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Random and systematic land-cover transitions in northern Ghana

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Résumé / Abstract

The objective of this paper is to detect the dominant landscape changes in a 5400 km² area in northern Ghana. An in-depth analysis of the conventional transition matrix was used to separate landscape transformations to random and systematic transitions. A landscape transition is random if a land-cover category gains from other categories in proportion to the availability of those other losing categories, or if a category loses to other categories in proportion to the size of those other gaining categories. Any large deviation from those proportions is referred to as systematic transition. The highest systematic transition involved the conversion of about 12% of landscape from grassland to cropland. Other systematic landscape transitions included degradation of closed woodland to open woodland (11% of landscape), gain in biomass from open woodland to closed woodland (8% of landscape), and the degradation of open woodland to grassland (6% of landscape). The vulnerability of grassland to transition to cropland probably reflects the ease of clearing grassland compared to other natural vegetation. Cropland systematically avoided gaining from woodland and woodland systematically avoided losing to cropland, suggesting that woodcutting for charcoal and firewood collection is the major proximate cause of decline in woodland. Most of the random landscape transitions occurred in areas affected by spontaneous occupation by migrants, peri-urban cropland expansion as a result of displacement of farmers, and the resettlement of households along the White Volta River after the eradication of water-borne diseases. It is essential to combine systematic and random landscape change analyses for improved understanding of the processes of land use change. This will help in linking patterns to processes and in designing policy interventions aimed at reducing the unfavorable effects of dramatic land change.

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