

Topic 14: Floods – Human vs Nature

test #4 today, due by midnight
topics 11-13, HW2
late submission subject to point reduction

HW#4 due tomorrow
late submissions not eligible for extra/bonus credit

discussion session (TAs): 4 pm York 3030

office hour (Laske): 5 pm Zoom

beachwalk signup open online for
Sat 11/2 noon PDT
Sun 11/3 noon **PST**

short videos are
test material!

SIO15 2024: Topic14 - Floods: San Diego

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Understanding Flood Risks

HUMAN FACTORS

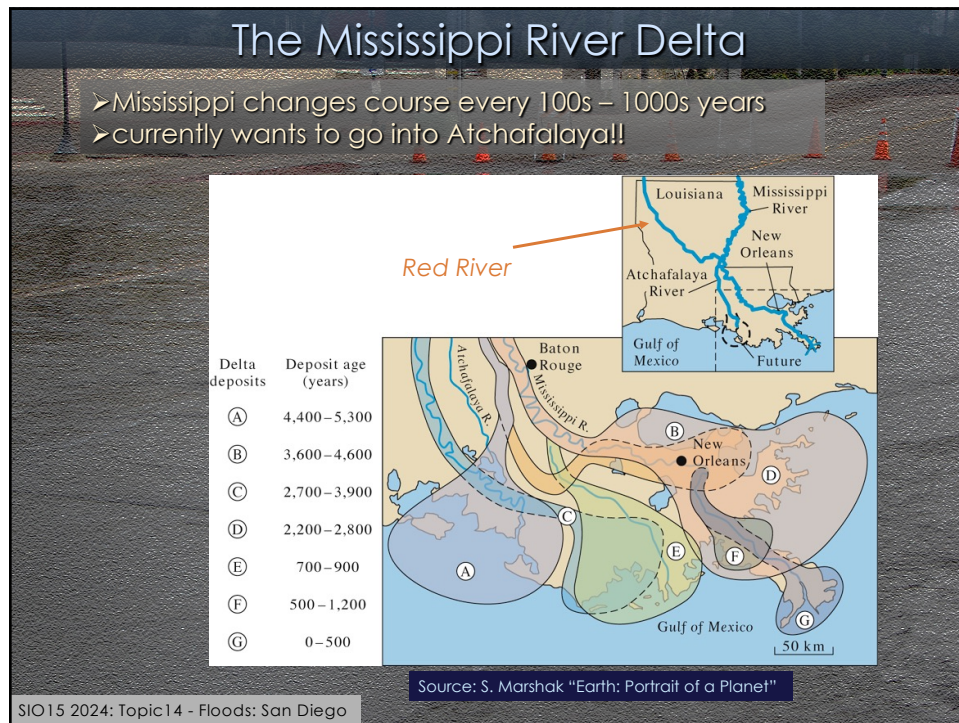
- failing of human-built dams and levees (Katrina, Johnstown)
- (excessive) sedimentation in dammed waterways and reservoirs

1) Levees, seawalls and dams have limited live time
2) may be poorly built or sit on unstable ground

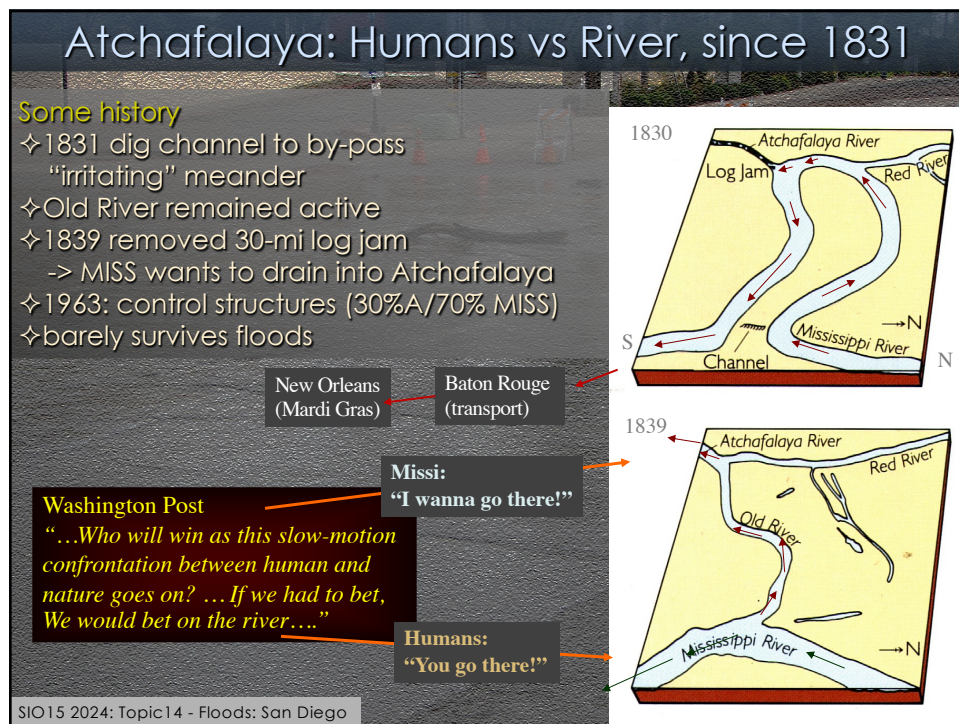
short video 9d – hydrographs
short video 9e – FFCs
short video 9f – San Diego River

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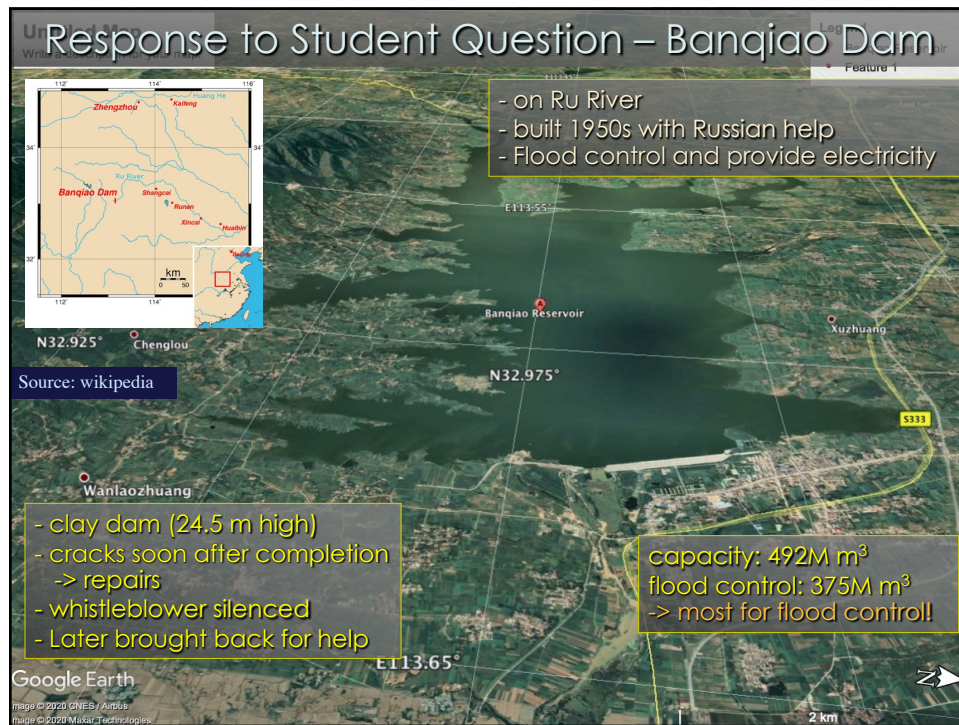
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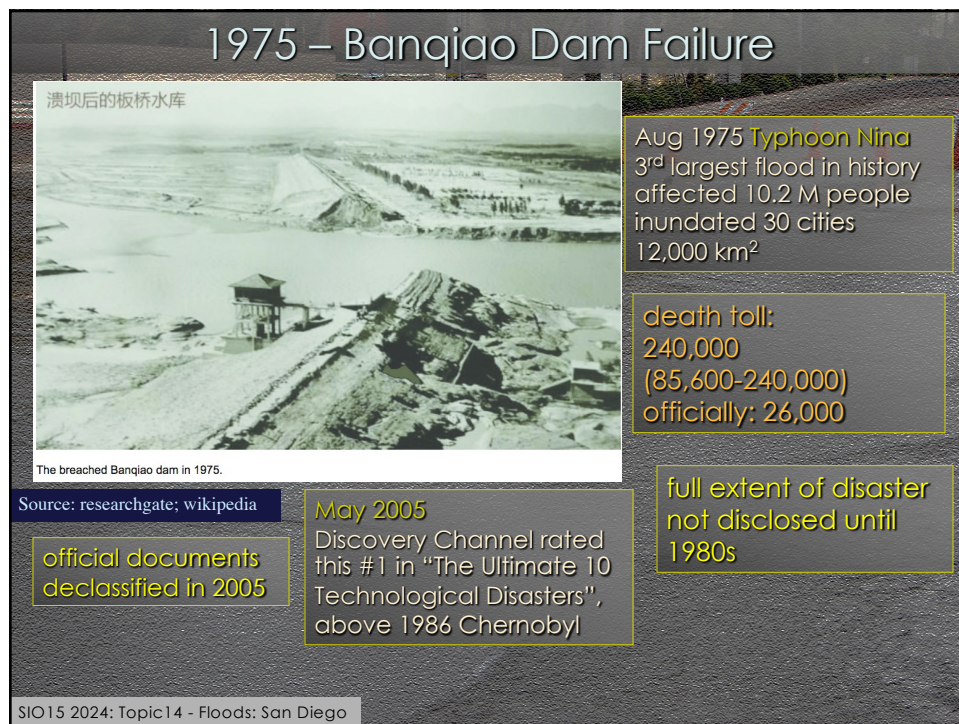
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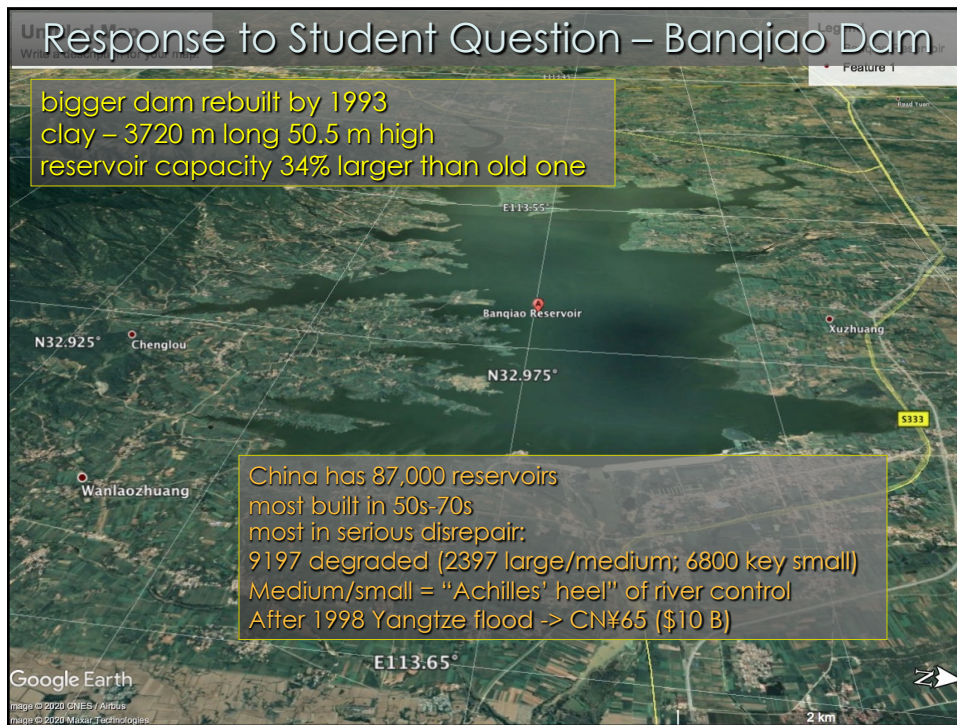
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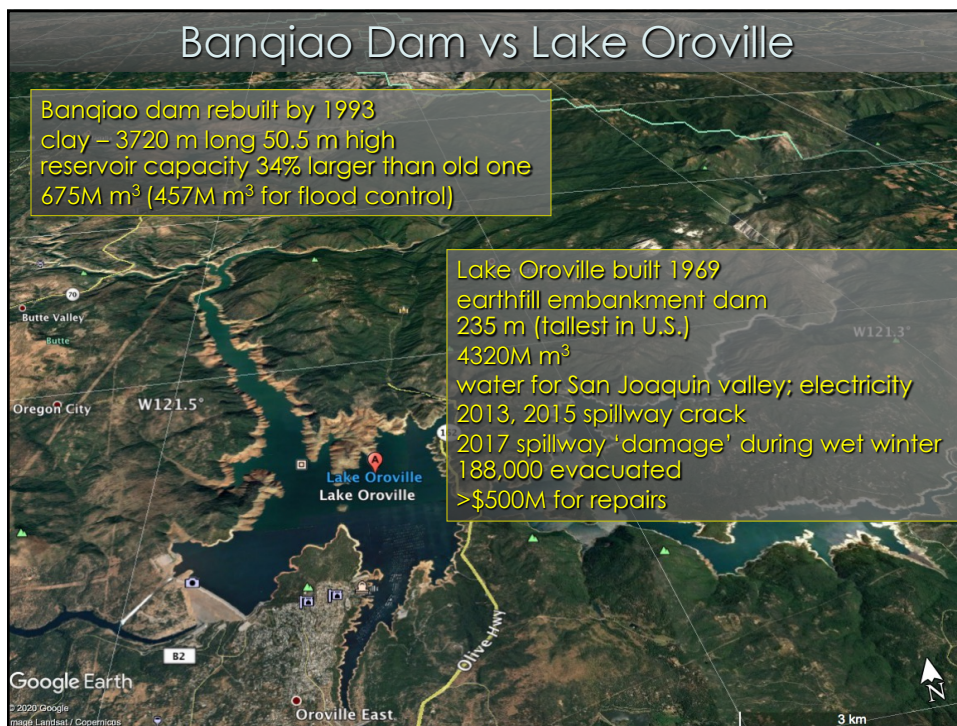
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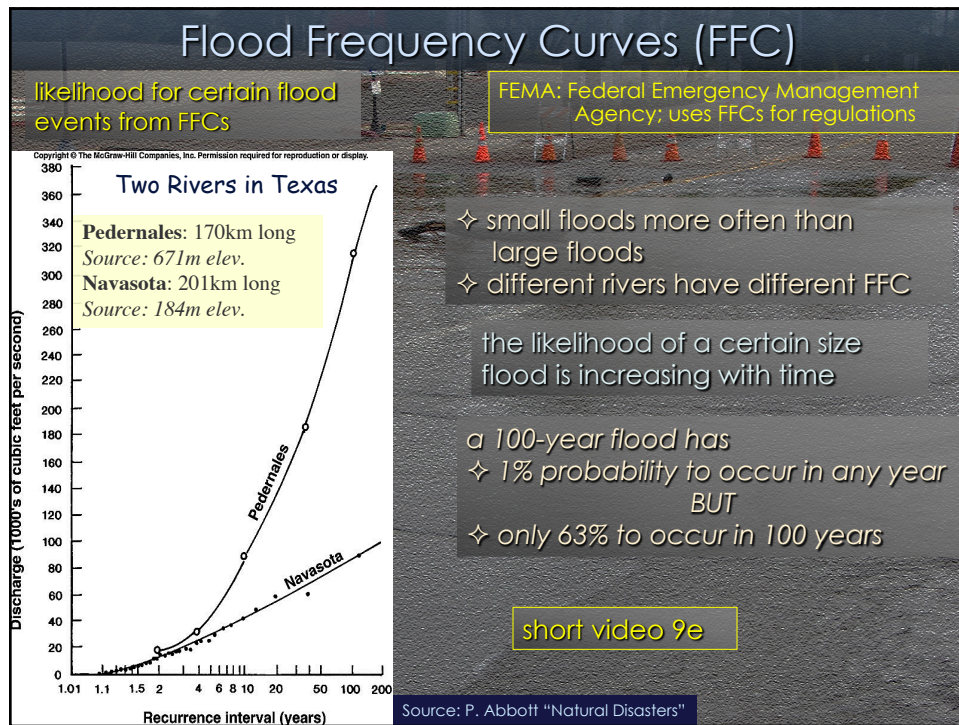
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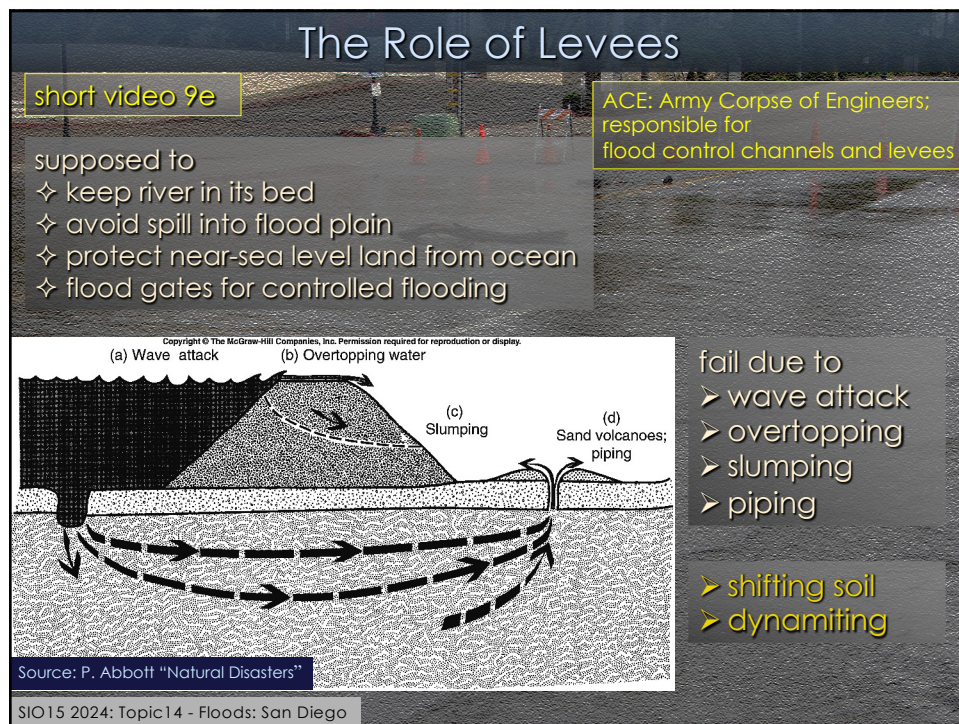
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The Impact of Levees

FLOODPLAINS
before:
 sediments/flood -> floodplain
now:
 sediments/channels -> taller floods
 -> increased risk of severe floods

LEVEES - CONS:
 ✧ higher levees ... time ... ->
 river ABOVE floodplain
 ✧ **MISSISSIPPI:**
 floodwater height increased 2-4 m in
 engineered upper basin
 ✧ no change in not-engineered sections

The diagram illustrates the process of river channelization over time. It shows four stages: 1. A wide river with a large floodplain and shoulders. 2. The river begins to narrow and deepen as sediments accumulate in the channel. 3. Levees are built on either side, further confining the river. 4. The river channel becomes very narrow and deep, with the water level rising above the original floodplain level. Labels include 'Floodplain', 'shoulder', 'Levees', 'Sediments', and 'River'. A vertical arrow labeled 'TIME' indicates the progression from top to bottom.

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The Impact of Levees

PERHAPS:
 * remove some levees to restore
 wetland habitat
 * ease flood risk by moving towns


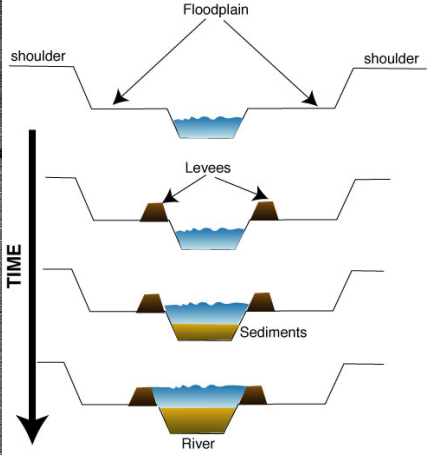
Louisiana: restore wetlands (\$18 billion)

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SoCal Flood Control Channels

excess sedimentation
also happens to local flood control channels!

[short video 9f](#)

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The Case San Diego




Source: P. Abbott "Natural Disasters"

short video 9f

- L.A.-style channels: lined with concrete
- have to be maintained vs. limited city budget
- rapid sedimentation, littering, growth of weeds
- breeding ground for disease-carrying insects


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San Diego Union Tribune 11/02/15

EMERGENCY FLOOD PERMITS ELUSIVE

Officials say environmental hurdles rarely allow agencies to quickly clear clogged drainage channels



Channels to be cleared
Drainage channels with the highest flood risk, which are now scheduled to be cleared during the fiscal year that begins next summer

Niño would not be eligible to clear brush, storm, and are possible in the middle of a storm only when a new threat to property or life has emerged and a long list of additional conditions are met. "It's not a simple process, and there are many rules to follow," said Drew Kleis, deputy director of San

That permitting process, which is governed by the Army Corps of Engineers and the state Regional Water Quality Control Board, aims to prevent local agencies from ripping out sensitive habitat in the name of flood prevention and damaging water quality by doing reck-

- emergency permits: allow immediate clearance of brush, debris, sediments
- governed by ACE and Regional Water Quality Control Board
- stringent criteria
- only for SPECIFIC imminent storm and specific channel where life is at risk
- storms predicted 1 week in advance
- El Niño predicted for 2014
- El Niño hits 2015!
- next El Niño – 2023/2024

Approximate locations U-T

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The 23 Jan 2024 Chollas Creek Flood

Heavy rain expected during morning commute

Storm is likely to reach coast between 7 and 9 a.m. today

BY GARY ROBBINS

A fast-moving storm out of the west Pacific will produce heavy rain across San Diego County today, slowing morning freeway traffic and making outdoor work a challenge.

The system also will likely drench faculty members who plan to be on strike at San Diego State University and Cal State San Marcos as part of a labor contract protest that will affect the entire California State University system.

The comparatively warm storm will reach the coast between 7 and 9 a.m., where it is expected to drop from 0.5 inches to 1.25 inches of rain by late afternoon, the National Weather Service said. Areas generally east of Interstate 15 could receive 0.75 inches to 1.5 inches of precipitation, while mountain areas should get about 2 inches. Significant snowfall is not expected.

A flood watch will be in effect throughout the county from 9 a.m. to 9 p.m.

"There could be urban street flooding in many areas," said Mark Moede, a weather service forecaster.


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Source: S.D. Union Tribune

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The 23 Jan 2024 Chollas Creek Flood

- several back-to-back storms
- large storm (3" in 6 h mostly S of I-8)
(normal: 2"/Jan) 2.7" at Lindberg Field
-> wettest Jan day on record
- hundreds of people had to be rescued



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The 23 Jan 2024 Chollas Creek Flood

- hundreds of people had to be rescued
- Southcrest, Encanto, Mt. View, Lincoln Park
La Presa
- some of S.D.'s most underserved communities

"city hasn't cleaned the canyon for 40 years"

"big trees in canyon"



COUNTY, CITY DECLARE neighborhoods across the county are left with repairing the FLOOD DAMAGE


question: is Chollas Creek partially left natural?

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The Jan 2024 Chollas Creek Flood

- entire city block flooded
- 3 fatalities
- 1000+ homes damaged



COUNTY, CITY DECLARE EMERGENCY OVER FLOOD DAMAGE

HUNDREDS OF SAN DIEGO RESIDENTS NEEDED TO BE RESCUED FROM THEIR FLOODED HOMES AND STREETS, PROMPTING STATES OF EMERGENCY

SIO15 2024: Topic14 - Floods: San Diego Source: NBC 7/39

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The Jan 2024 Chollas Creek Flood


"many people have no renters insurance and those that do have no flood/landslide coverage"

"6 of city's 15 stormwater pump stations overwhelmed"

ALERT 7 FIRST ALERT

"thousand-year storm"

"last time something like this happened was 1989"



COUNTY, CITY DECLARE EMERGENCY OVER FLOOD DAMAGE

TO DIG OUT FROM ALL OF THE MUD

SIO15 2024: Topic14 - Floods: San Diego Source: NBC 7/39

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The Jan 2024 Chollas Creek Flood



NBC 7 San Diego
2:55

DRONE RANGER 7

700+ flood victims sue City of San Diego, alleging it failed to maintain Chollas Creek

Watch >

Uploaded: Sep 11, 2024

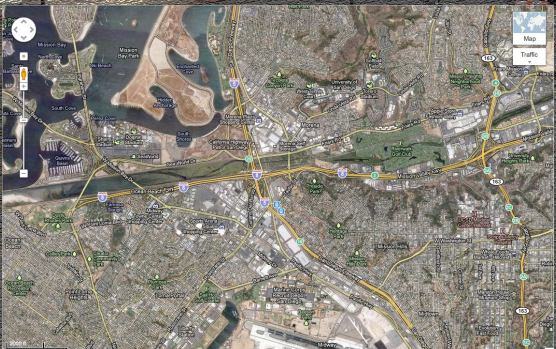

More than 700 people have joined a lawsuit against the City of San Diego,... [More](#) v

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Poll

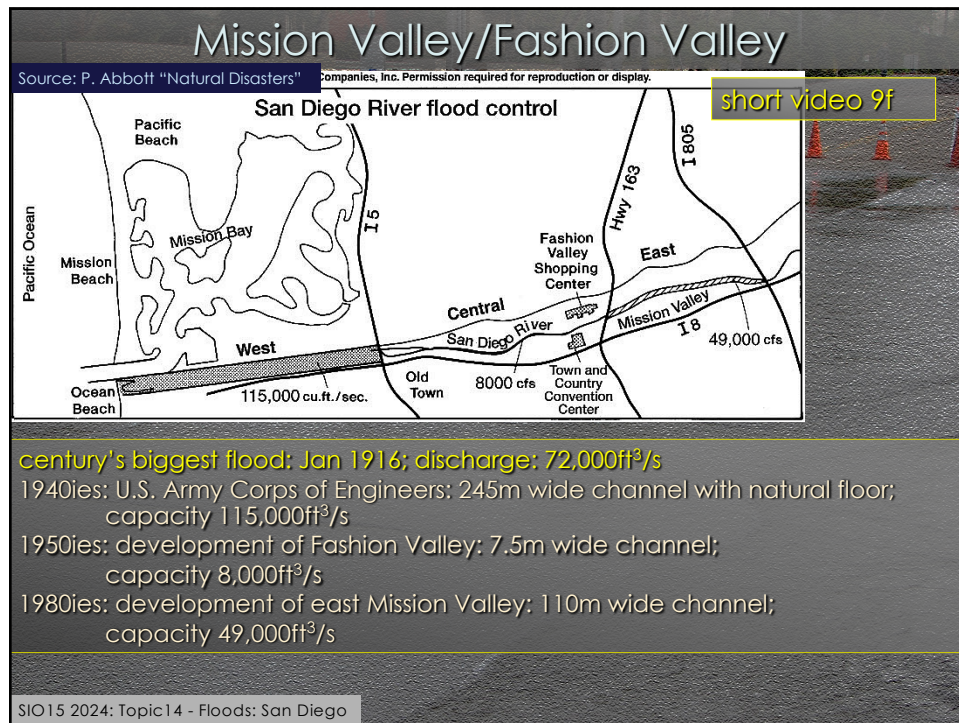



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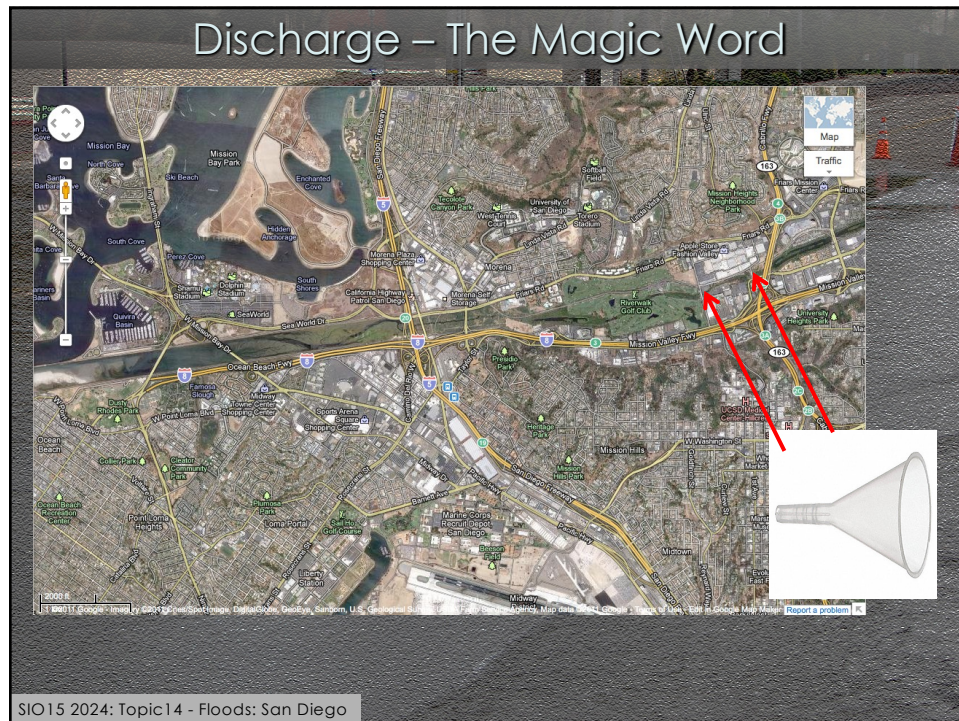
[short video 9f](#)

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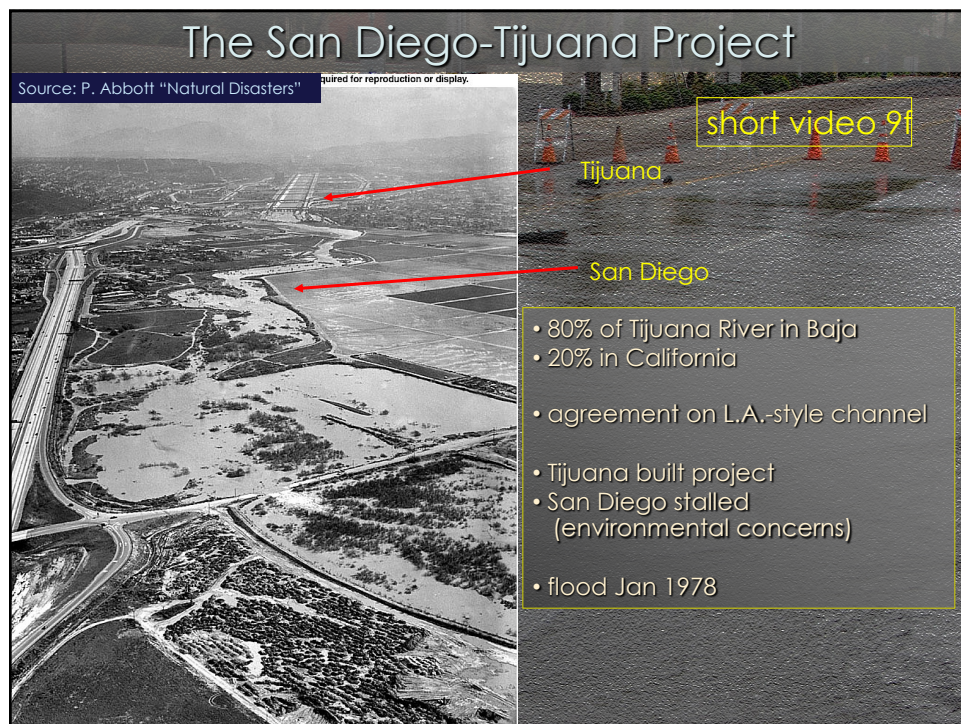
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17 Dec 2008 T.J. River Valley Flood

- 2 storms in 3 days
- after flooding by earlier 1 Dec storm
"a lot of flooding with small amounts of rain"
- flooding within 15-20 min (~4 ft)
"it felt like a tsunami coming in, a wall of brown water"
- flooding worst in 10 years



- dramatic rescue efforts for 21 people and 70 horses
- 1 fatality
- 4 horses, 15 goats drowned
- foul water killed plants at nursery
- (\$600,000 damage, no insurance)



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Source: SD Union Tribune

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Smuggler's Gulch: Flood Control in Tijuana River Estuary

Contributing factors:

- several storms in short time



- Tijuana River clogged with debris
- trash in Smuggler's Gulch
- construction of new border fence



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Source: SD Union Tribune

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