**Reconnaissance Report on Crop Variation in Meherpur District**

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**Executive Summary**

This report analyzes the land use/land cover (LULC) changes in Meherpur from 2013 to 2023 and provides predictions for future changes up to 2050 under different scenario. The study examines transitions between different land cover categories, including agricultural land, water bodies, built-up areas, and tree vegetation, and assesses the implications of these changes on environmental sustainability and land management.

**Key Findings:**

Agricultural land Increased from 33,163.2 hectares in 2013 to 42,048.2 hectares in 2023. Agricultural land (36%) remained constant from 2013 to 2018, with 3% converted to built-up areas. The agricultural land predicted to further increase under all future scenarios, driven by ongoing demand for agricultural production.

Waterbodies slightly increased from 3,525.21 hectares in 2013 to 3,526.92 hectares in 2023. Waterbody (2.5%) remained constant from 2013 to 2018, with 1.5% converted to agricultural land. The waterbody projected to fluctuate slightly, with potential decreases under high-development scenarios.

Built-up areas increased from 12,448.7 hectares in 2013 to 14,071.8 hectares in 2023. Expected to continue growing, particularly under the development scenario, reflecting ongoing urbanization and infrastructure expansion.

Tree vegetation decreased from 30,190.2 hectares in 2013 to 19,680.5 hectares in 2023.Tree vegetation (28.5%) remained constant from 2013 to 2018, with 9% converted to agricultural land. Predicted to further decrease, particularly under business-as-usual and development scenarios, raising concerns about deforestation and loss of biodiversity.

**Implications:**

Environmental Impact: The reduction in tree vegetation and waterbody areas poses significant risks to local biodiversity, ecological balance, and climate regulation. The expansion of agricultural and built-up areas needs to be managed to minimize these impacts.

Water Resource Management: Decreases in waterbody areas could lead to water scarcity issues, affecting both agricultural productivity and human consumption.

Urban Planning: The increase in built-up areas highlights the need for effective urban planning to ensure sustainable development and infrastructure expansion without compromising agricultural and natural lands.

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**1. Introduction**

Meherpur district was established in 1984. Previously it was a subdivision under Kushtia district. Meherpur district consists of 3 (Three) upazilas namely Meherpur Sadar, Mujibnagar and Gangni. The district located in the Khulna Division of Bangladesh, is primarily an agrarian region. The district's fertile lands and favorable climatic conditions support diverse agricultural practices. This report aims to provide an overview of the existing land use and land cover variations within Meherpur District, highlighting the main crops cultivated, cropping patterns, and any notable agricultural trends. The cropping intensity is 268. The reconnaissance report examines the Land Use/Land Cover (LULC) changes in Meherpur from 2013 to 2023, with prediction up to 2025 focusing on the transitions between agricultural land, water bodies, built-up areas, and tree vegetation. Significant shifts were observed, with agricultural land and built-up areas increasing at the expense of tree vegetation. These changes have implications for land management and urban planning in Meherpur. Agricultural land increased from 33,163.2 hectares in 2013 to 42,048.2 hectares in 2023. The water body areas were more or less stable from 3,525.21 hectares in 2013 to 3,526.92 hectares in 2023. While built-up areas increased from 12,448.7 hectares in 2013 to 14,071.8 hectares in 2023. Tree Vegetation decreased from 30,190.2 hectares in 2013 to 19,680.5 hectares in 2023.

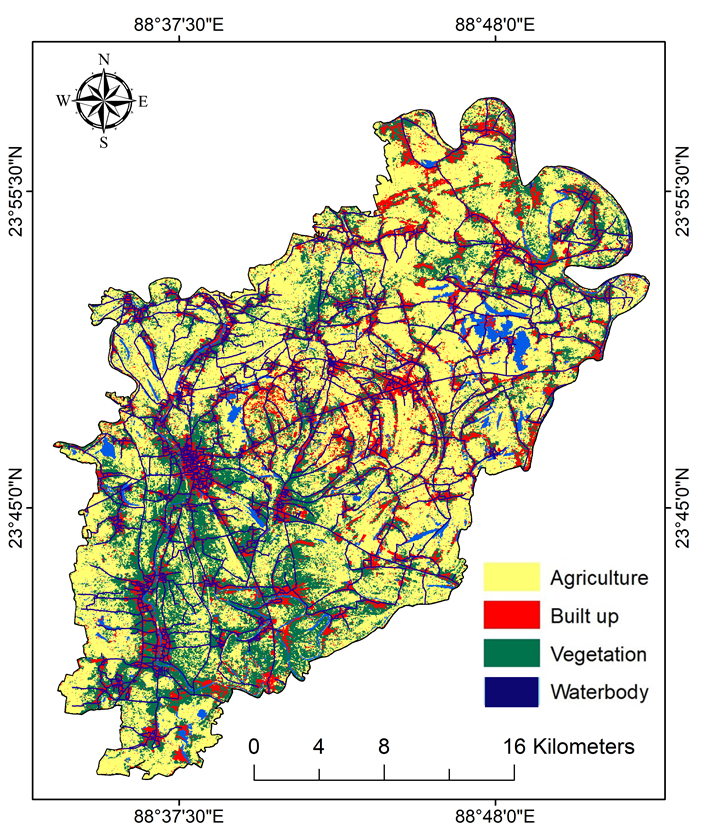


Fig.1. Land use and land cover map of Meherpur from 2023

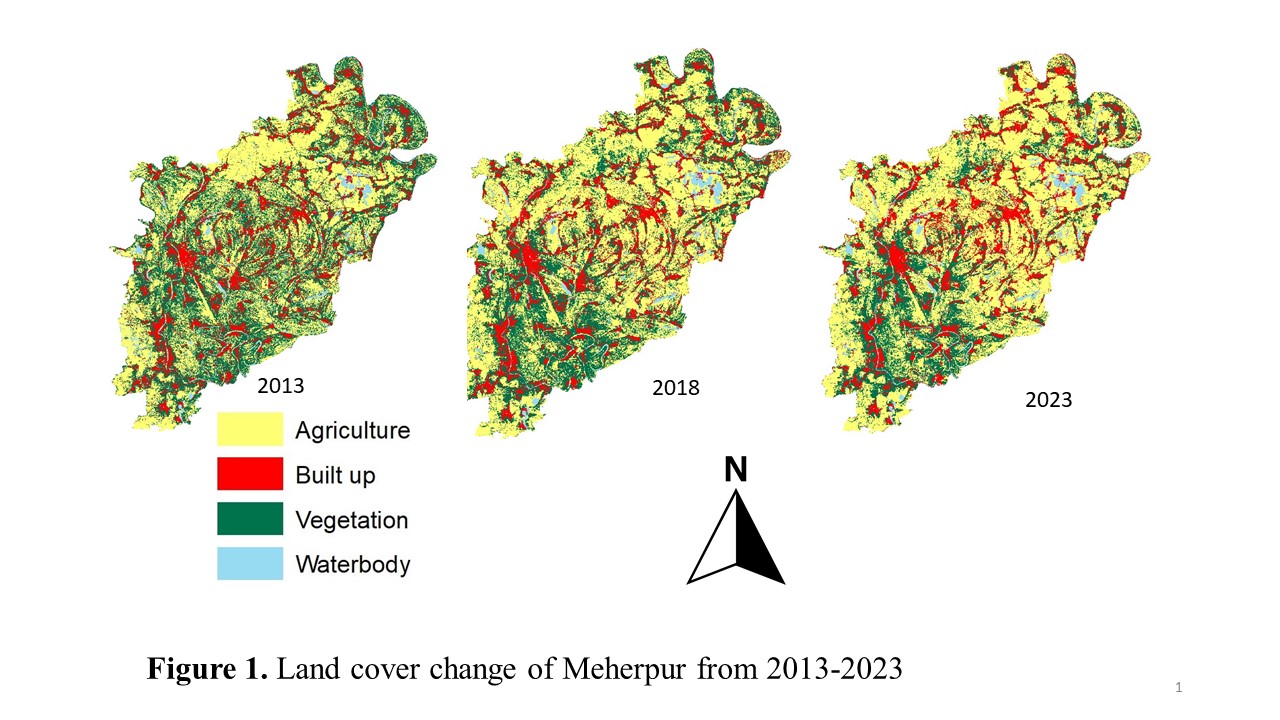


Fig.2. Land use and land cover changes of Meherpur from 2013-2023

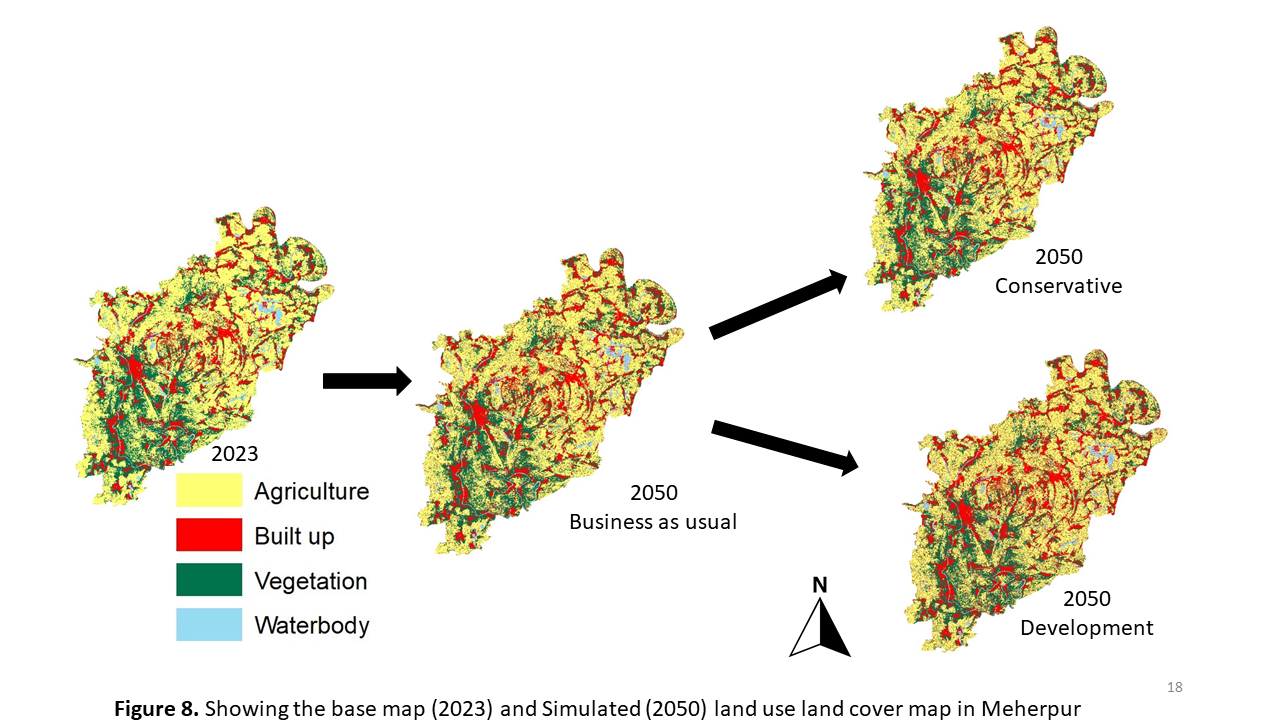


Fig.3. Showing the base map (2023) and simulated (2050) land use land cover map in Meherpur in three different scenarios.

Table 1. Simulated Land Use Land Cover area of Meherpur of (2050)

|  |  |  |  |
| --- | --- | --- | --- |
| Land use and land cover category | Business as usual in Ha  (2050) | Conservative in Ha  (2050) | Development in Ha  (2050) |
| Agriculture | 38991.10 | 39307.20 | 37114.60 |
| Waterbody | 3271.59 | 3293.46 | 3116.79 |
| Built-up | 18796.10 | 18329.50 | 21727.90 |
| Vegetation | 18268.60 | 18397.20 | 17367.90 |

**2. Major Crops Cultivated**

The agricultural landscape of Meherpur District is characterized by various crops, primarily divided into staple food crops, cash crops, and horticultural produce.

**2.1 Staple Food Crops**

Rice: The most significant staple crop, cultivated extensively in both Aman and Boro seasons. The high-yielding varieties (HYVs) and traditional local varieties are both prevalent.

Wheat: Grown during the Rabi season, wheat is another important staple that complements rice in the local diet. Nevertheless, due to the prevalence of wheat blast disease, farmers often like to grow crops other than wheat in some places.

**2.2 Cash Crops**

Tobacco: Increasingly cultivated due to its high market value, though it has raised environmental and health concerns.

Jute: Historically known as the "golden fiber," jute remains a crucial cash crop, contributing significantly to the local economy.

Sugarcane: Grown primarily for local consumption and supply to nearby sugar mills.

**2.3 Horticultural Produce**

Vegetables: A wide range of vegetables, including potatoes, tomatoes, brinjals (eggplants), gourds, and leafy greens, are cultivated, supporting local consumption and market supply.

Fruits: Mangoes, bananas, and papayas are the significant fruits grown, with a growing interest in high-value fruits like litchis and guavas.

**3. Cropping Patterns**

The cropping patterns in Meherpur District vary based on seasonal cycles and irrigation availability. The main cropping seasons include:

Kharif1: Dominated by Aman rice, jute, and various vegetables.

Kharif2: This interim season involves cultivating additional vegetables and short-duration crops like mung beans.

Rabi: Characterized by Boro rice, wheat, pulses (such as lentils), oilseeds (mustard), and various winter vegetables.

**4. Agricultural Trends and Innovations**

High-Yielding Varieties (HYVs): There has been a significant shift towards HYVs of rice and wheat to boost productivity.

Irrigation Development: Enhanced irrigation infrastructure has facilitated double and triple cropping practices, particularly the expansion of Boro rice cultivation.

Organic Farming: Some farmers are adopting organic farming practices, particularly for vegetables, to meet the rising demand for organic produce.

Integrated Pest Management (IPM): Increased awareness and implementation of IPM practices to reduce dependency on chemical pesticides and enhance sustainability.

**5. Challenges and Opportunities**

**5.1 Challenges**

Soil Degradation: Continuous monoculture and excessive use of chemical fertilizers are leading to soil health deterioration.

Water Scarcity: Despite improvements in irrigation, water scarcity during the dry season remains a significant constraint.

Market Access: Farmers often face challenges in accessing broader markets, limiting their profitability.

**5.2 Opportunities**

Diversification: Encouraging crop diversification can improve soil health and farmers' incomes.

Agri-Tech Adoption: Modern agricultural technologies and practices can enhance productivity and sustainability.

Value-Added Products: Developing value-added agricultural products (e.g., processed foods and organic produce) can open new market opportunities and increase farmers' income.

**Recommendations:**

Sustainable Land Management: Implement strategies to balance agricultural expansion with environmental conservation, such as promoting sustainable farming practices and reforestation programs.

Waterbody Protection: Enforce policies to protect and restore water bodies, ensuring sustainable water resource management.

Integrated Urban Planning: Develop comprehensive urban plans that accommodate growth while preserving agricultural and natural areas.

Continuous Monitoring: Establish robust monitoring and evaluation systems to track LULC changes and inform policy decisions.

This report emphasizes the need for integrated and sustainable land management practices in Meherpur to balance development with environmental conservation, ensuring long-term sustainability and resilience.

**6. Conclusion**

Meherpur District's agricultural sector is marked by a rich diversity of crops driven by favorable climatic conditions and fertile soils. While challenges such as soil degradation and water scarcity persist (due to land cover change pressure), significant opportunities exist for improving land use planning, agricultural productivity and sustainability through diversification, technology adoption, and market development. Continued research, infrastructure development, and farmer education efforts are essential to harness these opportunities and ensure the district's agricultural prosperity.

Annexure

Table 1. Land cover area change of Meherpur from 2013-2050

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Class | 2013 (Ha) | 2018  (Ha) | 2023  (Ha) | 2028  (Ha) | 2033  (Ha) | 2038  (Ha) | 2043  (Ha) | 2050  (Ha) |
| Agriculture | 33163.2 | 38778.2 | 42048.2 | 40954.3 | 40270.1 | 39862.8 | 39559.9 | 38991.1 |
| Water body | 3525.2 | 3242.1 | 3526.9 | 3432.1 | 3381.9 | 3344.13 | 3320.5 | 3271.6 |
| Built-up | 12448.7 | 13056.4 | 14071.8 | 15773.1 | 16181.8 | 17479.7 | 17944.2 | 18796.1 |
| Vegetation | 30190.2 | 24250.7 | 19680.5 | 19167.4 | 18856.6 | 18640.7 | 18502.6 | 18268.6 |