Advisor:
Mr. Sandeep Kumar, IAS
Secretary (Education), GNCT of Delhi

Guidance and Support:
Dr. Sunita S. Kaushik, Director, SCERT, Delhi
Dr. Nahar Singh, Joint Director, SCERT, Delhi

Contributors:
Mr. M. Dwarkanath, Senior Scientific Officer, Dept. of Environment, GNCT of Delhi
Ms. Nigam Aggarwal, Senior Scientific Officer, Dept. of Environment, GNCT of Delhi
Mr. Sharat Kumar, Superintending Engineer, DSIIDC, Delhi
Ms. Deep Mala, Executive Engineer, Delhi Jal Board, Delhi
Mr. Somnath, Executive Engineer, Irrigation and Flood Control Department, Delhi
Mr. Parvinder Kumar, Core Academic Unit, DoE
Ms. Tripti Gupta, PGT, DoE
Mr. Rahul Dev, TGT, DoE
Ms. Raman Arora, Lecturer, SCERT
Dr. Bindu Saxena, Lecturer, SCERT
Ms. Neha, Lecturer, DIET, Daryaganj
Ms. Anuradha, Lecturer, SCERT
Ms. Jayotsna, Lecturer, SCERT

Publication Officer:
Dr. Mukesh Yadav, SCERT, Delhi

Publication Team:
Mr. Navin Kumar, Ms. Radha, Mr. Jai Bhagwan

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We hope that a small step taken today would bring positive change in the mindset of teachers and students towards the revival of river Yamuna.
<table>
<thead>
<tr>
<th>Acronym</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
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<tr>
<td>CETP</td>
<td>Common Effluent Treatment Plant</td>
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<tr>
<td>CPCB</td>
<td>Central Pollution Control Board</td>
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<td>CSIR</td>
<td>Council of Scientific &amp; Industrial Research</td>
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<td>DDA</td>
<td>Delhi Development Authority</td>
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<td>Directorate of Education</td>
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<td>DPCC</td>
<td>Delhi Pollution Control Committee</td>
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<td>DSIIIDC</td>
<td>Delhi State Industrial and Infrastructure Development Corporation Ltd.</td>
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<tr>
<td>ETP</td>
<td>Effluent Treatment Plant</td>
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<td>HOS</td>
<td>Head of School</td>
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<td>I&amp;FC</td>
<td>Irrigation and Flood Control</td>
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<td>MCD</td>
<td>Municipal Corporation of Delhi</td>
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<tr>
<td>MOW</td>
<td>Ministry of Water Resources</td>
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<tr>
<td>NCT</td>
<td>National Capital Territory</td>
</tr>
<tr>
<td>NEERI</td>
<td>National Environmental Engineering Research Institute</td>
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<tr>
<td>NGT</td>
<td>National Green Tribunal</td>
</tr>
<tr>
<td>PPM</td>
<td>Parts Per Million</td>
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<tr>
<td>PWD</td>
<td>Public Works Department</td>
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<tr>
<td>RD&amp;GR</td>
<td>River Development &amp; Ganga Rejuvenation</td>
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<tr>
<td>SCERT</td>
<td>State Council of Educational Research and Training</td>
</tr>
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<td>SMC</td>
<td>School Management Committee</td>
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<tr>
<td>STP</td>
<td>Sewage Treatment Plant</td>
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<tr>
<td>UYRB</td>
<td>Upper Yamuna River Board</td>
</tr>
<tr>
<td>YAP</td>
<td>Yamuna Action Plan</td>
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<td>YMC</td>
<td>Yamuna Monitoring Committee</td>
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<tr>
<td>S.No.</td>
<td>Topic</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2</td>
<td>Pollution in Yamuna</td>
</tr>
<tr>
<td>3</td>
<td>Responsibilities of Major Stakeholders in Delhi</td>
</tr>
<tr>
<td>4</td>
<td>Role of School</td>
</tr>
<tr>
<td>5</td>
<td>Rejuvenation of river Yamuna</td>
</tr>
<tr>
<td>6</td>
<td>Importance of Biodiversity</td>
</tr>
<tr>
<td>7</td>
<td>Salient Features of UN Biodiversity Report</td>
</tr>
<tr>
<td>8</td>
<td>Biodiversity Parks in Delhi</td>
</tr>
<tr>
<td>9</td>
<td>Frequently Asked Questions</td>
</tr>
<tr>
<td>10.</td>
<td>References</td>
</tr>
</tbody>
</table>
INTRODUCTION

The Yamuna is the most important tributary of the Ganga and its source is the Yamunotri glacier. The Yamuna's basin is one of the most fertile and high grain yielding river basins in the country and a boon for agriculture.

River Yamuna is a 1,376-km long perennial river. It traverses through various states such as Uttarakhand, Haryana, Himachal Pradesh, Delhi and Uttar Pradesh. Apart from the Capital city Delhi, many large urban hubs and cities like Yamuna Nagar, Panipat, Sonepat, Gautam Budh Nagar, Faridabad, Mathura, Agra and Etawah are situated on the river's banks. The challenge lies in harnessing the river to boost environmentally safe and sustainable activities.

Importance of river Yamuna

Yamuna as a Life Line

The river water is used for drinking and agriculture by the basin states of Uttarakhand, Haryana, Uttar Pradesh, Delhi & Rajasthan. The share of each state has been decided by a Memorandum of Understanding signed by all the states in 1994 and is being regulated by the Upper River Yamuna Board (MoWR, RD & GR.).

Ground water recharge:

The river helps replenish the water table by recharging it with flood water and performing important ecological functions. It sustains aquatic biodiversity and brings with it nutrient rich alluvial sedimentation full of minerals and organic matter, during the monsoon months.
THE YAMUNA FLOOD PLAINS IN DELHI

Within NCT of Delhi the Zone O(River zone ) is 52km long and 800 m – 3.5 km wide depending on the location. In all, it covers some 9700 hectares.

There are 3 distinct stretches in the river zone:

- The ‘Northern stretch’ running over 26 km from the Palla village till the Wazirabad barrage cum road.
- The ‘Central stretch’ running over 22 km from the Wazirabad barrage till the Okhla Barrage and
- The ‘Southern stretch’ running over 4 km from the Okhla barrage till Jaitpur Village.

The river forms a natural interstate border between NCT of Delhi and the state of Uttar Pradesh (UP).

Importance of flood plains

- A healthy flood plain gives water space to spread out and slow down.
- Rivers carry sediment and nutrients and aquatic life flourishes when there is sufficient oxygen.
- The vegetative cover prevents soil erosion and helps regulate the water temperature.
- Flood plains can be rich and biologically diverse environments that often support an abundance of plants and birds.
- Flood plains take on and store excess water in times of flood, releasing it slowly into ground water aquifers which eventually helps recharge the river.

Present status of river Yamuna

Yamuna is the lifeline of Delhi as its water is being harnessed from both of its banks for domestic, industrial and irrigation purpose. To meet the ever-growing water demand of the city, the river is trapped at three points—Wazirabad, ITO and Okhla by construction of barrages.

Various anthropogenic activities such as dumping of waste material, religious offering of flowers or food, immersion of idols, holy baths, washing of clothes or cattle bathing take place in Yamuna due to which the life of aquatic plants and animals is affected. The wastewater/sewage generated by the city also contributes to pollution of river Yamuna.
The Yamuna in Delhi has been destroyed by pollution.

- While everyone wishes for a clean river which can be used for cultural, religious and recreational purposes, today high levels of pollution have destroyed the river often described as “Maily Yamuna.”
- Over the years citizens, civic and administrative authorities have in different ways neglected the river.
- The challenge lies in making citizens conscious of the harm they do when they pollute the river, directly and indirectly.

Though the Government has taken several measures to maintain the water quality in Yamuna from time to time, still the condition of river Yamuna in Delhi is deteriorating. It is high time that every stakeholder becomes aware of the responsibilities and contributes in making river Yamuna clean.

State Council of Educational Research and Training, Delhi is the State Academic Authority and is responsible for providing training to the in-service teachers and other stakeholders. SCERT has been assigned the task of providing training to sensitize the Heads of School and teachers about the ‘Cleanliness of River Yamuna’. They will further make the students aware about the importance of river Yamuna and their role in making river Yamuna clean.

### Objectives of training

- To create awareness about pollution in river Yamuna
- To make aware about roles of various Government departments in making river Yamuna clean
- To sensitize Head of Schools, Teachers and other Stakeholders about the role of schools in Cleanliness of river Yamuna

### Role of various stakeholders in training

Various Departments of Government of NCT of Delhi such as Department of Environment, GNCT of Delhi; Delhi State Industrial and Infrastructure Development Corporation Ltd; Delhi Jal Board; Directorate of Education and SCERT have worked together to provide training and resource material to the participants.
By 2020 Delhi is expected to become 3rd largest metropolis in the world with a population of over around 20 million.

Over the last 2 decades, unauthorized colonies were built through unapproved conversion of agricultural land for residential use. Some million plus people live in habitations without planned roads, drainage system, sewerage networks or designated dumping sites. They have been given or assured of regularization. However, acute congestion prevents proper development.

The density of population of urban villages (Over 135 villages), also known as the village abadi or “Lal Dora” has expanded, making them highly congested. This population also lives without adequate sanitation or drainage.

There are over 2 million people living in slums which contribute to waste, and a challenge for provision of civic services.

Such haphazard urban growth has given rise to illegal household industries, many of which discharge toxic effluents into the drains.

Dumping of city construction and demolition waste in and around the drains and river have choked the flow of water contributing to river stagnation and pollution.

Causes of Pollution in the Yamuna

1. Sewage
2. Industrial Effluent
3. Solid Waste
4. Encroachments on the flood plains/Embankments
5. Lack of Environmental flow in river Yamuna
1. Untreated Sewage from areas with no Sewerage Network

- About 40% of Delhi has no sewer connection.
- Septage is being collected by privately organized tractor/trolley pumping services and released into the open storm water drains, vacant low lying areas and water bodies.

2. Outfall of Industrial effluent into Drains

- Industrial Effluent
- There are 28 planned Industrial estates in Delhi.
- Societies are formed by Industrial Associations to operate and manage the industrial waste and to treat effluent in a Common Effluent Treatment Plant (CETP)
- Industrial effluent and sewage is also flowing into Yamuna from drains in Haryana- particularly Yamuna Nagar, Panipat, Karnal, Sonepat and Gurgaon and from UP particularly Indirapur, Loni and Sahibabad.
3. Dumping of Solid Waste, Construction & Demolition waste into drains and river
   - Truckloads of construction and demolition waste and even Bio-medical waste is dumped onto the floodplains or directly into the drains and river.
   - The river gets choked and its natural self-cleansing ability is destroyed.
   - Solid waste blocks the drains and deadens the river. That is one reason why there is backflow and there is flooding on the streets even after few showers.
   - Trucks dumping malba and debris are not stopped or fined by enforcement agencies. There is little deterrence of illegal dumping by land owning agencies.
   - Dredging and de-silting of drains is reported to be done perfunctorily.

4. Habitation, Dairies and Dhole Ghats on River Embankments
   - Running of dairies is continuing on the flood plains and river embankments despite periodic bans.
   - People have encroached on the flood plain area.
   - Human occupation and activity on the flood plain is also responsible for pollution in the river bed.
5. Cultivation/Vegetable growing with the use of chemical fertilizers/pesticides on the flood plain
   - A vast tract of the flood plain is under cultivation.
   - Produce grown in sewage water leads to water borne diseases

6. Idol (murti) immersion during festive seasons
   - Idol (murti) immersion during festive seasons causes extensive damage to the quality of river water.
   - Idols are mostly made of Plaster of Paris, and use toxic paints and synthetic material. It does not dissolve even after a year.
   - Post immersion, the chromium, iron, nickel and lead concentration increases in river Yamuna.

**Effects of Pollution:**

- Paints contain heavy metals like mercury and lead. Both mercury and lead are neurotoxins. Acid content in the water increases.
- Idols made of cement clog the river and cause river to stagnate leading to release of toxic gases and foul odour.
- Pooja remnants and idols block the river's flow and also give rise to mosquito breeding.
- It is harmful for aquatic plants and animals.
- Water-borne diseases such as typhoid, jaundice, cholera, etc in nearby areas are a matter of concern.

Requirement of adequate environmental flow in the river. There is no fresh water flow downstream of the Wazirabad barrage, only treated effluent/untreated sewage from drains flows in river Yamuna. Adequate environmental flow in the river is required for dilution so that self cleaning of the river is achieved.
Responsibilities of Pollution Control Boards

Effectiveness of the Central Pollution Control Board and Delhi Pollution Control Committee which are Statutory regulatory bodies is key to checking pollution. They have enormous powers to stop pollution.

1. The Agencies have to set up quality monitoring stations at critical locations to measure quality of River water at regular intervals.

2. They have to check that industries are following the environmental standards for discharge of effluent into water bodies.

3. To monitor whether all STPs and CETPs are working according to design parameters and report shortcomings and also issue directions for closure for any non compliance.

4. Check that no untreated waste is allowed to flow into drains or River Yamuna and ensure that polluters are penalized.

Responsibilities of Delhi Jal Board

1. Delhi Jal Board (DJB), constituted under Delhi Jal Board Act 1998, is responsible for collection, treatment, and disposal of waste/sewage in the capital.

2. Plan and commission Sewage Treatment Plants to bridge the gap in sewage generation (720 Million Gallons per Day (MGD) or say 3268 Million Liters per day (MLD)). At present against the 720 MGD of waste water generated, Delhi has a capacity only of treating 607 MGD.

3. Create and rehabilitate sewer network to convey sewage to the STPs to prevent flow of sewage into storm water drains and also improve capacity of utilization of some of the STPs which are not receiving sewage commensurate with the installed capacity.

4. Rehabilitate and upgrade the old STPs which are functioning sub-optimally and are not adhering to the present environmental standards notified by the MoEF & CC and CPCB.

5. Improve utilization of treated waste water as most of it even after being treated to very high standards of 10mg/L of BOD is released into drains carrying untreated waste water.

6. Commission Interceptor project as per the timeline laid down.

7. Replacement of old pipelines which may have outlived their life.


9. Establish and maintain an effective online monitoring system for monitoring the performance of STPs and share such information with public through its website or otherwise.
Responsibilities of Industries Department and DSIIDC

- Ensure that all the industries located within the industrial clusters are linked through conduit pipes with the CETP.
- Any industry not linked to CETP to be closed and de-licensed.
- All the water consuming industries set up their own primary ETP before conveying their effluent to the CETP and also adhere to the standards for primary ETP.
- Establish and maintain online connectivity of CETP with CPCB and DPCC servers for real-time online monitoring of performance of CETPs with a mechanism for exception reporting.
- Prohibit functioning of industries in non-conforming/residential areas in coordination with MCDs, DDA and other Agencies/Departments.
- Achieve Zero Liquid Discharge status for all the CETPs and thereby recycle all the treated waste water and reduce demand of ground water.
- Prepare and implement Action Plan for disposal of Hazardous waste and sludge generated at CETPs.

Responsibilities of Upper Yamuna River Board (UYRB)

- Entire water is barded at Hathni Kund Dam and diverted into Eastern Yamuna Canal in UP and Western Yamuna Canal in Haryana.
- There is no water in River Yamuna after Hathni Kund Barrage for bulk of the year except the 10 Cumeecs released which percolates/evaporates about 70-80 Km downstream with the river being completely dry thereafter. Clean water discharged into River Yamuna at Palla is hardly adequate to run Chandrawal and Wazirabad Water Treatment Plants.
- Hence, there is no fresh water beyond Wazirabad Barrage.
- Only waste water coming from Najafgarh, Supplementary and 17 other drains flows into the River from Wazirabad Barrage to Okhla.
- UYRB regulates water in Yamuna to ensure that river has fresh water between Hathni Kund and downstream of Wazirabad.
- To decide about measures needed to improve environmental flow based on expert advice.
Responsibilities of Delhi Development Authority (DDA)

- Mapping and Demarcation of the Floodplains.
- Creation of wetlands and biodiversity to rejuvenate the flood plains.
- Use Watch & Ward measures and Technological Solutions e.g Geo Spatial mapping to take prompt and effective action against Encroachment and Unauthorized Construction on the floodplains.
- Take effective deterrent action against those found dumping waste into river. Police cases to be followed up and the progress of arrests, status of issue of charge sheets, convictions monitored.
- Reclaim DDA land on the flood plains which is under encroachment

Responsibilities of Municipal Corporations

- The three MCDs have a statutory responsibility for sanitation.
- MCDs have stopped all enforcement activity in respect of drains under jurisdiction of Public Works Department (PWD), Irrigation & Flood Control Department. They need to re-start enforcement against polluters of drains.
- Enforcement powers are vested only with the Municipal Corporations which have direct responsibility to fine those who discharge any prohibited effluent or construction waste into drains.
Roles of Heads of Schools

- HOS will act as the team leader and facilitator for all the activities inside the school, involving all stakeholders
- HOS will be monitoring Head of the activities prescribed in the calendar of the booklet
- HOS will also coordinate to organize monthly meetings with the in-charges of the Ecoclub, NSS, Scout and Guide and all the Club incharges
- HOS also holds the responsibility to review all the activities in the previous month and plan the activities for the next month with the help of stakeholders as provided in the calendar of activities
- HOS will coordinate with outside agencies like DJB, DSIIDC, etc. to plan visits to STPs or Water Treatment Plants for team leaders/teacher in-charges
- HOS will also encourage the visit of students to Yamuna Biodiversity park while ensuring the safety and security of students.
- HOS will encourage the school teachers and students participation in school assembly for awareness talks, role play, skit, quiz and drama regarding water conservation and river Yamuna rejuvenation and other related issues and appreciate them by providing certificates for their sincere efforts
- HOS will motivate SMC members to appraise the society to take initiative for water conservation and rejuvenation of River Yamuna campaign
- HOS will ensure that the telephone numbers of the monitoring committees like Central Pollution Control Board, NGT are displayed at prominent place/notice board of the School.

Roles of Teacher/club In-charges

- Organize role plays related to Cleanliness of river Yamuna
- Drawing competitions may be arranged for school children
- Promote students to write articles, blogs in the local newspapers, the internet etc.
- Share good practices related to rejuvenation of Yamuna with friends, family, colleagues, community, etc.
- Nominate a Green Champ Committee at School to monitor waste management.
- Organize trip to Yamuna Biodiversity Park under the guidance of HOS.
- Sensitize the students to minimize the use of plastic bags, not to throw them in public places as they choke drains and sewers, cause water logging.
- Message on environment during Prayer/Morning Assembly.
- Organize action-oriented programmes like Paper recycling, Vermi-composting, Rain water harvesting, waste management etc.

**Activities Which Can Be Organized In School**

*I hear and I forget,*
*I see and I remember,*
*I do and I understand.*

-Confucius

The above statement holds its relevance in the educational context. The students until they perform the activities, they are unable to imbibe the values inherent in the activity.

They better learn by performing the activities. The activities which can be organized in schools to sensitize the students on River Yamuna are:
The activities should be observed by the teachers and the peers. The students who perform the activities that help in cleanliness of river Yamuna should be appreciated/rewarded.

**Note** - Clay modelling sessions should be imparted for making murti from clay and worship them during festivals at home. Later on, they can be put in a bucket of clean water at home and water can be used for watering the plants.

**Let's Help You:**

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<td>Delhi Jal Board</td>
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| Delhi State Industrial and Infrastructure Development Corporation Ltd | 2331 4231-33  
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The need of the hour is to focus on solution which is local and traditional. We should invest in water harvesting along with preservation of water bodies and waste water recycling.
River Yamuna has been polluted to such an extent that it remains stagnant for about nine months in a year. There is an emerging need to rejuvenate the Yamuna in order to conserve the water resources and maintain the ecological balance of the river. The various steps for rejuvenation are as under:

- To release adequate water for dilution.
- Provide universal access to sewer facility.
- To capture entire sewage and convey it to Sewage Treatment Plant, treat it and dispose it safely.
- To prevent dumping of garbage in the drains.
- Closing illegal activities of Industries, Slaughter houses and Dhobi Ghats.
- Desilting and channelisation of drains, preventing solid waste, idols and plastic waste from being thrown in the river.
- To prevent discharge of untreated industrial effluent and sewage into river water.
- Ensuring all industrial effluents are treated properly before discharge.
- Removal of squatters from the banks of the river and floodplain.
- Developing wetlands.
- Rejuvenation of the Flood Plains.
- Protecting river bed from dumping of Debris and Biomedical Wastes.
- Setting up of quality monitoring stations at critical locations to measure quality of river water at regular intervals.
- The old pipelines of the sewer lines, which may have outlived their life, must be replaced from time to time.

Initiative by Irrigation and Flood Control Department:

Considering the demand of the era, I&FC Department decided to initiate steps towards the improvement of water quality as well as rejuvenation of drains. An activity aimed at improving the quality of water as well as restoring channels in left bank of the Bawana Escape Channel at RD 9700 M, a pilot venture to treat at least ten lakh liters per day of wastewater using naturally delicate and sustainable technology like wet land model was created to treat Ghoga Drain’s wastewater. Ghoga Drain is located in the National Capital Territory of Delhi.
Working

Mechanically worked gated framework for flow regulation has been introduced at the outfall of Ghoga Drain as well as inlet of wet land framework with the goal that peak discharges in Ghoga Drain can securely be passed into Bawana Escape Drain by lifting gate at the mouth of Ghoga Drain. Raw water initially goes into 38 M long sedimentation cum biodigester tank where heavy suspended solid gets subsided into this chamber as waste water stream gradually through crisscross dividers.

Waste water further moves through the pipe channel system into four chambers of constructed wetland, each 28 M long. Bio remediation and denitrification occurs in these chambers.

Main areas

Developed wet land has three main areas:-

- First of all, it is an impenetrable layer that prevents waste water from invading groundwater.
- Secondly, the gravel layer provides nutrients and support for the root zone of unusual species of plants, specifically Cana Indica Cypure. In this zone, both aerobic and anaerobic oxidations occur. The contaminant and heavy toxic metal are corrupted at the plant root zone by anaerobic microbes and aerobic microorganisms further improve the water quality.
- The third and last area is surface vegetation, which bolsters aerobic-anaerobic microbes' lives. Treated water from constructed wet land moves further into 30 M long natural wetland where Water receives the same treatment for further quality improvement.

Tests

CSIR-NEERI collected water samples at the inlet and outlet wetland frame and found its BOD level to be radically reduced from 330 PPM to 40 PPM.

Outcomes

Currently based on test results of treated water coming from wet land system, dry water body is decided to be restored at 1.2 km downstream of this framework after further improving its quality by using carbon filter which will help to reduce the level of BOD and make water more compatible for different purposes. For this reason, the pipe conduit is laid in such a way that water flows only through gravitational forces.
Biodiversity means the diversity among living organisms existing in Nature which plays an important role in ensuring the survival of the life on planet Earth. The life forms include species of plants, animals and microorganisms. If we look at river Yamuna, we see that due to pollution there is ecological imbalance and the aquatic life is most affected. There is an urgent need to conserve the biodiversity in and around the river in order to manage the environment naturally.

Biodiversity is very important. So, to restore the biodiversity of Yamuna, Yamuna Biodiversity Park has been developed by DDA.

Wetlands of Yamuna Biodiversity Park have the typical landscape features having ecological niches such as deep water, shallow water, marshy water and seasonally wet zones. Such habitat support diverse biological communities including water purifiers such as phyto planktons, zoo planktons and benthic fauna.
The park consists of conservatory of medicinal plants, butterfly garden, rangelands, sacred grove, acacia woodland, migratory ducks wetland, resident ducks wetland and conservatory of fruit-yielding species.

Migratory and residential duck wetlands of Yamuna Biodiversity Park are perennial. The residential birds include Spot-billed Duck, Indian Moorhen, Purple Swamp Hen, Little Cormorant, Darter, Pond Heron, etc. Migratory birds include Red Crested Pochard, Tufted Duck, Eurasian Wigeon, Large Cormorant, etc. These birds mainly feed upon the wetland vegetation, insects and fishes.

The conservatory of medicinal plants consists of over 300 plant species known to have therapeutic values. Some of the most important herbs planted there are ashwagandha (*Withania somnifera*), artimisia, sarpagandha (*Rauwolfia serpentine*), nirgundi (*Vitex negundo*) and isabgol (*Plantago major*).
There is a well-designed conservatory of butterflies.

The conservatory of fruit plants consists of pomegranate, amla, cheeku, mulberry, kaith etc.

Sacred Grove is an area which comprises of different species of Ficus and is being developed to showcase plants of religious importance.

Biodiversity is very important to the well-being of our planet. Most cultures, at least at some time, have recognized the importance of conserving natural resources. Our environment and the species that live in them need a diverse population of genes. Genetic defects are also caused by inbreeding. With reduced diversity in the gene pool, the chance for extinction increases.

All species, including humans, are adversely affected by the loss of species diversity. So, try to preserve the Biodiversity.
Three-quarters of the land-based environment and about 66% of the marine environment have been significantly altered by human actions. On average these trends have been less severe or avoided in areas held or managed by Indigenous Peoples and Local Communities.

More than a third of the world's land surface and nearly 75% of freshwater resources are now devoted to crop or livestock production.

The value of agricultural crop production has increased by about 300% since 1970, raw timber harvest has risen by 45% and approximately 60 billion tons of renewable and non-renewable resources are now extracted globally every year – having nearly doubled since 1980.

Land degradation has reduced the productivity of 23% of the global land surface, up to US$577 billion in annual global crops are at risk from pollinator loss and 100-300 million people are at increased risk of floods and hurricanes because of loss of coastal habitats and protection.

In 2015, 33% of marine fish stocks were being harvested at unsustainable levels; 60% were maximally sustainably fished, with just 7% harvested at levels lower than what can be sustainably fished.

Urban areas have more than doubled since 1992.

Plastic pollution has increased tenfold since 1980, 300-400 million tons of heavy metals, solvents, toxic sludge and other wastes from industrial facilities are dumped annually into the world's waters, and fertilizers entering coastal ecosystems have produced more than 400 ocean 'dead zones', totalling more than 245,000 km2 (591-595) – a combined area greater than that of the United Kingdom.

Negative trends in nature will continue to 2050 and beyond in all of the policy scenarios explored in the Report, except those that include transformative change – due to the projected impacts of increasing land-use change, exploitation of organisms and climate change, although with significant differences between regions.

The Report also presents a wide range of illustrative actions for sustainability and pathways for achieving them across and between sectors such as agriculture, forestry, marine systems, freshwater systems, urban areas, energy, finance and many others. It highlights the importance of, among others, adopting integrated management and cross-sectoral approaches that take into account the trade-offs of food and energy production, infrastructure, freshwater and coastal management, and biodiversity conservation.

Also identified as a key element of more sustainable future policies is the evolution of global financial and economic systems to build a global sustainable economy, steering away from the current limited paradigm of economic growth.
Biodiversity Parks in Delhi

Jagatpur Road,
Near Wazirabad, Delhi 110084
Email: yamunabiodiversitypark@gmail.com
Phone: 09899055001
Scientist Incharge: 09810511552

Aravalli Biodiversity Park
Near Air India and RBI Colony,
Pooori Marg, Vasant Vihar,
New Delhi 110057
Email: aravalibiodiversitypark@yahoo.co.in
Phone: 01126152972
Scientist Incharge: 09891059970

Neela Hauz Biodiversity Park
Near Sanjay Van,
Aruna Asaf Ali Marg
Vasant Kunj, New Delhi 110067
Phone no: 01126152972
Scientist Incharge: 09891059970

Northern Ridge (Kamla Nehru Ridge)
Near Chauburja,
Vishwavidyalaya Marg
Civil lines, Delhi-110007
Email: kamlanehrruridge@gmail.com
Phone: 09899055001
Scientist Incharge: 09868913435

Tilpath Valley Biodiversity Park
W22 Lane, Western Avenue
Sainik Farms, Delhi 110092
Email: tilpathvalley@gmail.com
Scientist Incharge: 09868755959

Tughlaqabad Biodiversity Park
Opposite Tata Motors
Okhla Phase-I
Maa Anandmai Marg,
Delhi-110020
Incharge: 09210788770
1. Why is the water of river Yamuna black in colour?

The colour of the river Yamuna is black due to several reasons:

a. Yamuna is flowing through industrial cities like New Delhi. The discharge of sewage, and many other untreated industrial wastes are dumped into this river.

b. Plastics also contaminate this river.

c. Garbage and untreated liquid waste of households, agricultural lands and factories also find their way into it and make it look black.

2. How can we control pollution of river Yamuna?

We can control the pollution of river Yamuna by:

a. Household sewage water should be treated properly so that it becomes environmentally safe before getting mixed with the water of Yamuna.

b. Contamination of the river Yamuna should be prevented by not allowing people to throw wastes into the water.

c. Providing 100% sewerage facility in each of the cities in the vicinity of river Yamuna

d. Stopping the untreated industrial wastes dumping into this river.

3. Why is river Yamuna known as open sewer?

Industrial waste and sewage disposal have led to heavy pollution in river Yamuna that is why it is often termed as open sewage or "khula naala". It is contaminated with biochemical oxygen demand (BOD) values ranging from 14 to 28 mg/l and high coliform content. Also there is no fresh water flow in the river Yamuna downstream of the Wazirabad Barrage in Delhi in the lean period of November to June.

4. Which is the nodal agency for cleaning of river Yamuna?

Cleaning of Yamuna is also part of the Namami Gange Mission and Government of India has been supplementing the efforts of the States for checking the rising level of pollution of river Yamuna, a tributary of River Ganga, by providing financial assistance to States of Haryana, Delhi and Uttar Pradesh in phased manner since 1993 under the Yamuna Action Plan (YAP).
5. **What are the effects of pollution of river Yamuna on the people and the environment?**

The presence of heavy metals in the vegetables that are grown with water from the Yamuna, makes them potentially hazardous to health. The pollution in river Yamuna affects the aquatic plants and animals. It also leads to land pollution and air pollution.

6. **How river Yamuna is polluted by human activities?**

River Yamuna is polluted by human activities by household and municipal waste disposed into river, soil erosion resulting from deforestation occurring to make way for agriculture, and resulting chemical wash-off from fertilizers, herbicides, and pesticides and run-off from commercial activity and industrial sites.

7. **What are the efforts made by the government to clean the river Yamuna?**

Central Pollution Control Board (CPCB) has identified sewage and industrial effluents as source of pollution which enters into river Yamuna through 18 identified drains in Delhi stretch of Yamuna and through another four drains discharging waste water into Agra and Gurgaon canal. CPCB monitors the water quality of river Yamuna at various locations from Yamunotri to Allahabad.

Cleaning of rivers is an ongoing process and the Ministry of Water Resources, River Development and Ganga Rejuvenation is supplementing the efforts of the Government of NCT of Delhi for pollution abatement of river Yamuna by providing financial assistance to Delhi under JICA assisted Yamuna Action Plan (YAP) Phase-III project.

8. **What are the activities people are performing on the river bank of Yamuna?**

The activities people are performing on the river bank of Yamuna are:

a. Throwing garbage (Plastic bottles, polybags, left over food) in the river Yamuna.

b. Dumping of religious material during Puja and festivals.

9. **What are the causes of pollution on river Yamuna?**

Humans are the main cause of water pollution, which is triggered in many ways: by the dumping of industrial waste; due to temperature rise, that cause the alteration of water by reducing the oxygen in its composition; pollution causes water to be unfit for domestic as well as industrial use. It also affects aquatic life.

10. **How can Yamuna be saved?**

By generating awareness among the people not to throw garbage such as (plastic bottles, polybags, left over food, religious materials during the festivals, etc) in the river Yamuna. The Sewage Treatment Plants should work properly and industrial waste to be treated properly before getting disposed into the river Yamuna.
11. **How can we, as citizens, help in cleaning of the Yamuna river in Delhi?**

   We, as citizens, can help in cleaning of the Yamuna river in Delhi by:
   
   a. Creating awareness among the masses not to dump any types of wastes in Yamuna.
   
   b. Steps must be taken to relocate the existing settlements and encroachments near the floodplains and no further encroachments should be allowed.
   
   c. It is necessary to install more sewage and effluent treatment plants and the discharge of untreated waste water should be restricted.
   
   d. Industrial waste should be treated before discharge into the river.

12. **Which Government bodies are responsible for cleaning of River Yamuna?**

   The Yamuna Action Plan (YAP), one of the largest river restoration projects in the country, is a bilateral project between the Government of India and Japan. This project is being executed by the Ministry of Environment and Forests, National River Conservation Directorate and the Government of India. Under the Yamuna Action Plan Phase III, the Delhi stretch is given prime emphasis as it is the most critical stretches of Yamuna, where most of the city's sewage is dumped. In Delhi, DJB, DDA, Municipal Corporations, DPCC, DSIIDC, I&FCID are the departments dealing with control of pollution in River Yamuna.

13. **How does pollution in River Yamuna affect our health?**

   Effects of water pollution on human health are Typhoid, Cholera, Paratyphoid, Fever, Dysentery, Jaundice, Amoebiasis and Malaria. Chemicals in the water also have negative effects on our health. Pesticides – can damage the nervous system and cause cancer because of the carbonates and organophosphates that they contain. Heavy metals from industrial wastes cause serious health hazards.

14. **What effect does pollution in Yamuna have on aquatic animals and plants?**

   Aquatic plants and animals get severely affected due to water pollution. Due to plethora of moss in the polluted water of the rivers, the sun light fails to reach to the depths of the river which affects the growth of aquatic plants due to lack of photosynthesis taking place. In the polluted water of the rivers, some aquatic weeds such as aquatic ferns and water hyacinth start increasing. Similarly, the sewage water getting mixed into the water of the rivers, helps in the increase in the growth of fungus, algae, bacteria, etc
15. **How can students contribute in making river Yamuna clean?**

School children should be sensitized about cleaning of Yamuna. They should be educated about the following points:

- No solid waste and plastic waste should be thrown in the drains/river Yamuna.
- Use of plastic things should be avoided.
- Eco friendly material should be used for making idols (murti).
- No flowers /religious offering should be thrown in river Yamuna.
- Sewer connections should be obtained by each and every house hold in areas where sewer network exists.
- The children should remain vigilant so that no septic tank waste is discharged into the drains and should report any such incident. Septic tank waste is to be discharged at the designated points identified by DJB.
- Need for water conservation and Rain Water Harvesting.

16. **What is an effluent?**

Effluent is a liquid waste flowing out of a factory, farm, commercial establishment, or a household into a water body such as a river, lake, or lagoon, or a sewer system or reservoir.

17. **What are ETPs?**

Effluent Treatment Plant or ETP is one type of waste water treatment method which is particularly designed to purify industrial waste water for its reuse and its aim is to release safe water to environment by freeing it from the harmful effect caused by the effluent.

18. **What are STPs?**

Sewage Treatment Plant is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater. Physical, chemical, and biological processes are used to remove contaminants and produce treated wastewater that is safe enough for release into the environment.
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