Sustainability in the City and Beyond

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Identifying risk areas for future loss of connectivity in the Adirondack-Laurentians Ecological Corridor and proposing proactive protection areas, and mitigation measures

Jonathan Cole and Jochen Jaeger

Land conversion from natural areas to human use (cities, roads, agriculture, etc.) is the leading cause of biodiversity loss worldwide. In over half of the ecosystems on the planet, between 20-50% of the land area has been converted to human use. This immense habitat loss and fragmentation has caused wild vertebrate populations to decline by more than 50% since 1970, and the abundance of invertebrate species to decrease by 45% in the last 35 years. Livestock now constitute 60% of the global mammalian biomass, with humans taking up another 36%; the remaining 4% represents all that is left of the more than 5000 wild mammalian species on the planet. These animals live in habitat patches that are scattered and sometimes isolated across the landscape. This enormous loss of natural vegetation cover greatly enhances the effects of climate change and extreme weather patterns worldwide. These effects on biodiversity and climate in turn affect the integrity of the remaining ecosystems. This research will address these issues from a local scale in the Adirondack-Laurentians ecological corridor (ALEC).

The ALEC is a critical wildlife movement linkage that flows from the Adirondack Mountains in northeastern New York, to the Laurentian Mountains in Québec. This region boasts a wide variety of habitats that still maintain a high degree of ecological integrity and are rich in biodiversity. Population growth over the past 50 years, however, has caused a rise in development putting the area under increased risk of habitat loss and landscape fragmentation. This project will quantify the degree of human modification, the degree of landscape fragmentation and changes in landscape connectivity that have occurred within the ALEC over the past 50 years. The degree of human modification will be determined by measuring land-use/landcover (LULC) changes, landscape fragmentation will be assessed using the effective mesh size metric, and landscape connectivity will be determined using graph and circuit theory models. This historic information will then be used to investigate future LULC scenarios and proactive landscape configurations by applying the Dynamic Conversion of Land Use and its Effects (Dyna-CLUE) modelling framework. Insights gained from these past, present and future studies will be combined to identify the location of risk areas for loss of connectivity due to roads and development. Mitigation opportunities utilizing fencing and wildlife passages to improve connectivity will be compared, and priority protection areas for conservation of wildlife habitats and landscape connectivity will be identified. Initial insights about the degree of human modification and changes in landscape connectivity will be presented in this talk.

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