Abstract: We use a hydrology-based fragmentation index to explore the influence of land-cover distribution on the generation and buffering of Hortonian overland flow (HOF) in two disturbed upland basins in northern Vietnam (Tan Minh). Both the current degree of fragmentation in Tan Minh and the current spatial arrangement of buffers (relative to HOF source areas) provide only limited opportunities for infiltrating surface runoff from upslope source areas, in part because of the high connectivity of swidden fields on long hillslopes. The intentional placement of buffers below HOF sources and the reduction of the down-slope lengths of swidden fields could reduce the occurrence of HOF on individual hillslopes. Reduction of the total watershed total depth of HOF would require maintaining a sufficient area of buffering land covers; and this may necessitate the use of longer fallow periods. These measures are, however, counter to the land-practice trends witnessed in the last several decades (i.e., no buffers, cultivation of long slopes, and increasingly shorter fallow periods). The two most likely scenarios of future land-cover change in Tan Minh—one representing increased fragmentation, the other decreased—both lead to an increase in HOF because of reduced buffering potential. The unlikely scenario of abandonment of agriculture and subsequent regeneration of forest, leads to both less fragmentation and less HOF. The study highlights the hydrological impacts associated with fragmentation at Tan Minh, which is the product of decades of local and regional forcing factors that have dictated the degree and timing of timber removal and swiddening at the site. © 2007 Elsevier B.V. All rights reserved.

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