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不同库容配置比例淤地坝的减沙效应

Effects of warping dams of different storage capacity configuration proportion on reducing sediment base

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中文摘要：

　　根据调查资料，采用数理统计方法，以黄河中游大理河流域为研究对象，进行了基于不同配置比例的淤地坝减沙效应分析和影响因子贡献率研究。结果表明，大理河流域大、中、小型淤地坝的坝地保存面积依时序增长的趋势比较显著，但近期明显变缓。1960－2002年流域淤地坝年均减少洪水1 840万m3，年均减沙1 290万t；流域大、中、小型淤地坝减沙量占总减沙量的比例分别为80.1%、14.6%和5.3%；90年代以来淤地坝的减沙效益最大，达到30.2%，对应的淤地坝的配置比例为1.84:2.37:5.79；大型淤地坝（含骨干坝）减沙量是中型淤地坝的5.5倍，是小型淤地坝的15倍；未来流域实现持续减沙作用的淤地坝优化配置比例可按1:3.0:7.0选取。流域不同类型淤地坝的减沙量与汛期降雨和最大1日降雨密切相关，在淤地坝减沙能力范围内，汛期降雨量和最大1日降雨量越大，其减沙量越大，具有"多来多拦"的显著特点。不同年代淤地坝减沙量与洪水量呈正相关线性关系；20世纪70、80年代单位立方米洪水对应的淤地坝减沙量约为0.19 t/m3，90年代以后约为0.23 t/m3。淤地坝减沙模数随着3个主要影响因子的增大而增大。各影响因子对流域淤地坝减沙模数变化的贡献率由大到小排序为：洪水量＞汛期降雨量＞最大1日降雨量。

英文摘要：

　　Abstract: This paper analyzed the effect of warping dams of different configuration ratios on reducing sediment and major factors contribution rate by mathematical statistics method and the investigation data in Dali River basin in middle of Yellow River. The investigation data showed land area of different type dams increased with time in Dali River basin, but presented obviously slow increasing in the near future. Warping dams reduced mean flood amount with 18.4 million m3 and sediment 12.9 million t during 1960－2002 annually, and the ratio of different type dams was 80.1%, 14.6%, 5.3%, respectively. The period of biggest reduction of sediment with 30.2% was 1990 s, and the responding ratio of different type warping dams was 1.84:2.37:5.79. The sediment decrement of large-scale soil-retaining dam was 5.5 times than that of medium dam, and was 15 times than that of small dams. The optimized proportion of distributions of warping dams for achieving continuous sediment reduction in the future in drainage basin was 1:3.0:7.0. The maximum amount of sediment reduction by different types of soil retaining dams correlated closely with flood season rainfall and 1-day maximum rainfall. Within the sediment reduction capability of warping dams, the amount of sediment reduction increased with rainfall intensity, presenting the characteristics of "the more sediment reduction with the more incoming sediment". Reducing sediment of the warping dams had a proportionality relationship with observed flood in different periods. Since 1990s, sediment reduction was about 0.23 t/m3 of unit cubic meter of flood discharge. Sediment reduction amount was about 0.19t/m3 per unit cubic meter of flood discharge during 1970s and 1980s, and the amount was about 0.23 t/m3 since 1990s. The warping dams reduced sediment increased with the value of 3 major factors. The contribution ratio of the factors was in the order: the flood amount ＞rain season rainfall ＞1-day maximum rainfall.

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