Long-term Land Cover Change in Alberta and the Effects of Government Intervention on Future Landscape Alteration

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Long-term land cover change (LCC) assessments have not been created for the Edmonton to Calgary corridor despite rapid population growth and urbanization in the region. This study allows for the assessment of change in the province over the next decade and the potential impact on fragmentation, connectivity, and biodiversity by combining government policy with historical rates of landscape alteration using the Dinamica Environment for Geoprocessing Objects (EGO) platform.

Satellite imagery taken from Landsat was classified to create an LCC history of the Edmonton to Calgary area. Bio-geophysical variables, used in conjunction with the landscape maps, were utilized to develop a baseline projection model in Dinamica EGO. Current provincial environmental policy has few set guidelines relating to urban sprawl and landscape fragmentation which provides an opportunity to explore the effects of implementing legislation, compared to allowing unrestricted growth, over the next decade. Three scenarios were developed: i) business as usual; ii) utilizing greenbelts around urban areas to reduce sprawl, similar to ones established in England; and iii) protecting the most valuable agricultural areas from alteration, similar to policies in other parts of Canada.

Our results indicate that over the past 40 years, urban area has nearly doubled in size, and there has been an increase in rural subdivisions. Farmland is targeted over grassland for conversion to developed land, and Edmonton has experienced the largest increase in size of the major urban centres. The amount of agricultural land has historically stayed consistent, but as cities have encroached, farmland has expanded into the surrounding grassland ecosystems. Without government intervention, cities will continue to split existing farms which will, in turn, lead to fragmentation and damage of the remaining natural landscapes. Policies can be initiated to reduce sprawl or to direct growth to areas that are less ecologically and economically advantageous.