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Monitoring land cover changes and farming dynamics in the fringes of Mount Elgon National Park, Uganda.

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Analyzing the dominant forms and extent of land cover changes in the Mount Elgon region is important for tracking conservation efforts and sustainable land management. Mount Elgon's rugged terrain limits monitoring these changes over large areas. With conducive climatic conditions, highly fertile and productive soils; Elgon is one of the densely populated rural mountainous regions in East Africa. The demand for more agricultural land and space for settlement has led to continued vegetation clearance and encroachment of the park. These pressures combined with the loss of vegetation cover have led to the continued occurrence of natural hazards, especially landslides and soil erosion events. Recent studies have given focus to these hazards and coping strategies. However, monitoring changes in land cover and associated driving factors are fundamental towards the improvement of land use, land restoration, and vegetation recovery in Mount Elgon. This study used multitemporal satellite imagery, aerial photographs, field surveys, and expert interviews to analyze and quantify the land cover flows in the upper Manafwa watershed of Mount Elgon, for 42 years covering an area of 319.73km^2. The study employed remote sensing techniques and geographic information system and software to map land cover changes for four stages (1978-1988, 1988-2001, 2001-2010, and 2010-2020). The study considered nine land cover classes; tropical high forest well-stocked, grassland, shrubs, bushland, bare & sparsely vegetated surfaces, tropical high forest low-stocked, agriculture, planted forest, and built-up. The maximum likelihood classifier of supervised classification and post-classification comparison technique was used in land cover classification and change detection analysis. The classified maps of 2020, 2010, 2001, 1988 and 1978 achieved high accuracy values of 93%, 89%, 89%, 88% and 83% respectively. Results showed conversion of tropical high forest well-stocked (22%), grassland (6.89%), shrubs (6.21%), bushland (4.29%), and bare & sparsely vegetated surfaces (1%) into agriculture (19.8%), tropical high forest low-stocked (10.29%), planted forest (5.83%) and built-up (4.46%) most especially at the peripheries of the park from 1978 to 2020. These dynamics are due to rapid population growth and increasing demand for agriculture space. Regreening as a restoration effort has led to an increase in land area for planted forests, attributed to an improvement in conservation efforts jointly implemented by the concerned

stakeholders and native communities. Landsat satellite imagery provides information on change detection which is resourceful to tracking conservation efforts. The trend of land cover flows found in this study, especially illustrations of areas of deforestation and loss of natural vegetation cover classes provides resourceful information for policymakers and responsible authorities to further take appropriate decisions and actions to revert the situation and reduce encroachment into the National Park. Near real-time monitoring systems of human disturbances in conservation areas should also be incorporated and actions are taken to minimize forest encroachment. These findings could further, enhance the implementation of rigorous conservation efforts when coupled with in-depth studies on associated determinants of these changes.