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## Introduction of Agricultural Technologies — Did It Cause Land-Use Changes and Poverty Reduction in the North-Western Upland of Vietnam?

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### Abstract

Before economic innovation or “Doi moi”, north-western upland of Vietnam was characterized by complicated terrain, diversity of culture, high illiteracy, severe environmental degradation, and poor infrastructure facilities. Livelihoods of rural upland communities were maintained through a combination of hillside swidden agriculture with low productivity, forest product exploitation and limited wet rice production. Access to available, new agricultural technology was extremely limited. Poverty was widespread in the region. However, development in this region has gained some remarkable achievements since 1990 and the acceptable explanation is contribution of agricultural technology. This paper examines to what extent introduction of access to agricultural technology and extension services, and adoption rate contributed to changing land-uses and alleviating poverty at 75 communes of Son La province from 1989 to 2000. The aerial photographs and satellite images taken in 1989, 1995 and 2000 are interpreted to detect land use changes. Poverty is proxied by the number of assets controlled by the poor, which are collected at the commune level by means of a survey with a structured questionnaire. All data are geo-referenced and spatially analyzed by using Geographical Information System (GIS) and statistical software. The research findings show that lack of suitable technologies (e.g. improved breeds of crops and livestock and new farming techniques) and agricultural extension services hindered agricultural potentials of the region and forced the local farmers into pursuing extensive farming approach at the expense of forests and other natural resources. That was why vast area of forest was destroyed both for agricultural cultivation and forest products from 1989 to 1994 whilst poverty was still resistant at a high rate. Thanks to improvement of access to modern agricultural inputs and extension services, subsistent and low productive crops have been replaced by highly yielding and more profitable varieties since mid-1990s. Agricultural production has boomed. As results, living standards of local inhabitants were considerably improved and deforestation was decreased. However, rates of technological adoption, land-use changes and poverty elimination are not the same pattern at all communes. Therefore, this research also provides some recommendations to enhance effectiveness of current agricultural extension services.

**Keywords:** Extension services, GIS, land-use change, technology adoption, Vietnam