World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:17, No:09, 2023

Wildlife Habitat Corridor Mapping in Urban Environments: A GIS-Based Approach Using Preliminary Category Weightings

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Abstract : The global loss of biodiversity is threatening the benefits nature provides to human populations and has become a more pressing issue than climate change and requires immediate attention. While there have been successful global agreements for environmental protection, such as the Montreal Protocol, these are rare, and we cannot rely on them solely. Thus, it is crucial to take national and local actions to support biodiversity. Australia is one of the 17 countries in the world with a high level of biodiversity, and its cities are vital habitats for endangered species, with more of them found in urban areas than in non-urban ones. However, the protection of biodiversity in metropolitan Adelaide has been inadequate, with over 130 species disappearing since European colonization in 1836. In this research project we conceptualized, developed and implemented a framework for wildlife Habitat Hotspots and Habitat Corridor modelling in an urban context using geographic data and GIS modelling and analysis. We used detailed topographic and other geographic data provided by a local council, including spatial and attributive properties of trees, parcels, water features, vegetated areas, roads, verges, traffic, and census data. Weighted factors considered in our raster-based Habitat Hotspot model include parcel size, parcel shape, population density, canopy cover, habitat quality and proximity to habitats and water features. Weighted factors considered in our raster-based Habitat Corridor model include habitat potential (resulting from the Habitat Hotspot model), verge size, road hierarchy, road widths, human density, and presence of remnant indigenous vegetation species. We developed a GIS model, using Python scripting and ArcGIS-Pro Model-Builder, to establish an automated reproducible and adjustable geoprocessing workflow, adaptable to any study area of interest. Our habitat hotspot and corridor modelling framework allow to determine and map existing habitat hotspots and wildlife habitat corridors. Our research had been applied to the study case of Burnside, a local council in Adelaide, Australia, which encompass an area of 30 km2. We applied end-user expertise-based category weightings to refine our models and optimize the use of our habitat map outputs towards informing local strategic decision-making.

Keywords : biodiversity, GIS modeling, habitat hotspot, wildlife corridor
Conference Title : ICWCDP 2023 : International Conference on Wildlife Corridor Design and Purposes
Conference Location : Tokyo, Japan
Conference Dates : September 04-05, 2023