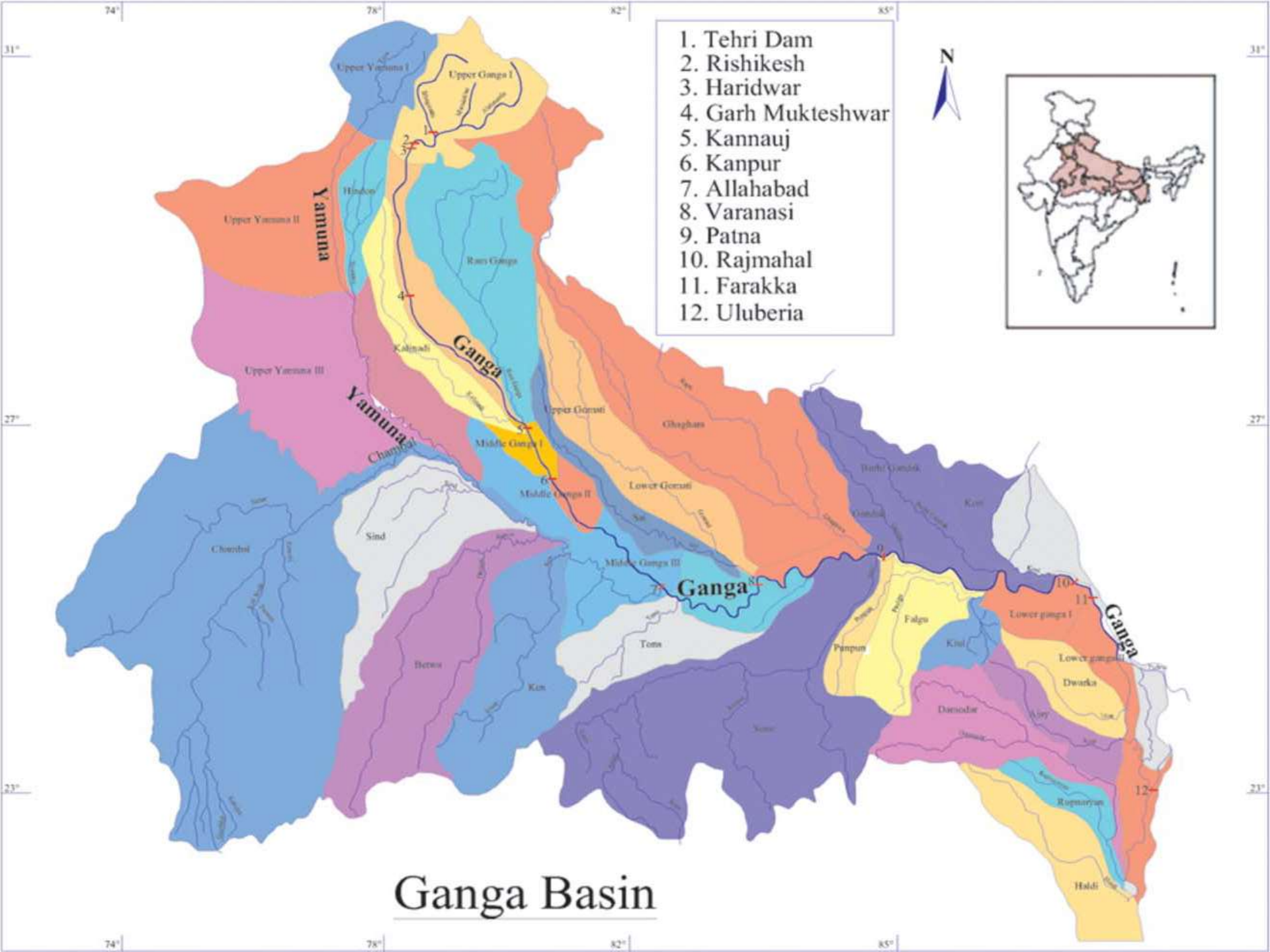


# **WETLAND DEVELOPMENT: A GREEN TECHNIQUE FOR REMEDIATION OF GANGA POLLUTION AT KANPUR CITY**

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# River Ganga

- ❑ The River Ganga has been considered one of the dirtiest rivers in the world.**
- ❑ The extreme pollution of the Ganges affects 400 million people who live close to the river.**
- ❑ The river waters start getting polluted right at the source.**
- ❑ The exploitation of pollution in the river has just proportional to industrialization and excessive growth of population.**





**Pathway of Ganga River**

**❑ Approximate 29 cities, 70 towns, and thousands of villages are situated on the banks of Ganga.**

**❑ More than 1.3 billion liters sewage per day goes directly falls into the river.**

**❑ More than 260 million liters of industrial wastes.**

**❑ Municipal sewage constitutes 80% volume of the total waste dumped into the Ganga.**

**❑ The major pollutants of the Ganga are inorganic and organic wastes, sewage (Domestic and Industrial), trash, food, and human and animal remains.**

# **Pollution Status of River Ganga at Kanpur**

- ❑ Ganga at Kanpur is highly polluted.**
- ❑ Major pollutants of river:**
  - Domestic and municipal waste water**
  - Industrial specially leather industrial wastes**
  - Road runoff**
  - Agricultural runoff**

- Decreased flow, increased pilgrimage
- Critically polluted
- Growing cities decreased assimilation



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# WETLANDS



**❑ A wetland is an area of land whose soil is saturated with moisture either permanently or seasonally. Such areas may also be covered partially or completely by shallow pools of water.**

**❑ Wetlands include swamps, marshes, and bogs, among others. The water found in wetlands can be saltwater, freshwater, or brackish.**

**❑ Wetlands have huge capacity to digest many harmful organic and inorganic chemical pollutants of water.**

**❑ The most significant attribute of wetlands is universal capability to filtration and purification of polluted water into clean water.**

# **PROPERTIES OF WETLANDS**

## **Slow Down Runoff**

**Most pollutants enter a wetlands area through storm-water runoff, which contains sediments, excess nutrients and animal waste and toxic chemicals.**

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# **PROPERTIES OF WETLANDS**

## **Trapping Sediments**

**Because of the slow velocity of wetland water, sediment settles to the bottom after the conclusion of a rain event. It is then held in place by plants, and eventually further sediment deposits.**

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# **PROPERTIES OF WETLANDS**

## **Nutrients and Toxic Chemicals**

**Excess nutrients and toxic chemicals are capable of causing water-quality problems and are harmful to humans and animals alike. Many of these are taken out of the water and utilized by aquatic plants that convert them to less harmful forms.**

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# PROPERTIES OF WETLANDS

## Efficiency

According to the Ecological Society of America (ESA), wetlands are capable of removing 20 to 60% of metals from the water, retaining 80 to 90% of runoff sediments and can eliminate 70 to 90% of nitrogen buildup.

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# MAJOR AQUATIC PLANTS SPECIES FOUND IN WETLANDS

*Eichhornia crassipes, Lemna paucicostata, L. gibba, Spirodela punctata, S. polyrhiza, Pistia stratiotes, Typha latifolia, T. domengensis, Hydrilla sp., Potamogeton sp., Ipomea aquatic and Salvinia sp.*

# **Constructed Wetlands**

- A constructed wetland or wet park is an artificial wetland, marsh or swamp created for anthropogenic discharge such as wastewater, storm water runoff, or sewage treatment.**
  
- Today, artificially-constructed wetlands are purifying water for municipalities, businesses and residences. A constructed wetland at Arizona's Jacob Lake Inn treats effluent from campgrounds, laundry facilities and rental cabins, with a volume of 2,000 gallons per day.**



Newly Planted constructed wetland





**Constructed wetland after two years**

# TYPES OF CONSTRUCTED WETLANDS

- ❑ **Sub-surface Flow Wetland:** Move the effluents through soil or sand medium on which plants are rooted.
- ❑ **Surface Flow Wetland:** Move effluents above the soil in a planted marsh/swamp.

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# **WETLANDS AND WATER PURIFICATION: MECHANISM**

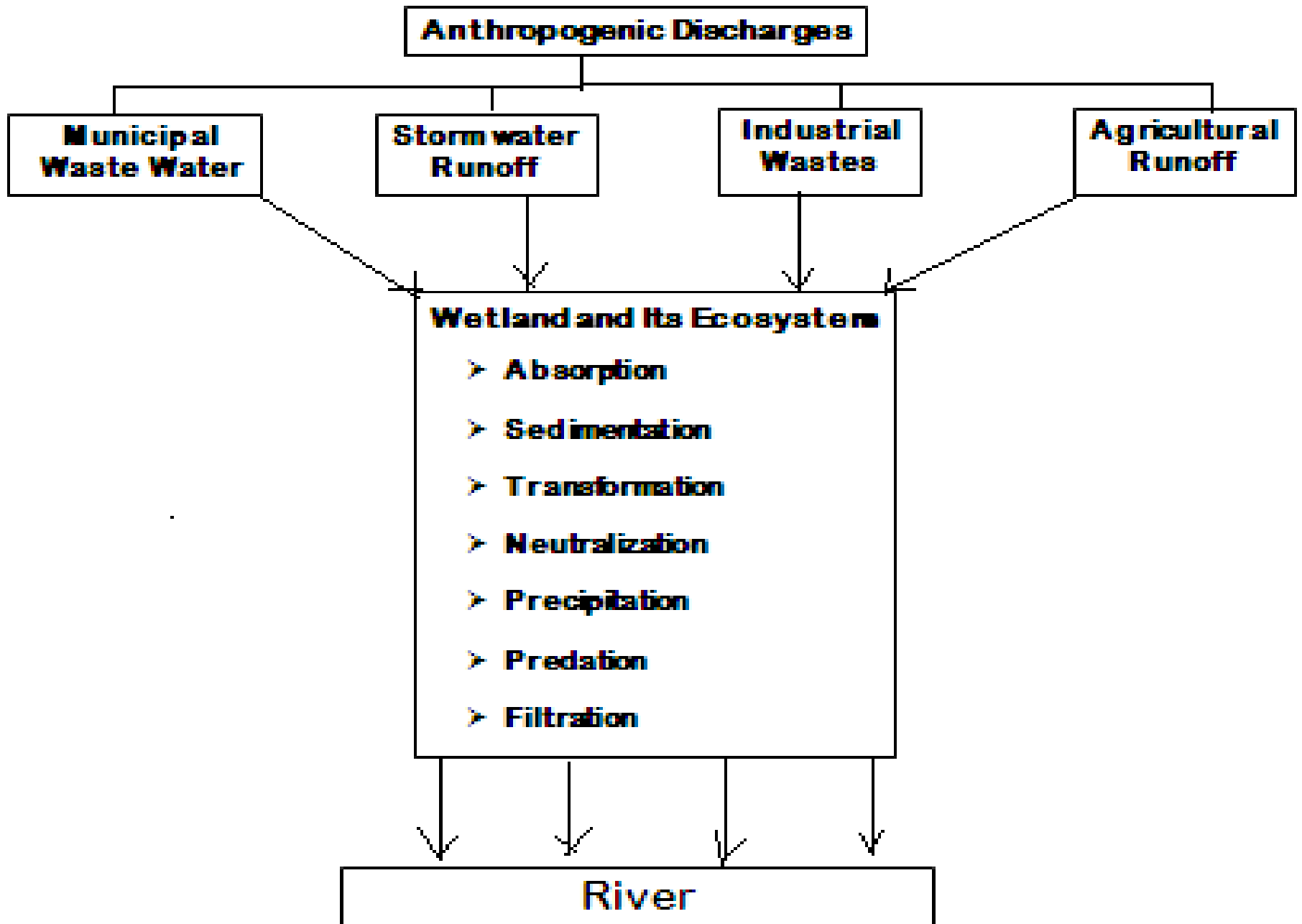
**❑ The water current enters into wetland, it slow down as it moves through the wetland's vegetation.**

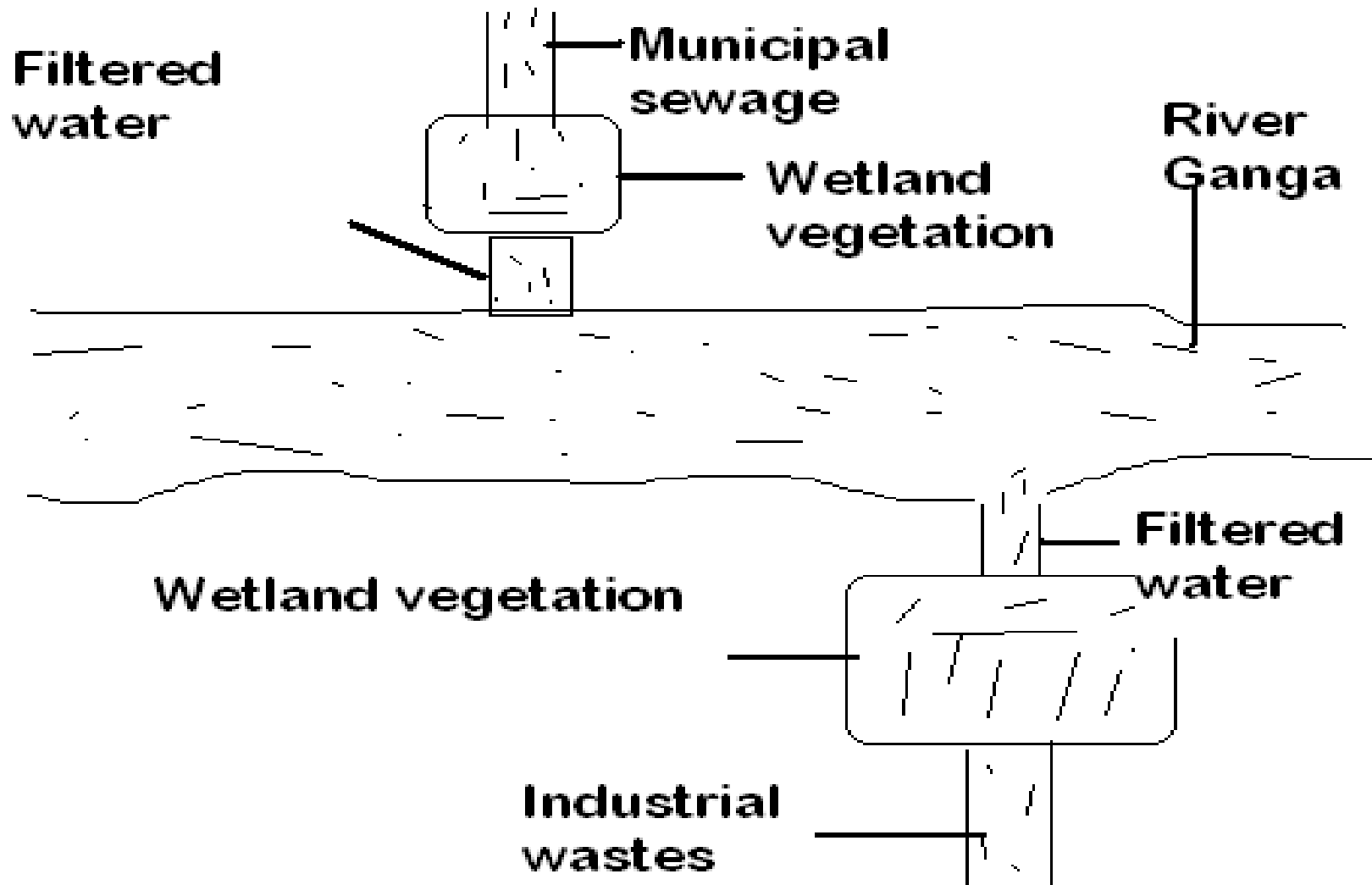
**❑ In the process of moving the water through the wetland's vegetation many pollutants initiate to settle down into bottom soil of a wetland or become trapped among the vegetation.**

**❑ The purification of water through wetlands contains a series of physical, chemical and biological processes.**

# Processes occurred in wetland

- Absorption
- Sedimentation
- Transformation
- Neutralization
- Precipitation
- Predation
- Filtration





Hypothetical constructed wetlands for the purification of Ganga water at Kanpur city

# CONCLUSION

- ❑ Thus, it can be said that the wet lands are best green attempt to purify river Ganga at Kanpur city.
- ❑ The development of constructed wetlands comprising of algae and aquatic plants for treatment of municipal sewage waste water before allowing them to flow into the river as a low cost and eco-friendly solution.



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**THANK YOU**