

## STREAM EROSION IN WESTERN CHINA

C. L. FOSTER, Norman

The Red Basin of Szechuan Province is an area roughly three and a half degrees in longitude by three degrees in latitude, an area approximating one hundred and twenty by one hundred and seventy miles—twenty thousand square miles. At the western edge of this area lies the Chengtu plain. Both the larger Red Basin as a whole and the smaller plain are surrounded by higher land, reaching on the west and northwest to elevations above ten thousand feet. The season of heavy rainfall coincides with the summer melting of snows in the Tibetan borderlands. The result is a wild rush of flood waters down valleys with steep grades and precipitate slopes. Thus large amounts of debris are taken to the borders of the plain.

"The volume of water per second at Ichang, a thousand miles from the sea in June is 675,000 cu.ft.; at Hankow, six hundred and forty miles from the sea, 1,000,000 cu.ft., the increase being due to the influx from the Tung Ting lake, one hundred and twenty miles above Hankow and from the Han River which joins the Yangtze at that point."\* The discharge for the whole year is calculated at 560,000 cu. ft. per second at Ichang.\*\* This may be compared with 675,000 cu.ft. per second discharged by the Mississippi at the Gulf. Taking the sediment of the latter, annually as four hundred million cubic yards, the Yangtze is estimated at about one half this amount. Sir Archibald Little has calculated the denudation for the six hundred thousand square miles of the Yangtze basin at the rate of one foot in three thousand years.\*\*\*

Before man attempted to control the wild mountain torrents, they spread their burden of outwash over the bottoms of inland seas and lakes. Thus were the sediments of the Red Basin accumulated. Rapid filling went on in a manner similar to that now proceeding in the Tung Ting Lake. The mountain building which continued from Cretaceous until Pliocene resulted in warping, folding and faulting over extensive areas. The Chengtu plain was faulted down and with the filling of the basin, the outlet was cut down and the plain gradually dissected. The sands and shales are a part of our Red Basin of today. The repeated or continued elevation speeded up stream flow so that master streams and tributaries for the most part flow in narrow gorges.

The cities along the Yangtze from Chung king, fifteen hundred river miles from the sea, to Sui Fu, eighteen hundred miles and the others in between are all built on rock terraces. If the river at Chung king be taken at 630 ft. alt. the rock terrace would perhaps be 800 ft. At Sui Fu, the river is 800 ft. and the terrace is about 900 ft. South of the Yangtze, a boulder terrace has been built upon the rock terrace, an additional 50 ft. in thickness.

Here we leave the Yangtze and turn north up its tributary, the Min. One hundred and twenty miles brings us to Kia ting, where the river is at 1200 ft. and the city at 1250, for there is room here for flood waters to spread out. The cliffs across the Min rise 300 ft. above the river. Another one hundred and twenty miles and we arrive at Chengtu, the provincial

\*Little, Sir Archibald, "The Far East," pps 58,9

\*\*Ibid. p/60

\*\*\*Ibid. P. 60

capital at 1700 ft. Here we turn northwest to Kwanshien, forty miles at an elevation of 2400 ft. where the controls for the irrigation system are located. About 250 B. C., a provincial official conceived the idea of a control for the mountain waters which the Min river discharged at the edge of the plain. He cut a channel through a mountain spur to distribute about half the flow to the east and northeast. He then connected the ditches leading from the Min eastward across the divide to the next valley. The remaining waters were permitted to follow by gravity flow and local controls to provide water for the rice fields and other crops. The last general remodeling occurred after disastrous floods during the Min dynasty which began in 1868. The rule laid down by the originator of the system has been passed down and at some time in the past chiseled on a granite boulder on the river bank. It reads "Dig deep the bars; Keep low the banks." Observation of this rule together with the annual cleaning of the silt from the ditches has preserved the system intact. The irrigated area which previously was a wilderness is doubtless the most densely populated agricultural area in the world. The area of the Chengtu plain of an area of about 2800 sq.miles supports a population of 5,000,000 people and sends large quantities of food supplies to other districts.

---