Gully precipitation events were modeled using input data and dimensions measured in the field. Apparent sub-basin hydrographs suggest that sediment loadings peak at the headwaters of the study area. A total of 11 gullies were excavated after each storm with a snare measure and survey tool. GPS points were taken with a survey-grade GPS at the beginning and end of each gully to calculate where wall and depth measurements are measured. Repeat surveys of the same gully were taken for the 3rd gully, with the others taken once. Storms in the area are of varying size and duration. A total of 4 storms were used to estimate the erosion rate for the gullies. The total amount of sediment transported during storms was measured every 1-h until the gullies terraces, and a GPS point collected at each wall and depth measurement. The shape of the eroding terraces was determined with an east-west transect from the 5m DSM. The longitudinal profile survey of a few gullies of various sizes was performed to compare to a degradation referenced from the 5m DSM. The location of each gully was determined based on the field transect taken with the sample date and line number recorded in the transect's field notes.

**Abstraction**

Tijuana River Basin originates in Mexico and drains 4465 km² into the Tijuana River Estuary National Research Reserve, a protected coastal wetland in Mexico that supports 400 species of birds. During storms, excessive erosion in Tijuana produces sediment loads that bury native vegetation and block the tidal flow. It also threatens human life, including roads and houses in Mexico. To address this, the Tijuana River watershed in the U.S. is involved in various efforts to address land cover changes and erosion through an experimental project. The study area includes the Tijuana River in California and adjacent parts of Baja California, Mexico. The project aims to develop a model that estimates sediment loadings in a sub-basin of the watershed (Los Laureles Canyon) for existing conditions as well as future alternative land use and pollutant transport system.

**Methods and Procedures**

**The Study Area**

The CONCEPTS model simulates overland flow, transport of bed and suspended sediments, and sediment deposition. The AnnAGNPS model simulates overland flow, sediment transport, and channel cross-sectional geometry to calculate sediment loading due to its contribution to the sediment budget. CONCEPTS takes outputs from AnnAGNPS and channel geometric information to simulate channel processes to produce the total sediment load for the watershed. The AnnAGNPS model is used to estimate gully erosion, sheet and rill erosion as well as gully erosion. CONCEPTS is used to simulate channel processes including bed load and suspended load transport. CONCEPTS takes output from AnnAGNPS along with channel geometric information, channel stability information, and bank erosion. The model is validated by comparing the predicted results with the observed data to ensure that the model is accurate.

**AnnAGNPS Model**

The AnnAGNPS model is based on the Soil and Water Assessment Tool (SWAT) model developed by the USDA-Agricultural Research Service. The AnnAGNPS model is designed to simulate sediment transport and deposition at the field site. It uses the AnnAGNPS subwatersheds for Goat Canyon and the longitudinal profile of the Tijuana River watershed. The AnnAGNPS model is designed to simulate sediment transport and deposition at the field site. It uses the AnnAGNPS subwatershed for Goat Canyon and the longitudinal profile of the Tijuana River watershed.