

PARIVESH

**ENVIRONMENTAL ISSUES RELATED
WITH HIMALAYAN STRETCH OF RIVER
GANGA (BHAGIRATHI RIVER)**



cpcb

**CENTRAL POLLUTION CONTROL BOARD
(MINISTRY OF ENVIRONMENT & FORESTS)**

'Parivesh Bhawan', East Arjun Nagar

Delhi-110 032

e-mail: cpcb@nic.in; Website: www.cpcb.nic.in

February, 2011



PREFACE

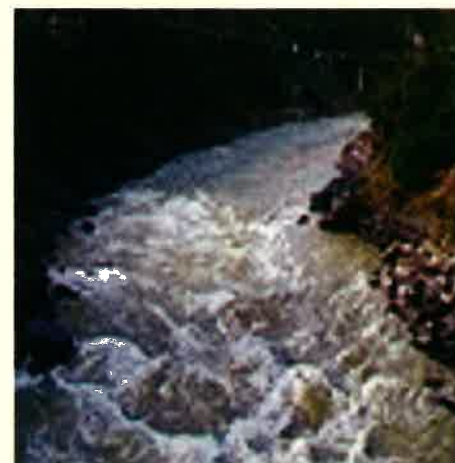
River Ganga is the life-line of India and provide food, water and shelter to millions of Indians. In past few decades the water quality of river Ganga in Gangetic plain has been deteriorating alarmingly. In Himalayan stretch too its tributaries are adversely affected by various human activities. To assess the environmental issues in the catchment area of Bhagirathi River, the main stream of river Ganga in Himalayan region, Central Pollution Control Board conducted a survey of the area in June, 2010. Magsaysay Awardee and member of National Ganga River Basin Authority Sh. Rajinder Singh, members of Swedish International Development Cooperation Agency (SIDA) and members of a Dehradun based NGO Society for Harmonizing Agriculture, People and Environment (SHAPE) guided the team significantly. The present report is a compilation of the survey. The efforts of Sh. N. C. Durgapal, Scientist 'C' in data compilation and supervision of Dr. D. D. Basu, Scientist 'E' and Sh. J. S. Kamyotra, Member Secretary are appreciated.

Hope, this report will be useful in bringing forward the various environmental concerns associated with Bhagirathi River basin and encourage the people to contribute in maintaining the pristine nature of river Bhagirathi.

(Prof. S. P. Gautam)
Chairman

CONTENTS

1. Introduction	3
2. Source and Drainage Area of Bhagirathi River	4
3. Tributaries of Bhagirathi River	5
4. Hydrological Characteristics of Bhagirathi River	7
5. Unique Characteristics of Bhagirathi Water	8
6. Uses of Bhagirathi River Water	8
7. Source of Pollution and its Impacts on Bhagirathi River	9
8. Water Quality Status of Bhagirathi River	12
9. Environment Management Steps Initiated by Various Agencies for Bhagirathi River	14
10. Involment of Central Pollution Control Board in Environmental Survey and Mass Awareness Activities in Towns Along Bhagirathi River	17
11. Recommendations to Make Various Environmental Management Activities More Effective	19
12. Conclusion	19





1.0 INTRODUCTION

Bhagirathi is the source stream of river Ganga, the major river of Gangetic plain of northern India. River Bhagirathi transforms into Ganga River after its confluence with river Alkananda at Devprayag. Bhagirathi - Ganga is the most sacred river of India and serves as cradle of Indian civilization. It is so important for Indians that they revere Ganga as mother. The greatness of Ganga River is described in details by the first Indian Prime Minister Pandit Jawahar Lal Nehru in his famous book "Discovery of India". According to Pandit Nehru 'Ganga stood first among all the Indian rivers that conquer the

heart of peoples and attracts uncountable persons to visit its banks. The story of Ganga is related with Indian civilization, its culture and witnessed rise and falls of numerous dynasties'. Ganga River basin is very fertile, rich in biodiversity and supports livelihoods of large human population. All these characteristics make Ganga a great and unique river of the globe. Considering the importance and various features of Ganga River, on 4th November, 2008 the Government of India declared it as a 'National River'.



River Bhagirathi

The word Bhagirathi refers to a mythological Sagar dynasty prince who, to gain the release of 60,000 great uncles from the curse of saint Kapila, brought the goddess Ganga from heaven to earth and the passion and mission carried during the course are known as 'Bhagirathi efforts'.

Central Pollution Control Board (CPCB) is regularly monitoring Bhagirathi River at two locations i.e. Gangotri and Devprayag for its

water quality. A comprehensive study had also been undertaken by the CPCB during the month of June, 2010 to assess the various environmental issues related with this river. Activities like assessment of solid and liquid waste management, monitoring of water quality at Gaumukh along with mass awareness etc were included in the study. Present report is the summary of informations about the river Bhagirathi and of the study.

2.0 SOURCE AND DRAINAGE AREA OF BHAGIRATHI RIVER

Gaumukh is the place on southern slope of Himalayas from where Bhagirathi trickles down from the glaciers. Gaumukh is located at a height of 3892 meters and is about 19 kilometers from Gangotri. The place is called Gaumukh because in the distant past, it was treated as resource for body senses. The source of a river is generally considered the highest place from where the river receives water. Tapovan, at an elevation of 4463 meters and about 5 kilometers from Gaumukh, is also considered as the main source of Bhagirathi River. From Tapovan to Gaumukh the river flows beneath the glacier and appears on the surface only at the terminal end of Gaumukh glacier.



Tapovan area



Views of Gaumukh Glacier

The river flows a distance of about 205 kilometers (12.3% of the entire length of Ganga) from Gaumukh and traversing through two districts of Uttarakhand State i.e. Uttarkashi and Tehri Garhwal to reach Devprayag and become Ganga after the confluence with another tributary, that is, river Alkananda. Many towns are located on the banks of Bhagirathi River, few important ones being Bhojbasa (5 kilometers from Gaumukh), Gangotri (at a height of 3048 meters) Harshil, Bhatwari, Uttarkashi (1158 meters from mean sea level), Dunda, Dharashu-Chinyalisaur, Tehri (at a height of 755 meters) and Devprayag (465 meters from mean sea level). The total basin area of river Bhagirathi is about 6921 square kilometers which constitute approximately 0.8 % of the total Ganga basin.



Confluence of Bhagirathi and Alkananda River



The head and tail end of river Bhagirathi



Human settlements along the banks of Bhagirathi at Bhojbas, Gangotri and Uttarkashi

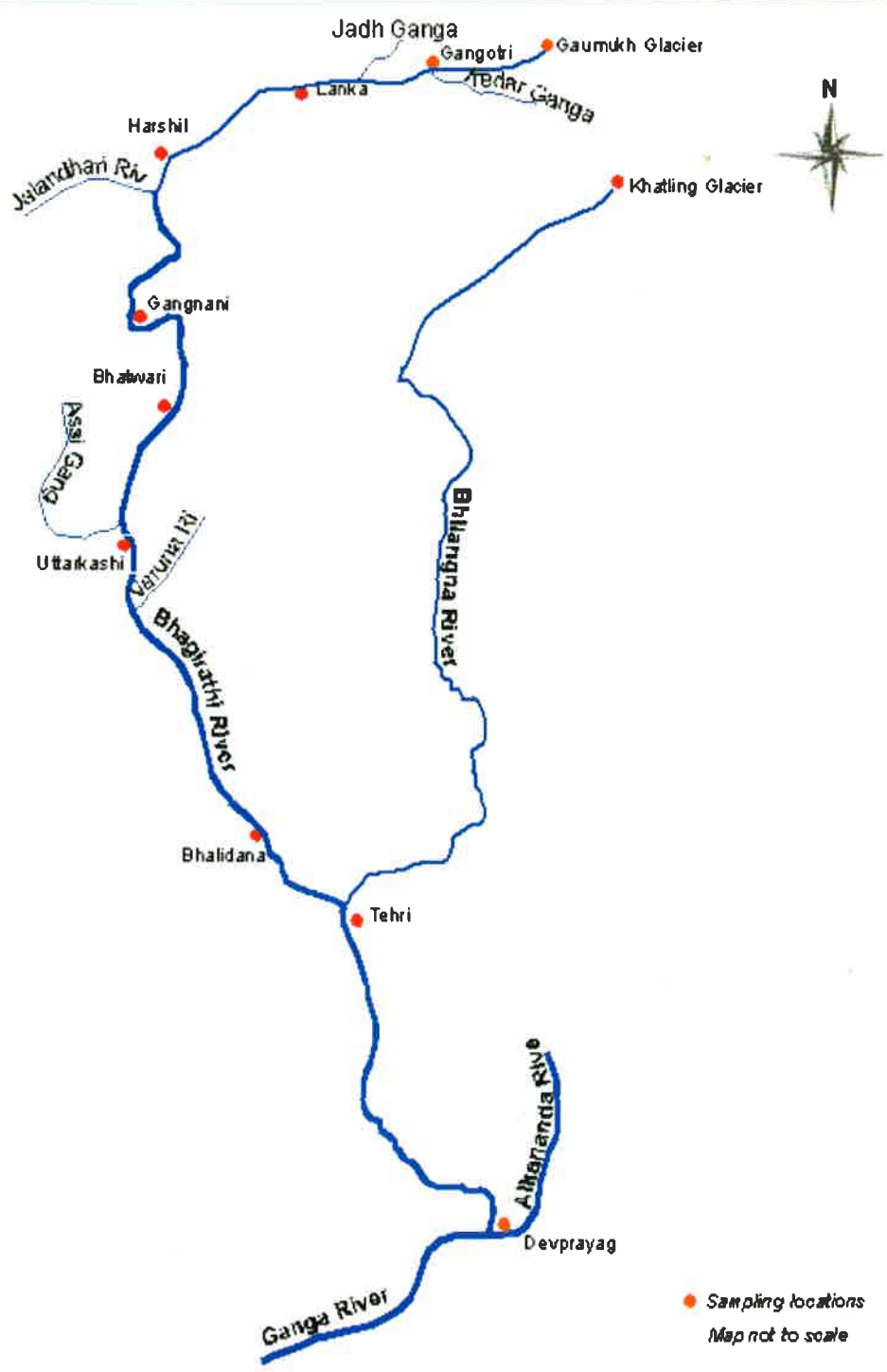
3.0 TRIBUTARIES OF BHAGIRATHI RIVER

A number of glacier fed rivers contribute water to river Bhagirathi. The important tributaries that join the river at right bank are Jadh Ganga at Bhiron Ghati, Jalandhri and Kakora near Harshil, Siyan at Jhala and Assi Ganga at

upstream of Uttarkashi, while its prominent tributaries of the left bank include Kedar Ganga at Gangotri, Varuna at downstream of Uttarkashi and Bhilangana at Tehri.



Tributaries of Bhagirathi: Kedar Ganga, Jalandhri and Bhilangana River



MAP OF BHAGIRATHI RIVER

● Sampling locations
 Map not to scale



4.0 HYDROLOGICAL CHARACTERISTICS OF BHAGIRATHI RIVER

The average water discharge of Bhagirathi River near its source is about 2450 million liters per day (MLD). Like other Himalayan rivers the flow of this river also varies significantly with seasons. The river has maximum flow during monsoon period (July to September) which reduces drastically during post monsoon

season (October to December). The river has minimum discharge during winter season (December to February) as extreme cold conditions restrict melting of glaciers. River Bhagirathi regains its discharge during summer season (March to June) with the melting glaciers.



Courses of river Bhagirathi: Steep slope, plain and pool

The slope of a river reflects its intensity of flow, turbulence and is also indicative of the mixing capacity of its tributaries with the components of the main river. The average slope of Bhagirathi River is about 16.71 meters per kilometers. The river slope in various stretches is presented at Table 1. As depicted from the table the river stretch between Gangotri to Lanka has the maximum slope as in this stretch the river flows

through a narrow and rocky terrain with several steep falls. The river stretch between Bhatwari and Uttarkashi has minimum slope. At few places the river Bhagirathi transforms into man made reservoirs. One huge reservoir is formed at Tehri by the hydroelectric dam and another comparatively small size reservoir at Maneri formed by the dam constructed under Maneri-Bhali hydroelectric project.

Table 1: Slope of Bhagirathi in various stretches

Sl. No.	River stretch	Approximate Slope (meters / kilometer)
1.	Gaumukh - Gangotri	44.4
2.	Gangotri - Lanka	51.8
3.	Lanka - Ganganani	23.9
4.	Ganganani - Bhatwari	42.5
5.	Bhatwari - Uttarkashi	2.9
6.	Uttarkashi - Bhaldiana	8.1
7.	Bhaldiana - Tehri	5.2
8.	Tehri - Devprayag	6.0



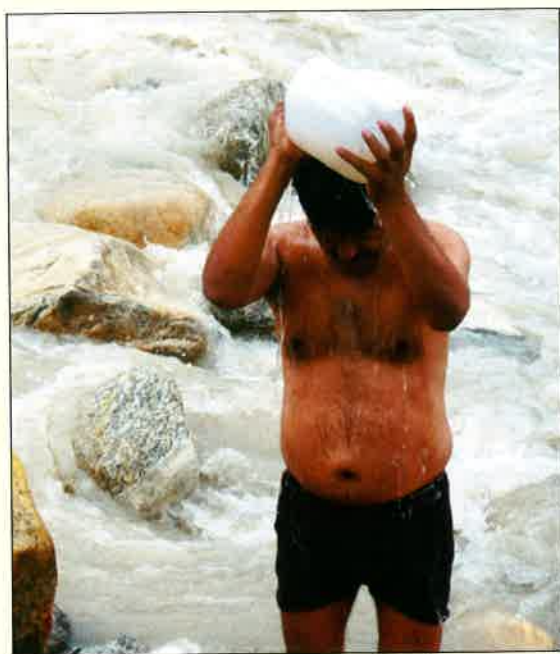
5.0 UNIQUE CHARACTERISTICS OF BHAGIRATHI WATER

Ancient religious books describe the qualities of Ganga River water along with the water of its Himalayan tributaries including Bhagirathi as cool, sweet, transparent, ability to remove evils, high tonic property, wholesomeness, potability, ability to resuscitate from swoon caused by dehydration, having digestive property, ability to help retain wisdom. However, besides these characteristics, Ganga including Bhagirathi and other Himalayan tributaries is famous world wide for its three unique characteristics. The first characteristic seems that there is no deteriorating effect in Ganga water even after prolonged storage period. This is the reason that most Indians preserve a bottle of Ganga water in their house for use in every important puja / ritual. Another feature of the water is its significantly high bactericidal capacity which is

confirmed by several scientific studies. According to some scientists, presence of Bacteriophage virus in the water is responsible for killing pathogenic bacteria. Few other scientists are of the view that the photolysis is responsible for this bactericidal capacity which is catalysed by the Zinc and Bismuth present in the water in micro level. The third characteristic of the water of river Ganga and its Himalayan tributaries is its self assimilation capacity. Sufficient quantity of fresh water, high turbulence and Dissolved Oxygen contents etc. are responsible for this remarkable self purification capacity of the river. Unfortunately, Ganga River and its Himalayan tributaries are gradually losing these characteristics due to anthropogenic activities with significant magnitude.

6.0 USES OF BHAGIRATHI RIVER WATER

The various uses of Bhagirathi River water include bathing, drinking, irrigation, pisciculture, power generation etc. Though the entire Bhagirathi River stretch is used for bathing purpose, people visits on large number at three pilgrimage places located on the banks of river i.e. Gangotri, Uttarkashi and Devprayag to take holy dip in river water before offering prayers. On auspicious occasions mass bathing takes place at these centers. Water is abstracted at



few places directly from the main stream of Bhagirathi for drinking water purposes but extensively used from its tributaries. Major part of Bhagirathi water along with the water of other tributaries of Ganga is used for irrigation and drinking purposes in Gangetic plain. Tehri reservoir insures round the year continuous water supply for these uses. Pisciculture occurs only in few stretches of river Bhagirathi. Tehri reservoir is one such place where fishes having



economical value, have been introduced to propagate the fish culture. The river stretch has the potential to generate about 5000 Mega watt (MW) of power. Two projects i.e. Tehri (2000 MW) and Maneri – Bhali phase I (90 MW) have already been commissioned, while other sites of



Ureda Hydroelectric projects on tributary of river Bhagirathi



Tehri Hydroelectric projects on river Bhagirathi

hydroelectric project include Bhairon Ghati Phase I and II (381 MW), Loharinag Pala (600 MW), Pala Maneri (480 MW), Maneri Bhali (304 MW), Koteswar (400 MW) etc. Besides mega projects small hydroelectric projects are also in operation at places like Gangotri, Harshil etc.

7.0 SOURCE OF POLLUTION AND ITS IMPACTS ON BHAGIRATHI RIVER

The various activities affecting the water quality of river Bhagirathi include discharges of untreated waste water, dumping of solid waste, bathing and washing, religious activities, open defecation on its banks, land slide/soil erosion etc.

Studies reveal that water quality of Ganga River and its tributaries in Himalayan region including Bhagirathi would remain unchanged if waste water is added in the ratio of 100:1. At present as this ratio of waste water disposal is maintained in river Bhagirathi, no significant impact is

observed on its water quality. However, increase in human settlements along the bank of this river especially at Gangotri, Uttarkashi, Dharashu-Chinyalisaur and Devprayag and uncontrolled pilgrimage/tourism certainly has impact on water quality. Waste water from over flow of septic tanks, toilets, hotels etc., finds its way into the river, may not lead to problems associated with organic waste but contribute micro nutrients in the water that may cause to eutrophication and increase of pathogenic bacteria.



Solid waste disposal on the river bank at Tehri

common sight at the source of river Bhagirathi at Gaumukh. This activity increases with greater magnitude during the month of July/August with the visit of Kanwaris (religious people who collect Bhagirathi River water to offer the same to Lord Shiva at their native places) leading to great environmental threat in areas of fragile ecosystem. According to the local inhabitants, disposal of non biodegradable waste by the trackers even at Tapovan areas is very significant, thereby severely affecting the delicate environmental conditions of that area. Offering of flowers, milk, sweets, ashes etc. during the religious activities into the river is also a source of pollution. In the absence of sufficient sanitary facilities people defecate along the banks of Bhagirathi which intern causes pathogenic contamination in river water.

Problems associated with solid waste disposal on the banks of river which constitute both biodegradable (parts of vegetation, remnants of food, paper etc.) and non biodegradable (plastic items, rubber, leather, ashes, pieces of glass and ceramic items etc.), is also increasing day by day along the river banks. The forest areas located down stream of towns along the banks of river are generally used as the dump site for solid waste disposal and thus not only affect the forest land but also spoil the aesthetic look of the river. Like other parts of the country, use of plastic packs/bags is extensively used in the catchment area of Bhagirathi, posing great threat to the delicate environment of the area. Pilgrims after taking bath in the river dispose off their old clothing and other belongings on the banks, creating heaps of solid waste, which is a



Disposal of non-biodegradable materials on river bank at Gaumukh



The upper Himalayan reaches of river Bhagirathi are prone to land slides and soil erosion due to fragile and unstable mountain formation. Landslides and erosion contribute silt and mud to the river thereby increasing turbidity in the river water. Based on an estimate Ganga River including Bhagirathi stretch receives

about 1450 million tonnes of silt and mud annually from its catchment areas and maximum of this quantity is contributed by Himalaya. These contents in the river increase further with the initiation of various developmental projects e.g. construction of road, erection of hydroelectric facilities etc.



Fragile rocks and landslide in the upper reaches of river Bhagirathi

Global warming caused by the increase in the level of green house gases also has impact on Gaumukh glacier. The marking on the rocks made by Department of Science and

Technology, Government of India near Gaumukh reflects shrinking of Gaumukh glacier by about 2.5 kilometres between the years 1891 to 2010.



Marking on rocks indicating the location of Gaumukh Glacier in the year 1891 & 1966

Presently there are two main issues related with water quality of Bhagirathi River i.e. high siltation rate causing significant turbidity in river

water and increase in bacterial count (Total and Faecal Coliforms) which indicate presence of pathogens in the river water.

8.0 WATER QUALITY STATUS OF BHAGIRATHI RIVER

Central Pollution Control Board (CPCB) is regularly monitoring the water quality status of Bhagirathi River at two locations i.e. Gangotri (once a year) and Devprayag (four times a year). In the year 2010 water quality of the river was also assessed at Gaumukh. The water quality status of river Bhagirathi is depicted in Table 2. The water temperature is one of the factors that governs the Dissolved Oxygen (DO) contents (temperature is inversely proportional to DO) was found in the range of 1.0°C at Gaumukh to 15.0°C at Devprayag. The DO contents which reflect health of the river varies from 9.0 mg/l (Gaumukh) to 9.9 mg/l (Gangotri). High DO along with low biodegradable organic matter in terms of Biochemical Oxygen Demand (BOD) confirms that



Collection of water samples from river Bhagirathi at Gaumukh



Sampling at Gangotri

Bhagirathi River water meets the criteria of "A" class of water (drinking water source without conventional treatment but after disinfection with $DO > 6$ mg/l and $BOD < 2$ mg/l) based on Designated best used classification of water bodies (CPCB publication: ADSORBS/3/1978-79). The microbial contents, Total and Faecal Coliforms (indicators of pathogens) are in the range of < 1 to 10,000 Nos./100 ml and < 1 to 2800 Nos./100 ml respectively in the month of June, 2006 and 2010. Significant variation is often observed in Total and Faecal coliform contents at Gangotri and Devprayag (Fig. 1 & 2), which may be due to rate of rainfall and/or variation in pilgrims density during monitoring.



Analysis of Bhagirathi river water samples



The values of majority of parameters as presented in Table 2 confirm the water quality of river Bhagirathi as good however, the water quality deteriorate gradually specially in terms of

coliforms as it flows down from its source and is significantly high generally at Devprayag and occasionally at Gangotri.

Table 2: Water quality status of Bhagirathi river at various locations

S. No.	Parameters	Locations				
		Gaumukh	Gangotri		Devprayag	
		June, 2010	June, 2010	June, 2006	June, 2010	June, 2006
1.	Water Temperature (°C)	1.0	6.0	5.0	15.0	9.5
2.	pH	8.00	8.10	7.13	8.00	7.36
3.	Turbidity (NTU)*	<1	2	1	2	2
4.	Conductivity (µ mhos/cm)	108	121	98	147	145
5.	Total Alkalinity (mg/l)	17	15	19	47	39
6.	Total Hardness (mg/l)	28	28	37	47	44
7.	Chloride (mg/l)	5	5	5	6	6
8.	Dissolved Oxygen (mg/l)	9.0	8.8	9.9	8.8	-
9.	BOD (mg/l)	<1	<1	<1	<1	<1
10.	Chemical Oxygen Demand (mg/l)	<5	<5	<5	<5	<5
11.	Total Coliform Nos./100 ml	<1	100	7700	10,000	9000
12.	Faecal Coliform (Nos./100 ml)	<1	12	2800	200	330
13.	Water quality* on the basis of designated best use classification	A	A		A	

● In filtered sample
In terms of chemical parameters

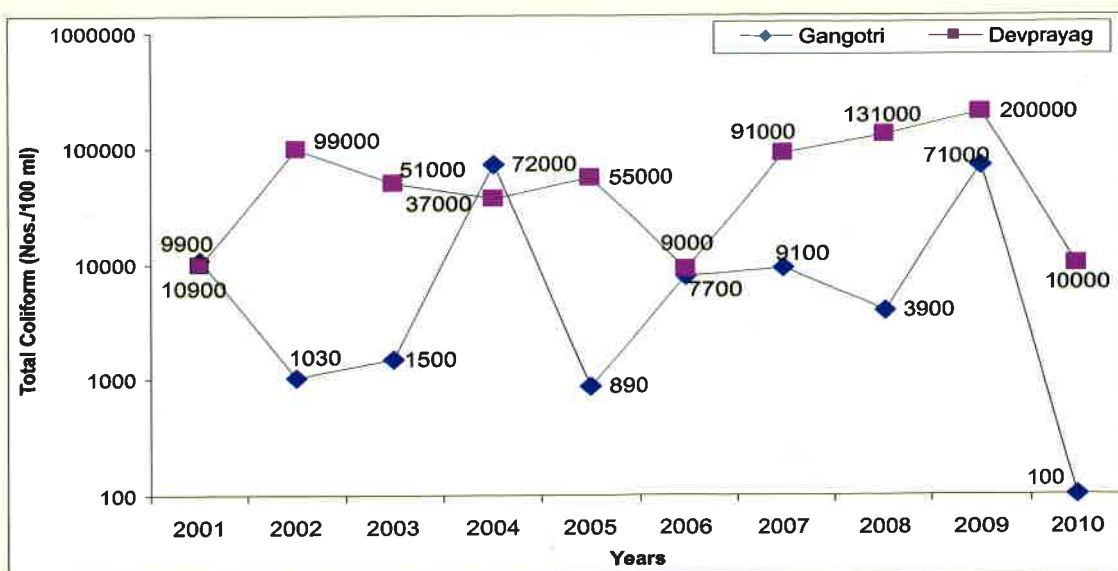


Fig. 1: Water quality trend of river Bhagirathi in terms of Total Coliform

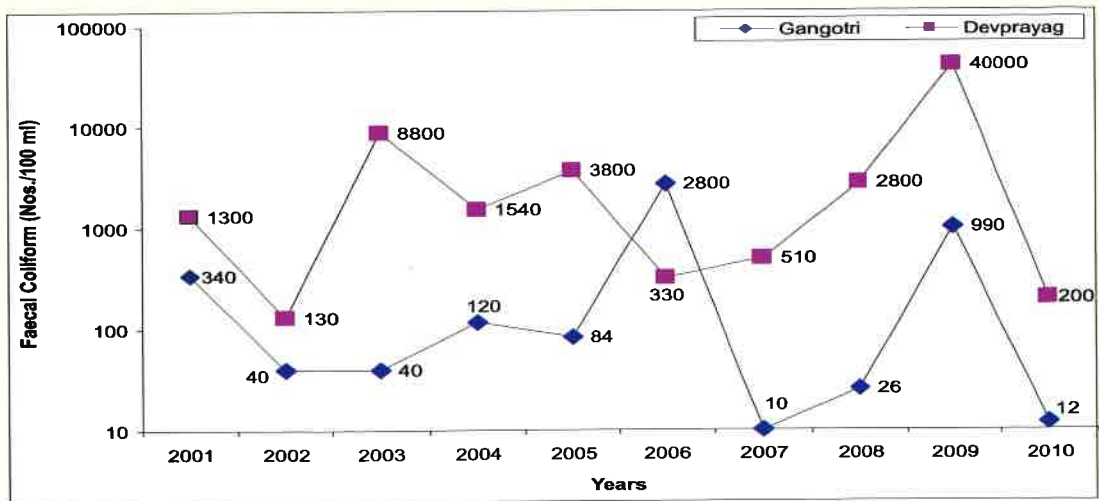


Fig. 2: Water quality trend of river Bhagirathi in terms of Faecal Coliform

9.0 ENVIRONMENT MANAGEMENT STEPS INITIATED BY VARIOUS AGENCIES FOR BHAGIRATHI RIVER

The problems of pollution are associated with anthropogenic activities. This is the reason that in the ancient period also pollution preventive measures were identified and propagated to protect the water of Ganga River in its entire stretch including river Bhagirathi from pollution. According to the "Brahmandapurana" thirteen activities were restricted on the banks of Ganga. Few of these activities are defecation, ablutions, discharge of waste water, throwing of used floral offerings, rubbing of filth, bodyshampooing,



Septic tanks on the bank of river Bhagirathi at Tekhala



Septic tanks on the bank of river Bhagirathi at Gangotri

frolicking, discarding of cloths etc. On the Himalayan stretch the problem of pollution is not as severe as it is observed in Gangetic plain. However, considering the rapid developmental activities in Himalayan region, significant increase in the pilgrimage and tourism etc., it is the right time to initiate pollution prevention activities to maintain the river water quality. Schemes have already been launched by the Government at three places along the banks of Bhagirathi River for the treatment of waste water



before its disposal into the river. An Activated sludge based 5 MLD Sewage treatment Plant (STP) is in operation at Tehri (Bhagirathpuram), which receives waste water from Tehri and adjoining areas. At Uttarkashi 4 Septic tanks with upflow filters having total capacity of 0.25 MLD are constructed and connected with sewer line at Gangori Cantonment, Gangori, Tekhala and Laksheswar however, work for connecting houses with sewer line is yet to be commissioned. There is also a proposal to install another STP of 2 MLD capacity at Uttarkashi. At Gangotri, 4 kilometre long sewer line has been laid down on both banks of river Bhagirahi. However, land is yet to be provided by the Forest Department for the construction of Septic tank.

With respect to management of the solid waste, collection and storage system exists for biodegradable and non biodegradable waste at various urban centres along the banks of river Bhagirathi. However, the other components of

the system to manage such waste, like segregation, transportation and recycling/proper disposal are not effective. In order to control the dumping of plastic waste in the areas upstream of Gangotri, arrangements for checking the belongings of visitors for materials like plastic bags, packing materials and other items has been initiated by the Forest Department. A refundable token amount is charged from the visitors for carrying plastic items beyond Gangotri and return of such items is ensured at the end of the visit. On the route to Gaumukh, solid waste collection bins are installed at several location and collected materials are destroyed through burning in open. Non Government Organisations, Gangotri Mandir Samiti, saints and local people are coming forward for supporting in scientific management of solid waste. Composting of biodegradable waste has been initiated by several saints at their Ashrams with the assistance from NGOs.



Solid waste collection bins at Gangotri

To avoid big gathering at the source of Bhagirathi River for the protection of sensitive environment of that area, Forest Department has estimated carrying capacity of that area and

accordingly, only 150 persons per day are allowed to visit Gaumukh / Bhojbasa. Even at Gaumukh a distance of 500 meters from the glacier is restricted for the visitors.



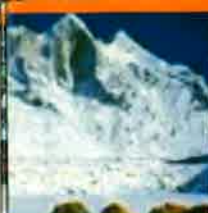
Plastic storage shed at Gangotri



Solid waste collection and disposal on the route to Gaumukh

Considering the impact of hydroelectric projects on environment, the Union Government has recently abandoned two proposed hydel projects i.e. Bhairon Ghati and Pala Maneri along with one under construction i.e. Loharinag Pala project. Forest Advisory Committee of Union Environment and Forests Ministry has decided not to give clearance to any proposed hydroelectric projects on river Ganga and its Himalayan tributaries including Bhagirathi Rive under Forest Conservation Act, 1980 until the National Ganga River Basin Authority conducts

a cumulative impact assessment study of the proposed dams. Government of India has also declared the 135 kilometres Bhagirathi River stretch from Gangotri to Uttarkashi as an "eco-sensitive" zone. To clean up river Ganga and its tributaries, State Government of Uttarakhand has launched a programme called "Sparsh Ganga River Programme" on May16, 2010 at Gangotri. The programme will be implemented in phased manner with the help of seers, and saints belonging to different "akharas".



10.0 INVOLMENT OF CENTRAL POLLUTION CONTROL BOARD IN ENVIRONMENTAL SURVEY AND MASS AWARENESS ACTIVITIES IN TOWNS ALONG BHAGIRATHI RIVER

Central Pollution Control Board is regularly monitoring Bhagirathi River at two locations i.e. Gangotri (near the source) and Devprayag (at tail end), to have a close vigil on water quality



Presentation of Books and Posters by CPCB to NGOs



Presentation of water testing kit by CPCB to NGOs



Demonstration of Water Testing by CPCB on the Bank of Bhagirathi

trend. Besides this, the Board had also participated in various programmes to create awareness among people. In June, 2010 CPCB has participated in a mass awareness cum environmental survey programme near the source of Bhagirathi River at Gangotri, Bhojbasa and Gaumukh along with the member of National Ganga Basin Authority Sh. Rajinder Singh, members of Swedish International Development Cooperation Agency (SIDA) and members of a Dehradun based NGO "Society for Harmonizing Agriculture, People and Environment" (SHAPE). Educating general public, students, saints etc. about the various environmental issues related with Bhagirathi River and their management was a part of the mass awareness activities. Meetings with members/ officials of NGO, Gangotri Mandir Samiti, Forest Department, Uttarakhand Jal Sansthan, organization of saints etc were organized to exchange the knowledge on various environmental issues. The operation of "Water testing kit" developed by the Board, in the river water quality assessment has also been demonstrated to the NGO. For frequent and widespread assessment of river water

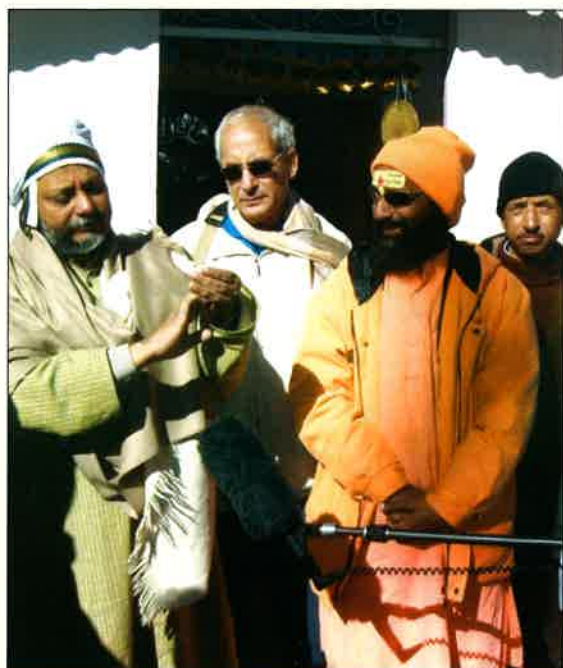
quality of Bhagirathi, two sets of the water testing kits were gifted to the NGO "SHAPE". Board publications, posters etc have also been distributed among NGO, other agencies, students and general public during the programme. At various places general public

especially pilgrims were requested what to do and what not to do to protect the environment and to maintain the sanctity of the area. The huts/Ashrams have been visited by the team during the programme to educate the saints and to get their cooperation in environmental management especially in collection, proper storage and safe disposal of the solid waste generated in and around the place of their residence.

At Bhojbasa (near Gaumukh), CPCB has participated actively along with other involved agencies in the collection of scattered non recyclable solid waste which was later on shifted by the NGO to the storage facilities at Gangotri for further processing. The police personals posted at Bhojbasa have been contacted to get their cooperation in the environmental protection by restricting various activities of visitors that may lead environmental degradation. Survey of river banks and other areas has also been conducted to assess the environmental conditions at Gangotri, Bhojbasa and Gaumukh. Water samples have been collected from Gaumukh and Gangotri to assess Bhagirathi River water quality in terms of physico chemical and biological parameters.



Demonstration of Water Testing Kit by CPCB



Discussion on Environmental Issues by Officials of Central Pollution Control Board with NGO and Saints





11.0 RECOMMENDATIONS TO MAKE VARIOUS ENVIRONMENTAL MANAGEMENT ACTIVITIES MORE EFFECTIVE

The various activities initiated to check the pollution in Bhagirathi River can be made more effective by adopting following recommendations:

- The waste water treatment facilities should be constructed away from the banks of Bhagirathi. As the treated waste water contains nutrients, therefore, possibility should be explored to use waste water after proper treatment either for irrigation or to sprinkle in forest areas instead of discharging the same into the river.
- Construction of sewage treatment facility should be planned in such a way that works on all the components of the project starts simultaneously. These facilities should be commissioned immediately after its completion.
- Segregation, transportation, recycling and proper disposal of the waste needs emphasis for solid waste management. Effective coordination between Government agencies and local people will give better results.
- In order to minimise open defecation on the banks of Bhagirathi public toilets be constructed at suitable places.
- Organized construction on the river bank will minimise the adverse impact on the river.
- Importance to physical and geographical features besides seismic activities around the areas should have proper share in environmental impact assessment (EIA) studies before initiating work on any hydroelectric projects on Bhagirathi River. Social impact should also be considered before launching such projects.
- Pollution prevention programme should ensure people's participation.
- Effective mass awareness programmes should be undertaken on regular basis by Government agencies, Mandir Samitis, NGOs etc. in order to educate the pilgrims, tourists and to take their cooperation in maintaining the environmental conditions in and around Bhagirathi River.

12.0 CONCLUSION

There is an old saying "*prevention is better than cure*" is pertinently applicable for river Bhagirathi considering its sensitive environmental status. It is the appropriate time to carefully plan and implement various developmental projects along the banks of Bhagirathi and its tributaries and check the human activities that may cause deleterious effects on the river. Imaginous hard work is required to restore the water quality of river Ganga to check water deterioration. Therefore, it is the duty of every Indian to contribute in maintaining sanctity, purity and pristine nature of Ganga River and its tributaries.

New Arrivals

Green Book
Rs. 750

POLLUTION CONTROL LAW SERIES
POL 5002010 (Sixth Edition)

POLLUTION CONTROL ACTS, RULES AND NOTIFICATIONS ISSUED THEREUNDER



CENTRAL POLLUTION CONTROL BOARD
June, 2010

E-Book
CD Rs. 300

POLLUTION CONTROL ACTS,
RULES AND NOTIFICATIONS
ISSUED THEREUNDER

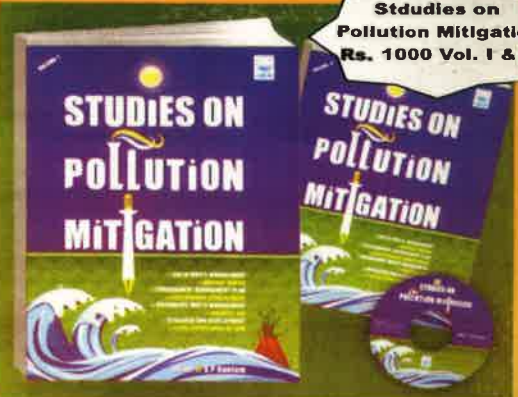
CENTRAL POLLUTION CONTROL BOARD
June 2010

E-Book
CD Rs. 300

STUDIES ON
POLLUTION MITIGATION

June - 11 2010

**Studies on
Pollution Mitigation**
Rs. 1000 Vol. I & II



Studies on Pollution Mitigation

Editor
Prof. B.P. Ekram, Chairman, Central Pollution Control Board

Highlights

- 132 papers - the largest collection of papers on issues related to pollution in one place.
- Contributors from 202 leading Indian R&D institutions, including Central Pollution Control Board, state pollution control boards, universities, and colleges.
- The first such compilation of papers in India on the subject of pollution.
- Papers categorized into 11 sections for ease of reference.
- Each navigable CD version with 'Content' page linked to respective chapters.
- CD's printed from the 'Author' side as well.

Target group

- Researchers
- Scientists
- Academics
- Concerned officials in industries
- Students
- University libraries, College libraries, A&E institutional libraries, Public libraries, etc.

ISBN: 978-81-931092-2-4 • Volume I • 112 pages, Softcover • 110 pages
Publication: Central Pollution Control Board, Delhi
Available on CD-ROM

For more information visit us

Central Pollution Control Board | Windows | www.cpcb.nic.in

Home | About | Infrastructure | Programmes/Projects | Environmental Handout | Environmental Data Statistics | 911

अज्ञान क्या सिन्धी शब्द - Learn

Messages: Chairman, Member Secretary, Central Pollution Control Board, Delhi, www.cpcb.nic.in

NOTIFICATION OF SCIENTIFIC PAPER FOR THE NATIONAL AWARDS FOR BEST RESEARCH PAPER

Guidelines of Co-Processing in Cement Industry

Schedule of Award for Original Writing of a Book on Matter Related to Pollution Control and Environmental Policies - 2010

Did You Know?

The Yashwantrao Chavan Pratishthan in Delhi is hereby 2 per cent of the length of the river. 100,000 people in the 10 per cent of the river pollution.

News@CPCB

27-10-2010 Review of Compendium of Research Papers presented during the 8th...

12-09-2010 Awareness workshop on 'Innovative Technology for Preservation of...

07-10-2010 A Two-day Workshop on Clean Technology in Paper...

Registration of Recyclers/Disprocessors - Application Status

Real Time Air Quality Status CCR Monitor

Catch CPCB

LIST OF PUBLICATIONS



CENTRAL POLLUTION CONTROL BOARD
(Ministry of Environment & Forests)
Parivash Bhawan, East Arjun Nagar, Delhi - 110 032
Website: cpcb.nic.in | E-mail: cpcb@nic.in
June, 2010

A Clean PARIVESH for all is our GOAL