



Santa Barbara County Multi-Modal Transportation Network Resiliency Assessment

SBCAG Joint Technical Advisory Committee

May 7, 2020

Item 5 – Draft Regional Resiliency Assessment

Background

- Funding: Caltrans SB1 Adaptation Planning Grant
- Drivers:
 - Incorporate adaptation planning into the RTP-SCS process (2017 CA RTP Guidelines)
 - Link state, regional, and local adaptation planning initiatives
- Consultant assistance
 - Energetics for technical work and documents
 - CEC helped to form and facilitate dialogue with the Climate Resiliency Team
- Climate Resiliency Team
 - Stakeholder group: local partner staff, community-based organizations, and emergency management staff
 - Provided direction on recommendations, priorities, and input on the Vulnerability Assessment

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Project Vision

- *The Transportation Network Climate Change Resiliency Assessment exists to further development of climate-smart transportation infrastructure, ensure that it is robust to current and future climate change impacts, and commit to holistic infrastructure solutions that allow everyone in the region to move freely, transport important goods, and receive crucial services that support our communities' needs – even during emergencies and natural disasters.*

Two deliverables associated with the project:

- Vulnerability Assessment (February 2019)
- Resiliency Assessment (May 2020)

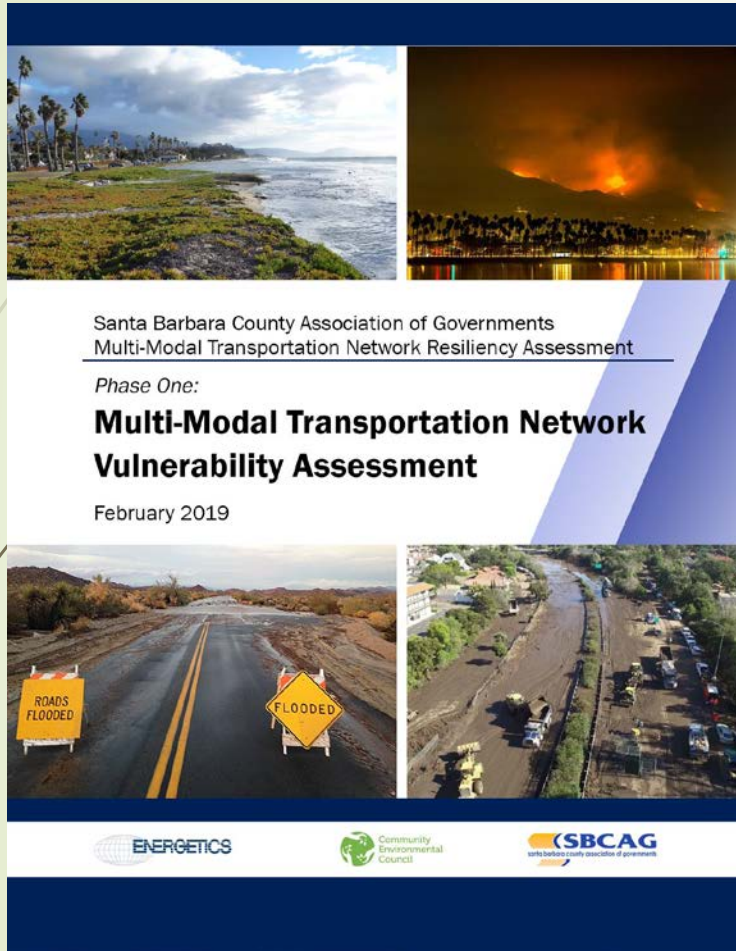
Initial and Final Case Studies (ICARP)

Data, data, data

- Some climate hazard data available for view on SBCAG's MapGeo

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Multi-Modal Transportation Network Vulnerability Assessment

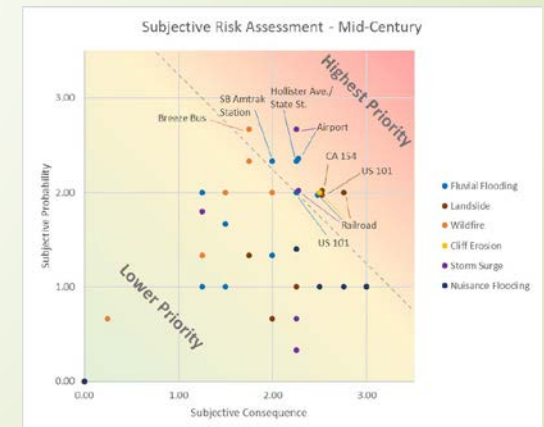
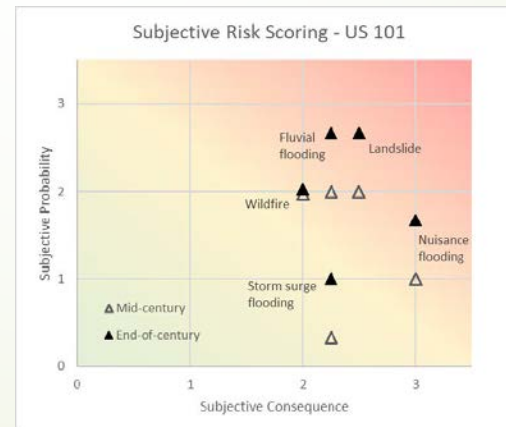


Identifies regional transportation assets vulnerable to future climate change hazards

- Sea-level rise – storm surge, nuisance flooding, and cliff erosion
- Fluvial flooding
- Increased wildfire potential – landslides

Risk-based prioritization of vulnerabilities to regional transportation systems

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Multi-Modal Transportation Network Vulnerability Assessment

Build on other adaptation planning efforts (data gathering):

- Santa Barbara Sea Level Rise / Adaptation Plan
- County Vulnerability Assessment
- Carpinteria Sea Level Rise Assessment
- Goleta Vulnerability Assessment
- Goleta Slough Management Plan

Establish parity with other plans/studies to greatest extent

- Parameters
- Data sources



Multi-Modal Transportation Network Vulnerability Assessment

Climate and coastal hazard scenarios

- Climate hazard scenarios – based on CA 4th Climate Change Assessment Report
- Coastal hazard scenarios – consistent with City of SB SLR Plan and Ocean Protection Council Guidance (2018)

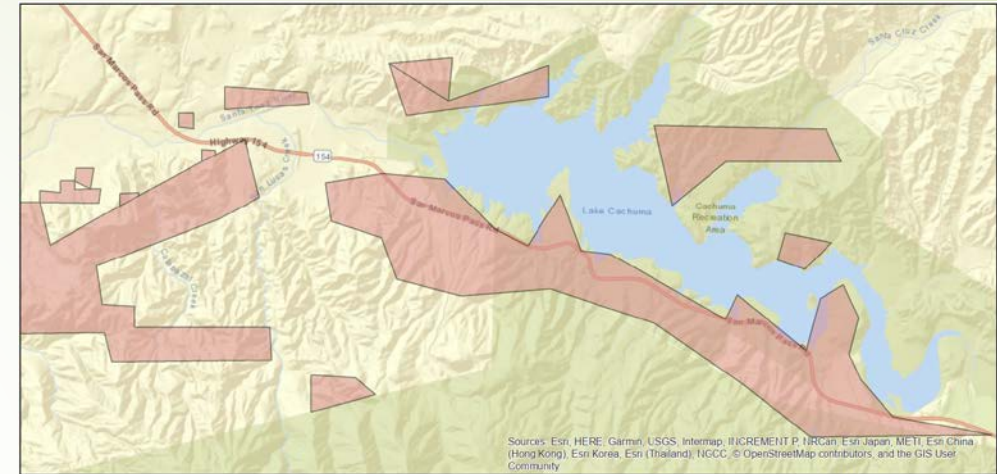
Time Period	Climate Hazard Scenarios			Coastal Hazard Scenarios		
Near-Term	-			2030	Medium-High Risk Aversion	0.25m
Mid-Term	2055 (2040 – 2069)	Low-Emissions	RCP4.5	2060	Medium-High Risk Aversion	0.75m
		High-Emissions	RCP8.5			
Long-Term	2085 (2070 – 2099)	Low-Emissions	RCP4.5	2100	Low Risk Aversion	0.75m
		High-Emissions	RCP8.5		Medium-High Risk Aversion	2.00m

Multi-Modal Transportation Network Vulnerability Assessment

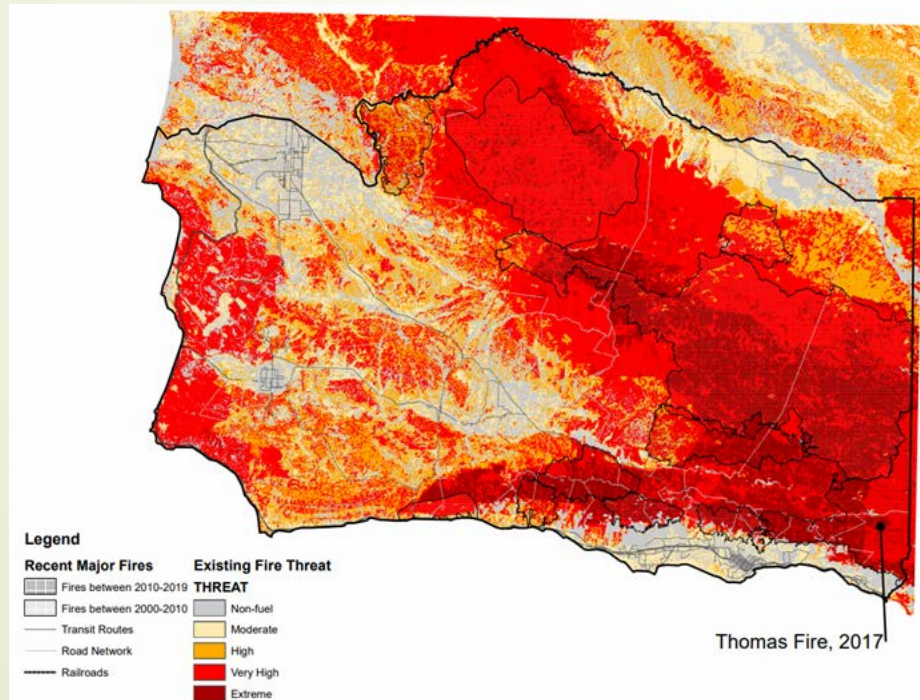
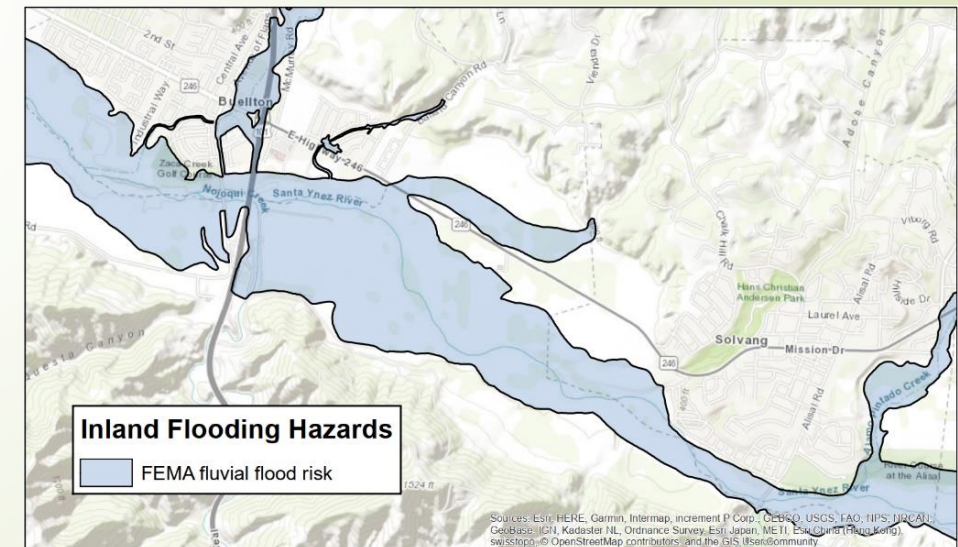
Inland hazards

- Wildfire, landslides, fluvial flooding
- CalFire FHSZ, C4CCA, FEMA FIRM

Landslide hazard areas along Highway 154 near Lake Cachuma



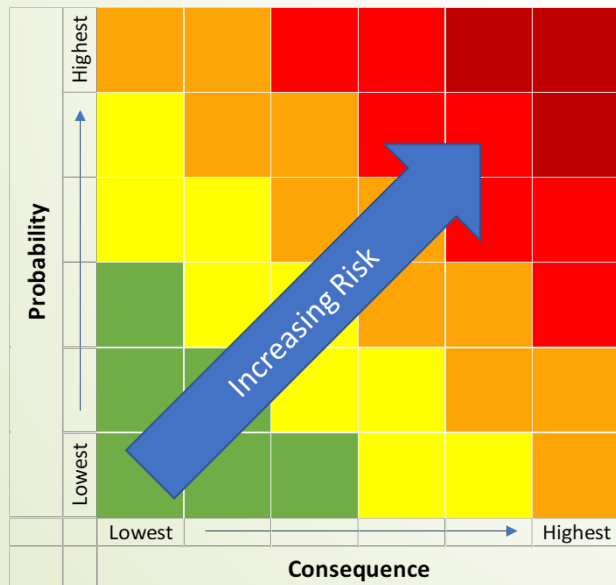
Inland flooding hazard in Santa Ynez Valley adjacent to Santa Ynez River



Multi-Modal Transportation Network Vulnerability Assessment

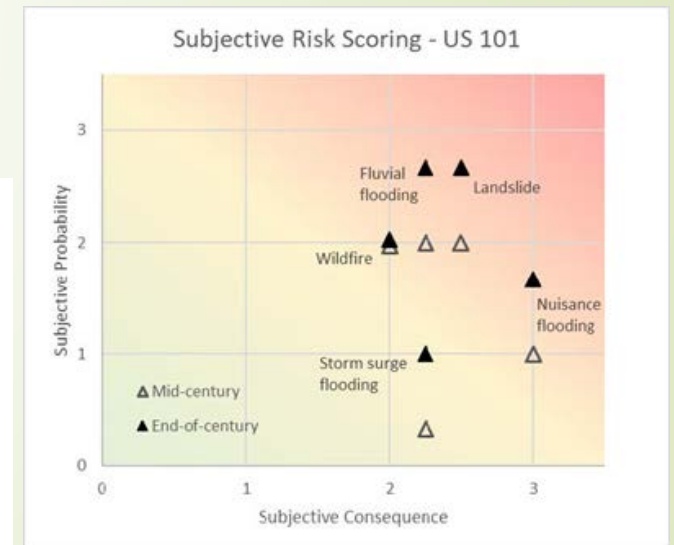
Subjective Risk Assessment

- Evaluate climate risks to regional transportation systems
- Systems were selected by evaluating; 1) current use levels, 2) emergency access, and 3) access to low-income communities
- Utilize risk-based framing to subjectively rank the *probability* of a climate hazard affecting a transportation system, and the *consequence* of such an impact



Subjective consequence score – US 101

	Cost of Damage	Cost of Disruption	Duration of disruption	Low-inc. comm.	Aggregate Consq.
Nuisance Flooding	3	3	3	3	3
Storm Surge Flooding	2	2	2	3	2.25
Coastal Cliff Erosion	-	-	-	-	-
Wildfire	2	3	2	1	2
Landslides	3	3	3	1	2.5
Fluvial Flooding	1	3	2	3	2.25



Resiliency Assessment

Includes key recommendations for implementation:

- Safeguard coastal infrastructure from flooding and erosion
- Create a long-term plan for the Santa Barbara Airport
- Ensure access and mobility during emergencies
- Conduct targeted hazard analyses of critical threats
- Engage in regional collaboration to identify potential solutions



Resiliency Assessment

Detailed Resilience Measures Inventory included in Appendix

- Examples of best practices for potential implementation

Road, rail, and transit-specific resilience measures

Resilience Action		Climate Change Vulnerabilities				Transportation Sector			Measure Type	
Name	Description	Primary Impact	Primary Vulnerability	Additional Impacts	Additional Vulnerabilities	Sector	Sub-sector	Infrastructure	Type	Sub-type
Construct Sea walls	Construction or improvement of physical barriers (usually made from concrete or other rigid materials) to prevent coastline erosion (either beach or cliff); seawalls are typically vertical or near-vertical	Coastal erosion	Erosion of Roadbed	Nuisance flooding; storm surge flooding	Flooding of roadways	Roads	All		Hardening	Barrier
Elevate roadway surface	Elevation of roadway surfaces to prevent inundation from flooding	Storm surge flooding	Flooding of roadways	Nuisance flooding; fluvial	Flooding of roadways	Roads	All		Hardening	Replacement
Relocation	Relocation of vulnerable roadways	Coastal	Erosion of	Nuisance	Flooding of	Roads	All		Relocation	Relocation