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# 石門水庫集水區艾利颱風土砂災因之探討

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**摘　　要**　2004 年 8 月艾利颱風侵襲台灣，造成石門水庫集水區極大的土砂災害，高濁度溪水與大量漂流木導致桃園地區停水達 17 天，主要的崩塌地分布於集水區西半邊玉峰、白石等暴雨集中區位。本研究分析石門水庫集水區相關地文及水文資料，探討艾利颱風造成集水區之土砂災因，發現其中崩塌面積以原始林 469.46ha 為最多；惟經依各土地利用類型轉換為崩塌率之後，原始林崩塌率僅及 0.81%，且原始林崩塌區位距離河道、水庫均甚遠；其餘類型之崩塌率，分別為濱水區 0.95%、人為用地 0.89%、竹林 0.60%及人工林 0.49%。本研究經再萃取溪流及道路兩側 200m 範圍內之崩塌區位，獲得崩塌面積已占集水區總崩塌地 64.45%。溪水混濁主因為部分河道凹岸沖刷崩塌、道路與野溪橫交設施毀損所致；溪流為地表逕流循地質弱面沖蝕切割而成，道路沿這些溪岸興築，同處於地質脆弱帶上。道路橫越支流水系時，施作之橋墩橋台等跨河構造物及野溪攔砂壩，短期雖有水土保持與保護道路效果，惟亦同時阻斷自然輸砂；長期的清水流不斷淘刷壩體基礎，一旦超越設計土砂蓄積量能，將產生連鎖破壞之大規模土砂災情。另一方面，此次石門水庫集水區艾利風災發生較大規模崩塌主要區位雖在原始林，惟正反映原始林平時固砂能力極佳。林區集水區土砂經年保蓄的結果，與攔砂構造物相同，易產生零存整付的現象，形成週期性大規模崩塌。以風險理論而言，災害事件發生的頻率與災損規模成反比；本研究由石門水庫歷年淤砂資料，推算石門水庫集水區發生大規模之土砂運移週期約為 8~12 年，週期性大規模輸砂現象即為集水區土砂蓄積能量之釋放。本研究同時建議山區河道野溪之治理應以柔性、可潰式之工法，適當控制渠床土砂運移量；同時對於河道兩岸濱水區應調整保護帶至 200m 以上，並建造通透性之複層林帶；尤其河道凹岸為水流攻擊面與土砂主要生產區，凹岸部分自濱水區至嶺線應有適當土地利用調整對策，尤其應禁止道路及短跨距橋樑之興闢。

**關鍵詞**：石門水庫集水區、艾利颱風、土砂災害。

# Reasons for Sediment Disaster Caused by Typhoon Aere on Shihmen Reservoir Watershed

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**ABSTRACT**　Taiwan is located in the subtropics, and the island has been frequently attacked by Typhoon. The Shihmen Reservoir watershed was severely damaged by the typhoon Aere due to catastrophic rainfall in August, 2004. It caused large scales of sediment disaster and resulted in water supply interruption up to seventeen days in

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Taoyuan area. Reasons of the disaster caused by the typhoon Aere were analyzed from different spatial and temporal scales on the Shihmen Reservoir watershed. The results indicated that the dominant regions of landside were distributed within the storm center in the west part of this watershed. The summary of landslide rate was 0.81% for primeval forest, 0.49% for artificial woods, 0.60% for bamboo grove, 0.95% for the riparian areas and 0.89% for the artificial development, separately. There were about 64.45% of total landslide areas found in 200 meters along drainage networks caused by surface runoff; the geological situations in these areas are fragile and vulnerable for erosion. Road constructions for crossing bluelines are usually assisted by hydraulic structures such as bridge piers and revetments. However, these dams and embankments are easy to accumulate sediments. Better control polices for mountain torrents are implementing ecological engineering methods or permeable structures. In order to adjust the sediment transport, the sediment evacuation practices are very important. From temporal analysis, the recurrence frequency of large-magnitude landslide was from 8 years to 12 years. Although the inducing reason for the disaster is storm event, the most significant potential reason for the disaster is sediment storage. The sediment accumulation is caused by forest protection and engineering structure interception. Therefore, the disaster prevention in watershed should be sediment budgets and controls on stream channels and riparian areas in the further.

***Key Words:*** Shihmen Reservoir watershed, Typhoon Aere, sediment disaster.