Quantification and Prediction of Ecosystem Services of the Extended Megacity Dhaka

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Introduction

In the past few decades, a series of significant changes have occurred in land use land cover (LULC) in Bangladesh due to the rapid population growth particularly in megacity Dhaka.

The continuous urban expansion changes the natural landscape and urban ecosystem, and this has a serious detrimental effect on ecosystem and human society.

Assessing the relationship between rapid urban expansion and ecosystem services can play an essential role for urban sustainability and development related to planning and policies

Key Words



Ecosystem Service Value

Total value (million dollar)						
	2004	2010	2015	2020	2030	2050
Water bodies	72.60	54.19	47.33	35.67	33.56	28.93
Agri/Grassland	5.62	5.35	4.43	4.18	3.48	2.60
Landfill	0	0	0	0	0	0
Builtup	0	0	0	0	0	0
Tree cover	32.78	24.33	16.99	13.40	11.90	10.33
Total	111.007	83.87	68.75	53.25	48.94	41.86

Results

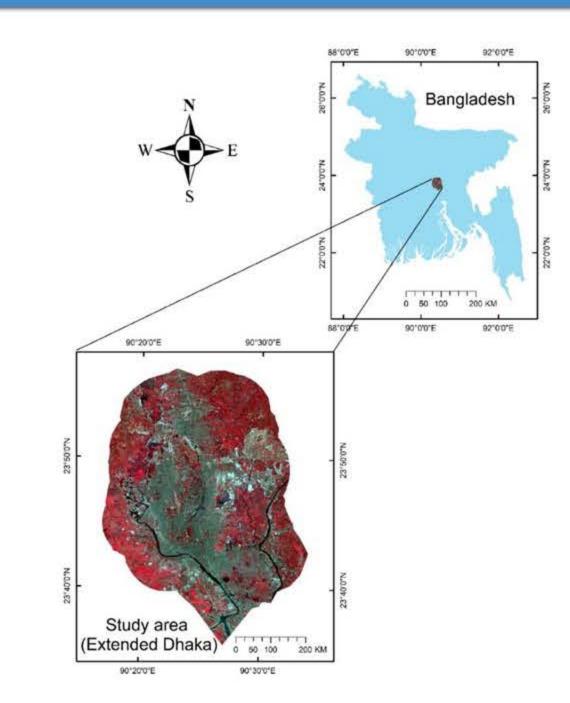


Figure 1: Study area of extended megacity Dhaka.

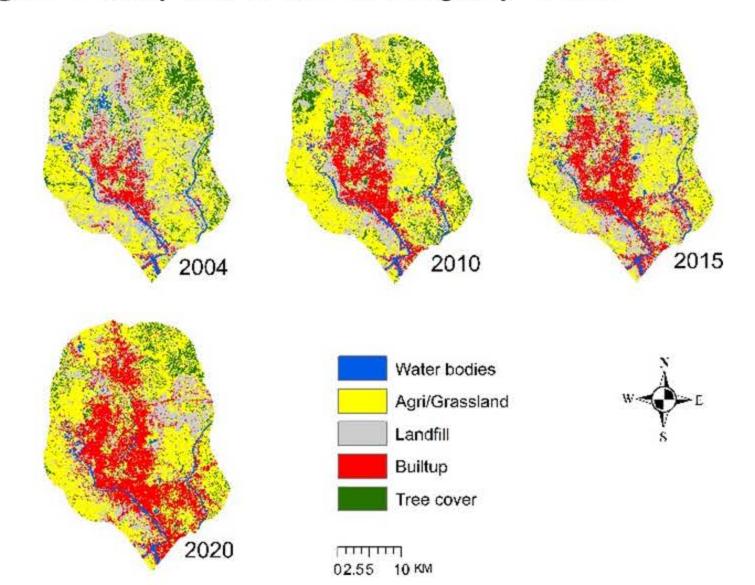


Figure 2: The map showing the Land cover change from 2004 - 2020

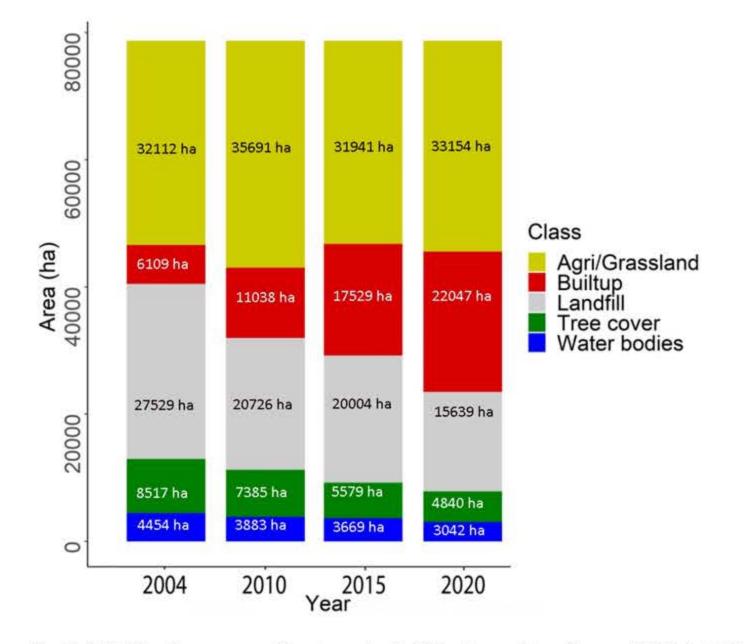


Figure 3: LULC change of extended Dhaka city from 2004-2020.

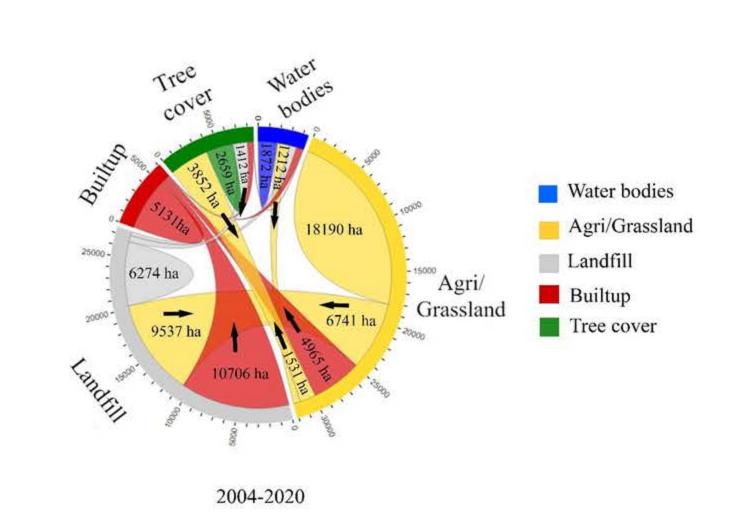


Figure 4: Chord diagram showing cross tabulation of LULC changes of extended Dhaka city from 2004-2020

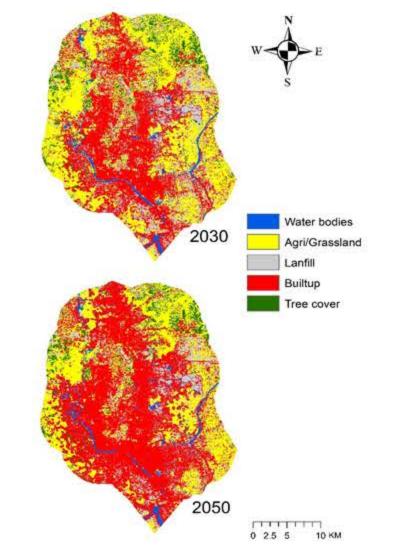


Figure 5: Predicted land cover map (2030 and 2050) of extended Dhaka city.

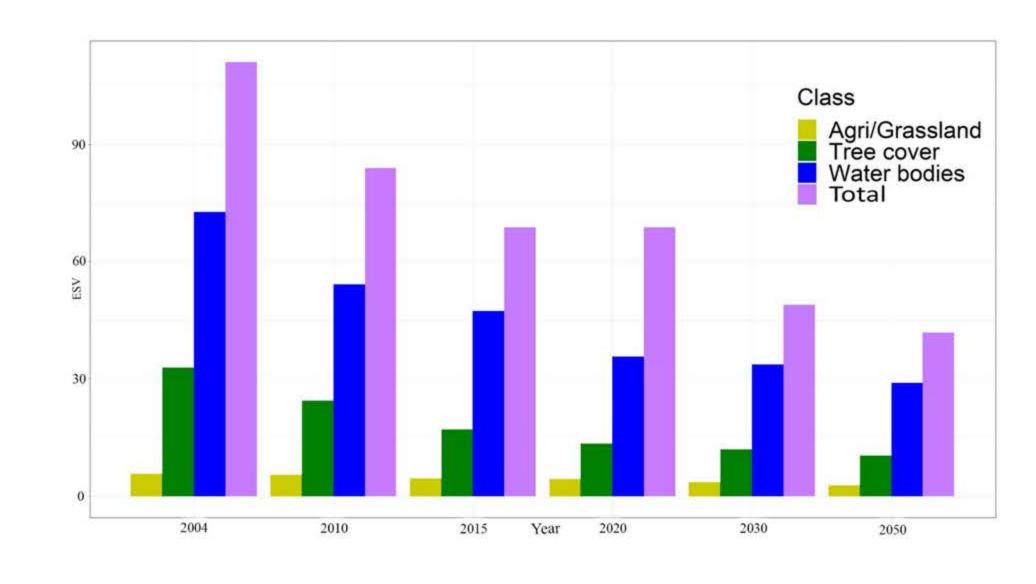


Figure 6: Estimated ecosystem service value for extended Dhaka city

Conclusion

This study evaluated not only the land use/land cover dynamics and its impact on the ecosystem services during the time period 2004 to 2020 but also the predicted results of the years 2030 and 2050.

The result shows that built-up area has increased by 43.2% and water bodies and tree cover declined by 10.8% and 12.16% respectively over the last 16 years and the total ecosystem service values (ESV) decreased from US\$ 111.007 million to US\$ 53.25 million. This has a detrimental effect and possess a serious threat to our ecosystem and human life.

Moreover, CA-Marcov based model predicted the future scenario of extended Dhaka city and determined that in 2050 the ecosystem services value will be S\$ 41.86 million which will be 27.21% lower than the ecosystem services value of 2020

Formulation of appropriate land-use policies, control of urban sprawl, and optimization of land use patterns can effectively enhance the value of urban ecosystem services and ensure urban ecological security

Flowchart

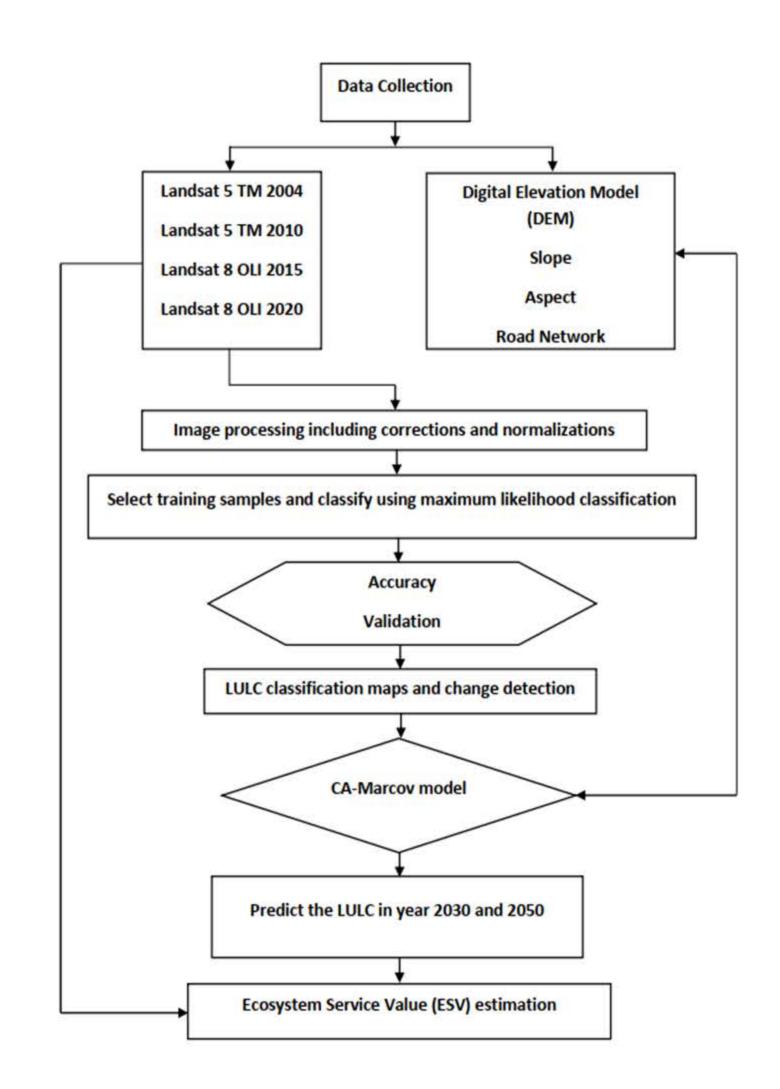


Figure 4: Flowchart of CA-Marcov model

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