Ganga River: A Paradox of Purity and Pollution in India due to Unethical Practice

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Abstract. In India, the river Ganga is believed as a goddess, and people worship it. Despite all the respect for the river, the river's condition is worsening, and we Indians are unable to maintain the purity of the river. The Ganga is a river of faith, devotion, and worship. Indians accept its water as "holy," which is known for its "curative" properties. The river is not limited to these beliefs but is also a significant water source, working as the life-supporting system for Indians since ancient times. The Ganga river and its tributaries come from cold, Himalayan-glacier-fed springs, which are pure and unpolluted. But when the river flows downgradient, it meets the highly populated cities before merging into the Bay of Bengal. From its origin to its fall, its water changes from crystal clear to trash-and sewage-infested sludge. Thousands of years passed since the river Ganga, and its tributaries provide substantial, divine, and cultural nourishment to millions of people living in the basin. Nowadays, with the increasing urbanization, the Ganges basin sustains more than 40 percent of the population. Due to the significant contribution of the growing population and rapid industrialization along its banks, river Ganga has reached an alarming pollution level.

Keywords: Ganga river, water pollution, river pollution, unethical practice, India.

1. Introduction

Water is one of the most important natural resources which is essential to life; thus, its management and proper utilization are as serious at a global level as at a local level. River Ganga (Ganges) is considered the longest and the holiest river of India, which originated from Gangotri glacier, at Gomukh, and ends at Bay of Bengal located in the East of India. It travels a distance of about 2,525 km during its entire course, and the total area covered by its basin is about 86,1404 sq.km. [1]. The water of the Ganges, which is also known as the "blue gold", is the major source of water to northern India, but because of the continuous growth of India’s population and its economy, it is being overexploited. River Ganga occupies a unique position in the cultural ethos of India. According to the Vedas, after long and arduous prayers made by King Bhagirathi for his deceased ancestors’ salvation, the river has descended from heaven to earth. From immemorial times, the Ganga has been India's river of faith, devotion, and worship. Millions of Hindus treat it as a Holy river. Even today, people from all over the country and abroad carry treasured Ganga water because it is "holy" water and known for its "curative" properties.
The Ganga is a holy and historical river of India, but due to its dense population of over 400 million, the unplanned urban expansion, rapid industrialization, deforestation as a need of urbanization, and increased use of water for different irrigation and industrial activities, increasing pollution in the river is occurring. The Ganga was ranked among the world's five most polluted rivers in 2007; [2].

2. The Pollution of Ganga River
River Ganga, due to rapid urbanization and industrialization throughout the basin, has now become extremely polluted. Although many of the Indians still consider it to have a purity which is believed to reflect its sacred powers, the Ganges is said to be “a biological nightmare” on account of “the indiscriminate discharges of municipal sewage and industrial effluent generated from 48 cities and 66 large towns located on its banks.”

The Ganga river has started losing its efficiency due to the enormous quantity of untreated sewage and toxic industrial influents, which is discharged into it. The vital source of degradation and pollution of the river Ganga are as follows:

- **Sewage and industrial effluents discharged from cities**: There is direct dispose of sewage disposal into the river Ganga or its tributaries (Figure 1c). These are significant pollution sources as 38,000 MLD is the amount of sewage generated from towns that exceed the Sewage treatment capacity of 12,000 MLD [3].

- **Cremation of dead bodies**: A large number of bodies from different cities of the country are dumped in River Ganga (Figure 1b) as they believe the river to be sacred and so if the bodies will be cremated and placed in the river, then the deceased person will achieve Moksha [4].

- **Runoff from agricultural practices**: Due to the use of modern techniques of farming, which includes the use of pesticides, herbicides, and fertilizers, the river is being polluted with runoff from such agricultural fields [5]. Indo Gangetic plain feeds 40% population of the country, which consume maximum pesticides, i.e., 60 000 MT used in India [6, 7]

- **Solid and bio-medical waste disposal**: Domestic and other solid waste dumped directly or indirectly into the river; also, the waste from hospitals and nursing homes, which should be appropriately treated, are disposed of untreated into the rivers resulting in polluted water giving rise to several water-borne diseases.

- **Washing of clothes**: Several laundry workers, known as dhobi’s, visit homes to collect the dirty garments and wash them in rivers. The detergents and chemicals which are used for cleaning the clothes mix with the river water and make it polluted.

- **Disposed waste from temples**: In Hinduism, God is worshipped with flowers, Roli, Chandan and many types of color which are dumped into the river like a waste after worship (Figure 1a), also in after the occasions like Durga Pooja, Ganesh Pooja etc. the vast statues which are made from plaster of Paris (not readily soluble in water) are dumped into these rivers resulting in its pollution [8].

- **Animal Bathing**: In India, cattle are left open for grazing; also, their owner uses river water for giving bath to their cattle, which is one of the direct sources of pollution in the river.

- **Industrial Pollution**: With the increasing urbanization, factories have also multiplied and the waste from these industries is being discharged directly into the rivers (Figure 1d) or into the nearby ponds or lakes, which reaches the river with the runoff [8].

- **A vast quantity of water extracted from the river through lift canal**: Increasing demand for water from the domestic and industrial sector is resulting in the over-extraction of water from the river due to which river water is declining as a result of which concentration in the river water is increasing.

- **Deforestation in the watershed and the origin of the river**: Due to the deforestation rate of runoff, it has increased, resulting in the increased pollution in the river.

- **Construction of dams in the Himalayan region and other major construction in the catchments area**: Dams and channel also cause higher contaminant concentration in the river.
Ganga. Tehri Dam in Uttarakhand on Bhagirathi River holds the Ganges River flow, so do many more hydroelectric projects construct throughout its course. As plenty of water is being extracted from the river, as soon as it enters into plains, for various industrial purposes, only polluted drains join the river contributing to its increased concentration in pollutants [9].

There are many sources of pollution in river Ganga, but as reported by the Central Pollution Control Board, the main sources of pollution within the Ganges are urban liquid waste (sewage), industrial liquid waste, surface runoff from solid waste landfills and dump sites, and solids and liquids from practices such as bathing of cattle and immersing dead bodies in the river. Approximately 30% of the total waste pollution is due to the is industrial activities, while the remaining 70% is primarily from municipal waste.

India is considered to be the largest pilgrimage/tourist site. In the country, Banaras city is highly esteemed as the center of Lord Shiva’s universe and the city is also believed to be the beginning and endpoint of human civilization. There is a noticeable change in the quality of the water when it is compared to the source from where it is being originated, where the water is pristine and blue to the

![Figure 1a.Disposed of flowers.][4]

![Figure 1b.Disposed of a dead body.][4]

![Figure 1c. Sewage disposal.][4]

![Figure 1d.Industrial liquid waste disposal.][4]
Ganges water at the sacred cities like Varanasi, which is brown and filthy, literally bubbling at some spots with untreated sewage and effluents from nearby tanneries. As reported long ago in 1982, Varanasi, which is one of the oldest cities in India, is the holy city witnesses the pollution of the Ganges not only in terms of large quantities of domestic and industrial waste, but also in terms of a yearly addition of approximately “3000 half-burnt human bodies, 6000 carcasses, 140-200 tons of flesh, and 200-300 tons ash (produced by burning 11000 tons of firewood).” This extreme amount of pollution is mostly associated with the fact that the city of Varanasi features a magnificent cremation ground called the Mahashmashana, where the remains of deceased pious Hindus are burned and disposed into the Ganges, and it is believed that the dead may reunite with ancestors or achieve liberation (moksha) [10]. This distorted religious belief is one of the contributing factors of Ganges water's pollution.

3. Mitigation
With the growing rate of population, the rate of pollution in the river Ganges is also increasing. Therefore, looking after the ever-increasing effects of pollutants on the river and its harmful impacts on the people, one must vigorously think over the matter and implicate proper measures. After realizing that the rivers of the country were in a severe stage of degradation, a step towards its restoration was made by the launching of the Ganga Action Plan (GAP) in the year 1985, which was introduced as a comprehensive program of river conservation with the objective of improving the water quality [11]. It was also visualized that the program would be enlarged in due course, and other major rivers of the country will also be covered in it. There are three major problem areas that need to be addressed to find a comprehensive solution to Ganga pollution: 1. Inadequacy of water is disposed into the river, which is caused by waste disposed into the river. 2. Increasing amount of untreated sewage discharged from cities along the river. 3. Lack of enforcement against point-source pollution from industries that are discharging its waste into the river.

Adding further efforts, the Government of India launched an Integrated Conservation Mission for the river Ganga as 'Namami Gange Programme', 'Flagship Programme' in June 2014 to restate the river's status Ganga[12].

4. Solution
In India major source of water is the river system, which is spread all over the country, which provides us with potable water, irrigation, electricity, and transportation; also, they are a great source of livelihood for a large majority of people in the country. Hence, it is clear are we are dependent on our rivers for different uses of water; therefore, it is a major part of the responsibility to protect our rivers and should not let them die.

The Government is already splurging massive amounts of money since the last many years in the name of reducing pollution from the rivers and its prevention, but no visible changes are noticed till now, and there won’t be any, either until meaningful actions will be taken.

The water quality of the Ganga river can be improved to some level if immediate robust environmental surveillance is applied in order to check their compliance with environmental standards. The strategies for saving water quality of the Ganga river may include defensive and proactive approaches [5]. Improvement in sewage networks, enhancing sewage treatment capacities, and preventing pollution load coming from tributaries are measured under a defensive approach, which should be urgently executed. The construction of a barrage on the Ganga river and tributaries rivers seems to be a suitable option for reducing the concentration of pollution on the Ganga river. The farmers in the Ganga river basin's catchment area must be educated to avoid the indiscriminate use of chemical fertilizers and pesticides.

At present, cremation is done on the riverbed itself nearly at all Ghats of the Ganga river, and people directly throw ashes into the Ganga river. People need to be educated about their Vedic belief systems and rituals with proper citations of the scriptures; for example, there is no puranic evidence that the dead
bodies or the half-burned bodies are to be dumped in the river. There is a need to construct improved wood-based crematoria and needs to educate people to use electric crematoria. As a result of religious beliefs, people use to dump holy materials and puja offerings into the Ganga river, which remains floating on the surface, creating an ugly scene. This problem can be solved by constructing a holy pond at an appropriate site that may be filled by the Ganga river water. Afforestation should be developed on the whole catchment area along the Ganga river banks to control soil erosion and water pollution. It is realized that a rapid increase in population also affects the Ganga river water as new colonies are developed without proper sanitation and treatment capacities and start discharging their wastewater directly into the Ganga river, which needs to monitor and developed proper sanitation and treatment capacities system.

As citizens of the country, it is more often said that we play a significant role in the conditions faced by the rivers and, therefore, are equally responsible, but collective responsibility is virtual. It has also been claimed that we can promote involvement from different communities in cleaning up local river and water bodies. However, still, it is not being done correctly to see the significant results. Thus, it is concluded that there is a need for active participation of all people to revitalize the Ganga river, which can be achieved by education and awareness. We are far away from our dream of having cleaned rivers. Hence, we should raise awareness among the people on the causes and effects of river pollution by organizing awareness programs, meetings and distributing literature on river pollution and its dangers.

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5. Conclusion
India is rich in its natural water sources in numerous rivers and lakes, and it has rightly been referred to as the “Land of Rivers”. Different people throughout the country worship these rivers as goddesses. But the reality even then too, we never think before polluting it by our selfish activities.

The Ganga river seems to be dying slowly because millions of untreated domestic and industrial waste are disposed into the river's water. The problem of continuous rising pollution is a matter of grave concern, which is affecting our country directly and indirectly. Still, we are not able to do anything in this regard. There is continuous water extraction from the river at an unsustainable rate resulting which affecting deteriorating water quality. Due to the overexploitation, there will be harmful impacts on the river’s ecosystem and local populations’ well-being, who will be the victims of many water-borne diseases occurring due to the polluted water.

According to the religious leaders’ spiritual rituals, it should not be merged with civic ethics. It is also being questioned how the Ganges will be believed to be “Ganga Ma” to survive if there will be no more water in her bed. Despite the fact that the Ganges is now one of India's most polluted rivers, India's people still believe pure and divine, but pollution and over-extraction of the river will weaken one of the Hindu culture pillars. Hence, to make the Ganges as a lasting resource, it seems that India and every person living in it and using its water as a resource have to learn from their mistakes and take the initiative on their individual and community level. However, cleaning the river is a mammoth task, primarily because of the country's population, which has already exceeded one billion. It is our responsibility to save our ecosystem, which is possible only when we will save our country's rivers regardless of all other religions, or other believes as these rivers act as the main part of it. We should take care of the river, not only because they consider her a goddess, it is considered to be sacred, but also because it is wrong to act against our environment.
References
[1] http://117.252.14.242/NMSHE/area.html
[2] Basant Rai 2013 Pollution and Conservation of Ganga River in Modern India. *International Journal of Scientific and Research Publications* **3**, Issue 4, ISSN 2250-3153
[3] http://www.mrcmekong.org/assets/Events/Mekong2Rio/1.1d-The-Ganges-case.pdf
[4] https://gangapollution.weebly.com/death-rituals.html
[5] Pradip Kumar, Rajendra Kumar Kaushal, Anjani K. Nigam 2015 Assessment and Management of Ganga River Water Quality Using Multivariate Statistic Techniques in India. *Asian Journal of Water, Environment and Pollution*, **12**(4), 61–69.
[6] D.K.Pal, T. Bhattacharyya, P. Srivastava, P.Chandran, S.K.Ray, 2009 Soils of the Indo-Gangetic Plains: their historical perspective and management. *Current Science*, **96**, 1193–1202.
[7] Sanjay Dwivedi, Seema Mishra, Rudra Deo Tripathi, 2018 Ganga water pollution: A potential health threat to inhabitants of Ganga basin. *Environment International*, **117**, 2018, 327-338
[8] http://shodhganga.inflibnet.ac.in/bitstream/10603/109248/11/11_chapter2.pdf
[9] https://www.youthkiawaaz.com/2018/11/the-rising-pollution-of-rivers-in-india-what-ight-be-the-consequences/
[10] https://knowledgeofindia.com/causes-ganges-river-pollution-case-study/
[11] https://nmcg.nic.in/NamamiGanga.aspx
[12] Elizabeth Ann McAnally 2007 Toward a philosophy of water: Politics of the pollution and damming along the Ganges river. Thesis for the Degree of Master of Arts University of North Texas.
[13] http://www.globalwaterforum.org/2012/03/05/special-essay-the-ganges-eternally-pure/

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