

# **Economic, Social and Environmental Viability of Wetlands: The Case Study of EKW**

**Dr Trishna Sarkar**

(Asst Prof. Department of Economics. Dr Bhim Rao Ambedkar College, University of Delhi)

## **Abstract**

Cities are one of the most important milestones of the journey called human civilization. Rather we can say that cities are the extension of ourselves. Like any healthy body our cities need functional lungs, kidneys, transportation (circulation) to name a few. As a kidney flushes out the waste and toxic materials from our body and so on its failure the body needs machine dependent detoxification also known as Dialysis. For our cities it's the wetlands which carry out the function of a kidney naturally just as the forests are supposed to be our lungs. But the ceaseless tendency to escalate the growth status in the name of development has led to eradicate the existence of wetlands. This constantly growing anthropogenic encroachment into wetlands all over the country is leading to a series of crisis. East Kolkata wetland (EKW) is one of them. Besides being a natural cleanser of the city's waste, EKW also provides several hundred tons of fish and vegetables for the city and employment to a large number of people in the times where employment, Importances of wetlands were felt strongly and eventually lead to the Ramsar Convention in Iran in the year 1971 also known as Convention of Wetlands later joined by India in 1982. Nationwide some 26 wetlands were Identified, EKW was one of them. Though **EKW** was designated as a "wetland of international importance" under the Ramsar Convention on August 19, 2002, it is facing challenges in form of rapid urbanization and lopsided development model. In last couple of decades a big portion of the wetland has been disappeared for ever and what is remaining is also in verge of destruction. In other words we are replacing the kidneys of our cities (wetlands) with fossil fuel intensive dialysis, that is, Sewage treatment plants. This study is an effort to make an cost benefit analysis economically and socially, of natural wetlands and the manmade artificial STPs. Along with the reference of EKW communities as role models in enhancing and sustaining these natural process through their traditional practices and hardships down the years, the study is based on primary data based on field work and secondary data collected from various sources.

**Keywords:** urbanization, wetlands, sewage treatment plants, cost

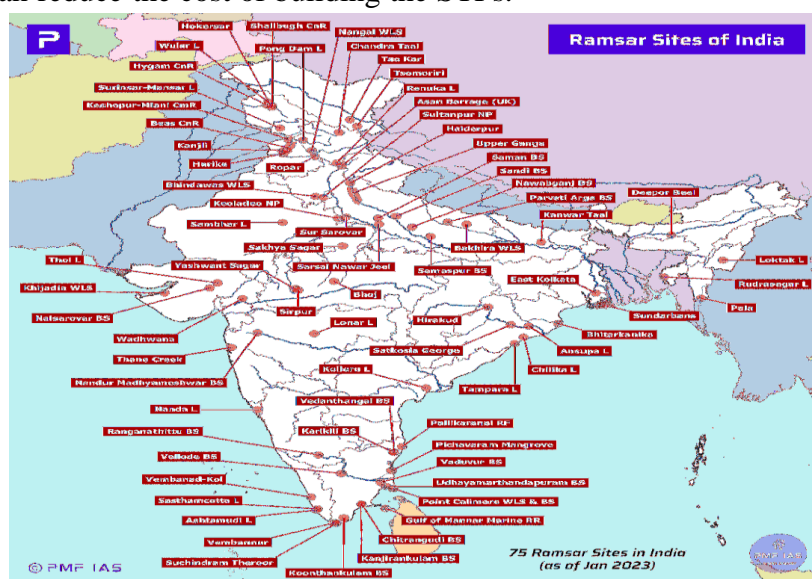
## **1. Introduction: -**

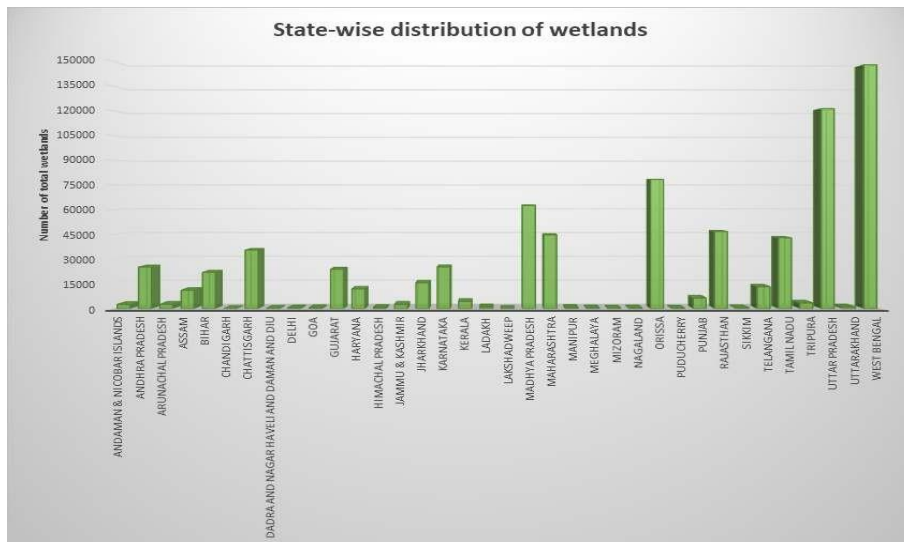
‘A wetland is an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical and biological features reflective of recurrent wetlands are hydric soils and hydrophytic vegetation. Common feature of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic, or anthropogenic factors have removed them or prevented their

development’, is the reference definition of wetlands. (Report: - Committee on Characterization of Wetlands National Science Council 1995: Wetlands Characterization and Boundaries)

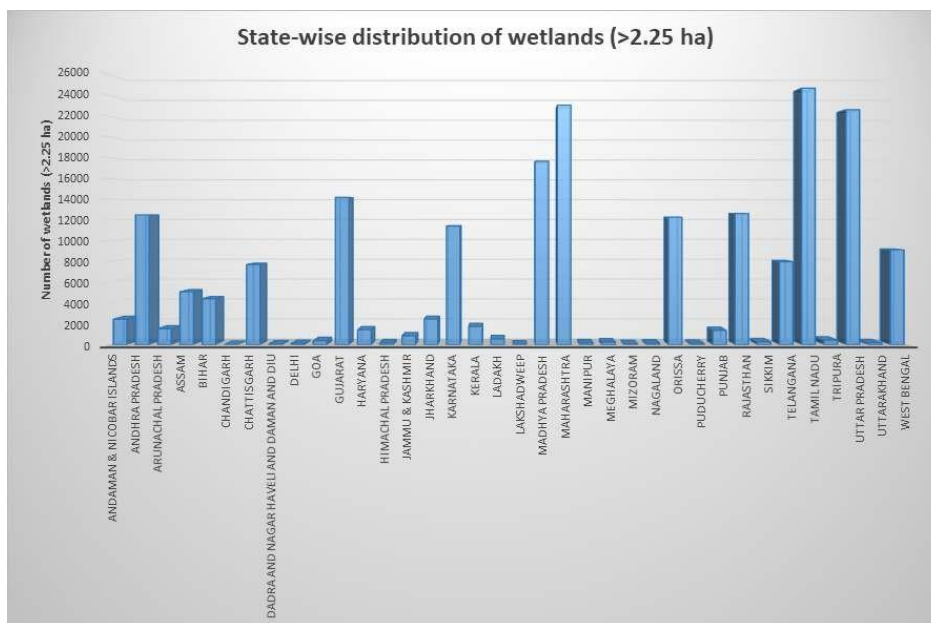
Wetlands performs various functions depending on its Ecohydrology as defined by, Gottlich(1977). Ecohydrology specifies the relationship between water and the ecological characteristics that it creates. Since ecohydrology also depends on location and geomorphology, so every wetland has a unique feature. Further this unique feature intertwines the social, economic and cultural relationship with the local population.

All India wetland survey was initiated by Government of India in late 1960s. In early 90s Wetland working group was established by the Department of Environment with Prof. C.K Varshney as chairman who further carried on the survey on wetlands. A total of 1,193 wetlands covering an area of 3,904,543 ha, was recorded in the first survey(A Directory of Asian Wetlands by James A Wolstercraft, S.A Hussain & C.K Varshney, 1989). With such governmental and some non-governmental initiatives undertaken, it was clear that wetlands were of great importance. In the year 1971 RAMSAR CONEVTION also known as “The Convention on Wetlands” was initiated in Iran by UNESCO to protect the wetlands. India signed the treaty on 1<sup>st</sup> of February 1982 and Chilika Lake in Odisha was identified as the first wetland under this convention. In 2023 presently India has 75 Ramsar sites. Under 2023-24 budget the finance minister has specially launched a scheme ‘ Amrit Dharohar’ to protect the wetlands of India and has allocated a budget of 3,079.40 crore for the same (<https://www.indiabudget.gov.in/>) Long before they were recognized by the authorities wetlands had been used by the people living around it for various uses. It always had a social and economic importance for the nearby dwellers. In India presently around 4.63 percent of the geographical areas of India are wetlands and India has lost nearly one-third of its natural wetlands to urbanization, agricultural expansion and pollution, over the last four decades. (Mongabay series, Aditi Tandon, 27Jan, 2021). This paper studies the importance of wetland in reference to East Kolkata Wetlands and how its presence and maintenance can reduce the cost of building the STPs.





Source: National Wetland statistics, Ministry of Environment, forest and climate change, GOI2023



Source: National Wetland statistics, Ministry of Environment, forest and climate change, GOI 2023

### Types of wetlands:

Before understanding the importance of wetlands it's vital to know its various types of wetlands. Since different types of wetlands contributes to this planet in different ways.

**MARSHES;-** These are type of wetlands, where water is saturated for long time and is characterize by herbaceous growth rather than woody species. Kanwar jheel is a marshy arealocated in the floodplains of Buhi Gandak in Bihar

**SWAMPS-** These wetlands are frequently inundated with water and are characterized by wet soils, trees and shrubs. Sundarban is one of the largest marshes in India stretching from West

Bengal to Bangladesh.

**BOGS-** These are fresh water wetlands usually formed in glacial lakes and mostly found in cold areas that are characterized by soft spongy ground that accumulates peat, deposits of dead animals. They receive water from precipitation.

**FEN -** A fen is a fresh water peat wetland covered mostly by grasses sedges, reeds, and wildflowers of high pH (alkaline) ground water. Water here is more nutrient rich.

Beside the above mentioned types, lake, pond, lagoons, estuaries are also types of wetlands. These wetlands are natural care taker for human civilization.

### **How does wetland benefit us?**

Wetlands are excessively a productive and bio diverse system. They provide and hold most of our fresh water. They are one of the vital food producing sectors. They are a huge source of income for lakhs of people. They are home to different species of aquatic and terrestrial plants and animals and is a vibrant part of our ecosystem. They regulate the climate and provide protection from flood and storms. Wetlands are source of research for biodiversity, ecosystem and aquatic life. These natural habitats of different species make this spots attractive as tourist destinations. They naturally filter pollutants and make the water safe for drinking purpose. With multifaceted uses of wetlands, it is well understood that these natural resources are of great treasure for the planet.

## **2. Wetlands as natural Filters (Introducing East Kolkata wetlands EKW)**

Beside its various functions, some wetlands have an innate property of purifying waste water. East Kolkata wetland is one such wetland which can be termed as natural sewage treatment system. . EKW are the world's largest sewage-fed pisciculture system, which naturally recycles nearly 910 MLD of sewage water generated from the Kolkata city, besides providing more than 20,000 tons of annual fish produce and 150 tons of vegetables daily. 'Kolkata: An Ecologically Subsidized City' by Dhrubajyoti Ghosh (2004) argued that unlike any other city, Kolkata is situated between two rivers – Hooghly from which water is abstracted for drinking and another, Kulti where treated sewage is disposed of. Also, the city has copious groundwater and wetlands to its east that treat its sewage free of cost, giving it food in the Bargain. According to “ Report-East Kolkata –Wetland by Gorky Charaborty and Dhrubo Dasgupto, 2019” which states, out of this, the livelihood aspect involves a robust population of more than about 1,18,000 according to conservative estimates . This population not only ekes out a living by successively using sewage for fish growing, vegetable cultivation and paddy cultivation, but in this manner, the wetlands also serve as a stable urban fringe. They keep the wetland inhabitants productively engaged instead of looking to Kolkata for employment. Infact the cooperatives of fisheries has developed a mutual relation with these wetlands .EKW as natural sewage works wonder at zero cost. The Municipal Corporation of Kolkata directs the water through series of inlets which are taken care and managed by the fishery cooperatives that thrive on wetlands. The cooperatives further checks the inflow of the waste water, and allows it to settle so that only

the clear top layers of water flow into the shallow wetland. A parabolic fish gate separates the wetland water from the waste water. The parabolic structure is there to prevent fish swimming into the oxygen-less urban waste water, where they would die. They keep the wetland inhabitants productively engaged instead of looking to Kolkata for employment. In the meantime nature does its work. In the inlets, organic waste settles down and is partly decomposed in the warm shallow water. In a series of biological steps, the organic waste in the wetland is converted into fish feed. There are several ecological processes at work: soil bacteria, macro-algae, plant bacteria and plants themselves convert nitrate, and absorb phosphate and heavy metals. The sediments in the waste water settle down. As the water becomes less turbid, sunlight accelerates some of these processes.

Besides being named as Kolkata's Kidney, EKW also nurtures various species of flora and fauna. It has almost 637 species of flora and 1288 species of fauna. It is also destination to many migratory birds. EKW observes a strong relation with local population adopting traditional knowledge in the use of EKW.



Source: <http://ekwma.in/ek/maps-2/>

### 3. Threats to EKW

Despite its importance in providing employment, food, sewage treatment, managing biodiversity and contributing in climate control, EKW faces threat and challenges of urbanization. Kolkata is a metropolitan city and is visited by migrant labour every year to settle here owing to employment. There is rapid urbanization and industrialization. This has forced city to expand length and breadth. This expansion has taken a toll on the area of EKW. A study "Spatial- Temporal change in land use and land cover pattern and its impacts-

A case study of EKW” by Anushka Roy and Ritula Paul, 2022, shows that from 1991 to 2021 there has been a rapid increase of 6% to 21% respectively in built up areas in EKW. These increase in encroachments are brought around mainly due to increase in real estate. This has affected the fisheries too. The above study also points out that there has been a decrease in fisheries from 29% to 16% during the same period due to selling of ponds for built up areas. With increasing population the EKW is used as dumping ground for urban waste. Rise in construction of metros, residential property, concrete roads have adversely effected the EKWs. This has affected the livelihoods of people who are dependent on EKW economically. It has forced the migratory birds to change their course, fisheries have been impacted adversely, and different species are being extinct. These anthropogenic threats are slowly destroying the Kolkata’s Kidney.

#### **4. Cost of building a Sewage Treatment Plant**

While planning an urban city or township, besides, green areas, drainage system, roads, buildings, sewage treatment plant is one of the most needed infrastructure. The tons and tons of grey water or human waste created day in day out needs to be disposed of to provide an environment friendly surroundings. The waste water from household is collected in septic tanks from where this is channelized into the first chamber of sewage treatment plants. The waste water is hold for the oil scum to float above and solid parts to settle down. Then the waste water is flowed into another chamber which is fitted with an air pump that circulates air around the chamber to encourage the growth of aerobic bacteria. This bacterium helps to break down the contaminants in the water, effectively cleaning it. Then comes the final stage of a sewage treatment plant that is the last settlement tank. This final tank allows the very last solids that may remain to sink to the bottom of the tank before the effluent is discharged into a soak away or watercourse.

As the process sounds, it’s a time taking task and involves various accounting and social costs which needs to be analysed.

- A) Accounting cost – This involves the factor costs for building the Plant, installation costs, maintenance cost, managerial cost, technician costs, logistics’ etc. Depending on the plant size, capacity, and technology the cost of building a STP is something between 4 lakh to 80 lakh or in crores for sewage generation between 2000 liters to 1000000 liters per day or 2 KLD to 1 MLD (Field survey: Netsol Water solution). There is a huge consumption of electricity as maintenance costs.
- B) Social Cost - Though it has been mentioned to not build STPs near residential areas, unfortunately most of the STPs are surrounded by residential area. The main cause is urbanization, due to which there is dearth of space. Now since the STPs release Ammonia and other hazardous gases in its process of purifying waste water, it is hazardous to health causing breathing problem and also effects the electronic appliances used by the nearby households reducing their lifespan. (Field Survey) These costs are borne by the society to have a built in STP in vicinity.

#### **5. Comparison between STP and EKW**

If we compare the benefits of EKW and STPs we can clearly distinguish between the

advantages and disadvantages of Natural sewage treatment and built in sewage treatment plant.

EKW	STP
Cost of Building and maintaining is almost nil.	Cost of Building varies from some thousands to crores depending on its capacity.
No electricity consumed in the process of purification	The power consumption of an STP in India can range between 0.5 to 1.5 kilowatt- hours per cubic meter of wastewater treated(Netsol Water solution)
Source of food ( Vegetables and fish)	No food is generated
Source of livelihood for locals, almost 1laks of natives.	Employs mostly highly skilled labour, as scientists, technicians, managers, and handful of ground level workers
Ground for migratory birds, tourist spots for bird watcher	No such destination availed
Maintains the biodiversity	No contribution to biodiversity
Field of research for different species	No such scope provided.
60% of carbon from wastewater is also locked in various forms in the production process, thus reducing harmful Green House Gas emissions from the region.(East Kolkata Wetlands Management plan 2021- 26)	Produces various hazardous gases as methane, sulfide, carbon dioxide, carbon monoxide

## 6. Conclusion

Sustainable development goals aim at protecting the environment not just for present generation but also for future generations to come. Goal 15 sets to protect, restore and promote use of terrestrial ecosystem, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss. With multifaceted importance of EKW, no wonder it has been undertaken as Ramsar Site. EKW needs to be preserved and the challenges and threats due to real estates are to be checked. The natives of Kolkata need to realize the importance of EKW and jointly work towards its protection by making joint efforts with government, non-government organizations, cooperatives and self-help groups. On one hand we have high cost, artificial, technology based STPs and on other hand we have the natural, low cost EKW. Citizens and authorities have to make right choice between Dialysis and well-functioning Kidneys.

## References

- [1] Ghosh, A., Saha, S. K., Banerjee, R. K., Mukherjee, A. B., & Naskar, K. R. (1985). Package of practices for increased production in rice-cum-fish farming system. *Aquaculture Extension Manual*, 4, 1-14.
- [2] Sen, S. N (1960), City of Calcutta: a socio-economic survey
- [3] Gardner, R. C., & Davidson, N. C. (2011). The Ramsar convention. *Wetlands: Integrating multidisciplinary concepts*, 189-203.
- [4] Ghosh.D (1999), Participatory Management in WasteWater Treatment and Reuse in West Bengal, UWEP Occasional Paper,
- [5] Mitra, A (1963), Calcutta India's city, New Age, New Delhi, India.
- [6] The Ramsar Convention on Wetlands (2004),
- [7] The Ramsar Convention Manual, 3rd edition,
- [8] [http://www.ramsar.org/lib\\_manual2004e.htm](http://www.ramsar.org/lib_manual2004e.htm)
- [9] Dhabliya, D. (2022). Audit of Apache Spark Engineering in Data Science and Examination of Its Functioning Component and Restrictions and Advantages. *INTERNATIONAL JOURNAL OF MANAGEMENT AND ENGINEERING RESEARCH*, 2(1), 01–04.
- [10] Urbanization in India; an inventory of source materials (1970), “Bibliography on Urbanization in India: 1947- 67”, Academic Books, Bombay, India.
- [11] Water Urban Solutions (2003), BBC [worldservice.com, http://www.bbc.co.uk/worldservice/specials/1454\\_urbanolutions/page4.shtml](http://www.bbc.co.uk/worldservice/specials/1454_urbanolutions/page4.shtml)
- [12] WBFD (1997), Forest change detection studies and wetland mapping in West Bengal through digital image processing of Indian Remote Sensing Satellite data, Collaborative project of wildlife wing, Forest Department and Regional Remote Sensing Centre, Kharagpur, West Bengal, India.
- [13] Dhabliya, D. (2021d). Examine Several Time Stamping Systems and Analyse their Advantages and Disadvantages. *International Journal of Engineering Research*, 1(2), 01–05.
- [14] WBFD (2002), Forest cover mapping of West Bengal state through digital image processing of IRS satellite DataProcedural manual and inventor, Joint collaboration project of forest dept, Government of West Bengal, West Bengal, India.
- [15] Dhabliya, D., & Others. (2021). An Integrated Optimization Model for Plant Diseases Prediction with Machine Learning Model. *Machine Learning Applications in Engineering Education and Management*, 1(2), 21–26.
- [16] James A Wolscraft, S.A Hussain & C.K Varshney,(1989).A Directory of Asianwetlands
- [17] Report: Committee on Characterization of Wetlands , National science Council(1995)