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Pollution in River Ganga due to Human intervention: A study

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The national river of India, know by the name of Ganga is considered to be a life-line of 1.336 billion of people, is altered and polluted on a daily basis by certain human activities. These activity range from construction of dams, cremation of dead bodies to discharge of industrial and municipal waste. This research paper is based on exploratory research design that studies the problem of pollution in river Ganga due to human intervention.

Keywords:- Ganga River, Environment, Pollution, Anthropogenic, BOD (Biological Oxygen Demand).

INTRODUCTION

The Ganga river covers an area of approximately 1086 thousand km square and 2511km in length across northern India from the Himalayas to the Indian Ocean. And it empties into the Bay of Bengal and considered to be the third largest river in the world and longest river in India. It has it source at Gaumukh, Gangotri Glacier known by the name of Bhagirathi River (in the top of Himalayas) and has an elevation of 3800 m above sea level. The river joins Alaknanda river and the sangam is known by the name of river Ganga. After flowing from Himalayas mountain, it reaches to plain at Haridwar where the elevation is 300m above the mean sea level. And after covering an area of 108600000 km square it flows to Bay of Bengal.

The River Ganga is altered and polluted biologically, chemically and physically on a daily basis by various human activities also known by 'Anthropogenic activities'. These human activities which lead to pollution in river ecosystem is considered misappropriate and hazardous for animals and aquatic life. And therefore the perseverance of river Ganga is very important. It is considered to be a life-line to 1.336 billion of Indians who depend on it for the daily necessities, and also considered to be a home to approximately ninety amphibian species, one hundred and forty fish species, and endangered Ganges river dolphin. According to a research by Munendra Singh and Amrit K. Singh (2005), over 25,000 species including animals, mammals and micro organisms. The government of India has also taken various initiatives to clean river Ganga like The Ganga Action Plan, 1985. The Ganga Action Plan was considered a failure irrespective of the fact that it was the largest single initiative, to clean and improve quality of water of a polluted river, in the world. Even now the Government of India has taken new initiatives to clean river Ganga (known by) Clean Ganga Project 2014 by PM Narendra Modi. In this situation the dilemma is that the man himself is the one who is taking conscious initiative to preserve the river Ganga and at the same time polluting it at a much higher degree. This means the act of polluting is very high in term of size and volume than the mere act of perseverance (or so called initiative). The other reasons for the failure in perseverance of river Ganga could be corruption, poor environmental planning, lack of support from various (religious) authorities, lack of proper equipments or technical expertise, etc.

The Ganga River basin experiences three seasons, which are summer, monsoon and winter and has a humid climate. The basin experiences heavy rainfall during monsoon (July, August and September) and supports the housing of approximately 0.5 billion people (i.e. approximately one third of the India's population).

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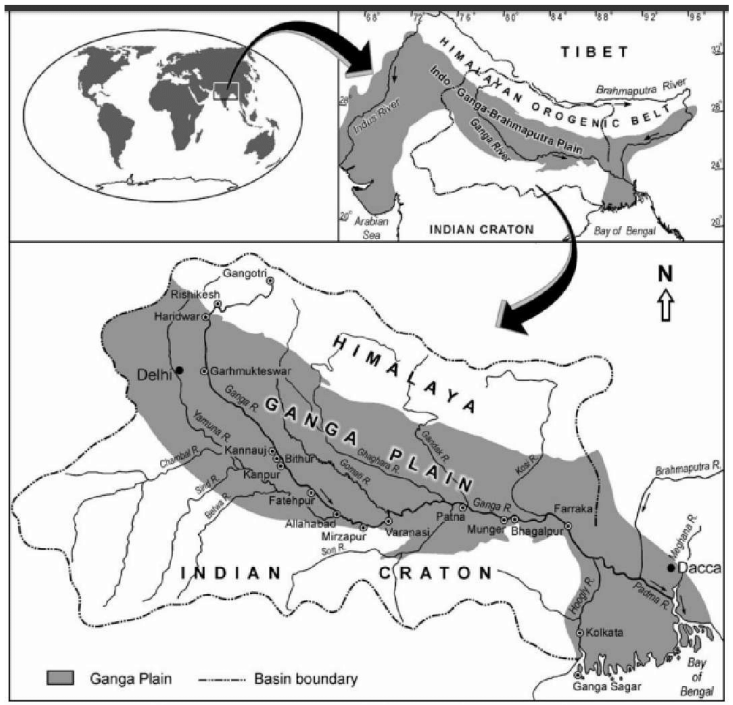

Figure 1 Location map of the Ganga River showing important riverbank sites used in several research studies.

According to a research by Munendra and Amit (2006) approximately 1.3 billion litres of sewage goes into river Ganga per day out of which 0.26 billion litres is of industrial sewage, .906 billion tons of agricultural waste (fertilisers and pesticides). The causes could be over yet increasing population, corruption, poor environmental planning, unplanned urban or rural growth, lack in waste management, lack of support from various (religious) authorities, lack of proper equipments or technical expertise, mass bathing or high use of chemical fertilisers, etc.

OBJECTIVES

1. To understand the current scenario of river Ganga.
2. To study the causes for pollution in river Ganga due to human intervention.
3. To study effects of human intervention on river Ganga.
4. Possible solutions- to reduce pollution in river Ganga

LITERATURE REVIEW

The Ganga River is the national river of India, and is regarded as holy and sacred river. Also known as Ganga Ma (Mother Ganges) and worshipped as goddess Ganga, whose purity cleanses the sins and help the soul of dead to their path towards paradise. It symbolises Indian Culture and civilisation.

It is considered to be a life-line to 1.336 billion of Indians who depends on it for the daily necessities. The Ganga river flows through Bangladesh and India. It covers an area of approximately 1086 thousand km square and 2511km in length across northern India from the Himalayas to the Indian Ocean. And it empties into the Bay of Bengal and considered to be the third largest river in the world and longest river in India.

When it comes to pollution, as per the current scenario the river Ganga is ranked second most polluted river in the world by Gursimran Kaur, listovative and ranked 1st by Kelley, soapboxie.

There are many initiative, from The Ganga Action Plan 1985 to The Clean Ganga Project 2014, taken to clean Ganga river but all seems to be a failure based on the fact that the river is ranked 1st in most polluted river in 2016 whereas it was ranked 5th in 2007. The reasons for the failure in perseverance of river Ganga could be corruption, poor environmental planning, lack of support from various (religious) authorities, lack of proper equipments or technical expertise, etc. Thesad part is that it is not only effecting the quality and quantity of water in river Ganga, but also the life of approximately ninety amphibian species, one hundred and forty fish species, endangered Ganges river dolphin and the same time life of human itself.

India's population of 1.336 billion and increasing every second, ranked second highest populated country by Internet World Stats. India's cultural ideologies and its population of 1.336 billion is a major reason for the pollution caused in river Ganga. It is highly polluted and even knowing this fact, people of India are still indulged in the cultural and religious practices that is polluting the river more day by day. This is due to the mere belief of the people (indulged in such activities) that the holy and pure river Ganga Ma can never be polluted by mere human actions (specially the religious or cultural act).

The government and the considered authorities should take certain initiative in order to motivate and guide the people of India about the importance of the preservation of river Ganga without offending the view of the people related to religion and culture. It would be tough and government is still working on such initiatives, especially at the time of festivals, such as eco-friendly Lord Ganesh idol at the time of the auspicious festival of Ganesh Chaturthi. But still they need to put more efforts and focus, irrespective of the time, day, or festival to guide the people of India to stop such activities that may cause pollution in river Ganga and form a community to preserve the river, both by stopping others and self causing any harm (pollution) to the river and cleaning the river Ganga considering it their moral duty or value or responsibility.

India and Germany signed an agreement for cleaning Ganga

- The agreement was signed on April 13, 2016 between ministry of resources, river development and Ganga Rejuvenation and German international cooperation (GIZ), in the presence of water ministry secretary Shashi Shekhar and German ambassador to India Martin Ney. According to the agreement, India will allow Indo-German Knowledge exchange on strategic river basin management issues, effective data management system and public engagement. German contribution in 3 year long project is 22.5 crore.
- The initiative was pitched during Indo European water forum organised by national water mission co-partnered with the environment directorate-General of the European Commission in November 2015.
- The project begin from Uttarakhand with the expansion of other states in downstream. India plans to adopt successful river basin management strategies to clean river and replicate the Rhine and Danube model.

The Cause of pollution on the Ganges River

- **Organic waste**

  Organic waste, or sewage is one of the major cause for the pollution of river Ganga. Around 2900 million kilogram of sewage are pumped into Ganga river. Out of this 31% of sewage is received in the form of treatment (Pokharel) and the rest 69% is dumped into the Ganga as raw sewage, just like what we flush down into the toilet. The count of coliform bacteria at the confluence of the Salori sewage with the Ganges river is 15,000 mpn/100 ml, as compared to the government limit of 500 mpn/100 ml, is an indication of human or animal waste. In addition, BOD (Biological Oxygen Demand) level increased to 5mg/l from 3.5mg between the year 2006 and 2011.

- **Industrial waste**

  Chemical waste is another major source of pollution, 20% of the pollution entering the Ganges are of this type and come from the sources such as paper mills, sugar mills, and tanneries. Chemicals like arsenic, cadmium, mercury, sulphuric acid. Chemical dyes and other effective metals are frequently find their way into the river which is a major threat.

Companies like pharmaceutical dump hydrochloric acid and acetone into the river. All these chemicals are very dangerous to the environment as well as to the people who drinks the water.

- **Death Rituals**

  The rituals of believing mother Ganga as goddess in many parts of India, believing that she will purify souls, many people hope to be placed in waters after their death to raise the souls up in the caste system in their upcoming lives and then acquire Moksha. After people's death, their asthia are dumped in Ganga water to get mukti from the world. Khumbha Mela is a big gathering in India as is celebrated as a festival where billion peoples come to take bath as Ganga Snans. People throw many materials like waste, food, flowers, leaves, fruits (or prashad) and even take bath (snan) at Ganges river for spiritualistic reason.

- **Agriculture runoff and improper agriculture practices**

  During the monsoons or whenever there are heavy showers, we will find the traces of fertilisers and pesticides which are washed into the holy river Ganga. When the agriculture inputs are diffused throughout the river basin, such point is known as the non-point sources of pollution. It's not only about ganges but for the other rivers of the country. In Haryana, the concentration of chlorides is 250,000 kg/day which is drained into the Yamuna river 32mg/l just upstream drain confluence to 150mg/l just downstream of it.

  According to CPCB, some of the seepage contains over 15,000mg/l of chlorides. Large use of chemical fertilisers, pesticides, weedicides are the new dimension to such pollution. Flood-plain cultivation is another contributor to water pollution.

  When more doses of chemical fertilisers are used, then it not only pollute water but it also pollute land and air, as said by A.K. DIKSHIT, scientist with Indian agricultural research institute (IARI), New Delhi.

- **Withdrawal of water**

  In the upper course areas, particularly Himalayan rivers have plenty of water. They are, however, starved of water when they enter the plain area. Irrigation whisk away clean water and denying water to flow in the river downstream. As the quantity of fresh water is very small, pollution either from urban and rural areas, industries—cannot get diluted and its ill effect are not reduced. Upper Ganga canal and lower Ganga canal have left the downstream of Ganga almost dry. When the Yamuna and Ganga flow passes through Delhi and Kanpur, they are turned into sinking sewers. Therefore, it is essential that minimum level of water is maintained in river. According to a report of the Ministry of water Resources on the study of minimum flows in the Ganga, there is huge impact on the water quality. Further, the study has expressed the view that it is not possible to fix the minimum flow of water in the entire course of river because it depends on the discharged of pollutants which creates pollution at different points of river. For example, the existing minimum flow of Ganga at Kanpur in May is hardly 50 cubic meters per second whereas minimum requirement is 350. The study further says that further we cannot add fresh water for dilution.

Effects of pollution in River Ganga

- Riverine Life – The pollution in the river Ganga has increased day by day and by this pollution marine life would lost in coming future and this contaminated water disturb and affect the river's ecosystem. And Hydroelectric and irrigation dams offer struggle to life in their life cycle. River Ganga is considered to be a home to approximately ninety amphibian species, one hundred and forty fish species, and endangered Ganges river dolphin.

- Bio Life – Many dams are built along the Ganga basin. A large volume of water is collected in the dams and this is dangerous for wild life that are living around river Ganga. About 1200 hectors of forest would be submerged by Kotli Bhel dam at Devprayag. There has been warning that wild animals will find it troublesome to cope with the changing scenario.

- Human Beings – An analysis of the river Ganga in 2016 displayed vital associations between enteric/water-borne disease incidence and the use of river water for washing, bathing, laundry, eating, brushing teeth and cleaning utensils. Exposure factors such as lack of sewerage toilets at residence, washing clothes, bathing and children defecating outdoors, poor sanitation, low income and low education levels additionally showed vital associations with enteric disease outcome. Ganges water has been correlate to catching infectious diseases, hepatitis, cholera, and severe diarrhoea that still a leading cause of death of children in India.

- Although irrigation has increased considerably in the country, because of which there is problem of high salinity in the river Ganga.

Possible solutions- to reduce pollution in river Ganga

Cleaning the Ganga step by step

- Firstly the brain-scale management as we know Ganges is a complex transboundary basin which flows across different states. Therefore basin-scale approach would help to manage the water resources in much better way. It requires close coordination among all the countries which are sharing Ganga, such as Nepal and Bangladesh, so that upstream and downstream users are taken into consideration. We can say that existing treaties on 'sharing water resources' could be retermed or renegotiated as 'shared management of water resources'.

- Secondly the river Ganga is highly polluted, still 400 million people living along the banks of the river rely on its natural system for their livelihoods. World bank report says that a number of efforts by government (Ganga action plan phase 1 and 2) have address the pollution problem, but the results so far are very disappointing. Sewage constitutes 80% of pollution load caused by industrial discharge activities. With agriculture activities near Ganga river, particularly in urban and urban peri areas, farmers basically rely on waste water for irrigation which poses serious public health risk.

- Thirdly, environmental flows are essentially the water requirements of aquatic ecosystems and of basic human and social needs. The concept behind the environmental flow only refers to the quantity of water required to maintain river ecology under different environmental conditions. Different innovative methods for maintaining environmental flows and the water quality during environmentally critical periods, along with procedures for implementing these methods, need to be investigated. Cities, towns and industrial estates are most vulnerable to flooding in the Ganges river basin. Major investments are done to address climate variability. Existing flood forecasts are too much technical and not easily understand by the public. Innovative approaches such as underground taming of floods for irrigation and aquifer management could offer solutions to the flood problems.

- Lastly towards the common goal, the steps taken by the government to clean the river Ganga. Successful implementation of this task would be possible only if there would be partnerships with various stakeholders. The private sector and civil society groups has also shown there interest in cleaning of the river Ganga, especially at critical points (Varanasi). By taking small steps, we can still reduce the pollution load and restore the river to people.

CONCLUSION

There are certain human activities which are hindering the success of initiatives of cleaning river Ganga. The anthropogenic activities, which are done deliberately or even unconsciously, have adverse effects, not only on the quality of drinking water for humans but also on the life of many species. In order to work on certain possible solutions to reduce pollution in river Ganga, the government of India along with the considered authorities should take certain steps in order to clean river Ganga. The people of India should understand the importance of the preservation of river Ganga and should take actions accordingly. Government of India need to put more efforts and focus to aware the Indian citizens to stop activities that causes pollution in river Ganga and form a community to preserve the river, both by stopping others and self, causing any harm to the river Ganga. There must be a proper environmental planning of

the Ganga River in future. The industrial and agricultural waste management programme and law should be form and implement as soon as possible so that the industries and farmers must not dispose hazardous and harmful chemical waste in the rivers without knowing the repercussions.

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