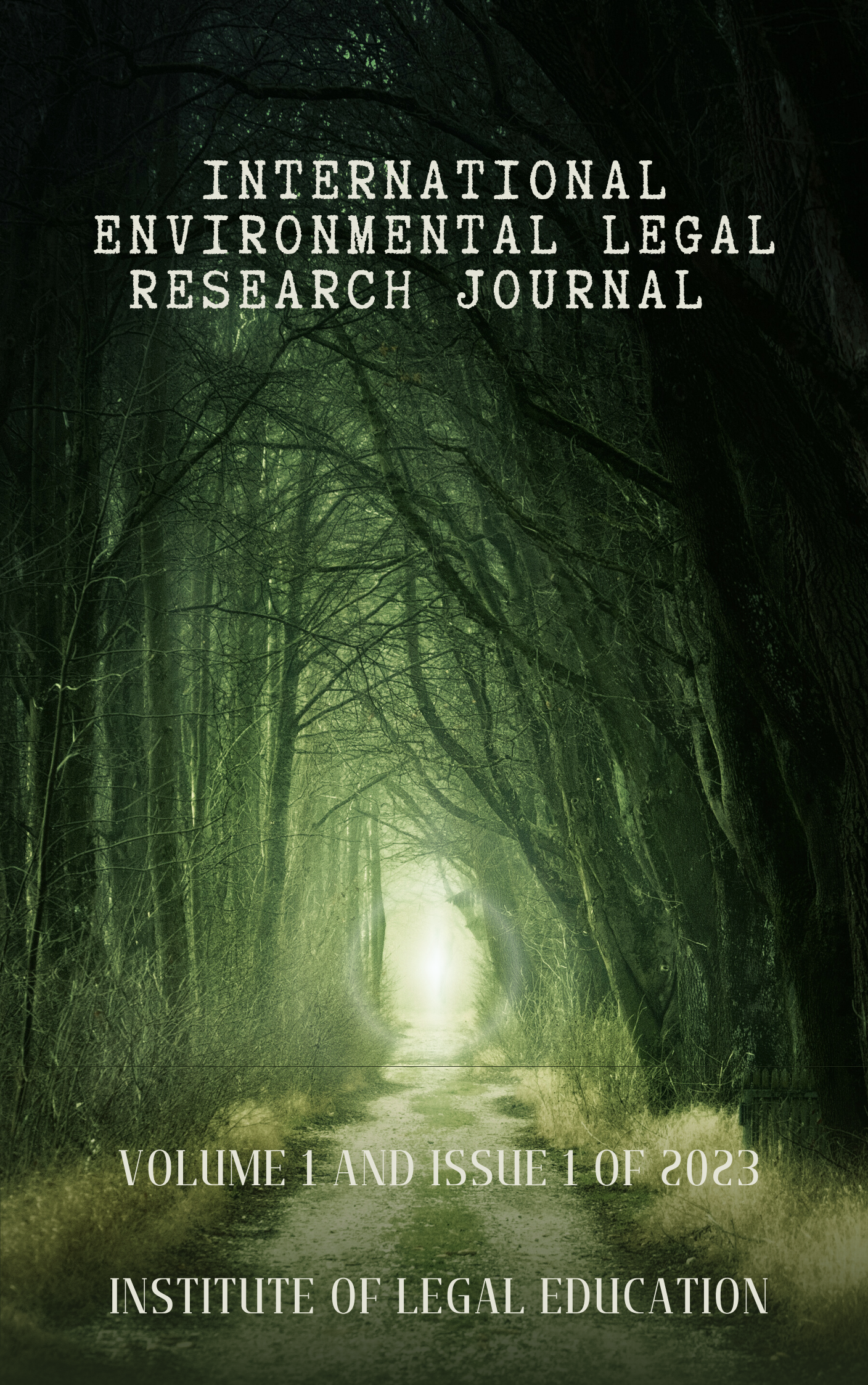


INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL

VOLUME 1 AND ISSUE 1 OF 2023

INSTITUTE OF LEGAL EDUCATION

International Environmental Legal Research Journal (Open Access Journal)

Journal's Home Page – https://ielrj.iledu.in/

Journal's Editorial Page - https://ielrj.iledu.in/editorial-board/

Volume 1 and Issue 1 (Access Full Issue on - https://ielrj.iledu.in/category/volume-1-and-issue-1-of-2023/)

Publisher

Prasanna S,

Chairman of Institute of Legal Education (Established by I.L.E. Educational Trust)

No. 08, Arul Nagar, Seera Thoppu,

Maudhanda Kurichi, Srirangam,

Tiruchirappalli – 620102

Phone : +91 94896 71437 - info@iledu.in / Chairman@iledu.in

© Institute of Legal Education

Copyright Disclaimer: All rights are reserve with Institute of Legal Education. No part of the material published on this website (Articles or Research Papers including those published in this journal) may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher. For more details refer https://ielrj.iledu.in/terms-and-condition/

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL

Volume I and Issue I of 2023

ISBN - 978-81-960677-0-0

Published by

Institute of Legal Education

https://iledu.in

CASE STUDY OF GANGA POLLUTION

Author - Andey Bharathi, Anya Nitin Parikh, Bhimanapati Deepthi & Ch Meher Manogya Lakshmi, Students of Symbiosis Law School, Hyderabad.

Best Citation - Andey Bharathi, Anya Nitin Parikh, Bhimanapati Deepthi & Ch Meher Manogya Lakshmi, CASE STUDY OF GANGA POLLUTION, *INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL*, 1 (1) of 2023, Pg. 27, ISBN - 978-81-960677-0-0.

ABSTRACT

The River Ganga is considered as a river of worship, devotion, faith, and is also the national river of India flowing through various states in the country. Though the river is considered to be the most sacred river in the country, it is extremely polluted owing to untreated sewage water, and industrial effluents caused by rapid industrialization and growth in the Ganga basin. The dependency of the surrounding population has increased drastically and 'wastes' dumped directly into the water have ruined the quality of the river, as the rate at which the river is being polluted is much higher than its ability to heal itself.

Due to the intensity of pollution, the Government was forced to step in and take initiatives to better the quality of the water such as the Ganga Action Plan I and II, Namami Gange, and others. Further, the judiciary has also made an attempt to provide judgments that would hinder the unethical practices which have polluted the river over the years. However, these actions from both the legislature and the judiciary have not been efficient in cleaning up and restoring Ganga to its original state. This paper, therefore, tries to provide a legal understanding of the policies, cases, and other government actions taken as well as provide recommendations to the policy that can create a positive impact on the current situation of the river considering the pandemic, using an empirical study conducted with students of law as the population.

Keywords: Ganga/Water Pollution, Ganga Action Plan, NGT Tribunal, Water Quality Index.

INTRODUCTION

Rivers India is a large country which has been endowed with a number of water resources. The riverine systems of the country are stretched across the length and the breadth of the countries and are approximately 45,000 km. The around 12 major rivers, along with several medium and minor river basins in India.

The river Ganga is the largest among them all and it originates from the Gangotri Glacier is considered as extremely holy in India. The length of the river is around 2,525 km, the longest in India and second greatest around the world by water discharge. It rises from the Western Himalayas to go to the Bay of Bengal through Bangladesh and extends across many states in north India like Haryana,, Delhi, Bihar, Himachal Pradesh, Jharkhand, Chhattisgarh, and West Bengal etc [34]

Due to the rapidly increasing population and subsequent exponential growth in industrialisation and urbanisation, rise in the standards of living have exposed all resources including water to several forms of deterioration. Most rivers in India, including Ganga have become extremely polluted and in some stretches even unfit for bathing.[35] Initially the pollution was only limited to the lower and middle stretches but the rapid growth and recently caused the upper stretches also to be declared as unsafe. The pollution and degradation of Ganga is caused by many

[34] Alternate Hydro Energy Centre IIT Roorke, *Status Paper on River Ganga*, National River Conservation Directorate Ministry of Environment and Forests - Government of India, (August 2009), https://www.iitr.ac.in/wfw/web_ua_water_for_welfare/water/Status_paper_on_River_Ganga_2009.pdf.

[35] Ibid.

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

activities like bathing of humans and animals, agricultural and industrial sewage, tourism,[36] solid and biochemical waste disposal, usage of vast quantities of water by canals, deforestation, construction of dams, waste disposal from temples and religious practices etc.[37]

Ganga has been named as one of the heavily polluted river basins in the world and has a population density around 1,000 inhabitants per square mile. In the year 2007 Ganga was named as one of the top 5 polluted rivers around the world.[38]

The Ganga River being polluted has a significant threat to human life and environment in general as it is one of the largest rivers.[39] The deteriorating quality of water due to careless human activities, is becoming a huge environmental concern. The river, heavily polluted with industrial contaminants and also human waste, provides water to about 40 per cent of India's population across 11 states, causing extreme damage.[40]

There have been several attempts to clean up Ganga in the past, but mostly they have been unsuccessful. These initiatives will be studied in this paper in detail, along with the present status of the river and the causes for its pollution. Further a study has been conducted among law students to understand their take on the effectiveness of the initiatives to clean up ganga and their recommendations on methods through which the river can be cleaned up in the future.

HYPOTHESIS

The research aims to test if the following hypotheses are true based on the responses of a survey conducted amid law students:

Hypothesis 1 - The government policies/initiatives had a positive impact on the reduction of pollution in river Ganga.

Hypothesis 2 - The reduction in human interaction with the River Ganga will reduce its pollution.

Hypothesis 3 - There is a need for change in the government policies to see a reduction in pollution of the Ganga River.

LITERATURE REVIEW

For this research paper, the literature used stems from the very root of the topic, that being "Case study of Ganga Pollution." A large amount of scholarly attention has been given to this topic, and an abundance of secondary literature published in various journals, publications, books, papers, articles as well as judgements from India and common law countries have been reviewed. The researchers have studied the following to understand the views of various researchers and experts in this field of academia.

The paper titled "*Pollution and Conservation River in Modern India*"[41], Basant Rai explains the various ways in which pollution is leading to reduction in the water quality of all the rivers in India, including Ganga. It further also explains

[36] Kenda Conley, *Wastewater treatment plants as a source of microplastics to Urban estuary: Removal of efficiencies and loading per capita over one year*, Water Res X, (April 1, 2019), https://doi.org/10.1016/j.wroa.2019.100030.
[37] Dalchand Jhariya, *Ganga River: A Paradox of Purity and Pollution in India due to Unethical Practice*, IOP Conference Series Earth and Environmental Science, (Decembre 2020), https://www.researchgate.net/publication/347803519_Ganga_River_A_Paradox_of_Purity_and_Pollution_in_India_due_to_Unethical_Practice.
[38] Basant Rai, *Pollution and Conservation of Ganga River in Modern India*, International Journal of Scientific Research and Publication, (April 2013), https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.439.2856&rep=rep1&type=pdf.
[39] Cameron Conaway, *The Ganges River is Dying Under the Weight of Modern India*, Newsweek Magazine, (23 September 2015), https://www.newsweek.com/2015/10/02/ganges-river-dying-under-weight-modern-india-375347.html.
[40] IANS, New Delhi, *Ganga receives 2900 million litres of sewage daily*, Hindustan Times, (April 12, 2012), https://web.archive.org/web/20150909164033/http://www.hindustantimes.com/newdelhi/ganga-receives-2-900-million-ltrs-of-sewage-daily/article1-842037.aspx.
[41] Basant Rai, *Pollution and Conservation of Ganga River in Modern India*, International Journal of Scientific Research and Publication, (April 2013), https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.439.2856&rep=rep1&type=pdf.

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

the methods through which conservation efforts can be undertaken, along with the already existing efforts of the government. However this is a general overview of all the rivers, and thus does not provide information extremely specific to Ganga.

The paper titled, "*Conservation of Ganga River - is Public Participation the Key*[42]" by Pranav Awasthi shed light on the importance of the executive in decision making in matters relating to Pollution and their failure to garner public and local support which leads to the executive being unable to reach the goals they have set.

The paper titled, "*Seasonal dynamicity of environmental variables and water quality index in the lower stretch of the River Ganga*,"[43] by Chakresh Kumar was helpful in understanding the quality of water in the lower stretch of Ganga in recent times. This study provided information with recent figures related to ganga pollution and was extremely significant to our study. However it was restricted to the seasonal dynamicity of the variable and did not study the river quality for the period of one year as a whole.

The paper titled, "*Investigation Over Water Quality Of Rivers Ganga And Yamuna During Kumbh-2019-A Case Study At Prayagraj (Allahabad), Uttar Pradesh, India,*"[44] by Richa Mishra was helpful in understanding the effects of human interaction with the water quality in Ganga. This assisted us in recognizing the effects of increased human activities. However, this study was only restricted to studying the effects of human interaction due to Kumbh Mela.

The paper titled, "*Ganga water pollution: A potential health threat to inhabitants of Ganga basin,*"[45] by Sanjay Dwivedi was effective in communicating the potential health effects of the pollution of Ganga. It helped us in understanding the various adverse health effects due to water pollution of the basin. Further, the paper titled, "*Ganga River: A paradox of Purity and Pollution in India due to unethical Practice*"[46] by Dalchand Jhariya was a study regarding the pollution which occured due to the holy status of ganga in Hindu Religion. It also studied the effects of rapid industrialisation on the river ganga. This helped us understand the dimension of religion and its effect on water quality.

The paper titled, "*Water Quality of River Ganga – Pre and Post GAP: A Review,*[47]" by Saba Hasan, the author briefly explains the Ganga Action Plan and its objectives. Further, the author analyzes the quality of the river pre and post implementation of GAP and assesses the impact of GAP on abatement of pollution.

The paper titled, "*Status Paper on River Ganga*[48]", by IIT Roorkee, gives a brief overview of course, demography, and physiographic aspects of the Ganga Basin. The paper enlightens about the approach of GAP, its phases, and institutional arrangements made with respect to it. Furthermore, the paper critically analyzes GAP while evaluating the water quality status of the Ganga River.

[42] Pranav Awasthi, *Conservation of Ganga River - is Public Participation the Key*, Environment Law and Practice Review, (2016) 5 ELPR 107.
[43] Chakresh Kumar et al, *Seasonal dynamicity of environmental variables and water quality index in the lower stretch of the River Ganga*, Environmental Research communications, (26 July 2021), https://iopscience.iop.org/article/10.1088/2515-7620/ac10fd/pdf.
[44] Richa Mishra et al, *Investigation Over Water Quality Of Rivers Ganga And Yamuna During Kumbh-2019-A Case Study At Prayagraj (Allahabad), Uttar Pradesh, India*, Pollution Research, (August 2021), https://www.researchgate.net/publication/353719515_Investigation_over_water_quality_of_rivers_Ganga_and_Yamuna_during_Kumbh-2019_at_Prayagraj_Uttar_Pradesh_India_Pollution_Research.
[45] Sanjay Dwivedi et al, *Ganga water pollution: A potential health threat to inhabitants of Ganga basin*, Environment International, (August 2018), https://doi.org/10.1016/j.envint.2018.05.015.
[46] Dalchand Jhariya, *Ganga River: A Paradox of Purity and Pollution in India due to Unethical Practice*, IOP Conference Series Earth and Environmental Science, (Decembre 2020), https://www.researchgate.net/publication/347803519_Ganga_River_A_Paradox_of_Purity_and_Pollution_in_India_due_to_Unethical_Practice
[47] Saba Hasan, *Water Quality of River Ganga – Pre and Post GAP: A Review*, International Journal of Advanced Research in Science, Engineering and Technology, Vol. 2, Issue 1, (2015).
[48] Alternate Hydro Energy Centre IIT Roorkee, *Status Paper on River Ganga*, National River Conservation Directorate Ministry of Environment and Forests - Government of India, (August 2009), https://www.iitr.ac.in/wfw/web_ua_water_for_welfare/water/Status_paper_on_River_Ganga_2009.pdf

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

The paper titled, *"Ganga Action Plan-A Critical Analysis*[49], by Rakesh K Jaiswal, the author interprets the GAP, its organizational structure, and key areas focused during two phases in a comprehensive manner. Further, the author elucidates upon the limitations of GAP and analyzes the reasons for the failure of GAP.

The paper titled, *"SWOT Analysis of Ganga Action Plan,*[50]" by the IITs, focuses on the strengths and weaknesses of the GAP with respect to design, implementation, operation and maintenance. Further the paper sheds light on the challenges faced during the implementation of GAP and discusses further opportunities to rejuvenate the Ganga River.

The paper titled, *"The Ganges and the GAP: an assessment of efforts to clean a sacred river*[51]" by Priyam Das and Kenneth R. Tamminga provides an in-depth analysis as to the effects the Ganga Action Plan was able to have. Through their study, the authors outline potential recommendations and future actions the country can take towards a cleaner Ganges. The paper titled, *"Cleaning of the Ganga*[52]" by Subhajyoti Das sheds light on the ideas and action plans for restoring the Ganga to its original state. The author emphasizes the need to start rapid action for improving the quality of the water.

The paper titled, *"Towards a healthy ganga—improving river flows through understanding trade offs*[53]*"* by Nitin Kaushal et al, reiterates upon various recommendations, challenges and possible solutions towards a cleaner Ganges. The authors outlined several unique solutions that were not just based on improving the water quality but also sustaining the levels and volume of water.

Though there is immense literature on the status of the river, the importance that it plays in the geography of India, the causes of such pollution and others. There is limited literature on the future aspects of the Ganga Pollution with specific reference to Policy. This Paper therefore aims to shed light on the importance of policy decisions that engage the local population of Ganga to own their river, and other such similar manners in which policy can be amended to better the future of Ganga through an empirical study involving students of law.

CHAPTER I - INITIATIVES TAKEN BY THE GOVERNMENT TO REDUCE POLLUTION OF THE GANGA RIVER

The pollution in Ganga River has been rising continuously, and in order to revamp its water quality, an action plan called Ganga Action Plan (GAP) was framed in 1984. This action plan was implemented based on a survey conducted by the Central Pollution Control Board under "Assessment and Development Study of River Basin Series (ADSORB)" on the Ganga Basin. This plan was launched in 1986 with an aim to restore the water quality level of Ganga to the permissible standards by prevention of the discharge of pollution load into the river. This plan emphasized on abating pollution with main focus on sewage treatment plants, interception and diversion facilities. This plan is the first-ever substantial effort on a national level for decreasing the pollution of Ganga River.

Based on recommendations given by the Monitoring Committee in 1987, the aim of the Plan was changed to restoration of the water quality level to the Bathing Class (Class B). During the Phase I of GAP, in 25 Class I towns in

[49] Rakesh K Jaiswal, *Ganga Action Plan-A Critical Analysis*, Eco Friends, (2007).
[50] *SWOT Analysis of Ganga Action Plan GRB EMP: Ganga River Basin Environment Management Plan*, Indian Institutes of Technology, December 2011, available at: http://nmcg.nic.in/writereaddata/fileupload/50_006GEN.pdf.
[51] Priyam Das, and Kenneth R. Tamminga, *The Ganges and the GAP: an assessment of efforts to clean a sacred river*, Sustainability 4(8), (2012).
[52] Subhajyoti Das, *Cleaning of the Ganga*, Journal of the Geological Society of India 78.2 (2011).
[53] Nitin Kaushal, Suresh Babu, Arjit Mishra, Nilanjan Ghosh, Vinod Tare, Ravindra Kumar, Phanish Kumar Sinha, and Ram Ujagir Verma, *Towards a healthy ganga—improving river flows through understanding trade offs*, Frontiers in Environmental Science 7 (2019).

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

Uttar Pradesh, West Bengal, and Bihar pollution abatement schemes were taken up. As Phase I could only address a part of the pollution abatement, between 1993 and 1996 Phase II was launched in stages. The Phase II concentrated on 59 towns along the Ganga River in 5 states – West Bengal, Bihar, Jharkhand, Uttar Pradesh, and Uttarakhand. The second phase also covered major tributaries of Ganga, namely, Damodar, Gomti, and Yamuna. During Phase I, schemes of I&D and STP were not executed in a full-fledged manner due to inadequate understanding of generating wastewater and treatment technologies available at hand.[54] However, in Phase II, an attempt was made to tackle the inadequacy with assessment of several technologies to select a suitable option for a geographic location.

This Action Plan had many limitations with respect to its implementation. This plan was able to tackle only a certain part of the pollution load. It only focused on improving the water quality in terms of dissolved oxygen and organic pollution. Further, there was focus only on sewage from towns flowing into the rivers. And solid waste management, household toilet connections, which form important aspects of municipal activities and that intrude the water quality, was neglected.[55] Moreover, GAP did not ensure proper environmental flows. This concept has gained importance due to the increasing demands on the Ganga river water such as power generation, irrigation, and drinking. Adoption of effective water conservation practices would have led to decrease in dependency on Ganga for abstraction of water.

There was no appropriate upkeep on the pollution load discharged from nonpoint sources. The plan has also not taken into consideration the water flow from agricultural lands that bring non-biodegradable pesticides into the river. While planning new or expansion of settlements, measures requisite for prevention of Ganga pollution was not taken into consideration.[56] Groundwater and surface water interaction, as well as watershed development was not part of GAP. There was no effective monitoring of pesticides, heavy metals, phosphorus, and nitrogen.[57] These parameters gained significance due to rapid urbanization and industrialization.

In 2009, the Government developed a comprehensive plan for conservation of Ganga with the establishment of National Ganga River Basin Authority (NGRBA) under Section 3(3) of the Environment Protection Act, 1986, and hence gives it strong regulatory and enforcement powers.[58] This plan had a modified approach towards various sectors, namely, river front development, industrial pollution, solid waste management, and waste water management. This is a collaborative institution of both the central and state governments. All the five Ganga basin states have also established the State Ganga River Basin Authority for efficient implementation of the NGRBA program. The main aim of this authority is to protect the drainage basin that is released into the Ganga River by way of safeguarding it from overuse or pollution. Additionally, in 2011, under the Societies Registration Act 1860, National Mission for Clean Ganga was registered. It is the implementation wing of NGRBA.

Further, in 2014, the Union Government launched the Namami Gange Programme to achieve twin objectives of reducing pollution, conservation and rejuvenating the Ganga River. Later on, NGRBA was replaced with a new body formed under the Environment Protection Act, 1986, i.e., National Council for River Ganga (Rejuvenation, Protection, and Management). This body is

[54] Saba Hasan, *Water Quality of River Ganga – Pre and Post GAP: A Review*, International Journal of Advanced Research in Science, Engineering and Technology, Vol. 2, Issue 1, (2015).
[55] *Supra* note at 1.
[56] Rakesh K Jaiswal, *Ganga Action Plan-A Critical Analysis*, Eco Friends, (2007).
[57] *SWOT Analysis of Ganga Action Plan GRB EMP: Ganga River Basin Environment Management Plan*, Indian Institutes of Technology, December 2011, available at: http://nmcg.nic.in/writereaddata/fileupload/50_006GEN.pdf.
[58] National Ganga River Basin Authority, https://cpcb.nic.in/ngrba/about.html, (last visited Apr. 3, 2022).

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

responsible for prevention of pollution and rejuvenation of the Ganga River Basin, inclusive of River Ganga and its tributaries. This has been given a Mission status with corresponding powers under the Environment (Protection) Act, 1986 to take cognizance of the provisions and follow up. It is anticipated that this move will make sure an active reduction of pollution conservation of Ganga River, and an ecological balance. Additionally, this program also proposes to conduct research on the quality of water and condition of the river.

CHAPTER II – PRESENT SITUATION OF WATER QUALITY OF GANGA RIVER

The banks of Ganga are surrounded with some heavily urbanised and have consequently been putting a lot of pressure on many rivers including Ganga.[59] There are extremely intense urban localities and industrial zones on the lower stretch of Ganga particularly such as Kanpur, Varanasi, Barrackpore, Kalyani, Tribeni, Diamond Harbour and Kolkata . On a daily basis there are a number of activities which affect the quality of Ganga water such as discharge of untreated industrial and municipal waste, wastage from tourism and religious activities.[60]

As per a Central Pollution Control Board (CPCB) report of 2014,[61] approximately 8250 million L/day (MLD) of wastewater is created due to the human settlements along Ganga. Around 2550 MLD of this wastewater is directly discharged into river Ganga without being treated. Scientists have also further stated that the value of WQI (Water Quality Index) of the lower stretch of the river was between 1452 and is deteriorating continuously regardless of when the samples were collected.[62]

A study based on Change of Water Quality Index in Upper Ganges[63] elucidated the present condition due to pollution. It stated that the total dissolved solids (TDS) consisted of inorganic salts like carbonates, chlorides, iron etc., and that their value was below the Bureau of Indian Standards (BIS) desirable limit. The values of Magnesium, ferrous iron, Chlorides, and Fluoride were found to be more that the BIS desirable amounts. This could be due to the increase in pollution because of sewage and the agricultural runoff into the water.[64]

The WQI was also found to be very poor in the areas of Rishikesh, Haridwar and Bhogpur as there is intense human interaction due to hotels, shops, and transportation for religious purposes. However, in areas of Kaudiyala and Shivpuri there were better WQI conditions as there was less human interaction and the river was more in contact with nature.[65]

In another study conducted based on Kumbh Mela and how it affects the pollution[66] stated that the overall pollution was high during the Mela. This was due to the participation of 10-15 million devotees, which led to continuous mass bathing, ashes immersion, and sewage discharge. The pollution in the lower stretch of the river Ganga was conducted in a 2021 study. [67] In this study the WQI was studied, and it

[59] Tare et al, *Ganga River Basin Environment Management: Interim Report*, IIT Consortium (August 2013), http://mowr.gov.in/sites/default/files/GRBEMPInterimReport_2.pdf.
[60] Muduli et al. *Water Quality assessment of the Ganges River During COVID-19 Lockdown*, International Journal of Environmental Science and Technology, (2021).
[61] Central Pollution Control Board, *Status of Sewage Treatment Plants in Ganga Basin*, Government of India, (2014), http://cpcb.nic.in/newitems/8.pdf.
[62] India Today Web Desk, *Water quality in lower stretches of Ganga alarming : Study*, India Today, (December 2021), https://www.indiatoday.in/science/story/ganga-river-water-quality-detriorating-floods-pollution-1885597-2021-12-08.
[63] Pradip et al, *Impacts of Land Use Change on Water Quality Index in Upper Ganges River near Haridwar, Uttarakhand: A GIS- Based Analysis*, Water, (13 December, 2021), https://doi.org/10.3390/w13243572.
[64] Ibid.
[65] Ibid.
[66] Richa Mishra et al, *Investigation Over Water Quality Of Rivers Ganga And Yamuna During Kumbh-2019-A Case Study At Prayagraj (Allahabad), Uttar Pradesh, India*, Pollution Research, (August 2021), https://www.researchgate.net/publication/353719515_Investigation_over_water_quality_of_rivers_Ganga_and_Yamuna_during_Kumbh-2019_at_Prayagraj_Uttar_Pradesh_India_Pollution_Research
[67] Chakresh Kumar et al, *Seasonal dynamicity of environmental variables and water quality index in the lower stretch of the River Ganga*, Environmental Research communications, (26 July 2021), https://iopscience.iop.org/article/10.1088/2515-7620/ac10fd/pdf

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

categorically stated that the water quality is deteriorating in the lower stretch of ganga at a rapid pace. The water pH was observed to be less in the lower stretch of Ganga than the pH observed in upper steam.[68] It was also further discovered that the level of dissolved nitrogen in the lower stretch of ganga was much lower than the stipulated limits. Collectively it was stated that the lower stretch of Ganga had bad water quality which was not suitable for usage under Category B, C, D and E of CPCB.[69]

The effects of pollution have led to a difficulty for survival of native species in the river.[70] At least 10 species including the Dolphin which has been placed in the endangered list, face extinction in the river ganga.[71]

The rapid changes in the quality of the water have had a cascading effect on the health of the whole ecosystem which is dependent on the river including human beings. Further it has also been studied that if there is an increase in human activity and climate change, there could be an alteration in the flow of Ganga which can have devastating impacts such as more floods in that region.[72]

The present situation of Ganga is that in most areas of human interaction the quality of water is very poor in whatever scale it is measured. In most cases it is not safe for consumption or even bathing. There are numerous harmful chemicals which are not being treated and thus are affecting the species in the river and also dependent on the river. Even though there are pollution plants, usually they are not functioning or are below the level of treatment which is required. If the interaction with the river is not reduced in most forms, including dams, the river could change its course in the future which would lead to extreme consequences to all the regions in its vicinity.

CHAPTER III - PROMINENT JUDICIAL DECISIONS

The Judicial system in India has a very limited role in the control of the pollution and the curbing of the same as the executive is believed to be the better enforcing agency that can enable and create change. However, with the case of ***MC Mehta v Union of India***,[73] the Supreme Court rendered its landmark decision on the matter of water pollution. In the said case, the enforcement of a decision of the Supreme Court in *MC Mehta v. Union of India and others*[74] was in question.

The 1986 case was regarding the nature of the pollution that is caused by the industries that use chlorine and other such similar hazardous material and the directions issued for the same in the wake of the Bhopal gas Tragedy. The Court further held that the industries were also found to be responsible for the pollution of Ganga and would therefore be taken up on the next occasion.

The 1988 case was the next occasion on which the industries around the Kanpur area were brought under the hammer to decide regarding the pollution that they were generating. It was recognized that the Water Pollution (Prevention and Control of Pollution) Act, 1974 levied certain responsibility on the local bodies of each municipality around the Ganga River to take action in cleaning up and taking measures to clean up the Ganga by levying relevant restrictions on the industries. This however did

[68] Tiwari et al, Time *scale changes in the water quality of Ganga Rover, India and estimation of suitability for exotic and hardy fishes*, Hydrology Current Research, (2016), https://www.hilarispublisher.com/open-access/time-scale-changes-in-the-water-quality-of-the-ganga-river-india-and-estimation-of-suitability-for-exotic-and-hardy-fishes-2157-7587-1000254.pdf

[69] Ibid.

[70] Bhutiani et al, *Assessment of Ganga River ecosystem at Haridwar, Uttarakhand, India with reference to water quality indices*, Applied Water Science, (2014), https://doi.org/10.1007/s13201-014-0206-6.

[71] Toufiq Rashid, *At least 10 species in the Ganga face extinction: Ministry Reports*, Hindustan Times, (May 27, 2018), https://www.hindustantimes.com/environment/at-least-10-species-in-the-ganga-face-extinction-say-ministry-reports/story-ecpjjZPoeiMZofK6oRexEL.html.

[72] India Today Web Desk, *Climate Change altering Ganga's flow, more flood predicted: Study*, India Today, (November 18, 2021), https://www.indiatoday.in/science/story/climate-change-ganga-river-water-flow-alkananda-dams-1878231-2021-11-18.

[73] MC Mehta v. Union of India, (1988 AIR 1115).

[74] MC Mehta v. Union of India and others, (1987 AIR 965).

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

not happen as there was no action taken up by the municipalities, and this led to water sewage trouble in various areas.

This PIL was therefore filed in order to create some change and the court directed all municipalities around the Ganga River in specific Kanpur to prevent pollution by moving the diaries around the river to outside the city, invest in better sewage systems, and take immediate action to create more public urinals so as to maintain the cleanliness. The Court further importantly held that dead bodies and semi-burnt bodies cannot be thrown into the river and directed for industries to be found responsible for the water pollution. This case laid the foundation in creating directions to the government and the executive to take necessary action to prevent pollution and protect the river.

Most cases after the case of MC Mehta, utilized the ratio in levying costs and damages on industries that are found polluting. This included the case of ***Krishna Kant Singh v. National Ganga River Basin Authority***[75], where the court levied a fine of Rs.5 crore against a sugar mill for the pollution it caused to the Ganga River water by upholding the principle of polluter pays. In the said case, Simbholi Sugar Mills and Distillery and other industries were discharging harmful effluents into the river. The Court derived the principles of reasonable care and specific negligence in causing environmental damage from the MC Mehta case and held that the industries were "polluting units" and therefore are liable to pay and compensate the Pollution Board to rejuvenate the ganga.

In the recent case of ***Adil Ansari v M/s. Dhampur Sugar Mills Ltd and Others***[76], the NGT fined the industry that was creating water pollution and violation of environmental laws on a continuous basis. The Tribunal imposed a fine of Rs. 20 crores with Rs. 5 crores being levied on each of the four units that were under scrutiny. The Court held that there was a clear case of continuous violations based on the reports filed by the UP-Pollution Board and the industry has been indifferent to the pollution due to which the fine was levied. This came as an extension of the previous cases where the industries are being levied fines as a last resort to restore the river.

In addition to the same in the case of ***Saurabh Tiwari v. Union of India***,[77] the NGT held that the though the relevant plans to clean the ganga are in place, there is a need for remedial action considering the ground level situation and decided based on the suggestions of the supervisory and execution committees that there is need to take restoration measures and keep checks on the officers responsible for the same so as to ensure that is being appropriately followed and must be tracked by the NMCG and CPCB.

The most recent judgment on the matter is that of ***Sushil Bhatt v. Moon Beverages Limited***[78], where the respondents who are the bottlers for companies like Coca Cola and Pepsi Co have been found to be operating without the required NOCs from the UP-Pollution Control Board to extract water from the ground. The Tribunal imposed a fine of Rs. 25 crores on the Companies as it was not only using the water without permission but also causing an environmental impact with such extraction as similar to the one ordered in the case of ***MC Mehta v. Union of India***[79]**.**

Additionally, though the government authorities are being directed to bring change in the case of ***Vipin Nayar v. Union of India***[80], the Municipal corporation was planning to build toilets 10 meters close to the Ganga River, the water from which would be directed to the Ganga, illegally.

[75] Krishna Kant Singh v. National Ganga River Basin Authority 2014 SCC Online NGT 1163.
[76] Adil Ansari v M/s. Dhampur Sugar Mills Ltd and Others 2021 SCC Online NGT 315.
[77] Saurabh Tiwari v. Union of India OA 128/2021.
[78] Sushil Bhatt v. Moon Beverages Limited 2022 SCC Online NGT 76.
[79] MC Mehta v. Union of India OA 202/2014.
[80] Vipin Nayar v. Union of India 2022 SCC Online NGT 9.

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL

Volume I and Issue I of 2023

ISBN - 978-81-960677-0-0

Published by

Institute of Legal Education

https://iledu.in

The Court in the case ordered interim relief to the petitioner and directed the Corporation to move the position of the toilet.

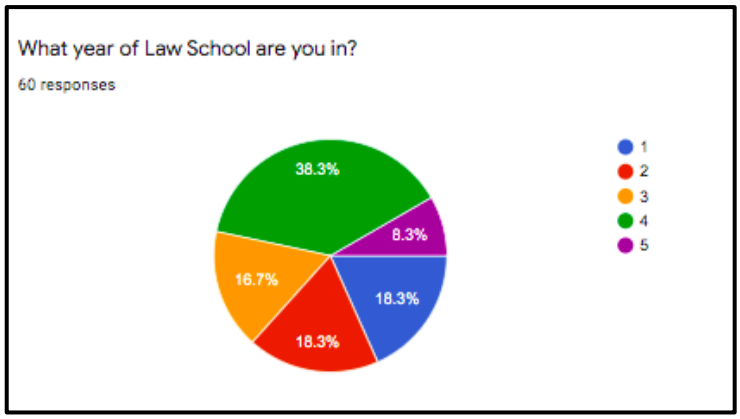
In addition to the same, the NGT has relentlessly aimed at disposing off cases and levying fines on all the polluters, especially industries so as to revive not only Ganga but also other similar river basins including River Bhella in the case of ***Shailesh Singh v. State of UP***[81]; Lakes Rohini, Ami and Rapti in the case of ***Meera Shukla v. Municipal Corporation and others***[82] as well as River Godavari in the case of ***Rajesh Pandit v. Municipal Corporation***[83], among various others.

Though Ganga is the most polluted among the others, the role of the judiciary is limited to that of levying punishment or directing relevant authorities to create certain change, the enforcement still lies with the executive and can only remain to that extent till there is either more power given or better authority in execution, as these judgments are proof that the pollution and the change is slow.

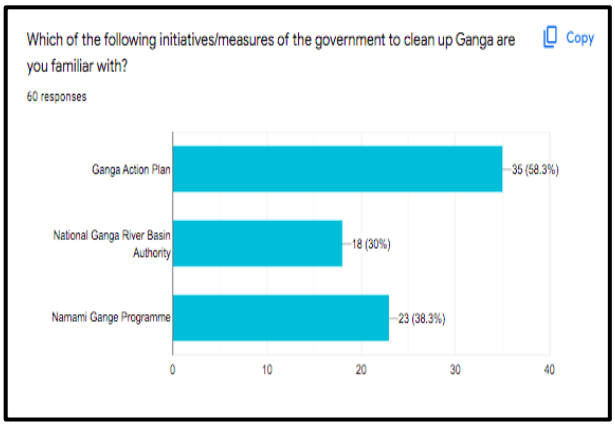
CHAPTER IV - EMPIRICAL ANALYSIS OF THE SURVEY

To understand the efficacy of the legislative and executive actions taken to improve the pollution levels of the Ganges and potential policy changes and recommendations that can be made towards improving the quality of water, the authors created and circulated an online survey questionnaire. Google Forms was utilized for the same. With a sample size of 60 participants, the year and batch division can be understood as:

The highest number of responses were from the age group of 4th year students, resulting in a total of 23 responses. The second highest demographic was of those 2nd years, which was 11 responses. The author purposely sought



varied years to understand whether their knowledge pertaining to Environment actions was the same. This would also be a determination for recommendations. An online survey was circulated due to geographical



constraints faced by the author.

When the respondents were asked which initiatives/ measures of the Government to clean the Ganges they were familiar with, it was important to understand the awareness that each programme was able to create and their effectiveness in terms of actual change they were able to bring. 58.3% which is 35 individuals stated that they were aware of the Ganga Action Plan. Whereas the Namami Gange Programme constituted only 38.3% of the individual's answers. A minimum of 30% were aware of the National Ganga River Basin Authority. This is intriguing as this was a multiple option question, yet most respondents were only aware of the Ganga Action Plan.

22 respondents answered that they were "neutral" towards the effectiveness of the State's initiates thus showing that they were

[81] Shailesh Singh v. State of UP 2021 SCC Online NGT 331.
[82] Meera Shukla v. Municipal Corporation and others 2021 SCC Online NGT 717.
[83] Rajesh Pandit v. Municipal Corporation AIR 2019 (NOC 129) 41.

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL

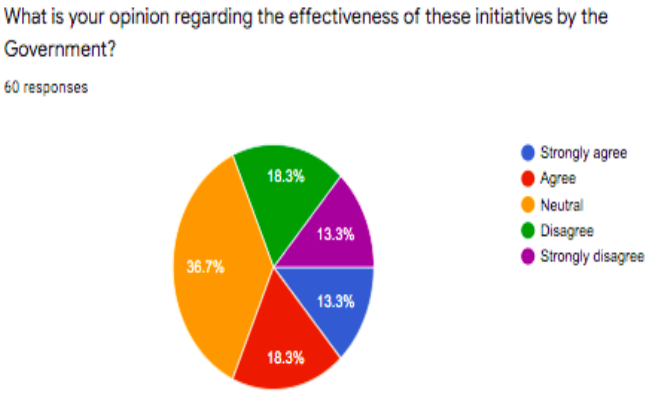
Volume I and Issue I of 2023

ISBN - 978-81-960677-0-0

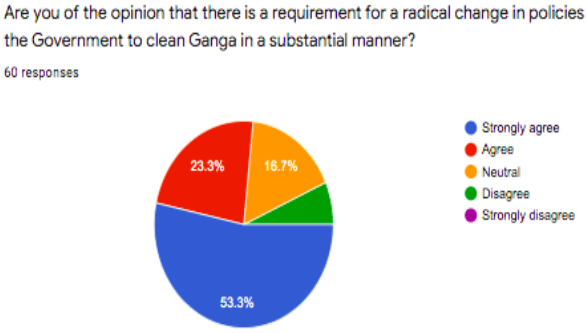
Published by

Institute of Legal Education

https://iledu.in

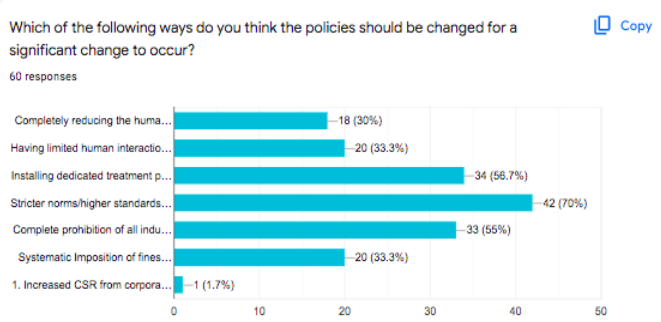


neither appreciative nor disappointed by the actions made. This is interesting because over half of the respondents, and are from across India, with access to distinct resources, media materials and real-life experience of interacting



with the waters of the river. This eliminates the conclusion the respondents are happy with the actions taken till date. Additionally, it signifies that if not always, certain movements do capture the eyes of the public. Only 8%, which is 13.3% of the respondents "completely agree" that the actions taken were effective. Over 75% of the respondents have indicated that they believe better action with stronger implementation are required.

The next question helped outline the view of the respondents about the theory of whether lesser human interaction with the Ganges, as seen during the early phases of the first and second lockdown, would result in lesser pollution and cleaner water. Over half of the respondents, 55.9% which is 33 respondents believe that lesser human interaction may lead to cleaner water and lesser pollution levels, thus being inversely proportional to each other. A mere



15.3% which is 6 3 respondents actually believe human interaction is not relative to the pollution levels in the water, and does not have a positive impact. And 17, individuals were neutral about the situation and didn't believe any strong impact was seen.

To examine if the respondents were well aware, they were asked if they believed there is a requirement for a radical change in the policies of the Government to clean the Ganges in a substantial manner. While it is evidently a fact that it is the need of the hour, 75.6% agreed that such change was imperative and needed for a cleaner future. While 16.7% were neutral, only 6.7% disagreed which signifies that they either did not care for the matter or were content with the current programmes that are being implemented.

Finally, our last question was to get a real idea of policy changes that can be accumulated and revised so as to understand the final conclusion as to what we as law students put forth as our envisioned approach to reduce the pollution levels of the Ganges. We were given several options, in a manner where multiple options could be selected to understand in the best possible manner the imminent actions that can be proposed.

The most apparent choice for the respondents at 70% was to have stricter norms/higher standards for the treatment of industrial waste. Though far-fetched and a change that cannot be brought in overnight and will require the passing of stricter legislations, it had 42 votes. To install dedicated treatment plants across the river to undo the damage was chosen by 56.7%

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

of the respondents. The complete prohibition of all industrial activities in the catchment area of Ganga and its tributaries, as effective as it may be, will take several years before we are able to completely eradicate industries from that area, got 33 votes. Finally, completely reducing the human interaction in the river for a few years, having limited human interaction in the river for a few years and imposing fines on the State Governments for nonadherence of the policies to clean up the Ganga river, were also chosen in lesser amounts are all possible solutions to tackling this national issue.

Thus, based on the conducted study and the conclusion drawn, Hypothesis 1 - the government policies/initiatives had a positive impact on the reduction of pollution in river Ganga, is *rejected*. Hypothesis 2 - the reduction in human interaction with the River Ganga will reduce its pollution is *accepted* as it was voted upon by 50.3% cumulatively (partial and complete ban) - though studies show that it is not a sustainable option. And, Hypothesis 3 - there is a need for change in the government policies to see a reduction in pollution of the Ganga River is *accepted*.

CHAPTER V - RECOMMENDATIONS AND CONCLUSION

For centuries, the Ganges has held a valuable position in India's spiritual landscape. However, the pressures of urbanisation, combined with the growing threat of pollution, have prompted significant thought throughout the years. This river currently is vulnerable to anthropogenic pressure because of the socioeconomic significance of these areas as a result of the rise of industries, agricultural activities, aquaculture, port activities, and tourism.[84]

In analysing recommendations for future pollution management programmes in the Ganges basin, it is critical to highlight some of the electic policy adjustments to bring about radical change.[85]

1. In order to ensure successful implementation of stricter norms/higher standards for the treatment of industrial waste, there is a need for decentralisation. Decentralisation would attempt to herd the power of making decisions towards the public while fostering participation.
2. When it comes to establishing dedicated treatment plants across the river to undo the damage, which was selected by the majority of respondents, it is critical to recognise the cost and the requirement for modern equipment. Previous experience with the Ganga Action Plan in Varanasi, for example, has revealed that, in addition to being expensive, the plants' capacity was not enough for the waste produced. Furthermore, inconsistent electricity left them inoperable for long durations. During monsoon, flooding of the wells would result in untreated sewage to flow untreated into the river. Though thus an easy option to recommend, it requires in-depth research and dealing with the sewage treatment.[86]
3. Another option selected by the Respondents in large numbers was limited human interaction in the river for a few years. Though its effects were seen in the initial COVID lockdowns, complete or even partial ban of human interaction with the Ganges, does not seem likely. It is critical to emphasise that, because the Ganges is a holy body, any interaction-based operation must reflect the pilgrims and traders along its banks, as well as the many Hindu followers throughout India, that follow popular religious and cultural traditions. In this regard, both the quality and amount of

[84] Subhajyoti Das, *Cleaning of the Ganga*, Journal of the Geological Society of India, 78(2), (2011).

[85] Santosh Kumar Sarkar et al, *Water quality management in the lower stretch of the river Ganges, east coast of India: an approach through environmental education*, Journal of Cleaner Production, 15(16), (2007).

[86] Shri Krishan, *The River, Its Pollution And What We Can Do To Clean It*, (2014).

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

water must be considered. Religious bathing, for example, cannot be removed entirely in India.

4. The enactment and implementation of legislations with stricter policies and harsher punishments, is a sustainable achievable solution, yet it will take time. There is no way such policies can be implemented at an instant. Not only will legislation and executive orders be able to increase environmental knowledge and participation among the public, but so will the media and the internet. Social media platforms are also playing an important role in enforcing restrictions. Furthermore, the Right to Information Act, 2005 is a turning point, granting ordinary persons access to information with its mission is to ensure transparency in the operations of all public authorities. This has the potential to significantly increase public participation in environmental policymaking. It could also increase civil society's critical role in environmental stewardship.
5. Working towards the complete prohibition of all industrial activities in the catchment area of Ganga and its tributaries is an option that can be operated over due time. Relocating industries completely from one area to another requires time, resources, labour, access to fundamental requisites, permits, etc. Stringent policies and punishments with magnanimous fines have the ability to ensure that industries start pursuing options of moving to other places, and installing functional waste treatment machinery.
6. Fundamentally, the urban infrastructure surrounding the Ganges is in desperate need of renovation. Slum settlements with limited access to essential amenities have proliferated as a result of urbanisation, mostly due to migration of rural poor seeking workWhen untreated wastewater from disconnected households flows into open sewers and finds its way into the river, the performance of sewage treatment plants is typically jeopardised. Addressing this vast and geographically scattered, yet regionally distinctive, challenge will place a significant burden on local governments.
7. Moreover, starting with furrow, comparable simple-to-implement improved irrigation management measures, and a gradual shift toward micro-irrigation systems will assist promote sustainable irrigation and agricultural practices. This technique is to be merged with marginal changes in cropping patterns grounded on soil health enhancement, as this should result in substantial water savings and assist in recovering the standing of the river.[87]
8. And finally, there is a need for punitive fines and severe punishments for those who violate any laws, policies, orders, rules or regulations with respect to the polluting of the river. More judgments such as that by the NGT imposed a Rs 10 crore fine on the UP government for failing to regulate damaging chromium discharge into the Ganga in Kanpur. Furthermore, immersion of idols and other things in the Ganga at locations other than specified ghats and sites in Haridwar were going to face a Rs 50,000 along with legal actions according to the NGT's directives.[88] Such orders and directions can go a long way in controlling the public's actions and ensure there is a sense of apprehension when it comes to violating laws.

REFERENCES

Index of Authorities

Statutes

- The Environment (Protection) Act, 1986.

[87] Nitin Kaushal, Suresh Babu, Arjit Mishra, Nilanjan Ghosh, Vinod Tare, Ravindra Kumar, Phanish Kumar Sinha, and Ram Ujagir Verma, *Towards a healthy ganga—improving river flows through understanding trade offs*, Frontiers in Environmental Science, 7, (2019).

[88] Express News Service, *Rs 50,000 fine for unauthorised idols immersion in river Ganga,* The New Indian Express, (October 11 2021), https://www.newindianexpress.com/nation/2021/oct/11/rs-50000fine-for-unauthorised-idols-immersion-in-river-ganga-2370229.html.

Articles

- Basant Rai, *Pollution and Conservation of Ganga River in Modern India*, International Journal of Scientific Research and Publication, (April 2013), https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.439.2856&rep=rep1&type=pdf.
- Chakresh Kumar et al, *Seasonal dynamicity of environmental variables and water quality index in the lower stretch of the River Ganga*, Environmental Research communications, (26 July 2021), https://iopscience.iop.org/article/10.1088/2515-7620/ac10fd/pdf.
- IANS, New Delhi, *Ganga receives 2900 million litres of sewage daily*, Hindustan Times, (April 12, 2012), https://web.archive.org/web/20150909164033/http://www.hindustantimes.com/newdelhi/ganga-receives-2-900-million-ltrs-of-sewage-daily/article1-842037.aspx.
- Pranav Awasthi, *Conservation of Ganga River - is Public Participation the Key*, Environment Law and PRactice Review, (2016) 5 ELPR 107.
- Rajrupa Sinha Roy, Indrajit Dube and Dipa Dube, *Pollution of River Ganga in West Bengal - Problems and Policy Initiatives*, Gujarat Development of Law Development and Politics, (2015) 5 GJLDP (April) 1.
- Richa Mishra et al, *Investigation Over Water Quality Of Rivers Ganga And Yamuna During Kumbh-2019-A Case Study At Prayagraj (Allahabad), Uttar Pradesh, India*, Pollution Research, (August 2021), https://www.researchgate.net/publication/353719515_Investigation_over_water_quality_of_rivers_Ganga_and_Yamuna_during_Kumbh-2019_at_Prayagraj_Uttar_Pradesh_India_Pollution_Research.
- Ajith Athrady, *NGT slaps Rs 280 cr fine on tanneries for polluting Ganga,* Deccan Hearld, (April 19 2019) https://www.deccanherald.com/national/south/ngt-slaps-rs280cr-fine-on-tanneries-for-polluting-ganga-777594.html.
- Alternate Hydro Energy Centre, IIT Roorke, *Status Paper on River Ganga*, National River Conservation Directorate Ministry of Environment and Forests - Government of India, (August 2009), https://www.iitr.ac.in/wfw/web_ua_water_for_welfare/water/Status_paper_on_River_Ganga_2009.pdf
- Basant Rai, *Pollution and Conservation of Ganga River in Modern India*, International Journal of Scientific Research and Publication, (April 2013).
- Bhutiani et al, *Assessment of Ganga River ecosystem at Haridwar, Uttarakhand, India with reference to water quality indices*, Applied Water Science, (2014), https://doi.org/10.1007/s13201-014-0206-6.
- Cameron Conaway, *The Ganges River is Dying Under the Weight of Modern India*, Newsweek Magazine, (23 September 2015), https://www.newsweek.com/2015/10/02/ganges-river-dying-under-weight-modern-india-375347.html.
- Central Pollution Control Board, *Status of Sewage Treatment Plants in Ganga Basin*, Government of India, (2014), http://cpcb.nic.in/newitems/8.pdf.
- Chakresh Kumar et al, *Seasonal dynamicity of environmental variables and water quality index in the lower stretch of the River Ganga*, Environmental Research communications, (26 July 2021), https://iopscience.iop.org/article/10.1088/2515-7620/ac10fd/pdf.
- Dalchand Jhariya, *Ganga River: A Paradox of Purity and Pollution in India*

due to Unethical Practice, IOP Conference Series Earth and Environmental Science, (December 2020), https://www.researchgate.net/publication/347803519_Ganga_River_A_Paradox_of_Purity_and_Pollution_in_India_due_to_Unethical_Practice

- Express News Service, *Rs 50,000 fine for unauthorised idols immersion in river Ganga,* The New Indian Express, (October 11 2021), https://www.newindianexpress.com/nation/2021/oct/11/rs-50000fine-for-unauthorised-idols-immersion-in-river-ganga-2370229.html.
- India Today Web Desk, *Climate Change altering Ganga's flow, more flood predicted: Study*, India Today, (November 18, 2021), https://www.indiatoday.in/science/story/climate-change-ganga-river-water-flow-alkananda-dams-1878231-2021-11-18.
- India Today Web Desk, *Water quality in lower stretches of Ganga alarming : Study*, India Today, (December 2021), https://www.indiatoday.in/science/story/ganga-river-water-quality-detriorating-floods-pollution-1885597-2021-12-08.
- Kenda Conley, *Wastewater treatment plants as a source of microplastics to Urban estuary: Removal of efficiencies and loading per capita over one year*, Water Res X, (April 1, 2019), https://doi.org/10.1016/j.wroa.2019.100030
- Muduli et al. *Water Quality assessment of the Ganges River During COVID-19 Lockdown*, International Journal of Environmental Science and Technology, (2021).
- Nitin Kaushal, Suresh Babu, Arjit Mishra, Nilanjan Ghosh, Vinod Tare, Ravindra Kumar, Phanish Kumar Sinha, and Ram Ujagir Verma, *Towards a healthy ganga—improving river flows through understanding trade offs,* Frontiers in Environmental Science, 7, (2019).
- Pradip et al, *Impacts of Land Use Change on Water Quality Index in Upper Ganges River near Haridwar, Uttarakhand: A GIS- Based Analysis*, Water, (13 December, 2021), https://doi.org/10.3390/w13243572.
- Priyam Das, and Kenneth R. Tamminga, The Ganges and the GAP: an assessment of efforts to clean a sacred river, Sustainability, 4(8), (2012).
- Rakesh K Jaiswal, *Ganga Action Plan-A Critical Analysis*, Eco Friends, (2007).
- Richa Mishra et al, *Investigation Over Water Quality Of Rivers Ganga And Yamuna During Kumbh-2019-A Case Study At Prayagraj (Allahabad), Uttar Pradesh, India*, Pollution Research, (August 2021), https://www.researchgate.net/publication/353719515_Investigation_over_water_quality_of_rivers_Ganga_and_Yamuna_during_Kumbh-2019_at_Prayagraj_Uttar_Pradesh_India_Pollution_Research.
- Saba Hasan, Water Quality of River Ganga – Pre and Post GAP: A Review, International Journal of Advanced Research in Science, Engineering and Technology, Vol. 2, Issue 1, (2015).
- Sanjay Dwivedi et al, *Ganga water pollution: A potential health threat to inhabitants of Ganga basin*, Environment International, (August 2018), https://doi.org/10.1016/j.envint.2018.05.015.
- Santosh Kumar Sarkar et al, *Water quality management in the lower stretch of the river Ganges, east coast of India: an approach through environmental education*, Journal of Cleaner Production, 15(16), (2007).
- Shri Krishan, *The River, Its Pollution And What We Can Do To Clean It*, (2014).

- Status Paper On River Ganga, Alternate Hydro Energy Centre Indian Institute of Technology Roorkee, (2009).
- Subhajyoti Das, *Cleaning of the Ganga*, Journal of the Geological Society of India, 78(2), (2011).
- *SWOT Analysis of Ganga Action Plan GRB EMP: Ganga River Basin Environment Management Plan*, Indian Institutes of Technology, December 2011, available at: http://nmcg.nic.in/writereaddata/fileupload/50_006GEN.pdf.
- Tare et al, *Ganga River Basin Environment Management: Interim Report*, IIT Consortium (August 2013), http://mowr.gov.in/sites/default/files/GRBEMPInterimReport_2.pdf.
- Tiwari et al, Time *scale changes in the water quality of Ganga Rover, India and estimation of suitability for exotic and hardy fishes*, Hydrology Current Research, (2016), https://www.hilarispublisher.com/open-access/time-scale-changes-in-the-water-quality-of-the-ganga-river-india-and-estimation-of-suitability-for-exotic-and-hardy-fishes-2157-7587-1000254.pdf.
- Toufiq Rashid, *At least 10 species in the Ganga face extinction: Ministry Reports*, Hindustan Times, (May 27, 2018), https://www.hindustantimes.com/environment/at-least-10-species-in-the-ganga-face-extinction-say-ministry-reports/story-ecpjjZPoeiMZofK6oRexEL.html.

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL

Volume I and Issue I of 2023

ISBN - 978-81-960677-0-0

Published by

Institute of Legal Education

https://iledu.in

APPENDIX

Understanding the Effect of Pollution on the Ganges

This form was curated to understand from law students, policy recommendations and suggestions that can be further implemented to reduce the present pollution levels of India's river, the Ganges.

1. What year of Law School are you in?

Mark only one oval.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

2. Which of the following initiatives/measures of the government to clean up Ganga are you familiar with?

Check all that apply.

- ☐ Ganga Action Plan
- ☐ National Ganga River Basin Authority
- ☐ Namami Gange Programme

3. What is your opinion regarding the effectiveness of these initiatives by the Government?

Mark only one oval.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

INTERNATIONAL ENVIRONMENTAL LEGAL RESEARCH JOURNAL
Volume I and Issue I of 2023
ISBN - 978-81-960677-0-0
Published by
Institute of Legal Education
https://iledu.in

4. Are you of the opinion that less human interaction may lead to a reduction in pollution as may have been seen during Covid -19?

Mark only one oval.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

5. Are you of the opinion that there is a requirement for a radical change in policies of the Government to clean Ganga in a substantial manner?

Mark only one oval.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

6. Which of the following ways do you think the policies should be changed for a significant change to occur?

Check all that apply.

- ☐ Completely reducing the human interaction in the river for a few years
- ☐ Having limited human interaction in the river for a few years
- ☐ Installing dedicated treatment plants across the river to undo the damage
- ☐ Stricter norms/higher standards for the treatment of industrial waste
- ☐ Complete prohibition of all industrial activities in the catchment area of Ganga and its tributaries
- ☐ Systematic Imposition of fines on the State Governments for nonadherence of the policies to clean up the Ganga river
- Other: ☐ _____