AR6 情境下苗栗縣坡地災害之風險評估

Assessment of Landslide Risk in Miaoli County under AR6 Scenarios

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摘　要

近年來，根據全球專家學者的研究報告，可得知各地所面臨的氣候變遷有逐漸快速變化之趨勢。除了最高氣溫不斷突破過往的歷史高溫記錄外，短延時強降雨的發生機率與強度亦逐漸增加，對於苗栗縣 80%以上是山地及丘陵地形的地區，恐導致坡地環境的不穩定性增加，進而造成社會、經濟與自然環境深遠的影響。因此，針對坡地災害在氣候變遷下的風險評估，將有助於瞭解未來各地的坡地災害風險及其變化趨勢。在本研究中將風險定義為危害度與脆弱度兩種指標。在危害度部分，是應用「臺灣氣候變遷推估資訊與調適知識平台(Taiwan Climate Change Projection Information and Adaptation Knowledge Platform, TCCIP)」所提供的 AR6 統計降尺度雨量資料，依據基期(1995 年至 2014 年)與四種未來推估情境(2081 年至 2100 年)進行苗栗縣的降雨機率分析，以每日降雨量 350 毫米為門檻值(大豪雨標準)分析各村里的危害度並分類為五個等級，等級越高相對發生強降雨的機率越大；在脆弱度部分，本研究是應用「氣候變遷災害風險調適平臺(Disaster Risk Adaptation，簡稱 Dr.A 網站)」所提供的坡地脆弱度指標，產製苗栗縣村里尺度的坡地脆弱度地圖，可瞭解各村里間發生地質脆弱與其崩塌範圍大小的程度。最後透過半定量風險分析將危害度與脆弱度兩指標結合，獲得 AR6 情境下苗栗縣坡地災害風險地圖，可藉此瞭解氣候變遷下苗栗縣坡地災害風險等級的分布情形及其變化趨勢，將可做為擬定防救計畫、配置防災資源及提升社區防災能力的依據，期能減緩坡地災害對於居民所帶來的威脅及損失，強化苗栗縣面對氣候變遷之韌性能力，提升民眾對於坡地災害的認知與警覺。

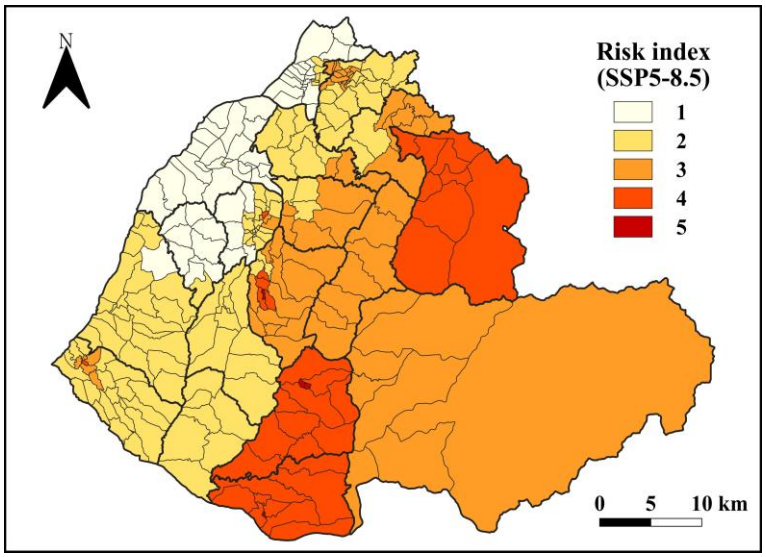
關鍵詞：坡地災害，風險評估，AR6 情境，氣候變遷，苗栗縣

Abstract

According to recent research reports by global experts and scholars, climate change is evolving at an increasingly rapid pace worldwide. In addition to record-breaking high temperatures, the probability and intensity of short-duration heavy rainfall events have been

increasing. For Miaoli County, where more than 80% of the area consists of mountainous and hilly terrain, this trend may increase the instability of slope environments, with profound social, economic, and environmental impacts. Therefore, conducting risk assessments of landslide disasters under climate change can help to understand future disaster risk levels and their trends across different regions. In this study, risk is defined by two indicators: hazard and vulnerability. For the hazard, the study applies AR6 statistical downscaling rainfall data provided by the Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP). We analyze rainfall probabilities in Miaoli County during the base period (1995 to 2014) and four future projected scenarios (2081 to 2100), using a daily rainfall threshold of 350 mm (aligned with the torrential rain standard). The probability of each village experiencing such rainfall is then classified into five levels, with higher levels representing higher probabilities of torrential rain. For the vulnerability, this study applies the landslide vulnerability indicator provided by the Disaster Risk Adaptation (Dr.A) to produce village-scale landslide vulnerability maps highlighting geological fragility and potential collapse extents. Finally, we integrate the hazard and vulnerability indicators using semi-quantitative risk analysis to produce landslide disaster risk maps for Miaoli County under AR6 scenarios. These maps reveal the spatial distribution and trends of landslide disaster risk levels across villages or regions under climate change, providing an important reference for disaster prevention planning, resource allocation, and strengthening community resilience. The aim is to reduce threats and losses caused by landslide disasters, enhance Miaoli County's resilience to climate change, and improve public awareness and vigilance regarding landslide-related risks.

Keywords: Landslide Disaster, Risk Analysis, AR6 Scenarios, Climate Change, Miaoli County



苗栗縣坡地災害風險地圖(SSP5-8.5)