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Title: “Land Suitability and Cropping Pattern Analysis for Optimal Land Use in Bijnor District (U.P.)”

Agriculture is the major source of livelihood in the rural areas. It is essential to choose the suitable season for crops to obtain the maximum profits. Land use planning and management can be effectively carried out by integrating Geographic Information System (GIS) and multi-criteria decision analysis. The study attempts to assess the prevailing cropping patterns and land suitability for optimal land utilization.

The study is based on both primary and secondary data sources. Land use land cover change in the study area was carried out using multi-date Landsat TM images. LISS III satellite images were used to assess the prevailing cropping pattern. The crop land suitability was assessed for major crops (sugarcane, wheat, paddy, oil seeds and pulses) using FAO framework and multiple criteria decision-making approach (MCDA). The weight of criteria maps was derived through fuzzy analytical hierarchy process (FAHP) and finally land suitability analysis for each crop was assessed through weighted overlay analysis (WOA).

The land use/land cover analysis revealed that the area under agriculture increased from 81.84 per cent in 2000 to 84.68 per cent in 2015. Forest area has decreased from 12.97 percent in 2000 to 9.95 per cent in 2015. The built-up area increased 1.58 per cent in 2000 to 1.97 per cent in 2015.

Sugarcane was the most preferred crop in all the three seasons with more than 40 per cent area under its cultivation. It is evident from the distribution of the cropping pattern that most of the area was covered under double cropping. Area under sugarcane-wheat was highest (10.7 per cent) followed by paddy-wheat (8.4 per cent).

Physical land suitability revealed that paddy was the most suitable crop, followed by wheat sugarcane, pulses and oilseed. After examining the socio-economic condition of the farmers and their preferences to grow crops, it was ascertained that majority of the farmers preferred to grow sugarcane, wheat and paddy. Although pulses and oilseeds have higher potential in terms of physical land suitability still these crops are not profitable to grow as their productivity and net returns are lower as compared to sugarcane, wheat and paddy. Moderate suitability can be improved to highly suitable by improving irrigation facilities, application of pH specific fertilizers, protecting crop damage from *Nilgai* and wild boar and improving road network.