



LAND DEGRADATION, DESERTIFICATION, AND DROUGHT

IN WEST BENGAL

JUNE 05, 2024
WORLD ENVIRONMENT DAY



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EXECUTIVE SUMMARY

'Restoring Land, Fighting Desertification, and building drought resilience are important for keeping our environment healthy and sustainable'.

Desertification, land degradation, and drought (DLDD) represent a silent and invisible crisis that significantly impacts people by obstructing land productivity, causing biodiversity loss, and leading to water scarcity. These severe hydrological imbalances greatly affect land resource production and ecological processes, directly impacting humans, wildlife, and plant communities. Desertification's intensity has surged 30–35 times historical rates in recent decades. Droughts, major threats to sustainable development, are escalating globally. By 2050, they may affect over three-quarters of the world's population. Since 2000, drought frequency and duration have increased by 29%, exacerbating water stress for 2.3 billion people.

Land degradation in India leads to soil erosion, nutrient depletion, and reduced fertility. 30% of soil is degraded, and droughts exacerbate this (Pandey, 2023). Land degradation, causing crop failures and food security issues, is expected to decrease by 20% by 2050 due to climate change (PIB, 2023a). Over-extraction of groundwater leads to decreased water tables and aquifer recharge, impacting 60% of agriculture. Groundwater levels are declining rapidly, affecting crop yields and productivity. Climate change impacts crop selection and pest management, increasing malnutrition and micronutrient deficiencies, affecting 18.7% of India's population (NFHS, 2019–2021). Water scarcity and poor water quality also cause health issues and economic losses because 70 per cent of rural households still depend primarily on agriculture for their livelihood (FAO, 2024).

West Bengal is undergoing pressing environmental issues, including land degradation, drought, wetland shrinkage, and deforestation, driven by rapid urbanization and agricultural expansion. Notably, the built-up area surged by 45% between 2017 and 2023, exacerbating land degradation and reducing critical wetlands like the East Kolkata Wetlands. 24% of West Bengal's soil is degraded due to erosion, salinization, and nutrient depletion, and 1.8 million hectares of land are affected by desertification. 70% of the state's agriculture is dependent on groundwater, and the groundwater levels are declining at an alarming rate of 3cm/year. Groundwater over-extraction and low recharge rates worsen water scarcity, especially in drought-prone districts like Purulia, Bankura, and Birbhum. Insufficient compensatory planting and tree removal for development projects have depleted urban and rural greenery.

Climate change and erratic monsoons intensify drought conditions, lowering soil moisture, biodiversity, and agricultural productivity. Declining groundwater levels and poor soil moisture retention compound these challenges. Despite efforts in wetland restoration, regenerative farming, and urban forestry, resource allocation, policy enforcement, and community engagement remain persistent obstacles. Effective management practices and **sustainable land use policies** are imperative for restoring ecological balance and ensuring long-term environmental health in the region.

Given the severity and frequency of increasingly severe dry spells, it is imperative that we increase our capacity to withstand drought. Droughts worsen poverty and increase already-existing disparities while also endangering agriculture and water supplies. However, by implementing integrated water resource management, better farming methods, and community empowerment, we may increase our resistance to drought and guarantee the sustainable growth of global communities. We create the conditions for a future in which ecosystems flourish, communities prosper, and our planet's landscapes are preserved for future generations by investing in drought-resistant technologies, encouraging soil conservation, and improving water efficiency.

The world is celebrating World Environment Day 2024 on June 05, and bringing attention to how people can contribute to halting environmental deterioration and revitalising neglected regions. A few suggestive ways to get involved in ecosystem restoration on World Environment Day, are *to make agriculture sustainable and use smart farming practices, preserve the soil, protect the pollinators, revitalization of the Freshwater Ecosystem, renew the coastal belts, reintroduce nature to the urban space.*

West Bengal has been actively addressing land restoration, desertification, and drought resilience through various government policies and initiatives. The Indian Space Research Organisation (ISRO) has identified desertification hotspots in West Bengal, highlighting the areas most vulnerable to desertification. In response, the Government of West Bengal has implemented a comprehensive drought management plan that includes drought monitoring, early warning systems, and water conservation measures.

Additionally, the state has launched several initiatives to restore degraded land, a program that aims to rehabilitate hectares of degraded land. The state government has also engaged local communities in these efforts through community-based land restoration initiatives, which focus on training and empowering local communities to participate in land restoration. Furthermore, West Bengal has collaborated with international organizations like the United Nations Environment Programme (UNEP) and the Food and Agriculture Organization (FAO) to tackle land degradation, and desertification, and enhance drought resilience.



01

INTRODUCTION



Land Use Land Cover (LULC) studies are vital for environmental management, urban planning, and agricultural development. They aid in conserving biodiversity, mitigating climate change, and promoting sustainable infrastructure growth. LULC data supports disaster management, watershed management, and waterbody conservation, informing land use policies that promote balanced regional development and sustainable practices. Additionally, LULC studies provide valuable insights for scientific research, enhancing our understanding of ecological and climate systems.

World Environment Day 2024 focuses on land restoration, desertification, and drought resilience (World Environment Day 2024, n.d.), with the theme "**Our Land, Our Future**" and the tagline "**We are #GenerationRestoration**" (UN Environment Programme, n.d.). This theme aligns closely with Sustainable Development Goal (SDG) 15, "**Life on Land**," which aims to protect and conserve all forms of life on land (Martin, 2024). SDG 15 efforts include protecting and restoring ecosystems and biodiversity, sustainably managing forests, halting deforestation, combating desertification, reversing land degradation, restoring degraded land and soil, and protecting threatened species to halt biodiversity loss. In recognition of this occasion, SwitchON Foundation has highlighted several land restoration issues in the state of West Bengal through this comprehensive report.



AN ASSESSMENT OF LAND USE AND LAND COVER

Agricultural land

West Bengal is endowed with diverse natural resources and varied agro-climatic conditions that support the cultivation of a wide range of crops. The net cropped area is 52.05 lakh hectares, which comprises 68% of the geographical area and 92% of arable land (GoWB, 2023).

Waterbodies

West Bengal has the highest number of water bodies in India. The state also has the maximum number of privately owned water bodies and the most water bodies in urban areas. According to the first-ever census of water bodies conducted by the Union Jal Shakti Ministry, 24,24,540 water bodies have been enumerated in the country. Of these, 97.1% (23,55,055) are in rural areas, and 2.9% (69,485) are in urban areas (IWR Team, 2023).

Forest land

The total recorded forest land in West Bengal is 11,879 square kilometres. This includes 7,054 square kilometres of Reserved Forest, 3,772 square kilometres of Protected Forest, and 1,053 square kilometres of Unclassed State Forest, constituting 13.38% of the state's geographical area (WBFD, 2023).

Built up area

Built-up land represents growth and economic development by expanding permanent assets and infrastructure. A comprehensive assessment of land cover patterns across India between the first (2005-06) and seventeenth (2022-23) cycles of the Annual Land Use and Land Cover (LULC) mapping reveals a consistent increase in built-up area for West Bengal. It expanded from approximately 7 lakh hectares in 2005-06 to nearly 10 lakh hectares in 2022-23. This significant transformation underscores the rapid pace of urbanisation and infrastructure development in the state (Land Use & Cover Mapping and Monitoring Division et al., 2024).

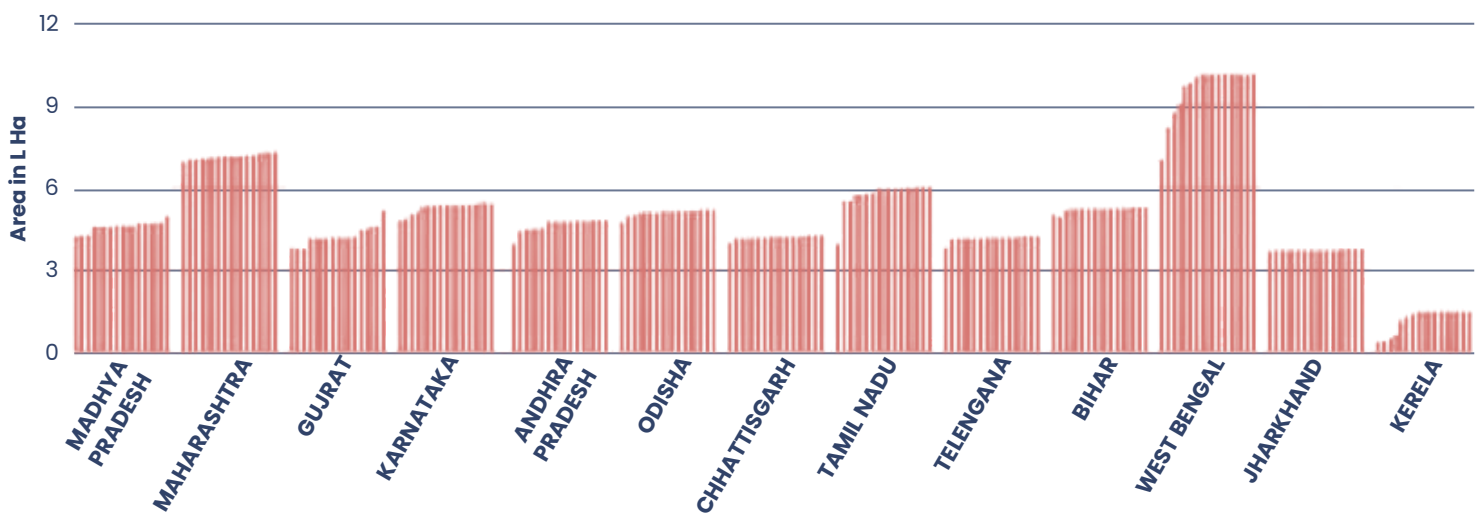


Image: Long-term trends of Built-up Land across states over an annual mapping cycle
Source: Land Use & Cover Mapping and Monitoring Division et al. (2024)

A note on land use and crop area statistics-

The percentage change in crop area in West Bengal over decades can be inferred as follows.

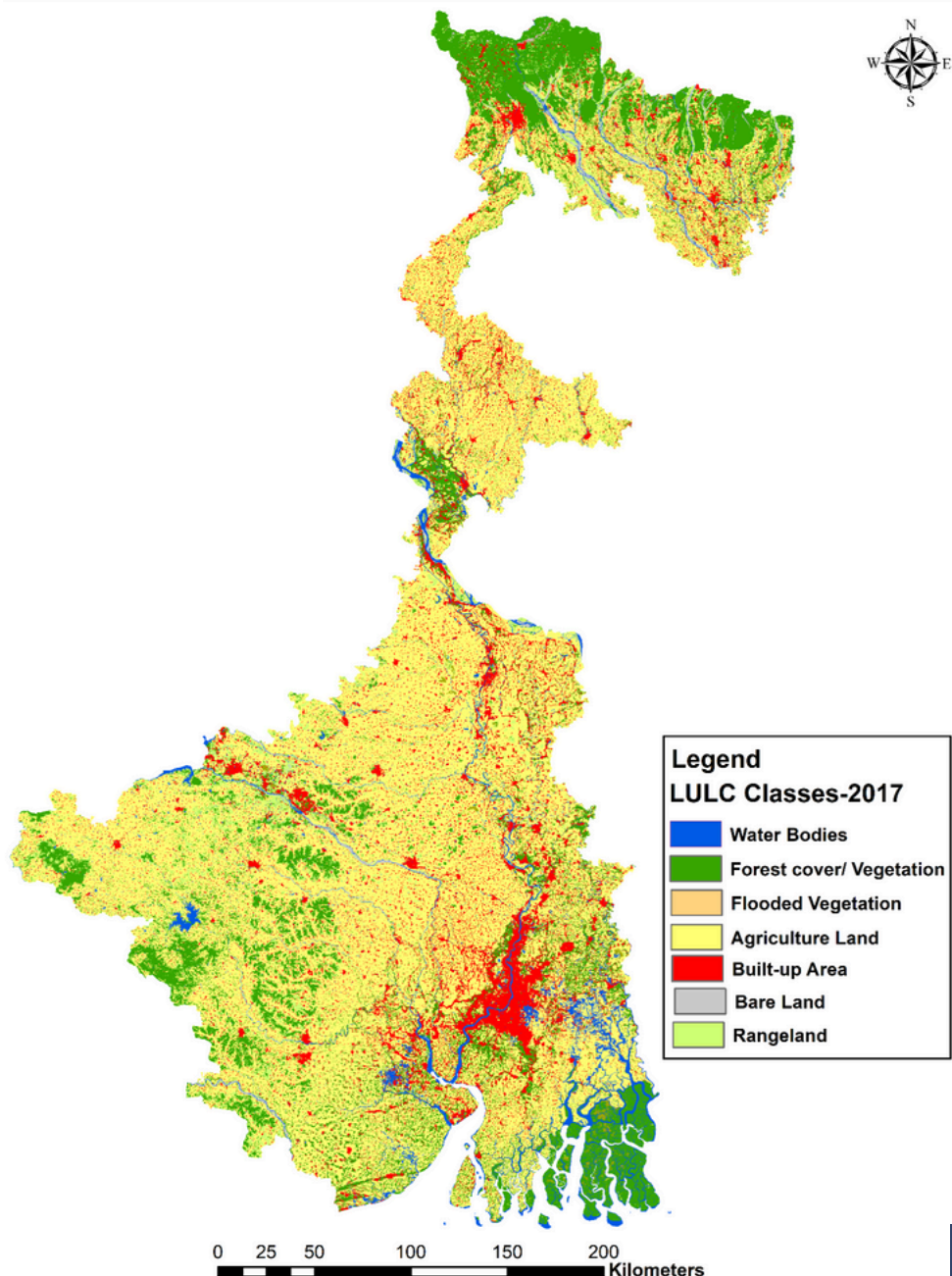
Gross Cropped Area (GCA) and Net Cropped Area (NCA): The GCA in West Bengal expanded at an annual growth rate of 0.73% from 1980-81 to 2009-10. The NCA, however, decreased at an annual rate of -0.16% during the same period.

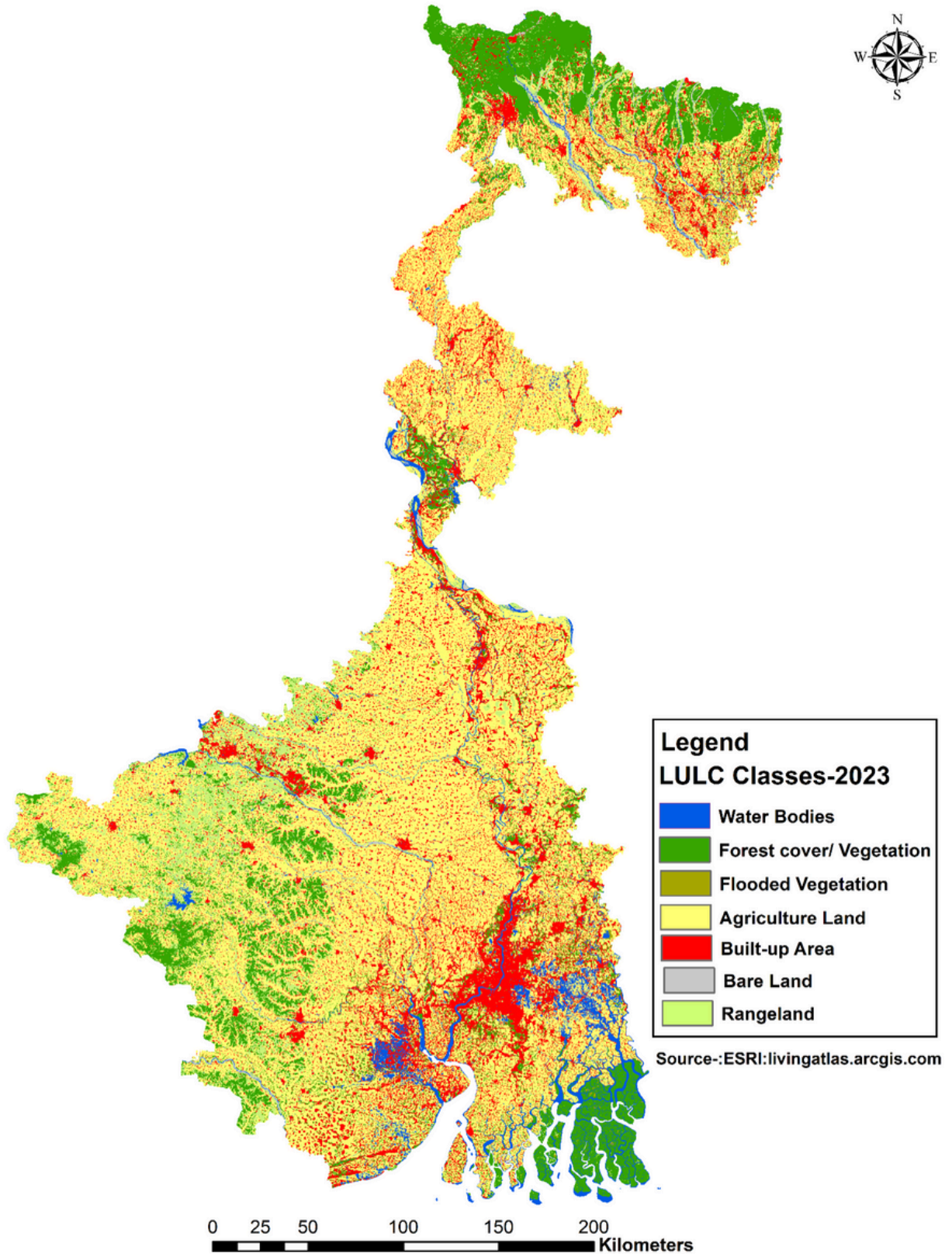


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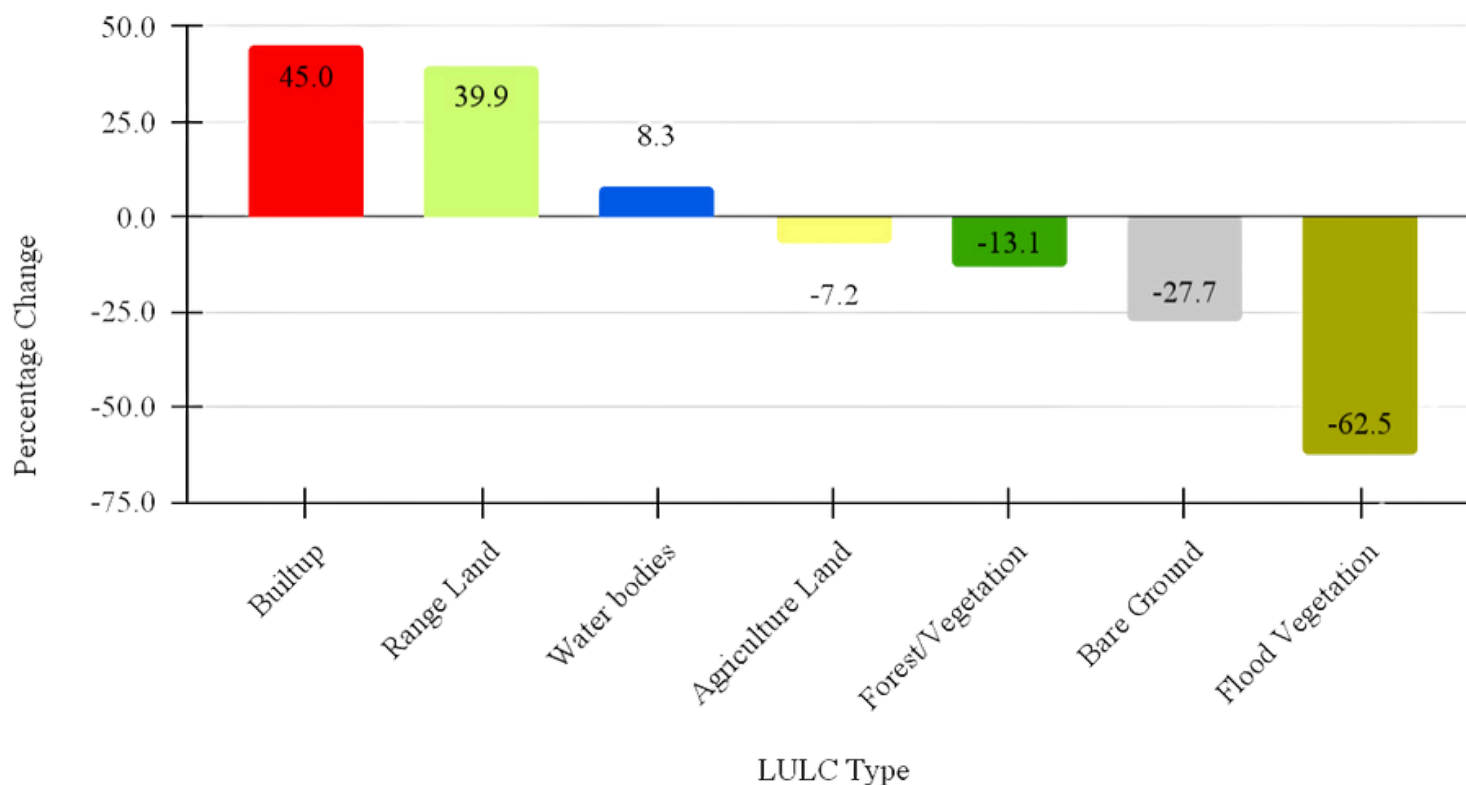
MAPS ON LAND USE, COVER, AND PATTERN: HIGHLIGHTING THE SHIFTS OVER TIME

Land Use and Land Cover (LULC) maps of the state for the years 2017 and 2023 were obtained from ESRI's Living Atlas of the World (livingatlas.arcgis.com) in GeoTIFF format. These GeoTIFF files were subsequently opened in a GIS platform. Initially, the datasets contained 256 classes, including 0 values, which were later consolidated into 7 classes: water bodies, forest, natural vegetation/forest, built-up areas, barren land, and rangeland (uncultivated grasslands, shrublands, woodlands, wetlands, etc.). The symbology tool in QGIS was employed to classify these areas. The areas of the 7 classes for both years were analysed and calculated to assess the changes between 2017 and 2023.





LULC Change between 2017 and 2023 in West Bengal



Increasing Trend:

Between 2017 and 2023, several increasing trends in Land Use/Land Cover (LULC) were observed. Water bodies increased by 8.3%, indicating an expansion in water areas, possibly due to improved water management or natural increases in water levels. Rangeland also saw a significant increase of 39.9%, which could suggest efforts in land rehabilitation or a shift in land use practices. Additionally, built-up areas expanded by 45%, reflecting urbanisation and infrastructure development.

Decreasing Trend:

Conversely, notable decreasing trends were observed during the same period. Flood vegetation decreased dramatically by 62.5%, possibly due to better flood control measures or changes in land classification. Bare ground decreased by 27.7%, which might indicate land stabilisation or conversion to other uses. Forest/vegetation areas saw a reduction of 13.1%, likely due to deforestation or land conversion for other uses. Agricultural land decreased by 7.2%, potentially reflecting shifts in land use priorities or changes in agricultural practices.



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GROUNDWATER RESOURCES: CURRENT SCENARIO AND ITS EVOLUTION



In West Bengal, groundwater usage is massively increasing for domestic consumption, agriculture, and industrial purposes. It meets approximately 80% of the total water demand and 60% of the agricultural water demand (RGICS, 2022). As per 2022 data, the state has a net availability of 21.41 BCM of groundwater (CGWB, 2022). The average groundwater extraction level is 47.01%, which reflects an increase of over 2.5% in the past five years (PIB, 2023b). Rainfall is the primary source of groundwater, significantly contributing to recharge and accounting for 78.36% of the total in West Bengal. District-wise, the central alluvial regions, particularly Nadia and North 24 Parganas, show the highest groundwater development at 89.2% and 65.69%, respectively (CGWB, 2022). This highlight shows that groundwater extraction trends have increased over the past 10 years (refer to Table 1.).

Table 1. Change in groundwater Scenario over 10 years

Years	Annual groundwater recharge (BCM)	Net annual groundwater availability (BCM)	Stage of groundwater extractions (%)
2010-11	29.25	26.58	40.22
2012-13	29.51	26.69	44.38
2021-22	23.60	21.41	47.01

(Source, CGWB, 2022)

The data shows a declining trend in total annual groundwater recharge, decreasing from 29.25 BCM in 2010-11 to 23.60 BCM in 2021-22. Similarly, net annual groundwater availability also fell, from 26.58 BCM in 2010-11 to 21.41 BCM in 2021-22. On the contrary, the stage of groundwater extraction has increased over the years, starting at 40.22% in 2010-11 and reaching 47.01% in 2021-22. The trend highlights increasing pressure on groundwater resources and requires sustainable management practices. These include controlling groundwater extraction and utilizing alternative water sources to mitigate the risk of overexploitation.

05

PERCEIVED IMPACT OF DROUGHT IN ECOLOGY



The state of West Bengal is not unfamiliar with drought conditions. Data from as far back as 1870, to 1990 show that the state experienced droughts due to El Nino South Oscillation (ENSO) events. However recent studies have indicated an increase in droughts that are linked to climate change, and urbanisation (Mohanty, 2020). A study tracking droughts for a period of a hundred years (1901-2000) shows that the frequency of droughts increased in the second half of the century. The study also reveals that for the past decade, there has been a late onset of monsoon in the state and lower levels of rainfall in June and July (Mishra 2021).

While the onset of monsoon has been delayed, there is no delay in the withdrawal of monsoons. This leads to shorter monsoon seasons with a higher likelihood of drought events. Districts that are especially vulnerable to droughts include Bankura, Hirbandh, Birbhum and Purulia (Mohanty 2020). In Purulia, there has been a constant decline in groundwater due to a shortening monsoon season and poor moisture retention capacity of the soil. This makes the district especially vulnerable to drought-like conditions (Mohanty 2020).

Droughts in West Bengal are increasing due to a complex interplay of climatic and environmental factors. The shortening of monsoons has led to declining groundwater levels. Moreover, several districts in West Bengal such as Purulia, Bankura and Birbhum have poor soil moisture retention qualities which further exacerbates the issue (Mishra, Bauri 2024). Apart from the lessening intensity of monsoons in the state, summer months are more prolonged and intense. The IPC report expects the region to face an average temperature rise of .5-1C by 2029 (Ghosh, 2019). The effects of rising temperatures and erratic monsoons can already be felt across the state. In total 40% of West Bengal's districts have become vulnerable to droughts with a two-fold increase in drought occurrence in the last decade (Mohanty, 2020).

The increase in droughts in the state has severe repercussions on the local ecology, disrupting various natural systems and processes. The region's dependence on monsoonal rainfall makes it particularly vulnerable to the drying up of rivers, lakes, and wetlands, which are crucial habitats for many aquatic and semi-aquatic species. This loss of habitat can result in significant declines in biodiversity. The reduced soil moisture impacts agricultural productivity, stressing both crops and natural vegetation, leading to diminished food sources for herbivores and subsequent disruptions in the food chain (Mishra, Bauri, 2024). Forest ecosystems suffer as well, with trees and plants becoming more susceptible to pests, diseases, and wildfires.

Furthermore, the decrease in groundwater levels exacerbates the situation, as many communities and ecosystems rely on this source during dry periods. Overall, droughts in West Bengal not only threaten the ecological balance but also the livelihoods and well-being of rural communities.

CONSERVATION, RESTORATION, AND THE MANAGEMENT PLAN OF THE URBAN WETLANDS



Wetlands play a crucial role in maintaining ecological balance and supporting biodiversity. In West Bengal, the conservation and restoration of wetlands have been a significant focus to preserve these vital ecosystems. The issue of wetland shrinkage has been a growing concern, prompting the need for effective restoration strategies.

Wetland Degradation in West Bengal

Wetland degradation is a critical issue across West Bengal, impacting biodiversity and ecosystem health. Urbanisation and agricultural expansion have contributed significantly to wetland shrinkage and degradation in West Bengal. The East Kolkata Wetlands (EKW), covering 12,500 acres, naturally filter about 50% of Kolkata's sewage. However, according to the West Bengal Pollution Control Board, urbanisation has reduced the EKW's area by approximately 20% by 2023 (Folk, 2023). Another study highlighted that in the Rarh tract region, built-up areas increased from 2.11% to 8.91%, and agricultural lands rose from 57.01% to 81.53% from 1990 to 2020. Consequently, wetland ecosystem health declined from 0.95 to 0.17 during this period (Khatun & Das, 2022).

Conservation and Restoration Efforts

In West Bengal, the conservation and restoration of wetlands have been a significant focus in recent times to preserve these vital ecosystems. The East Kolkata Wetlands Management Authority (EKWMA), established under the 2006 Act with the Chief Secretary of West Bengal as chairman, oversees the conservation and maintenance of the EKW area. Comprising government officials and NGO representatives, EKWMA's primary goal is to uphold current land use practices and sustain the unique wastewater recycling activities within the wetlands. It has developed a comprehensive management action plan for the period 2021–2026, which includes –

- **Mapping and Assessment:** Conduct detailed mapping and assessment of wetlands to identify areas of degradation and prioritize restoration efforts.
- **Ecological Restoration:** Restore degraded areas by reintroducing native vegetation, and native species, and enhancing natural water flows.
- **Community Engagement:** Engage local communities through workshops, meetings, and other events to raise awareness about the importance of preserving wetlands.

- **Monitoring and Enforcement:** Establish a monitoring system to track the condition of the wetlands and enforce regulations to prevent further degradation.
- **Invasive Species Management:** Manage invasive species to prevent their spread and impact on native ecosystems.

Other recent initiatives have also highlighted the importance of wetland restoration in West Bengal. For instance, the restoration of the Dankuni Wetlands has been a notable endeavour, with efforts directed towards preventing encroachment and restoring heavily affected parts of the wetland. Legal interventions, such as placing embargoes on encroachment activities, have been instrumental in safeguarding the Dankuni Wetlands and promoting their restoration (Human & Environment Alliance League (HEAL), 2023).

WETLAND RESTORATION EFFORTS AT DANKUNI, 2023



After the Destruction

A part of the wetland after illegal conversion



After the restoration

The same area after restoration based on court order

Source: <https://healearth.in/saving-the-dankuni-wetlands/>



Urban forestry is a specialised branch of forestry planned to ecologically benefit urban dwellers. Unplanned, overcrowded concrete buildings and metal roads in a city allow a meagre amount of rainwater to percolate into the soil. Urban trees play an important role in these situations to minimise soil degradation and restoration of soil fertility by improving the physical, chemical and biological properties. In essence, urban forestry acts as a strategic approach to achieving land degradation neutrality by promoting sustainable land management practices, conserving biodiversity, and enhancing the overall environmental quality of urban areas.

Role of Urban Forests in Preventing Land Degradation and increasing soil fertility

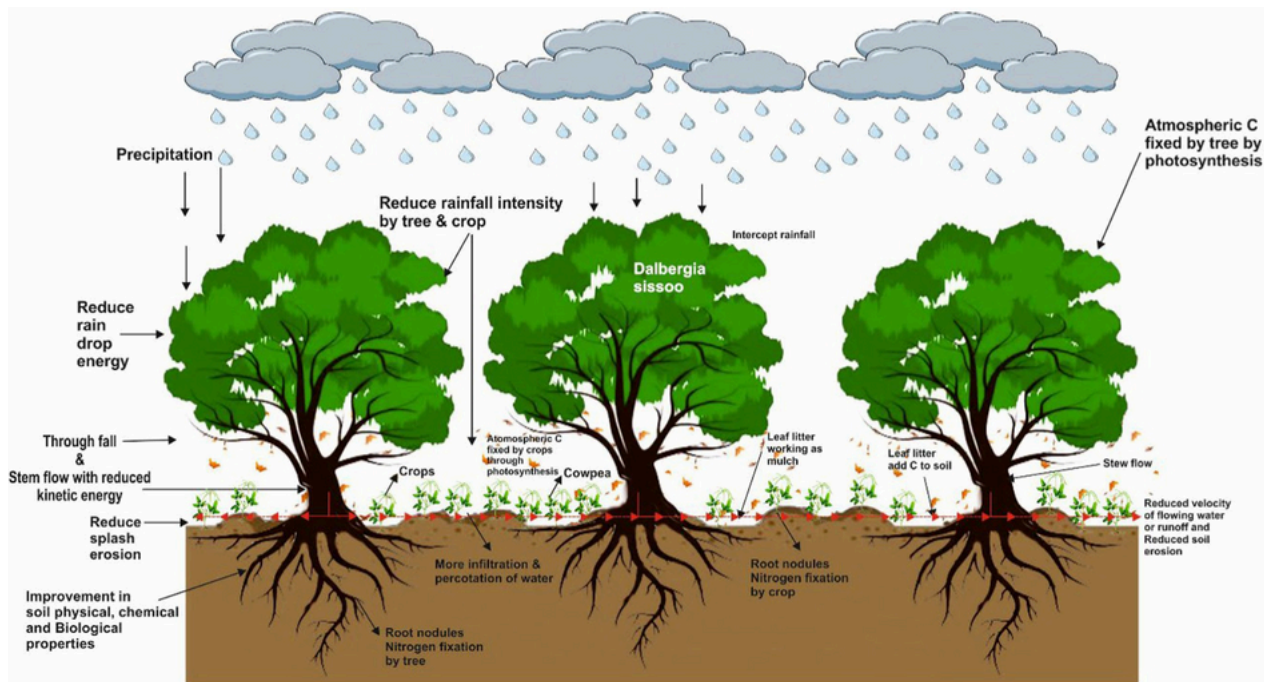


Fig. source: Jinger, D. et. al. (2023)

Present scenario of urban forestry in West Bengal:

- The scenario of urban forestry in West Bengal reflects a complex interplay between forest cover and urban development. While there has been a marginal increase in the state's forest cover, there has been a larger loss of non-forest greenery, especially in urban areas. This loss is attributed to large-scale tree-felling for developmental projects without adequate compensatory plantation (Sen, 2020).
- Das (2021) compiled the trend of district-wise forest cover change matrix in West Bengal for the period of > 30 years (1987–2019). It showed an overall trend of increase in the same, from > 8000 Sq km. in 1987 to > 14,000 sq km. in 2019.
- However, as per the data, the urban forest cover (mostly open forest) in West Bengal is much less in proportion to the overall canopy.
- In 2019, the open forest cover for Kolkata was 1 sq km. only, covering 0.54% of the total area of the city (whereas Mumbai has 22.24%).
- In Howrah, it's 253.77 sq. km. of open forest, consisting of 20.71%. Kolkata, the state capital and the largest urban centre has the lowest forest cover among the major Indian cities.
- Overall, due to rapid urbanisation, the tree cover in the urban areas of West Bengal has decreased from 23% to 7.3% over the last 20 years and is expected to decline further to 3.37% by 2030.

Constraints and some remedies in urban forestation–

Urban forests require meticulous care and management, which can be challenging due to the high maintenance needs of trees and the lack of resources for their upkeep. The use of native tree species is crucial for successful urban forestation. However, there is a need for more nurseries that can provide these native species, particularly in Kolkata, Howrah, and towns like Siliguri, and Durgapur. In this context, the Miyawaki method (SwitchOn, 2022) is a unique and innovative approach to growing urban forests faster and with less maintenance. It involves planting native species in a specific manner to create a dense and diverse ecosystem.

Initiatives like setting up urban forests in New Town and near Hyde Road indicate a growing awareness of the importance of green spaces within urban environments. Additionally, the shift towards joint forest conservation, making local stakeholders in forestry initiatives, has shown positive results, with newly forested areas becoming habitats for wildlife.



REGENERATIVE AGRICULTURE: ITS EFFECTIVENESS IN PREVENTING LAND DEGRADATION



Regenerative agriculture holds significant potential in mitigating land degradation in the West Bengal region.

- By implementing practices like cover cropping, crop rotation, and minimal tillage, regenerative agriculture enhances soil fertility, structure, and moisture retention. This helps combat soil erosion, nutrient depletion, and degradation, which are prevalent issues in West Bengal due to intensive farming and flooding (Dagar and Gupta, 2022).
- Regenerative techniques such as agroforestry, contour plowing, and water harvesting help improve water infiltration, reduce runoff, and mitigate waterlogging. Given West Bengal's susceptibility to floods and water scarcity, these practices are crucial for sustainable land management and agricultural resilience (Dinesha et al., 2023).
- Regenerative agriculture encourages diversified cropping systems, agroecological practices, and habitat restoration, fostering biodiversity conservation. This supports natural pest control, pollination, and overall ecosystem resilience, which are essential for sustaining agricultural productivity amidst environmental challenges in West Bengal (Samra, 2020).
- Practices like agroforestry, cover cropping, and soil carbon sequestration contribute to climate change adaptation and mitigation. By enhancing carbon sequestration in soils and vegetation, regenerative agriculture helps buffer against extreme weather events, erratic rainfall, and rising temperatures, which are increasingly impacting agriculture in West Bengal (Dagar and Gupta, 2022).

09

STATE GOVERNMENT INITIATIVES FOR THE PROMOTION OF SUSTAINABLE AGRICULTURAL PRACTICES



- Strengthening Soil testing infrastructure facilities at district and block level for comprehensive soil analysis and introduction of soil health card-based Integrated Nutrient Management Promotion of organic input production.
- Research priorities on standardization of location-specific seed production technologies for rice and potato and alternate cropping patterns and crop diversification.
- Certified seed production infrastructure through public-private partnership and development of seed villages involving progressive farmers' societies.
- Crop diversification with emphasis on oil seeds, pulses and vegetables especially in areas where upland rice cultivation is predominant. (RKVY, n.d)

Initiatives of NABARD under Sustainable Agriculture:

- NABARD has been promoting various projects under the Farm Sector Promotion Fund (FSPF) aimed at the promotion of Innovation in the Agriculture Allied Sector, enhancing agricultural productivity, promotion of climate resilient agriculture, promotion of value chain, expert advisory services etc.
- Promotion of Farmers' Clubs for taking up the use of technology in agriculture thus ensuring better output and thus improving the quality of life of rural people(NABARD, (n.d) a).
- Watershed Development and Wadi Development aimed at ensuring sustainability in farming by utilizing the natural resources in a sustainable manner.
- Climate Change projects as to enhance the adaptive capability of the farmers.
- NABARD has been implementing Natural Resource Management projects in collaboration with Co-operatives under CSR. (NABARD, (n.d) b)



SUGGESTIVE WAYS TO RESTORE LAND, HALT DESERTIFICATION, AND COMBAT DROUGHT

The world is celebrating World Environment Day 2024 on June 05, and bringing attention to how people can contribute to halting environmental deterioration and revitalising neglected regions. Here are a few ways to get involved in ecosystem restoration on World Environment Day-

Make agriculture sustainable and use smart farming practices

In West Bengal, a significant majority of the people are dependent on agriculture for their livelihood. However, our current farming practices are unsustainable and a prime driver of land degradation. There is a lot that can be done to fix this. Governments can promote regenerative agriculture to increase food production while preserving ecosystems.

The use of artificial intelligence in smart farming techniques offers a practical answer to the problems facing agricultural sustainability in the contemporary period. Time series analysis, deep learning, and machine learning are crucial to smart farming. Agriculture involves a wide range of operations, including crop selection, crop yield prediction, categorisation of soil compatibility, and water management. Time series analysis is used for agricultural demand forecasting, commodity price prediction, and crop yield production forecasting. Machine learning algorithms are to be utilised for crop selection and management. Deep learning techniques are to be used for crop selection and crop production forecasting. Machine learning and deep learning algorithms are to be used to select crops based on a variety of parameters, including soil composition and compatibility classification.

Preserve the Soil

One of the most biodiverse environments is soil. 95% of the food we eat comes from the earth, where nearly 60% of all organisms reside. To mitigate climate change, healthy soil serves as a carbon sink, trapping greenhouse gasses that might otherwise escape into space. Governments and the financial industry may encourage organic and soil-friendly farming to maintain healthy and productive soil. Zero-tillage is a practice that agricultural businesses can use to maintain organic soil cover by farming crops without disturbing the soil through tillage. The fertility of the soil could be increased by adding compost and other organic materials. Mulching and drip irrigation are two examples of irrigation strategies that can be utilised to assist in maintaining soil moisture levels and minimize drought stress. Individuals can also make compost from leftover scraps of fruits and vegetables and use in their kitchen gardens and balcony plant pots.

Protecting the Pollinators

75% of the crops are dependent on pollinators (United Nations Environment Program, 2024). The most abundant pollinators are bees, bats, insects, butterflies, birds, and beetles all contribute significantly but bees are the most prolific ones. Some fruits, such as mangoes, avocados, and bananas would disappear if bats disappeared. All pollinators, bees, in particular, are seriously declining despite their importance.

In order to save them, humans need to reduce air pollution, lessen the harmful effects of fertilizers and pesticides, and preserve the wetlands, woodlands, and meadows that are home to pollinators. To help restore nature, governments and citizens need to grow urban green areas and add additional ponds that are beneficial to pollinators. Birds, butterflies, and bees will be drawn to urban and residential gardens when a wide variety of native flowers are planted.

Revitalization of the Freshwater Ecosystem

Freshwater ecosystems sustain the water cycles that keep land fertile. They supply food and water to people, protect us from droughts and floods, and provide a habitat for countless plants and animals. Yet they are disappearing at an alarming rate due to pollution, climate change, overfishing and over-extraction. People can stop this by improving water quality, identifying sources of pollution and monitoring the health of freshwater ecosystems. West Bengal can join the [Freshwater Challenge](#) to accelerate the restoration of degraded rivers and wetlands by 2030 (Freshwater Challenge, 2023). Invasive species could be removed from degraded freshwater habitats and native vegetation replanted. Cities could champion wastewater innovation that addresses sewage management, stormwater runoff and urban flooding.

Revitalization of the Freshwater Ecosystem

Seas and oceans assist communities to prepare for catastrophic weather events and mitigate climate change while simultaneously giving humans oxygen, food, and water. The livelihoods of almost 3 billion people, mostly in developing countries, are dependent on marine and coastal biodiversity.

Governments can expedite the adoption of the [Kunming-Montreal Global Biodiversity Framework](#) to safeguard this priceless resource for future generations. In order to stop pollution, excess nutrients, agricultural runoff, industrial discharge, and plastic waste from seeping into coastal areas, the government can restore blue ecosystems, which include mangroves, salt marshes, kelp forests, and coral reefs (CBD, 2024). A life-cycle strategy might be utilized by nations to redesign plastic items so that they can be recycled, repaired, reused, and eventually kept out of the ocean.

Revitalization of the Freshwater Ecosystem

More than 30% of the people of West Bengal live in cities. By 2050, it is projected that two in three people will live in an urban centre. Cities consume 75 per cent of the planet's resources, produce more than half its global waste and generate at least 60 per cent of greenhouse gas emissions (United Nations Environment Program, n.d). As cities grow, they transform the natural world around them, potentially leading to droughts and land degradation (United Nations Environment Programme, 2024). Urban forests can improve air quality, provide more shade and reduce the need for mechanical cooling. Preserving cities' canals, ponds and other water bodies can alleviate heatwaves and increase biodiversity. Installing more roof and vertical gardens in the city buildings can provide habitats for birds, insects and plants.

11

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