

# 應用土壤沖蝕及崩塌潛勢模式推估集水區 之泥砂生產量

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## 摘 要

本研究應用土壤沖蝕模式及崩塌潛勢模式來推估石門水庫集水區之泥砂生產量(=坡面沖蝕泥砂生產量+坡地崩塌泥砂生產量)。在土壤沖蝕模式中，採用IDRISI程式-RUSLE模組(IR模組)及IDRISI程式-SEDIMENTATION模組(IS-模組)，來進行坡面沖蝕泥砂生產量計算。首先採用IR-模組計算土壤沖蝕量，並將適宜之集水區坡面泥砂遞移率(SDR<sub>w</sub>)配用於土壤沖蝕量上。隨之，再採用IS-模組即可計算坡面沖蝕泥砂生產量。另外，在崩塌潛勢模式中，採用IAEG (International Association of Engineering Geology, 1990)建議之方法，在選用適宜之崩塌土方膨脹折減因子33%，來降低崩塌土方可能高估之膨脹量之條件下，先計算坡地崩塌量。隨之，採用此坡地崩塌量，並配用適宜之崩塌土砂運移率(STRI)及河道泥砂遞移率(SDR<sub>f</sub>)，即可計算坡地崩塌泥砂生產量。其中，在IAEG(1990)方法中所需之臨界崩塌深度，乃先利用SHALSTAB崩塌潛勢分析程式，來反算集水區坡地崩塌時之相當土壤材料參數後，再配合運用Dymond et al. (1999)之無限邊坡臨界狀態關係式來求得。最後，由研究結果推估遞移至石門水庫庫區之坡地崩塌泥砂生產量約佔坡地崩塌量之35%，依此推知坡地崩塌量中之65%泥砂，可能仍堆積在坡地下坡處及河道邊緣區域。總結論之，未來在續接進行之集水區泥砂生產量推估中，建議應將前階段颱風事件所產生而尚未被運移之堆積土砂納入考量。否則，對現階段泥砂生產量計算結果之合理性，將會造成一定程度的影響。

**關鍵字：**坡面沖蝕泥砂生產量、坡地崩塌泥砂生產量、泥砂遞移率、土砂運移率。

## Estimation of Sediment Yield at Watershed Using Soil Erosion and Landslide Potential Models

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## Abstract

This study estimates the sediment yield (=sediment yield due to soil erosion + sediment yield due to landslide) of Shi-Men Reservoir watershed by implementing the soil erosion model and landslide potential models of IDRISI program. In soil erosion model, the sediment yield due to erosion was calculated by the IDRISI-RUSLE module (IR-module) and the IDRISI-SEDIMENTATION module (IS-module). Firstly the erosion quantity was calculated by the IR-module and subsequently incorporating the Sediment Delivery Ratio of watershed (SDR<sub>w</sub>) into the erosion quantity, the sediment yield due to erosion can be determined using the IS-module. On the other hand, in landslide potential model, the IAEG-method proposed by International Association of Engineering Geology (1990) was initially adopted to calculate the landslide quantity in which the Swelling Reduction Factor