



## **Watershed Analysis of Pulsing Landslide Using Ecosystem Model**

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Several kinds of natural hazard such as earthquake, typhoon, flooding, debris flow and landslide etc. have suffered in Taiwan. Due to the weak geological formation, steep terrain, intensive rainfall, the addition of increased population and land-use trended to slopeland, have led increasingly great damage from these natural hazards/events. Landslide and soil erosion are major hazards in watershed. In the past 40 years therefore, Taiwan has built over 3000 check dams in order to control sediments and try to mitigate hazards. It turned into the main methods for watershed management. It will probably extend the natural events interval, further accumulated more energy magnitude, often doing more damage than absence of such barriers when watershed has been over treatment. Even though the natural hazards may threaten human properties, however, they were the process of self-organizing to reach steady state for attaining the Maximum Power Principle. From ecosystem's perspective, natural hazard was deemed a "natural pulse" by ecologists, it can also be observed in the spatial dimension as well as in the temporal scale. To better understand the dynamics behavior of pulsing landslide for appropriately modulate the sediment discharge to coordinate between nature and mankind, this study establishes the ecosystem model of pulsing landslide by means of H.T. Odum's Energy Flow Diagrams, using symbols to illustrate the pathways of energy flow of sediments. Besides, with research model simulates large scale features of the natural ecosystem, and performs further What-If Analysis to vary time span under different the land-use conditions. From this viewpoint, we propose the attitude with Growth Management of sediment production and decrease in sediments delivery ratio via vegetation cover instead of unitary resisting structures. It could helpfully maintain ecological resilience and promote resist of watershed system and abate natural hazards.