STATISTICAL STUDY OF SUSPENSION LOAD OF THE TRINITY RIVER

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appendix of computer programs.

This study of the effect of some natural factors on the suspension load of the Trinity River is aimed toward a better understanding of the general principles of fluvial sediment transport.

The Trinity River drains an area of 17,500 square miles. It discharged about 5,321,000 acre feet of water and 2,740 acre feet of sediment to Trinity delta in 1965.

The investigation of the factors controlling sediment transport was accomplished by using both graphical and analytical correlation techniques. Graphic analyses were made on both hydrographs and sediment rating curves to examine the general features of the factors and their variation both in time and in space.

Five variables - stream discharge, surface runoff, base flow, air temperature, and water stage ratio - were chosen as independent variables, and two variables - silt discharge and concentration - as dependent variables for the correlation study. Correlation coefficients show high interdependence between independent variables. Those between independent and dependent variables show some variation in significance among seasons.

A successive elimination method was used to select the important independent variables. Surface runoff and base flow were both removed from further study because correlation coefficients to the remainder of the independent variables became insignificant after the factor of total stream discharge was eliminated. The remaining three independent variables were used in a model study employing both conventional regression and factor analysis. Combinations of different factors were analyzed to evaluate the net contribution of the predictors to the dependent variables. The percentage of variance of dependent variables accounted for due to regression is smaller for the October to December period than for other periods.

Total stream discharge is found to be the most important independent factor in all analyses. This variable alone accounts for up to 92 percent of the variance of silt discharge. Thus it makes all the other factors ineffective. The ratio of water discharge in two successive days representing the rising or falling water stage is found to be important in upstream areas and contributes 10 percent to the silt discharge variance and 28 percent to the concentration variance.

Application of the models to an unanalyzed set of data shows better predictability by conventional methods than by factor analysis when the new data were from the same area as previously analyzed. Applications of the models to the data from different areas show large standard errors. The standard error for prediction of concentrations is less than that for silt discharge.