

VARIATION OF EROSION AND SEDIMENT YIELDS IN MOUNTAIN AREAS OF LIAONING PROVINCE

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Soil erosion and its related sediment transport is one of the major environmental issues and is of central importance in considerations of environmental change. Using long-term records on precipitation and sediment transport, the characteristics and variation of erosion and sediment yields in mountainous regions of Liaoning Province are analysed in the paper.

There are different characteristics and variability of erosion and sediment yields in different parts of the province. The strength of soil erosion in the eastern part is small (modulus of annual sediment yield is 100-500 tonnes per square kilometre), as it has a high percentage of forest cover (30-45%), and resistance against soil erosion is strong. The strength of soil erosion in the western part is large (modulus of annual mean sediment yield is 1,000-5,000 tonnes per square kilometre) due to the quality of soil in the western parts and the low percentage (5-20%) of forest cover with weak resistance against soil erosion.

Analysis of annual sediment yields shows that the peaks occur in the same year as those of annual precipitation. The ratios of the maximum to the minimum annual sediment yields are 200-800 in the eastern part of the province and 100-500 in the western part which are far greater than similar ratios of annual precipitation 2-3 in the east and 2.5-3.5 in the west, and runoff 6-27 in the east and 10-35 in the west part.

Owing to many years of water and soil conservation work, including planting of trees, for several decades, annual sediment yields of river basins in the western mountain region of the province are decreasing greatly. For example, in the Jinzshou basin of the River Xiaoling, the five-year mean value of sediment yields in the eighties is 70-80% less than that in the

sixties under the same average areal precipitation (Table 1). However, in most of the eastern mountain region of the province, this is decreasing slightly. The five-year moving mean value of sediment yields in the later eighties is 20-50% less than the early sixties, under the same moving mean of precipitation as in the later eighties (figs. 1 and 2).

But in a few basins in the eastern mountain region of the province, annual sediment yields are increasing due to forest denudation. This is seen in the ten-year moving mean graph of annual precipitation, runoff, and sediment yields in Shalizhai station on the River Dayang (Fig. 3). It can be seen that the ten-year mean value of precipitation in the eighties is equal to that of 15 years earlier, but the ten-year mean value of sediment yields in the eighties is nearly 30% more than 15 years earlier.

It is observed from the above that the variation of sediment yields is easily effected by human activities. Owing to water and soil conservation, forest environment in basins will be improved. As forest cover increases, erosion in basins will lessen, sediment yields of streams will, correspondingly decrease. If water and soil conservation is neglected, forest environment will be harmed. As forest cover decreases, erosion intensifies, and sediment yields of streams will correspondingly increase. This should make our authorities aware of the great importance of water and soil conservation in reducing erosion and sediment yield.

Table 1. Comparison of Five-year Average Areal Precipitation and Sediment Yield in Jinzhou Basin

Period	Average Areal Precipitation (mm)	Sediment Yield (10^4 tonnes)
1963-1967	439	588
1983-1987	444	132

Fig. 1 Five year moving mean graph
of hydrologic elements in
basin Caohe

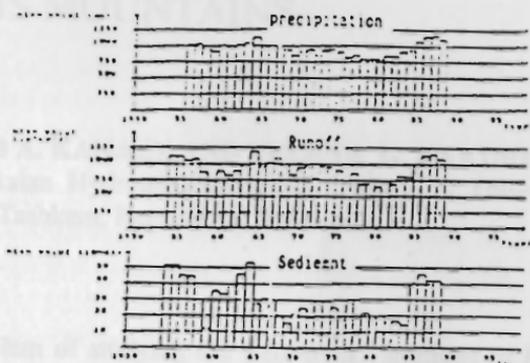


Fig. 2 Five year moving mean graph
of hydrologic elements in
basin Gengwangzhong

