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# Adaptation to Flash Floods and Landslides of Rural Households in the Northern Vietnam: An Insight into the Key Drivers

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**Abstract**

Flash floods and landslides are recurring disasters adversely affecting to rural households whose livelihood subordinate largely on agricultural production. The study, thus, explores farmer's responses to flash floods and landslides in Yen Bai province, one of the poor provinces in the Northern Mountainous Regions of Vietnam. The determinants of households´ choices and the barriers to adaptation, moreover, will also be identified. Household-level data was collected from 405 households in three communes namely: An Binh, An Thinh and Dai Son in 2016, from February to April. The analysis reveals that 97 % of the inhabitants practice at least one adaptation strategy in the context of flash floods and landslides. Adjustment in sowing/planting time, change in cropping pattern and varieties, farm diversification, land use change, selling of home and farm assets, assistance received from friends/relatives/government, borrowing money, applying more pesticides, fertilisers and plant protection products were the main adaptation techniques followed by the farmers. Out of these adaptation strategies, change in cropping pattern and variety, crop diversification, soil management and plant protection are the most adapted methods applied by farmers. Accordingly, to identify the key drivers of household adaptation responses, we used the Multivariate Probit Regression (MNP) model. The results from the MNP model highlighted that age of household head, education level, ethnic group, household status, land ownership, farm size, irrigation, contact with extension service, distance to market, farm income and climate information were the main factors influencing in farmer's adaptation decisions. In addition, money scarcity, lack of machinery and technical equipments, lack of knowledge about flash floods and landslides and insufficient supports from local government were identified as the barriers to adaptation.

**Keywords:** Adaptation, flash floods and landslides, livelihood strategy, multivariate probit model, Vietnam, Yen Bai province

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