



Changing land use pattern: A treat to East Kolkata Wetlands

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Abstract

The megalopolis of Kolkata produces almost 750 million liters of wastewater and sewage every day and the East Kolkata Wetlands works as a fully functional organic sewage management system. It can well be described as the kidney of the city. It also acts as a natural flood control system for the city. It is ironic that there is a little concern about the destruction of a world's important wet land site. Due to the rapid urbanization and change of urban morphology in the last few decades survival of East Kolkata Wetlands has become a challenge. The main objective of this study is to focus on the identification of changes in landuse/ land cover from 1990 to 2017 in the East Kolkata Wetlands in order to understand the underlying causes and also to identify the problems and challenges it faces currently. The methodology includes the detailed preparation of landuse map of 1990 and 2017 from Landsat TM data and Landsat Oli TRS. The analysis shows that the area under the settlements has increased from 22.587 sq km in 1990 to 35.287 sq km in 2017 due to rapid urbanization with a consequent decrease of open spaces from 12.112 sq km in 1990 to 4.129sq km in 2017. All these have significantly compounded its sustainability that would eventually affect the environmental health of the megalopolis in the long run.

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Introduction

Wetlands have been described as transitional lands between terrestrial and aquatic system where water table is usually at or near the surface or the land is covered by shallow water. The importance of wetlands lie in the maintenance of food chain, ecological balance and control the pollution, treat sewage and fulfillments of requirements of fish. Wetlands cover approximately 4 - 6% of the Earth's surface and contain about 35% of global terrestrial carbon. In India, wetlands cover an estimated three percent of India's land area.

The East Kolkata Wetlands (EKW) has been experiencing large scale changes in the landuse pattern due to expansion of urban and built-up area. The consequences are expected to be disastrous in long term. In the different phases of its development and growth to accommodate the growing population, the policy of expansion towards eastern fringe of the city has been adopted. This research paper discuss about the changing pattern of landuse in the EKW from 1990 to 2017. The EKW has inimitable impact in the daily life of

people in Kolkata and surroundings. It plays a significant role in ecological and economic security of the region. The staple food like fish and vegetables come from the EKW. The region is the world's largest recycling ecosystem which helps to treat around 600 million liters of sewage and waste water daily. It is primarily a flood control plain, waste control region and high productive area. It is considered as the kidney of Kolkata city. This natural waste water treatment system developed by the local community with their traditional knowledge saves the city of an expensive waste management system. In addition, it also provides livelihood around 25,000 families of fishermen, produces over 10,000 tones of fish per year for the people of Kolkata as well as supply significant amount of food grains and vegetables.

Changing such an ecologically, environmentally, and economically important zone will develop many problems in future. Keeping in mind the issue of sustainability, there is a strong need to acknowledge the importance of the EKW and take necessary initiatives towards its conservation.



The Study Area

The West Bengal is Indian state located in eastern part of India. The East Kolkata Wetlands is located in the eastern fringe of the capital city Kolkata, West Bengal. It lies approximately between 22°25' N to 22°40' N latitudes and 88°22' E to 88°55' E longitudes. It is a complex natural and man-made feature that covers about 12,500 hectares. It is a part of the mature delta of the Ganges.

Objectives

The main objectives of this research are:

- To analyse the significance of the EKW
- To detect the changes in landuse pattern from 1990 to 2017
- To analyse the causes and effects of landuse changes over the span of past 27 years
- To formulate some viable recommendations for its conservation

Research Methodology

This research is mainly based on secondary survey. The two data of 1990 and 2017 were downloaded from earth explorer. The data product used for 1990 is land sat TM while the other one for 2017 is OLI TRS. Initially the data products were layer stacked and ready for classification. The unsupervised classification was performed on both the images and then a supervised classification was carried on to extract the landuse details. Finally the supervised classification was digitized to get the landuse or land cover maps of East Kolkata Wetlands for 1990 and 2017.

Importance

The wetlands contain habitats for a big biological diversity and one of the most productive sites. The changing pattern of wetlands for urban construction or other purposes poses a serious threat to the world environment at a large scale and deserve a special attention from every sectors. The ecosystem of the EKW has profound impacts on the daily life of people in Kolkata. It is used to treat Kolkata sewage and waste water containing nutrients supporting the fishing and agriculture. This is the place for conservation of diverse elements of flora and fauna. Over 40 species of birds can be spotted at the wetlands. The process of urbanisation however, is leading to the disappearance of many bird species from the area (Ghosh, 2004). The EKW have been so important, both in terms of providing livelihood and products as well as in making use of a natural source of water. It absorbs the pollution and purifies the air for citizens. It also provides livelihood for local people and maintain a micro climatic region. The total area of the EKW is 12500 ha of which approximately 45.93% is the water body and 38.92% is the agricultural land. The remaining portion is occupied by urban and rural settlements and sites for garbage disposal.

The unique quality of this wetlands is that sewage and waste water of the Kolkata city get treated naturally through the practice of aquaculture. This helps the Kolkata Municipality to save 1300 million rupees per year and fish farmer has expenditure of rupees 60 million averted for buying the fish

feed (Ghosh, 2005). The Ramsar Convention describes the EKW as one of the rare examples of environmental protection and development management where city's sewage is treated through a network of canal and fish ponds. It is a rich site of bio-diversity. A large number of population depends on water body and bio-diversity.

Scarcity of water is perhaps the biggest fear of the present and future generations. Wastewater can be an alternative source of water for fish culture and crop cultivation. The EKW has been using this unique system for a long time. The cleaning of the water is basically done by oxidation, radiation and biological breakdown of the organic wastes (Mukherjee, 2006) and all this is done with the help of photosynthesis. The EKW came under the Ramsar convention in 2002. It provides a direct employment for 70,750 men and women who maintain fishponds, catch fishes, grow paddy and vegetables (Mukherjee 2006). Since then, continuous changes of landuse have been taking place through expansion of urban / built up area.

Analysis and Discussion

The developmental policies of the Government of West Bengal were designed during 1950s, 1960s, and 1970s for the east ward expansion of Kolkata city especially for residential and commercial purpose. The rate of growth of population mainly accelerated during the post-independent times due to migration of refugees. Urban expansion of Kolkata has resulted movements towards east leading to the shrinking of the wetlands over the years. Recognizing the loss and destruction of valuable services provided by the wetlands, 12500 acres of wetland area was brought under the protection of Ramsar Convention in 2002. Since then, the pace of changing the land use of wetlands may have reduced but the encroachments of wetlands continue in the form of expansion of a major arterial road, the metro railway and elite residential complexes. Recently illegal landfills are on the rise and the EKW is slowly reducing in area. The random land development and urbanization (Real Estate Projects in Rajarhat and Salt lake) are of serious concern about the impact on the environment. This is because wetlands serve as a natural sponge absorbing excess rainfall and also reducing pollution. Landuse is one of the most important natural resources. Its continuous modifications for industrialization, modernization, and urbanization certainly exerts deep and varied impacts on environment. The EKW is the largest fish pond in the world, where the sewage from the city is dumped. It shows gradual degradation due to urban encroachments.

The landuse patterns of 1990 and 2017 show that settlement has increased from 22.587 sq km to 35.287 sq km, mainly in the northern side at the cost of green agricultural lands. This modified land is within the vicinity of the satellite town, Salt lake. The real estate business is one of the main reasons behind the changing pattern of landuse. Ever increasing hunger for land insists the city of Kolkata to expand more towards east not considering the associated environmental impacts.

Fisheries have increased 33.419 sqkms to 35.367 sq. Km. As it is the main occupation in this area, only an increase of 2 sq km is not remarkable. The city receives about a third of its daily



requirement of fish from the EKW. Semi dry wetlands has remarkably increased from 5.240 sq km to 13.446 sq km. Thus, wetlands are not maintained properly. Agricultural land has been reduced from 53.405 sq km to 37.817 sq km. It is one of the integral parts of the wetlands. The vegetation cover has increased from 1.566 sq km to 8.916 sq km. Open space also decreased from 12.112 sq km to 4.129 sq km. Most of the open spaces have been converted to amusement park and picnic spots. As per report, tonnes of plastic from cement bag to toothpaste tubes are dumped from hundreds of illegal processing units (that have cropped up in the East Kolkata Wetlands) (The Times of India, 3 Feb. 2017). Thus, the major component of transformation is 'settlement' through which built up area has been increasing for urban expansion.

*"The loss of wetlands and bio-diversity at EKW is explained in the following: World Wildlife Foundation India found in 2012 that only half its floral and faunal species recorded a decade ago exist; a 2014 Indian Council for Social Science Research (ICSSR) survey said fishponds had shrunk to 202 from 264; and a survey by the Society for Creative Opportunities and Participatory Ecosystems (SCOPE) revealed water cover at Bhagabanpur Mouza fell from 88% in 2002 to 19% in 2016." Hindustan Times, on 6th April 2017 10.13 IST
"Ramsar boss highlights East Kolkata Wetlands as a model for water recycling" Source: Hindustan Times - 23 Mar 2017*

Conclusion and Recommendations

The above discussion focuses on the importance of conservation and proper management of East Kolkata Wetland. The Government has initiated the management of this ecological, socio-economically valuable area. The establishment of East Kolkata Wetlands Management Authority (EKWMA) for conservation and management of the EKW is a positive step towards alternation of land use. It is guided by Esat Kolkata Wetland Act, 2006. Conservation of wetland would prevent big natural calamities. It is found that many areas has been converted to amusement parks, boating and picnic spots. Architecturally harsh high-rises replacing the

green expanse of the EKW. The common people are hardly aware of it.

The two most important threats in these wetlands are the encroachment of urban development and siltation. Large areas have already been converted and constant change of landuse pattern has been affecting the ecology of these wetlands. As a number of industrial units are located in the vicinity of the EKW, the effluents of heavy metals in the wetland gradually degrading the quality of fish and aquatic vegetation and thereby enhancing the problems of siltation. Despite all these, the EKW remains an example of symbiotic interaction between man and environment. The city of Kolkata may get its huge volume of treated water without any expenses and get additional supply of fresh fish and vegetables. Steps must be taken, therefore to conserve the wetlands through focused development plan. Areas and target groups must be decided, specific needs must be chalked out according to priorities before any developmental funds are allocated for these areas with stakeholders participation in the programmes. More political, administrative and citizen's initiatives needed for conservation. Keeping in mind the adverse effects of global warming and climate change, there is a strong need to acknowledge and appreciate the importance of EKW and take steps for conservation.

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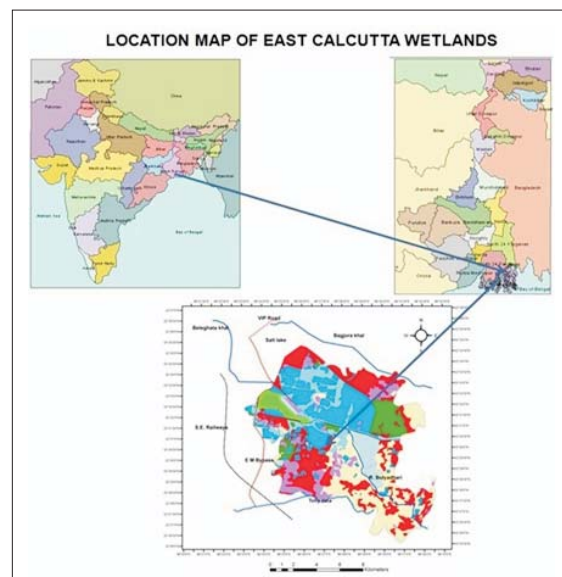


Fig. 1: Location of the Study Area

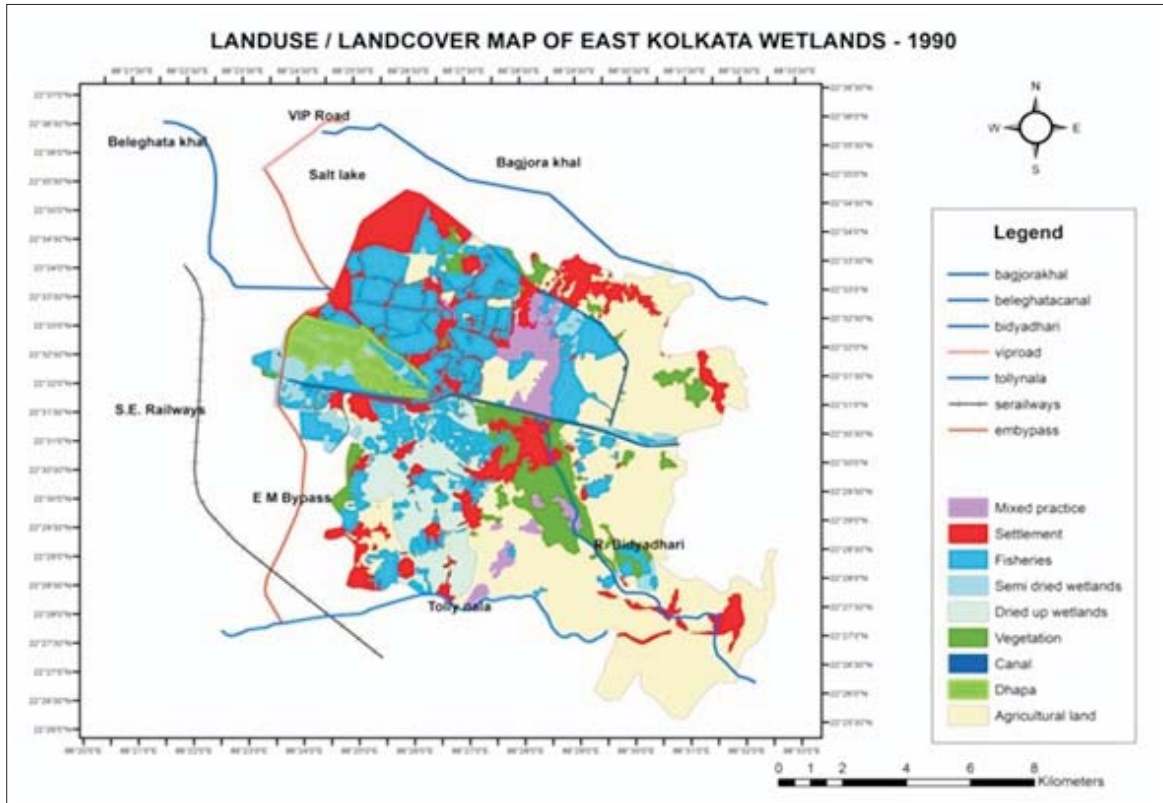
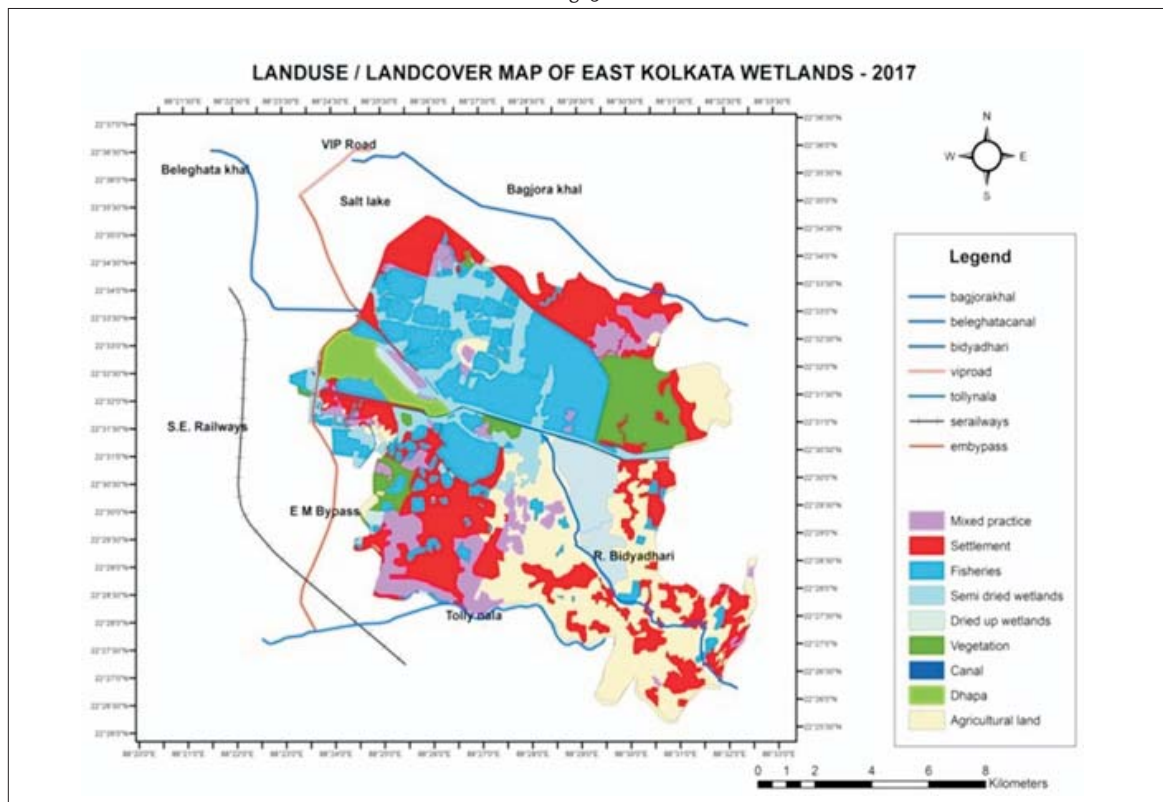


Fig. 2

Fig. 3



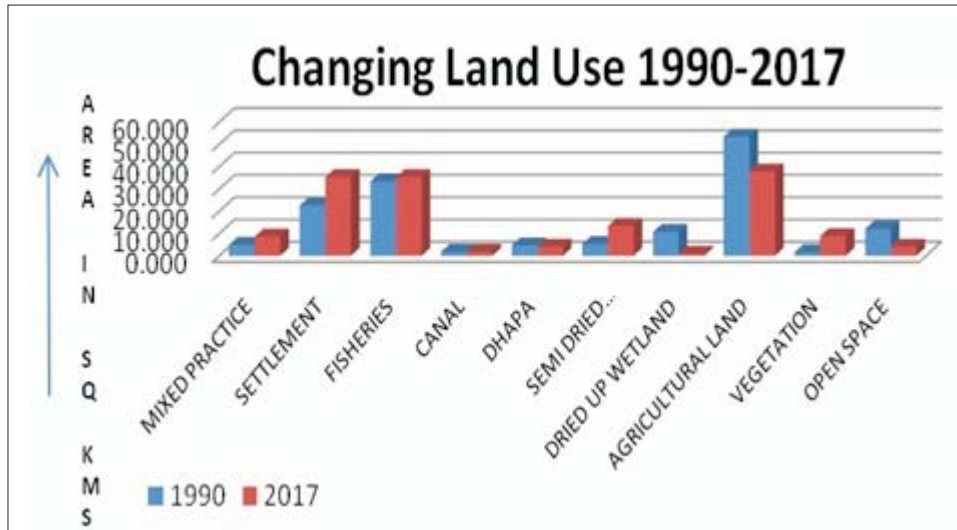


Fig. 4

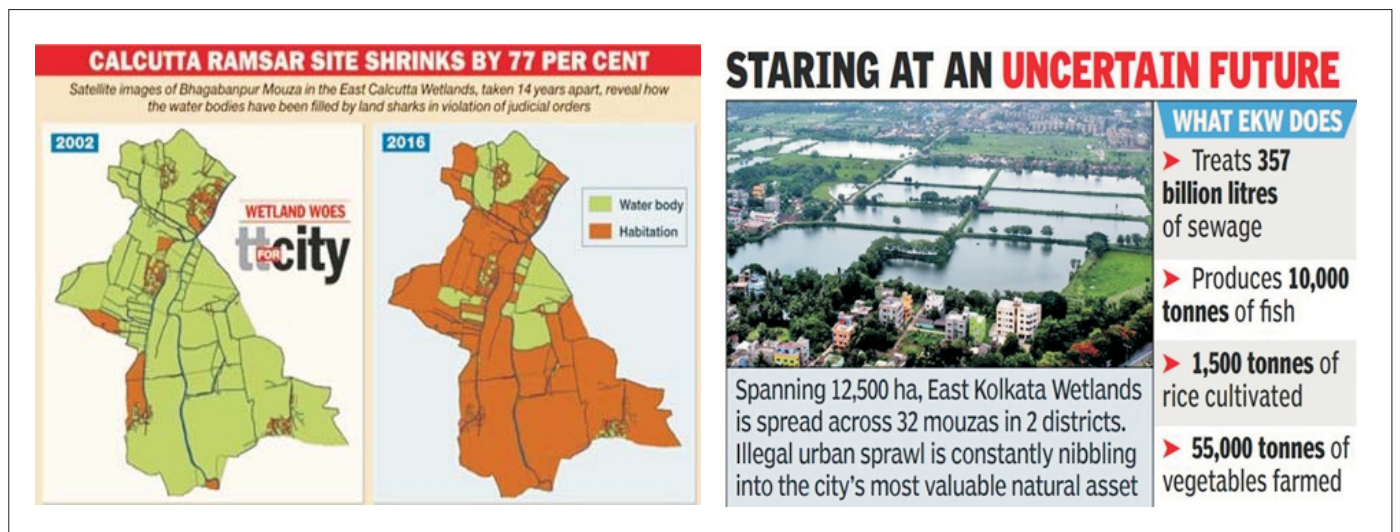


Fig. 5. Source: 2nd March, 2017 and Times of India, 16th Dec 2017



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