Valley Flood Management: Connecting Costs and Benefits

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# Acknowledgements

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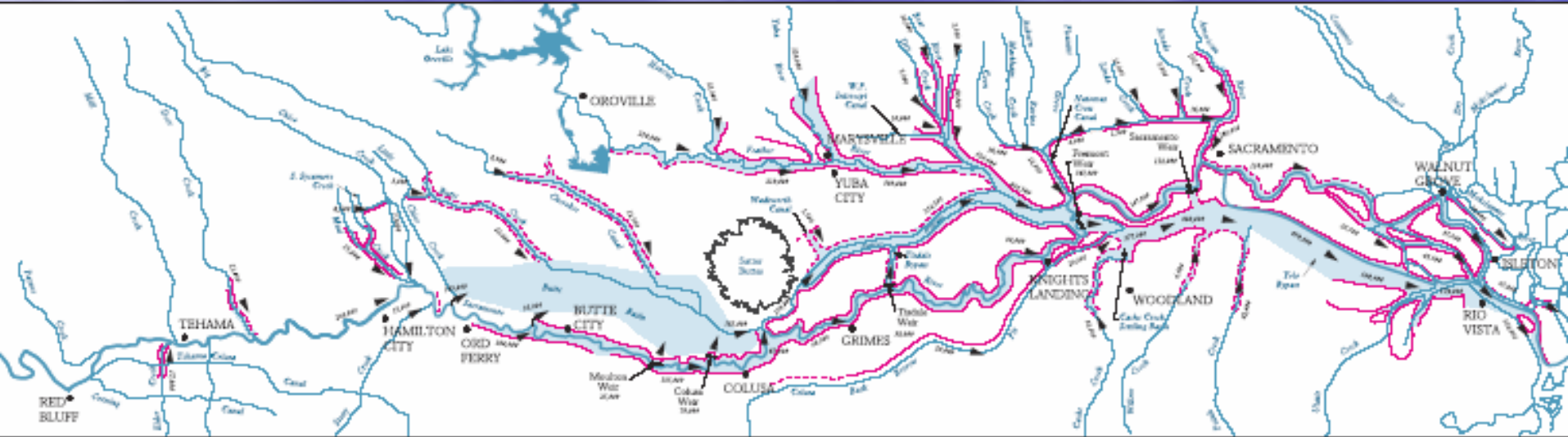
# Outline

- Central Valley & floods
- Strengths of the System
- Weaknesses of the System
- What should be done?
- Recommendations
- Conclusions

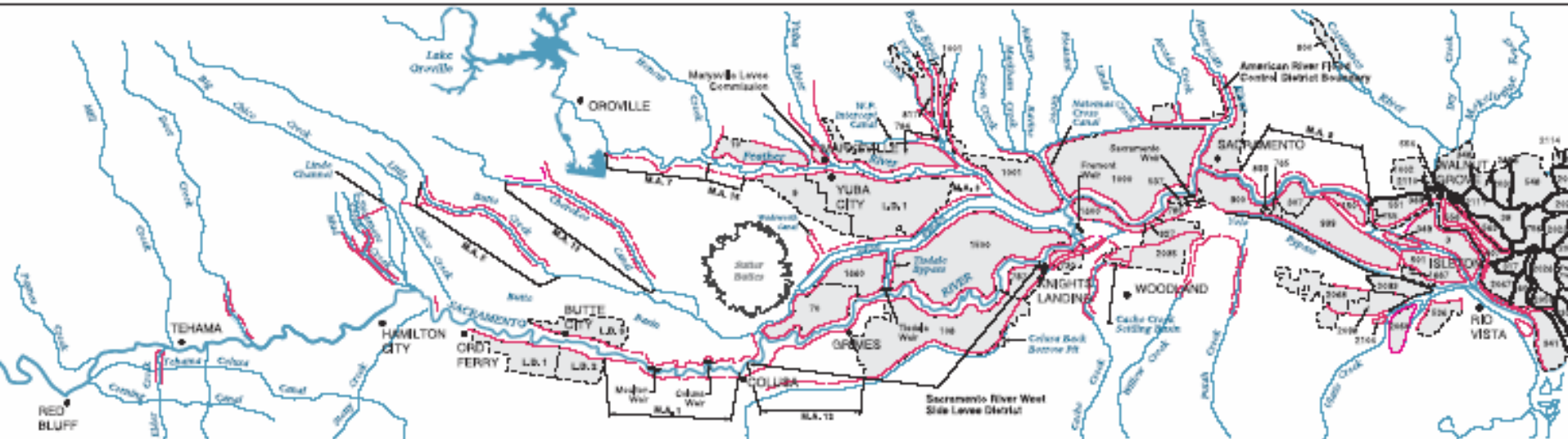
# Central Valley Flood System

- Sacramento and San Joaquin Rivers
- Composed of Levees, weirs, reservoirs, and bypasses
- Designed mainly to protect farmland and navigation

# Sacramento Flood By-Pass System



Estimated Channel Capacity (in cubic feet per second)

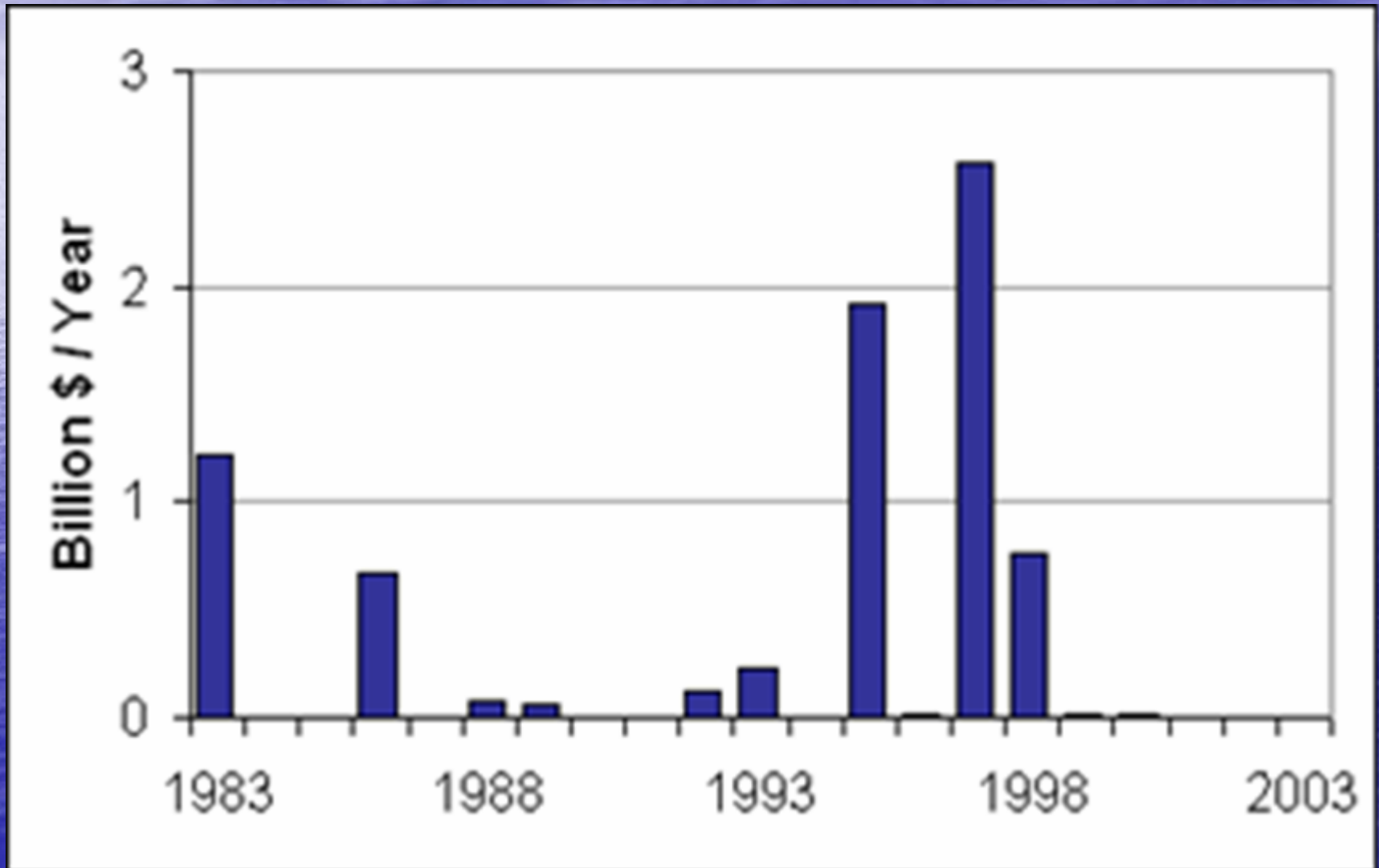


# Central Valley and Floods

- Large watershed, aging infrastructure, increasing population & urbanization
- Levees which were built on questionable foundations to protect agricultural land, protect \$47 billion of land and structure 0.5 million people (*Paterno vs CA, 2003*)
- The Delta (water supply)
- Liability for flood damages in Central Valley (*Paterno vs CA, 2003*)

# Recent CA Flood Damages

(Pielke et al., 2002)



# Strengths of the System

## 1. Sacramento River Bypass System

- Built in 1920s
- Carries over 80% of design flood flows
- Used for farmland, recreation, and environmental habitat

# Strengths of the System

## 2. Knowledgeable People and Past Performance

despite the weaknesses, it has provided protection, facilitating economic growth over 150 years

# Strengths of the System

3. Improved Weather Forecasting

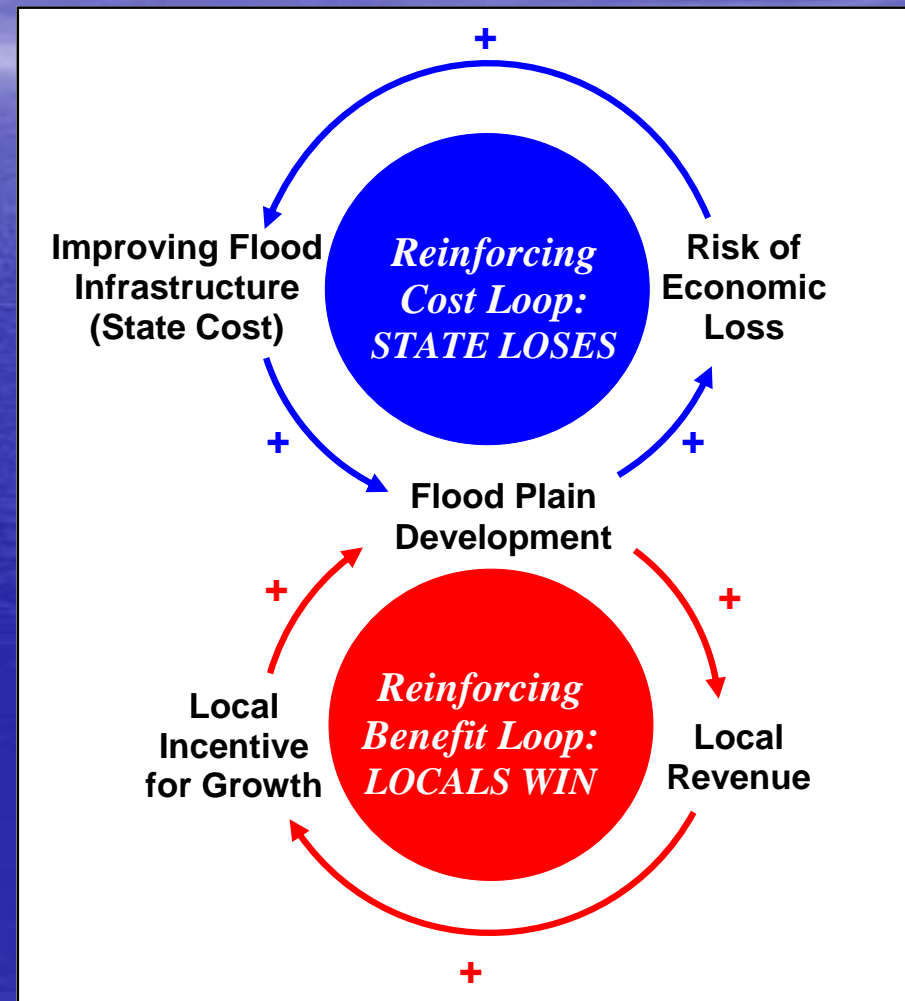
4. Strong Local Leadership

*e.g. Napa*

# Weaknesses of the System

## 1. Disconnect Between Costs and Benefits

- Who makes land-use decisions?
- Who is responsible for protecting public?
- Should we stop development in floodplains?!



# Weaknesses of the System

## 2. Poor Understanding of Risks

- Decision makers and residents poorly understand flood risks and liabilities
- Homeowners are not notified unless in 100-year flood plain
- Inaccurate and outdated FEMA maps which were developed for insurance purposes, not for land use planning and disaster response

# Weaknesses of the System

## 2. Poor Understanding of Risks

- 100-year protection does not clearly convey the risks
- Residual risks neglected
- False sense of security

<i>Floodplain</i>	<i>Chance of Flood during a 30-year Mortgage</i>
50 year	45%
<b>100 year</b>	<b>26%</b>
200 year	14%
500 year	6%
1000 year	3%

# Weaknesses of the System

## 3. No Long-term Comprehensive Program

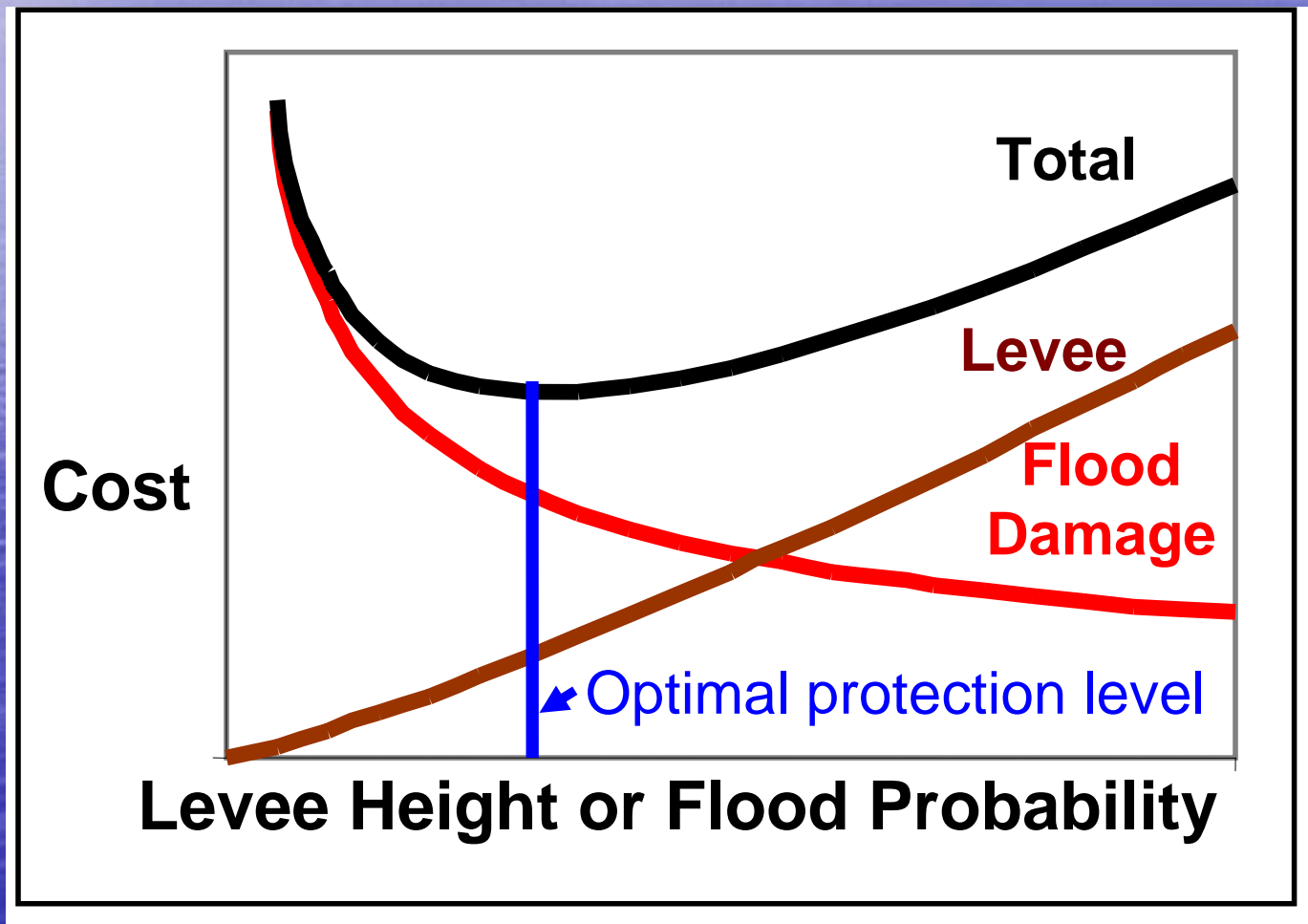
- Short-term plans
- Fluctuating & irregular funding
- Can the \$4.9 billion bond fund solve the problem? Well-planned bond expenditure is important, but insufficient
- Are we prepared for climate change?

# Flood Control vs. Management

- Floods cannot always be prevented (residual risk) but threats can be minimized
- Managing floodwaters (historic) vs. managing flood risks
- Structural (keeping water away from people) vs. non-structural methods (minimizing the damage potential of floods)

# Dutch Risk Analysis Approach

(Rijkswatersaat, 2006)



# What is Needed?

- Improve infrastructure
- Comprehensive flood mapping
- Notify residents
- Create incentives for regional collaboration
- Disaster response
- Coordinate land-use and public safety by:
  1. sharing liability for flood damages,
  2. establishing urban and rural boundaries and protection standards,
  3. compensating rural areas for urban benefits,
  4. planning for contingencies.

# What is Needed?

- Higher minimum protection levels (200 or 500-year protection level)
- Different protection levels based on land use (urban, business, rural, agricultural, etc.)
- Creating urban-rural partnership (rural communities are compensated)
- Flood protection system design codes (similar to building codes)
- Stricter building requirements, 2-story homes

# Conclusions

- California has always flooded and always will
- California can pay for flood management or it can pay more for mismanagement
- Improving Infrastructure alone will not eliminate flood risks
- A combination of approaches is needed
- Flood systems must provide land and water use services for most years, not just flood years