

Estimation of Urban Forest Carbon Stocks Considering Future Land-Use Change Scenarios: Case of Izmir City Core

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Abstract: Urban forests play a crucial role in mitigating climate change by sequestering and storing carbon dioxide (CO₂) from the atmosphere. However, rapid urbanization and land-use changes have threatened these fragile ecosystems. Therefore, in-depth assessment of their carbon stocks under future scenarios is required with proper methods. This study focuses on the İzmir City Core as an exemplary case to estimate the potential impact of land-use changes on urban forest carbon stocks. It was aimed to simulate future land-use change based on past urban development trends according to CORINE maps, demographic projections, and policy implementations. Future land-use changes simulations were made with GeoSOS-FLUS software by considering two scenarios: I) assuming current land-use change trend would be same in future, and II) assuming current urban forest would be protected. The analysis reveals important variations in urban forest carbon stocks across different land-use scenarios. These findings underscore the significance of adopting environmentally sensitive land-use policies for preserving and enhancing urban forests' carbon sequestration capacity. Additionally, the study highlights the importance of urban forest quality and its potential role in climate change adaptation and urban resilience. Moreover, it emphasizes the value of using innovative technologies and methodologies to accurately estimate urban forest carbon stocks in the face of dynamic land-use changes. In conclusion, this study provides valuable insights into the estimation of urban forest carbon stocks under various land-use changes scenarios within the İzmir City Core. The findings offer a foundation for evidence-based policymaking, fostering sustainable urban planning, and promoting the importance of urban forest conservation in combating climate change.

Keywords: Carbon stock, GeoSOS-FLUS, Future land-use, Urban forest.