

ORL-C&E-08

Transformation of Agricultural Land Based on Land Use Land Cover Dynamics in The Ganges-Padma Floodplain Under Changing Climate

M Ahmed Farukh*, M. Zulfikar Rahman, M. Abdus Salam, M. Mahfujul Haque, and M.G. Mostofa Amin

Department of Environmental Science
Bangladesh Agricultural University,
Mymensingh -2202, Bangladesh
farukhenvsc@bau.edu.bd

In Bangladesh, the Ganges-Padma (GP) floodplain covers huge fertile and productive flat land adjacent to the Padma River, providing food security and livelihoods for millions of people. In recent decades, this floodplain area has undergone rapid and broad land use changes, principally due to population growth, urbanization, climate change and agricultural intensification. As agricultural activities have always been an important contributor to the economy, the study aims to investigate the transformation of agricultural land in the GP floodplain based on land use and land cover (LULC) dynamics since 1990.

This study investigates the changes in agricultural land and its conversion into other land cover types. For this study, LULC maps were prepared using the Google Earth Engine (GEE) platform and LULC classifications were done using a random forest (RF) classifier from 1990 to 2023 for Kusthia, Pabna, Rajbari, Chapai Nawabganj, Natore, and Rajshahi belongs to the GP floodplain. The overall accuracy and kappa coefficients in this study ranges from 93-99% and 91-99%, respectively. The study implies an increasing trend in the built-up areas and a decreasing trend in vegetation cover in each districts of GP floodplain. The agricultural land cover also showed an increasing trend for all the districts except in Rajbari and Chapai Nawabganj districts. A change detection analysis has also been done for all districts to find out the change dynamics of every LULC classes.

Most of the land cover classes of the GP floodplain was occupied by agricultural land and vegetation cover. This study reveals that the GP floodplain had been going through changes at the most rapid pace in the last three decades in terms of all kinds of land cover classes. The study found that there was a substantial reduction in waterbodies (290.23 km²) in Pabna and vegetation cover (141.09 km²) in Kushtia.

In terms of agricultural land, all districts showed increasing trend except Chapai Nawabganj and Rajbari whilst, a major increase (342 km²) is noticed in Pabna. There was a noteworthy conversion of every considered land cover classes into another classes. A substantial amount of area (396 km²) was converted into agricultural land from vegetation in Rajbari and 364 km² area from waterbody to agricultural land in Pabna. The results provide a comprehensive scenario for the stakeholders and policymakers to realise the transformation of agricultural lands, thereby facilitating appropriate considerations of climate change issues in order to achieve sustainable development goals.

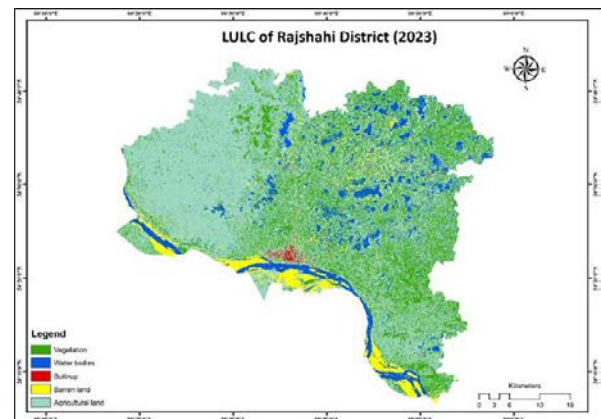


Figure 1. LULC map of Rajshahi district (2023)

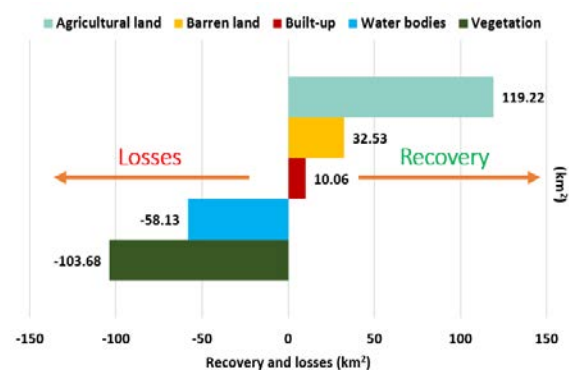


Figure 2. Recovery and losses of the land cover classes from 1990 to 2023 at Rajshahi.