

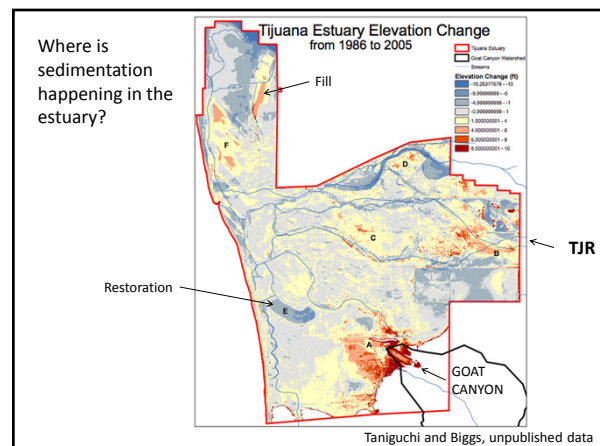
Is sediment loading higher now than in the past?

Topo maps suggest Tijuana Estuary lost ~80% tidal prism (1852-1986) due to sedimentation, beach erosion, human fill (Williams and Swanson 1987).

Urbanization likely increased sediment loading above natural background

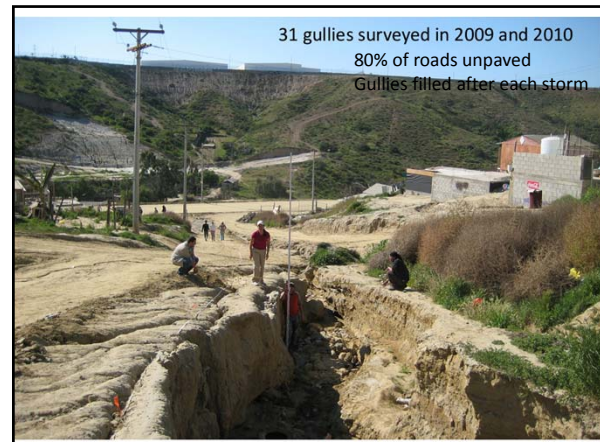
BUT: Inman and Masters (1991): Dam construction reduced sediment yield from the Tijuana River by 50-75% and eroded Imperial Beach

How can we reconcile these?



Erosional processes in Los Laureles (Goat) Canyon

1. Sheetwash-rills: RUSLE, GeoWEPP-Road
DEM (30m), %veg, impervious, soil
2. Gullies: Field measurements + empirical model
3. Channel: Field measurements + empirical model

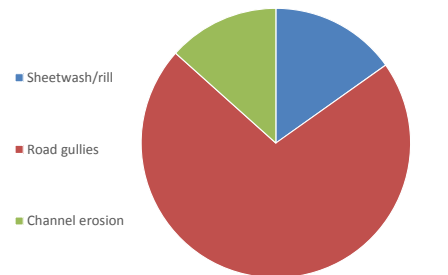


31 gullies surveyed in 2009 and 2010
80% of roads unpaved
Gullies filled after each storm



Channel erosion

Road erosion is a dominant source of sediment in Goat Canyon



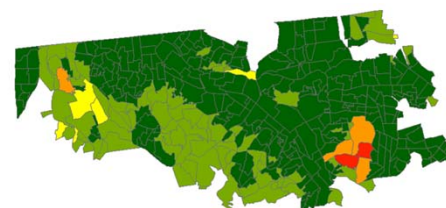
What would be the impact of different land use changes and BMPs on sediment and stormflow?

1. Continued urbanization
2. Road paving (already happening—should it be encouraged?)
3. Sediment retention basins

Strategy:

Measure stream discharge and sediment yield during storms
Model stormflow and sediment yield under different land uses
Map gullies with cameras (and balloons, minicopters) after storms

Map of potential sediment production in Tijuana by census tract



USLE_average_tons per ha

0 - 6
6-12
12-18
18-24
24-34

This is for sheetwash erosion...what about other types?

Is sediment loading higher now than in the past?

Maybe somewhat *lower* from the mainstem due to dams

Probably significantly *higher* from small urban watersheds

MAINSTEM

River	Source	Natural ^a 10 ³ m ³ /yr	Present ^b 10 ³ m ³ /yr
Tijuana River	Brownlie & Taylor, 1981	105	52
	Inman, 1976	535	
	Everts, 1987	153-380	100-115
	This study (Inman and Masters, 1991)	200	50
Inman and Masters, 1991			

"Only massive nourishment projects...have prevented erosion of Coronado beaches and the strand itself. More will be needed in the future if sediment flux out of the Tijuana River basin is not restored."
http://coastalchange.ucsd.edu/st1_thenandnow/silver.html

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