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ДЕПАРТАМЕНТ НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
АДМИНИСТРАЦИИ ТОМСКОЙ ОБЛАСТИ

**Природопользование и охрана природы:
Охрана памятников природы,
биологического и ландшафтного
разнообразия Томского Приобья
и других регионов России**

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Расчет суммарной трофности Галичского озера

Вид	Тип водоема (1)	Частота встречаемости (2)	(1) x (2) = (3)
Водокрас (обыкновенный) лягушачий (<i>Hydrocharismorsus-ranae</i>)	3	3	9
Элодея канадская (<i>Elodea canadensis</i>)	3	3	9
Частуха подорожниковая (<i>Alisma plantagoaquatica</i> L.)	3	2	9
Рогоз узколистный (<i>Typha angustifolia</i> L.)	3	1	3
Шелковник неукореняющийся (<i>Batrachium eradictum</i>)	4	4	16
Суммарная трофность $\sum(3) : \sum(2)$		$\sum(2) = 13$	$\sum(3) = 46$

Общая суммарная степень загрязнения Галичского озера равна 4,1 балла (табл. 1), что соответствует сильной степени загрязнения. Общая суммарная трофность составила 3,5 балла (табл. 2), что соответствует переходному типу водоема между мезо- и эвтрофным. Озеро с высокой степенью зарастания, имеет богатый видовой состав (порядка 30–35 видов растений), растительный покров в большей степени представлен полупогруженной растительностью (в основном тростником). Широкому распространению водной растительности способствуют невысокая прозрачность воды (до 0,5–1 м).

Озеро мелководно. Примерно 60–70% его площади покрыто зарослями высшей водной растительности, имеются мощные иловые отложения. Современное Галичское озеро находится в угнетённом состоянии. В связи с большой антропогенной нагрузкой необходимо быстрое принятие мер по его очистке и предотвращению эвтрофикации.

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IMPACTS OF WATER POLLUTION ON HUMAN HEALTH: A CASE STUDY OF DELHI ВЛИЯНИЕ ЗАГРЯЗНЕНИЯ ВОДЫ НА ЗДОРОВЬЕ ЧЕЛОВЕКА: ИССЛЕДОВАНИЕ ПРОБЛЕМЫ В РАЙОНЕ ДЕЛИ

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Water is an essential element for all the existing living beings. About 70% of the Earth is covered by water. All human beings need fresh drinking water. Without water no life is ever imagined on this blue planet. But life becomes difficult when many lives have to live on polluted water. According to WHO, 80% diseases are waterborne.

In Delhi, different types of toxic chemical discharge have different effects on humans causing diseases like bacterial, viral or parasitic. Therefore, it is recommended to focus daily on the water quality of Delhi from destructive events. So, the present paper defines condition of water pollution and their solutions in the given research area.

Вода – важнейший элемент для всех живых существ, около 70 % Земли покрыто водой. Все люди нуждаются в свежей питьевой воде, но жизнь становится трудной, когда приходится употреблять загрязненную воду. По данным ВОЗ, 80 % заболеваний передаются при употреблении некачественной воды. В Дели различные виды токсичных химических выбросов оказывают различное воздействие на человека, вызывая бактериальные, вирусные или паразитарные заболевания. Поэтому рекомендуется ежедневно контролировать качество воды в Дели. В настоящей работе определены условия загрязнения водных объектов и возможные решения в данной области исследований.

Keywords: Water, Pollution, Delhi, toxic chemicals, diseases, water quality, impacts, human, solution.

Ключевые слова: вода, загрязнение, Дели, токсичные химические вещества, болезни, качество воды, воздействие, человек, раствор.

The terrestrial parts of the natural hydrological cycle and the level of human ability to use the water that comes as a gift of nature govern availability of water in an area for meeting human needs and demands. Though the whole planet have large volume of water (1338 million BCM), the volume of traditionally accessible freshwater, in the lakes and in the rivers flow, amounts to 0.093 million BCM.

Because of mixing of unwanted or harmful chemical substances, adding of industrial wastes in water resources, physical properties of water got contaminated, fitness of water human use decline due to it, it created many problem related to respiratory and digestion system. Control and prevention of water contamination is big issue in modern day society, as because of agricultural practices, utilization of chemical, insecticides, herbicides etc, with mixing of it in rural areas health and productivity greatly affected, and in industrial areas because of dumping of untreated water mixing with chemicals and harmful unwanted substances water also got contaminated. So we can say that water contamination is a major problem being faced by both rural as well as urban areas, and to make sure the supply of clean water free from impurities is big issue for authorities, environmentalists, scientists and for ecologist.

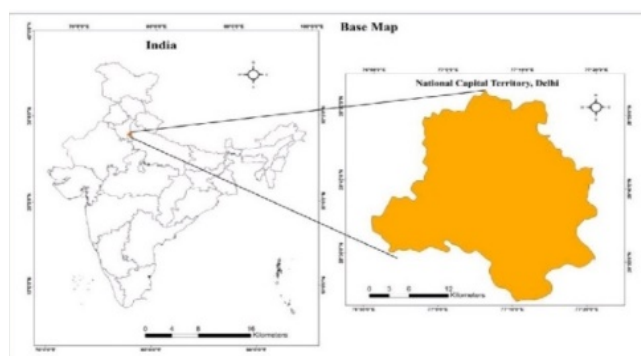


Fig. 1. GIS Map of Delhi, India

Water contaminated because of untreated urban sewage and mixing of untreated industrial waste greatly affects the health of population, and give birth to many problems related with health like jaundice, typhoid, diarrhoea, cholera, vomiting, skin and kidney problems. So prevention of expansion of water contamination, diseases born because of it is major issue for health department. There is demand more fund allocation, recruitment of sufficient and well qualified staff to stop these diseases, and to treat the peoples affected by these diseases.

Because of ever-increasing utilization of water resources in unsustainable way by human beings and by industries, availability of water resources created many challenges in big cities like Delhi, as

water resources are in limited quantity and water fit for human use is also in limited quantity. So solutions for better planning and management of water resources in the city is very important for better human health.

Study Area. Delhi covers an area of about 1,483 sq. kms. (573 sq. miles). The rural area covers 783 sq. kms. (302 sq. miles), and the urban area covers 700 sq. kms. (270 sq. miles). Delhi has a length of about 51.9 km (32 miles) and has a width of about 48.48 km. (30 miles). Delhi lies between 28° 24'15" and 28° 53' 00". North Latitudes and 76° 50' East Longitude. Delhi shares its border with state Haryana on the North, West and South and Uttar Pradesh to the East. Yamuna flood plains and Delhi Ridge are the two prominent features of the geography of Delhi.

Objectives:

To study the impacts of water pollution on human health in the study area.

To suggest solutions to prevent from water pollution in the study area.

Research Questions:

What are the impacts of water pollution on human health in the study area?

What is the solution to prevent from water pollution in the study area?

Methodology. The present study is mainly based on primary and secondary data. The secondary data has been collected from various officials and semi-officials published reports, research journals, newspaper, research articles, websites and works of individual scholars. The primary data includes map of Delhi applied through GIS software.

Analysis and Discussion.

Impacts of water pollution on human health in Delhi region. The toxic metals are making the water bodies contaminated in Delhi. The toxic elements present in water of Delhi are of worried concern for the environment and their effects on humans and aquatic life. The non-biodegradable heavy metals can also be named as 'chemical time bomb'. The surface sediments releases metals through natural and anthropogenic processes and is mixed with the surface water causing health effect to the environment. Lead, cadmium, chromium, mercury, and arsenic are the main heavy metals which is effecting the human health. The International bodies like WHO is deeply concentrating on this heavy metals to control water pollution. The heavy metal in water bodies is increasing mostly in the developing countries in the world like India, but the develop countries are in control due to high technical equipments to improve the water quality like UAE.

Justice V.R. Krishna Iyer once remarked that, – “the unconscionable industrialisation, the unpardonable deforestation and the inhuman extermination of living species betray an exploitative brutality and anti-social appetite for profit and pleasure which is incompatible with humanism and conservationism. Today a bath in Yamuna and Ganga is a sin against bodily health, not a salvation for the soul, so polluted and noxious are these holy waters now”.

Diseases like Diarrhoea, destruction of haemoglobin, tremors, paralysis, headache, inactivates functional proteins, damage of renal tissues, mimamata disease, and even death, impairment of vision and muscles and even coma, insomnia, memory loss, gum inflammation, loosening of teeth, loss of appetite are caused in Delhi due to discharge of *mercury* in water more than 100mg from various sources. Vomiting, brain damage, uncoordinated body movements, loss of appetite, convulsions, coma is due to presence of *lead* in water bodies in Delhi. Vomiting, chromosomal aberration and damage, gangrene, loss of hearing, injury to nerve tissue, liver and kidney damage, loss of hearing, irritation of nose and throat, diarrhoea, nausea, skin, lungs and liver cancer, abdominal pain, skin eruptions inflammations and even death is taking place due to more than 25mg of *arsenic* present in water consumed by humans in Delhi.

More than 70 mg of **chromium** causes lung tumours, complications during pregnancy, cancer, anuria, perforation in partition of nose, nephritis, gastrointestinal ulceration, penetrates cell membrane and badly affects central nervous system and respiratory trouble to humans. Any chromium compound is toxic as per research in Delhi.

Chromium also severely effects the aquatic life in the Yamuna river. Chronic diseases due to cadmium intoxicification in human body takes place atleast 4 to 5 years as per medical report in Delhi. More than 50 mg of cadmium attack human body causes unconsciousness, abdominal pains, vomiting and diarrhoea. More than 30 mg nickel in water bodies in Delhi changes muscle in humans, brain, lungs, liver, kidney and attacks hazardous diseases like cancer, tremor, paralysis and even death to life.

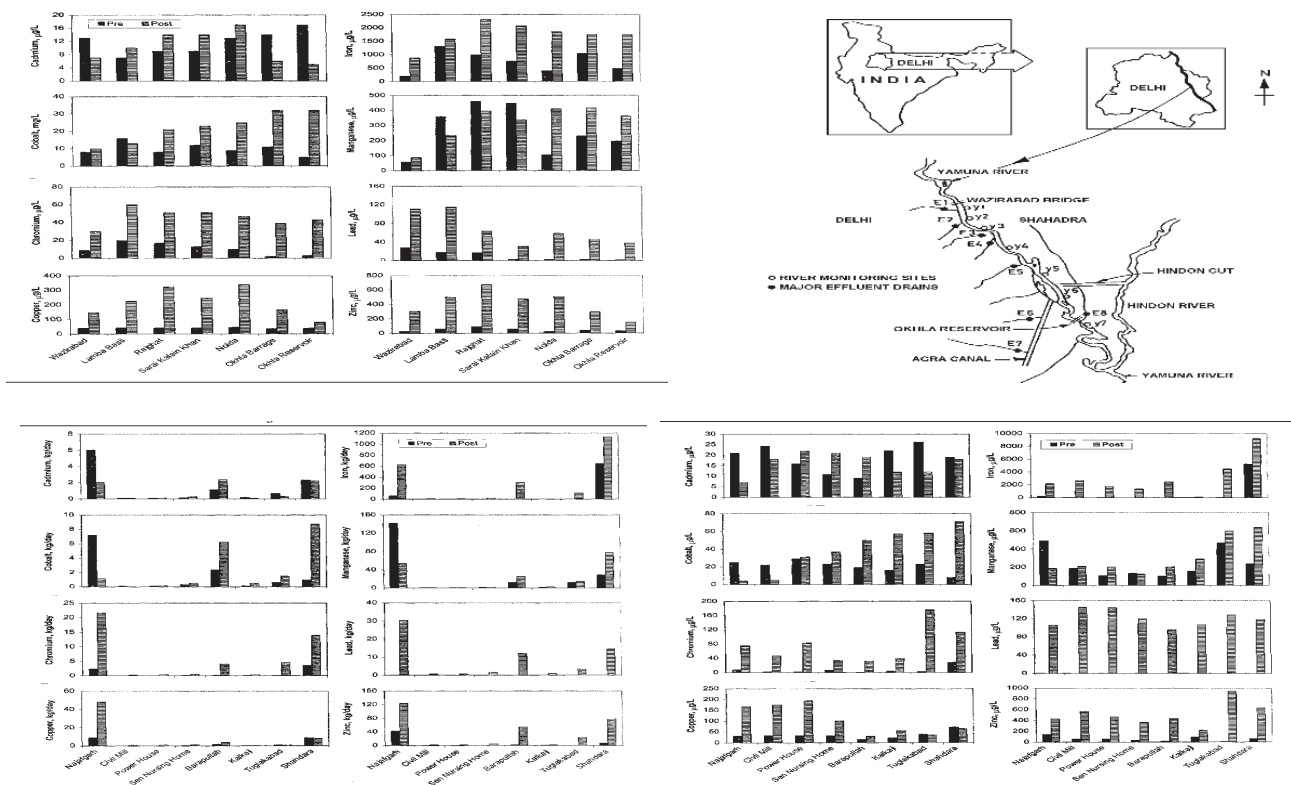


Fig. 2. Population Potential of toxic metals in the Yamuna River at Delhi, India [1]

In Delhi, human body is suffering from diseases through contaminated drinking water due to presence of different types of organisms like bacteria, viruses, parasitic protozoa and parasitic worms. Virus in drinking water causes Infectious Hepatitis (Type B) and Poliomyelitis. Severe headache, fever, abdominal pain, jaundice, loss of appetite, enlarged liver, rarely fatal, permanent liver damage are attacked to humans in Delhi by Infectious Hepatitis (Type B). Diarrhoea, fever, backache, paralysis, muscle weakness, spinal cord infection, backache, sore throat, limb aches, spinal cord infection attacked to human beings Poliomyelitis. Parasitic protozoa in drinking water causes Amoebic dysentery, Giardiasis, and Cryptosporidium to humans. Diarrhoea, headache, abdominal pain, chills, fever are the symptoms if not treated in time can cause to liver abscess, bowel perforation, and death. Diarrhoea, abdominal cramps, flatulence, belching, fatigue are attacked in human body through a disease called Giardiasis. Severe diarrhoea, cramps for few weeks, and possible death for people suffering from weak immune systems are the symptoms of disease Cryptosporidium. Parasitic worms present in non-purifying drinking water when is consumed by human beings causes diseases like Schistosomiasis and Ancylostomiasis. Symptoms found in body due to Schistosomiasis are

anaemia, skin rash, abdominal pain, chronic fatigue, and chronic ill health. Symptoms noticed in bodies due to Ancylostomiasis are severe anaemia and bronchial infections.

Water contamination is a very serious issue, which can take life to hell. So, for the betterment of health the Government must try their level best to supply pure drinking water to human beings in Delhi and even the Government must take initiatives to clean the Yamuna River and other groundwater and surface water bodies for future generations. Due to rapid growth of population, development of urbanization and industrialization took place, which put natural resources on pressure of demand therefore forcing people to have business, trade and commerce for their survival by doing horticulture, agriculture, industrial production, urban development later forced for appliance of fertilizers, chemicals and pesticides and due to excessive use of toxic chemicals and releases and discharges of waste materials through different source into water causes water pollution [2–9].

Solutions and Conclusions. The following solutions have been observed during the research:

1. As new technology was introduced to identify pollutants in the Yamuna river by The Tata centre for development. The centre has found out that in the Yamuna river dissolved oxygen, nitrates, turbidity and ammonia are mixed. The idea of the research team was to collect more and more data in order to clean the Yamuna river and to know the actual location of the pollutants.

2. There is a great need of the quality and standard equipments to clean the river for pollution. The related research team or water analyst should be given high level decision making freedom.

3. Research data should be based on non-stationary manner, time-stamped, geotagged and automated so that any project for water cleaning should be conducted in a fixed time frame.

4. With the help of high-resolution data machine, we can easily understand the water quality.

5. Among other analysis statistical analysis could be more strong with different layers of data for the better projection of the location of the pollutants.

6. Urban planning should be based on all new technologies for water drainage as wrong method of water draining causes polluted of underground water.

7. Industries should be set far from river. Strict action should be taken for the release of toxics and pollutants in the water.

8. Researchers need to gather data in a non-stationary manner, by using real-time, time-stamped, geotagged and automated sensors which will become easy to point out the water pollution area in the Yamuna river and it will help to find out the contamination spreading hotspot location in the river.

According to Supreme Court – Article 21 (right to life) and Article 48A (directing the state to “endeavour to protect and improve the environment”) the state i.e., Delhi must have the right and duty to protect groundwater against over exploitation as per democratic country. The Central Ground Water Board should look after the over exploitation of groundwater and should protect them for the future. Campaigning is a must for water education to the population of Delhi. The Delhi Jal Board can take in charge of the land where the water exists, along with the five Municipal bodies (North, South, East, and New DMCs and Delhi Cantonment Board) to manage the sewage and garbage of the area to improve the human health of Delhi. *Nema* insists that consumers also have to do more to check their water-usage practices. “Households are using RO filters that remove minerals and cause 40 percent of the water to be wasted,” he says, “Just a UV-based water-filter is needed, to only remove microbes.” *Veena Khanduri*, too, insists on minimising wastage. “Individuals and residential clusters need to be incentivised for water-recharge and preventing waste, big institutions have to be encouraged towards ‘zero liquid discharge’ policy, meaning treating and re-using water.” Stressing on political will, efforts and decision making, *Rajendra Singh* offers hope, citing promising outcomes of his work in Rajasthan: “We have one-third of the rainfall that Delhi gets.” If aggressive pace of recovery is done, Delhi can be saved from being “*bepaani*,” waterless, he states [10].

