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Effect of Linear Infrastructure on Protected Areas: A Study Relating to the Giritale Nature Reserve and Angamedilla National Park, Sri Lanka

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Abstract

Rapid urbanization in the dry zone of Sri Lanka has resulted in considerable losses in its original forest cover. Urban expansion, which typically includes expansion of human settlements and commercial establishments, and the construction of linear infrastructural facilities (roads, railways, and transmission lines) have led to many adverse impacts on natural landscapes. Linear infrastructure would be particularly detrimental when natural habitats are fragmented. Here we report on the changes in green cover along a stretch of the Elahera-Giritale B112 road where reconstruction took place during 2017-2019. The road traverses through the Giritale Nature Reserve block II and Angamedilla National Park, in the North Central Province of Sri Lanka. The study area covered a 3.8 km section of the road, 80% of which runs through the protected areas, and a 1 km buffer on either side of this road. We monitored changes in forest cover over the two decades i.e., from 2000 to 2020, using differences in the Normalized Difference Vegetation Index (NDVI), calculated based on the images in Landsat 5,7 and 8 thematic mapper using the ArcGIS platform. The accuracy of the classified habitats was verified using Google earth images and ground truthing. Accordingly, non-vegetated areas and four types of vegetated areas were identified. The range of NDVI recorded were non-vegetated (0.14-0.39), grasslands (0.39-0.41), shrublands (0.41-0.48), open forests (0.48-0.54) and dense forests (0.54-0.74). The study revealed that there were considerable losses in the forest cover over the 20 years. The non-vegetated habitats within the buffer zone of 200 m on either side of the road accounted for 8.6% of the total non-vegetated areas in the year 2000 whereas this had increased to 15.4% in the year 2020. Similarly, losses were noted for dense and open forests. Scrublands, grasslands, and built-up areas on the other hand have increased, replacing the forest habitats. The findings highlight the need to monitor forest cover losses arising from such linear infrastructure facilities, particularly when they are within or adjacent to protected habitats, and for remedial measures to be taken to strengthen the protection of these vital ecosystems.

Keywords: Forest cover, Fragmentation, NDVI, Roads