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GRAPH THEORY AND ANT COLONY OPTIMIZATION APPROACH FOR FOREST PATCH CONNECTIVITY ANALYSIS

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Abstract. Forest connectivity is necessary for prioritizing biodiversity conservation. Connectivity indices facilitate to predict the movement pattern of species across complex landscapes. Change in area and inter-patch distance in forest affects the biodiversity, wildlife movement, seed dispersal and other ecological factors. In graph theory components play an important role to analyze the group of patches and its impact with reference to the threshold distance between the patches. The study on link, threshold distance and components showed that with the increase in threshold distance, number of components decreased and number of links increased. Also Integral index of connectivity importance value (dIIC > 0.05) is high for big forest patches and considered to be intact forest. For those less than 0.05 importance value requires protection and conservation. Hence dIIC is categorised into Very low, low, Medium, high and Very high to analyze the degree of connectivity. Choosing correct threshold distance based on the requirement of species movement is preferred. Based on the selection of potential habitat patches shortest path between them is determined using Ant Colony Optimization (ACO) Technique. Vegetation type Map, Slope, Elevation, Disturbance Index, Biological Richness Map and DIIC layers facilitated to analyze the optimal path of the species through ACO for connectivity. Graph Theory and ACO works as a robust tool for Biodiversity Conservation.

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