

POLLUTION STATUS OF RIVER GHAGGAR



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FOREWORD

The Ghaggar is an intermittent river flowing during only in the monsoon season. Originating from the Shivalik Hills of Himachal Pradesh it flows through Punjab, Haryana, Rajasthan and Union Territory of Chandigarh. The wide river-bed (paleo-channel) of the Ghaggar suggests that the river once flowed full, through the entire region, presently dried channel of the Hakra River, possibly emptying into the Rann-of- Kutch. It supposedly dried up due to the capture of its tributaries by Indus and Yamuna rivers.

In addition, the industrial and domestic wastewater discharges from the towns located along Ghaggar or its tributaries deteriorate the water quality of the river.

The study was conducted by CPCB to assess the pollution potential of Ghaggar basin. The report provides an overview of the pollution problem of the river, measures for its control, the recommendations and action taken by CPCB to ensure pollution mitigation of river Ghaggar.

Sh. Vishal Gandhi, Scientist 'B', Sh. A.K. Sinha, Scientist 'C', Dr. D.D. Basu, Senior Scientist and Sh. J.S.Kamyotra, Member Secretary are thankfully acknowledged for their respective roles.

Hopefully, this report will be useful to the regulatory agencies, entrepreneurs, researchers, planners and the authorities concerned with water quality management.


(S. P. Gautam)

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1.0 BACKGROUND

Pursuant to the decisions taken in the meeting held on August 19, 2009 chaired by the Secretary, Cabinet Coordination, Rashtrapati Bhawan, New Delhi and communication received from the Joint Secretary, Ministry of Environment and Forests (MoEF), Shri Rajiv Guaba, for conducting a detailed field investigation on the issue of Pollution of River Ghaggar, Central Pollution Control Board (CPCB) constituted a team comprising; Sh. A.K Sinha, Scientist, Sh. Mrinal Kanti Biswas, AEE, Sh. Vishal Gandhi, AEE, Sh. Satyaveer Singh, Sr. Technician and Sh. Mirajuddin, Sr. Technician for assessment of the pollution problems of River Ghaggar.

2.0 THE GHAGGAR RIVER

History:

The Ghaggar is an intermittent river in India, flowing during the monsoon season. It originates in the Shivalik Hills of Himachal Pradesh and flows through Punjab, Haryana and Rajasthan. In Haryana, it flows through south-west of Sirsa and by-the-side of Talwara Jheel in Rajasthan. This seasonal river feeds two irrigation canals that extend into Rajasthan. The present-day Saraswati River originates in a submontane region (Ambala district) and joins Ghaggar near Shatrana in Punjab. A dried out channel of the Sutlej, joins the river Ghaggar near Sadulgarh (Hanumangarh), the Naiwal channel. The Ghaggar then joins with the dried up Drishadvati (Chautang) river. The wide river-bed (paleo-channel) of the Ghaggar suggests that the river once flows full of water, through the entire region, in the presently dried channel of the Hakra River, possibly emptying into the Rann-of- Kutch. It supposedly dried up due to the capture of its tributaries by the Indus and Yamuna rivers and the loss of rainfall in much of its catchment area due to deforestation and overgrazing.

The Ghaggar-Hakra and the Sutlej:

Many settlements of the Indus Valley Civilization era have been found along the Ghaggar and Hakra rivers. It has been shown by satellite imagery that at Ropar, the Sutlej River suddenly flows away from the Ghaggar in a sharp turn. The beforehand narrow Ghaggar river-bed itself suddenly becomes wider at the conjunction where the Sutlej should have met the Ghaggar river. And, there is a major paleochannel between the point where the Sutlej takes a sharp turn and the Ghaggar river bed widens.

The Ghaggar-Hakra and the Yamuna:

There are no Harappan sites on the present Yamuna River. However, painted Gray Ware sites excavated on the Yamuna channel, indicate that the river must have flown in that channel during 1000 - 600 BC. The distribution of the painted Gray Ware sites in the Ghaggar river valley indicates that during the ancient period, the Ghaggar River had already dried up partly.

3.0 METHODOLOGY:

The methodology adopted for carrying out the study are:

- i) Desk Inventory
- ii) Wet Inventory

i) **Desk inventory:** To carry out the present study, first desk inventory was performed based on background information available inhouse. During desk inventory, sites were finalized for the survey & monitoring of the basin as per satellite image (Fig. 1) of river Ghaggar. The concerned State Pollution Control Boards (SPCBs) were also informed about the

programme to depute those officers who have sufficient knowledge of drains, industries etc. discharging into the river in their areas to accompany with the CPCB

Roper, Sangrur in Punjab, Ganganagar, Hanumangarh in Rajasthan and Union Territory of Chandigarh. A large number of rivulets and Choes bring their surface run-off into river Ghaggar from left and right sides. The river has a total stretch of about 291 km with a catchment area of 42,200 sq. km.

4.2 Point Sources

During the five days of field study, the team monitored all the major point sources of River Ghaggar. The list of point sources are given in Table 2. The team also conducted a survey of the Ghaggar basin as per the Schematic Diagram given in Fig.2:

Table 2: Point sources of River Ghaggar

S.No	Code	Point Source	Region	Description
1	PS1	Sukhna Nallah	Parwanoo, H.P	Right side of Ghaggar
2	PS2	STP Kalka	Kalka, Haryana	
3	PS3	Seasonal River, Pinjaour (HMT)	Kalka, Haryana	Right side of Ghaggar
4	PS4	STP Raipur Khurd, 1.2 MGD	Chandigarh	
5	PS5	STP Raipur Kalan, 5 MGD	Chandigarh	
6	PS6	STP 3BRD, 25 MLD	Chandigarh	
7	PS7	Baltana Drain	Chandigarh	Right Side of Ghaggar
8	PS8	Dhakansu Drain	Punjab	Right Side of Ghaggar
9	PS9	Patiala River, U/S	Patiala, Punjab	
10	PS10	Jacob Drain	Patiala, Punjab	
11	PS11	Patiala River, D/S	Patiala, Punjab	Tributary right Side of Ghaggar
12	PS12	Jatawalla Nallah	Kala Ambh, H.P	
13	PS13	Jharmal Choe	Tiwana, Punjab	Left side of Ghaggar
13	PS14	Markanda River, U/S	Narayangarh, Haryana	
14	PS15	Markanda River, D/S	Shahbad, Haryana	Tributary left Side of Ghaggar
15	PS16	Samsabad Drain	Sirsa, Haryana	Left Side of Ghaggar

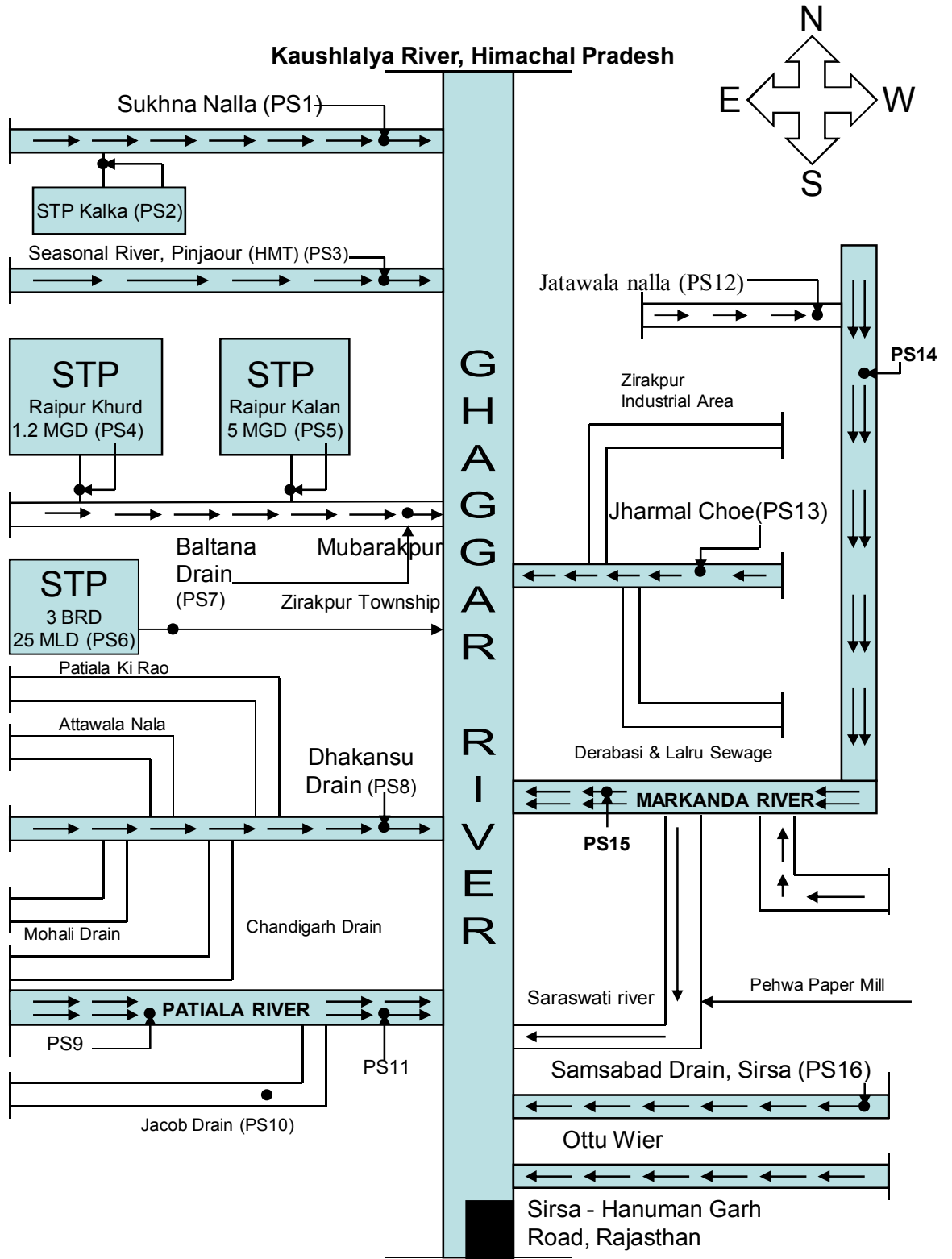


FIG 2: SCHEMATIC DIAGRAM OF POINT SOURCES IN GHAGGAR RIVER

Salient Features of Point Sources:

4.2.1 Sukhna Nallah (PS1): BOD load is measured as 32.76 kg/day with concentration of 7mg/l.

4.2.2 Kalka (PS2): Sewage Treatment Plant (STP) at Kalka was found non-operational and effluent was directly used for irrigation purpose. The effluent quality indicates high concentration of BOD and COD i.e. 393 mg/l and 921 mg/l respectively. The estimated BOD load was observed as 1500 kg/day. Pic.1 shows the shabby conditions of STP Kalka.



Pic.1: Kalka STP

4.2.3 Seasonal Rivulet at Pinjaour (HMT) (PS3): This is a tributary of Ghaggar River, flowing near Kalka. The concentration of BOD at this point was 1 mg/l and quality of water was good.

4.2.4 STP Raipur Kalan, Raipur Khurd (PS4, PS5): These two STPs are located at Chandigarh and working at full efficiency. The Outlets of these STPs fall in Baltana Drain. The physical parameters were found well within the prescribed standards. BOD load from Raipur Kalan and Raipur Khurd is about 431.1 kg/day.

4.2.5 STP 3BRD (PS6): The STP is performing satisfactory. The outlet BOD concentration is 22 mg/l and BOD load discharged to Ghaggar River is about 550 kg/day.

4.2.6 Baltana Drain (PS7): Baltana Drain carries wastes (sewage & industrial) from Chandigarh and Panchkula (Haryana). It was observed that the sewage from Raipur Kalan STP, with a capacity of 5 MGD for treatment of sewage from Panchkula, Chandigarh and Punjab was being by-passed without any treatment to Baltana Drain. BOD load of Baltana Drain was assessed very high as 57 mg/l and other parameters were also above the prescribed standards. Pic.2 shows the water condition of Baltana Drain.



Pic.2: Baltana Drain at Chandigarh

4.2.7 Dhakansu Drain (PS8): BOD concentration at Dhakansu Drain was 57 mg/l. Flow at this point was very high, but could not be measured due to heavy rain.

4.2.8 Jacob Drain (PS10): BOD concentration at Jacob Drain is 76 mg/l and TSS level is four times above the prescribed standard. The Jacob Drain directly meets the Patiala River. There was a heavy rain on the day of study, as such flow could not be measured. However, the load at Patiala River was measured.

4.2.9 Patiala River (PS11): A number of subsidiary rivulets join the Ghaggar River, the most important one being Patiala River. Patiala River meets the Ghaggar River at the upstream of Jharmal choe. This River also falls in the category of semi-arid region. At Patiala River, high BOD load was observed i.e. 32,228.26 kg/day.



Pic.3: Patiala River D/S, Dhanor Village, Patiala

4.2.10 Jatawallah Nallah (PS12): Sample was collected at downstream of Jatawallah Nallah, Kala Amb-Himachal. In Kala Amb, Himachal Pradesh, there are more than 200 industries comprising M/S Ruchira Paper Mills Ltd. (RPL), Steel Rolling mill, Pharmaceutical Units etc. Industrial wastes alongwith untreated sewage of Kala Amb area falls directly into **Jatawala Nallah** which ultimately meets the River Markanda. BOD load at Jatawala Nalla was very high i.e. 1270.08 kg/day. BOD and TSS concentration was observed as 84 mg/l and 1930 mg/l, respectively.

4.2.11 Jharmal Choe (PS13): Jharmal Choe received industrial and domestic sewage of Derabasi, Lalru and Zirakpur. Flow could not be measured due to heavy rains. BOD concentration at Jharmal Choe was 17 mg/l which is within the prescribed norms.



Pic. 4: Jatawallah Nallah, Haryana

4.2.11 Markanda River (PS15): River Markanda, a tributary of the River Ghaggar, is supposed to be a part of the ancient Vedic Saraswati River basin system. There is a large historic temple on the bank of the river, which is called Markandeshwar, after the name of the famous Maharshi Markandeya. This is a small river of Nahan area, in the Sirmaur District, Himachal Pradesh.

Markanda River at Narayangarh River Markanda is polluted due to Jatawallah Nala. The BOD load at this point was observed as 1764.24 kg/day, but the flow at the sampling point was high, thus the BOD concentration was found 4.6 mg/l. The flow of River at Shahbad was not observed due to abstraction of water for irrigation purpose.



Pic. 5: Markanda River at Narayangarh

4.2.12 Samsabad Drain, Sirsa (PS16): BOD load at this point was observed as 6879 kg/day due to discharge of untreated sewage into Ghaggar River. The BOD concentration of the drain was also high i.e. 81 mg/l and TSS 440 mg/l, which is far exceeding the prescribed standards.

4.3 Sewage treatment Plant:

Table 3: Pollution Assessment of Ghaggar Basin from various STPs

S.no	Locations	Flow MLD Capacity	Parameters				BOD Load Kg/day
			BOD	COD	pH	TSS	
1	STP Kalka, Haryana	1.2	393	921	7	228	471.6
2	STP Raipur Khurd, Chandigarh	5.4	9	47	7.2	24	48.6
3	STP Raipur Kalan, Chandigarh	22.5	17	95	7.4	35	382.5
4	STP 3BRD, Chandigarh	25	22	88	7.5	32	550
5	STP Diggian, Mohali, Chandigarh 45 MGD Mixed	202.5	198	393	6.7	420	40095
6	STP Diggian, Mohali, Chandigarh	67.5	22	120	6.9	46	1485

A critical review of the above table indicates the following:

STP at Kalka, Haryana and Diggian Mohali, Chandigarh need to be efficiently operated. The effluent quality of these STPs do not conform to the prescribed standards for BOD and TSS.

4.4 Drains:

Table 4: Pollution Load of Ghaggar Basin from Drains

S.no	Location	Flow MLD	Parameters				BOD load Kg/day
			BOD	COD	pH	TSS	
1	Sukhna Nalla,HP	4.68	7	18	7.3	25	32.76
2	Baltana Drain,Chandigarh	14.43	57	157	7.4	107	822.51
3	Jatawala Nalla, D/S at Haryana	15.12	84	246	9.7	1930	1270.08
4	Jacob Drain	**	76	297	7.2	400	**
5	Samsabad Drain, Sirsa Haryana	84.93	81	328	6.9	440	6879.3

A critical review of the above table indicates the following:

Jatawala Nalla at D/S in Haryana, Jacob Drain at Patiala in Punjab and Samsabad Drain at Sirsa in Haryana have very high level of BOD, COD & TSS concentration.

4.5 INDUSTRIAL SOURCES:

During the field study, the team visited a number of industries and collected samples. The list of industries and the observations of the inspecting team is given in Table 5.

Table 5: Industries inspected in Ghaggar Basin

S.No.	Industry name	Code	Region	Nearby drain	Remarks
1	H.P.M.C	IS1	Parwanoo, H.P	Sukhna Nallah	No effluent discharge was observed and ETP was well maintained. Well design composting (Vermi composting) system was in operation
2	KDDL Ltd	IS2	Parwanoo, H.P	Sukhna Nallah	
3	Fedral Mogul	IS3	Parwanoo, H.P	Sukhna Nallah	Well maintained ETP with Acoustic enclosure provided for noise control and for fumes scrubby system available.
4	Chandigarh Distillery	IS4	Banura, Patiala, Punjab	Jungapura Drain	Poor house-keeping and effluent treatment plant condition.
5	Nahar Ltd.	IS5	Punjab	Jharmal Choe	Well maintained house-keeping and ETP.
6	Surya Pharmaceuticals Ltd.	IS6	Banura, Patiala, Punjab	Jungapura Drain	Poor house-keeping/spillage of oil and bad ETP condition.
7	Rajiv Paper Mills	IS7	Patiala, Punjab	Jacob Drain	
8	Vishal Coaters Ltd.	IS8	Patiala, Punjab	Jacob Drain	Combined ETP with Vishal Paper Mill& Industry Pvt Ltd.
9	Vishal Paper Mill& Industry Pvt. Ltd.	IS9	Patiala, Punjab	Jacob Drain	Poor house-keeping and the treated effluents do not meet the prescribed standards.
10	Patiala Distillery Ltd.	IS10	Patiala, Punjab	Jacob Drain	The industry was not found in operation at the time of inspection. The house-keeping was observed very poor.
11	Jagdamba Paper Ltd.	IS11	Sirsa, Haryana	Samsabad Drain	The Industry is very old and the ETP condition is bad.
12	Shahabad Cooperation Sugar Mills	IS12	Shahabad, Haryana	Bainta Nalla	
13	NV Distilleries	IS13	Badauli, Haryana	Bainta Nalla	RO system installed on trial basis. In-house maintenance found satisfactory.

SALIENT FEATURES OF INDUSTRIAL POINTS:

4.5.1 M/S Chandigarh Distilleries and M/S Surya Pharmaceuticals (IS4 and IS6): The quality of effluent generated from M/S Chandigarh Distillery and M/S Surya Pharmaceuticals is not satisfactory. TSS, BOD, COD level of Surya Pharmaceuticals is not meeting the prescribed standards. Wastewater generated from M/S Surya Pharmaceuticals is 43 kld and in-house maintenance of the ETP is very poor as shown in Pic.7. The nearest drain to these industries is Jankpura. However, both the industries have installed storage tanks and are using their effluents for irrigation. In-house maintenance of M/S Chandigarh Distilleries is also poor as shown in Pic. No.6



Pic.6: Aeration tank of Chandigarh Distillery



Pic.7: Spillage of oil on floor of Surya Pharmaceuticals industry

4.5.2 M/S Vishal Paper Mills and Industry Pvt. Ltd (IS9): BOD, TSS, COD level of M/S Vishal Paper Mills are exceeding the prescribed standards. The nearest drain to the industry is Jacob Drain.



Pic.8: Figure showing condition of treated effluent of Vishal Paper Mills

5.0 MONITORING LOCATIONS AT GHAGGAR RIVER AND ITS TRIBUTARIES

During the field study, the team collected samples from a number of identified locations which are depicted in Fig.3 and detailed in Table 6:

Table 6: Monitoring Locations at Rivers

S.No	Code	River Source Name	Region
1	RP1	Kaushlalya River	Parwanoo, H.P
2	RP2	Ghaggar River at Amravati Enclave	Haryana, Kalka
3	RP3	Ghaggar River at Mubarakpur	Punjab
4	RP4	Ghaggar River at Tiwana Village	Punjab
5	RP5	Ghaggar at Chandrapur Siphon	Haryana
6	RP6	Ghaggar at Dabwali Road	Sirsa, Haryana
7	RP7	Ghaggar at Ottu Weir	Haryana

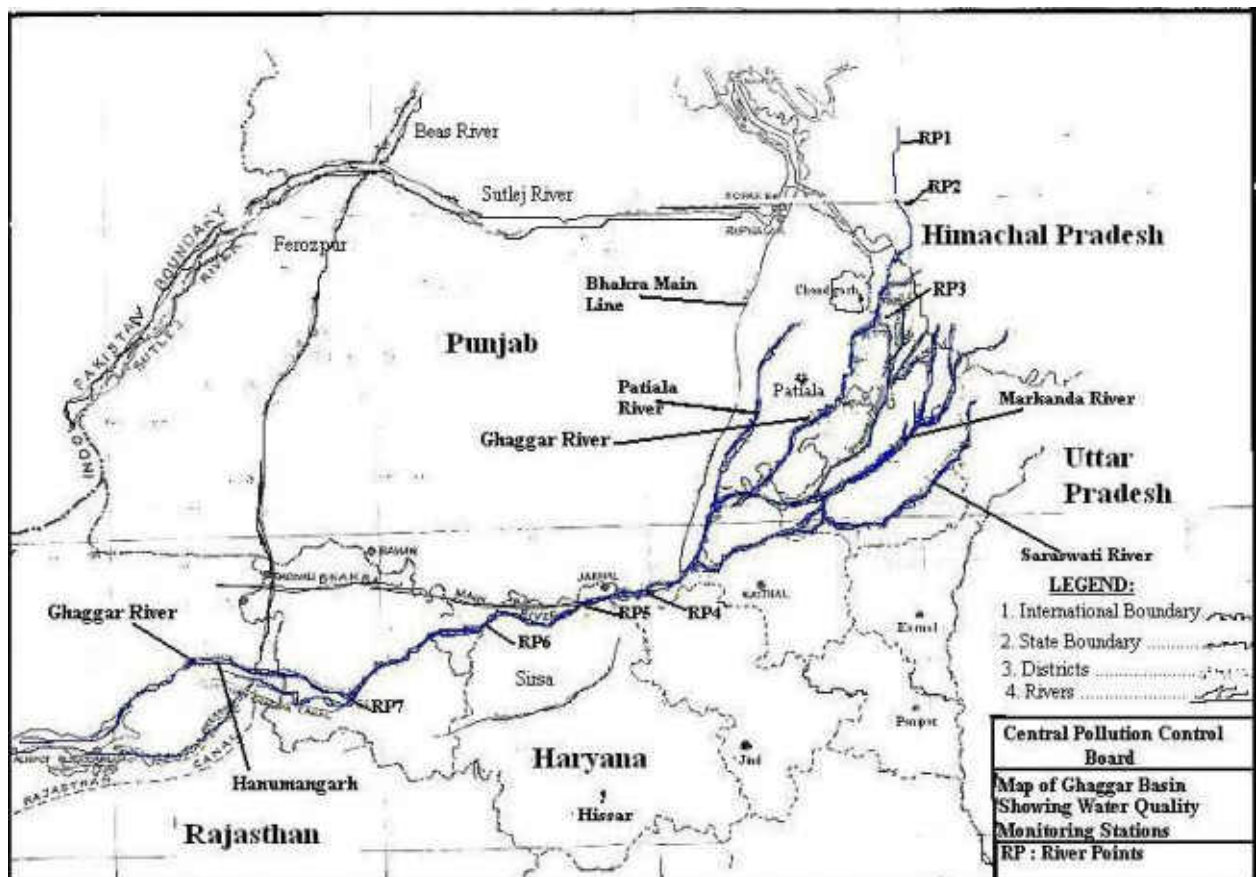


Fig.3: Ghaggar Map

5.1 Salient Features of River Points

5.1.1 Kaushlalya River, Parwanoo, H.P (RP1): Parwanoo is an industrial town and around 80% of its local population is engaged in the different kinds of industries located in the vicinity. There are about 200 industries running in the area. Parwanoo has an estimated population of 8609, as per census 2001. At Kaushlalya River, BOD level was observed as 1 mg/l and load was also low i.e. 37.78 kg/day. The image of Kaushlalya River is shown in Pic. 9.



Pic. 9 : Kaushlalya River, H.P

5.1.2 Ghaggar River at Amravati Enclave (RP2): The River has good flow at Amravati and BOD load at this point is 127.27 kg/day as BOD level is only 1 mg/l.



Pic.10: Ghaggar River at Amravati Enclave

5.1.3 Ghaggar River at Mubarakpur (RP3): BOD load suddenly increased at Mubarakpur (1783.18 kg/day) due to discharge of Baltana Drain carrying wastes (sewage & industrial) from Chandigarh and Panchkula (Haryana). It was observed that the STP at Raipur Kalan having capacity of 5 MGD was not functioning and the untreated sewage was bypassed to Baltana Drain.



Pic.11: River Ghaggar at Mubarakpur

STP Diggian, Mohali, Chandigarh was treating only 15 MGD of sewage and mixing it with 30 MGD of untreated sewage. This mixed sewage having high levels in terms of BOD, COD and TSS is used for irrigation.

5.1.4 Ghaggar River at Tiwana Village (RP4): Jharmal Choe receives domestic and industrial sewage of Derabasi and Lalru. This sewage is directly discharged into Ghaggar River at Tiwana Village. Pharmaceuticals industries of this area discharge their effluent in Jharmal Choe. BOD concentration at this point was observed as 4.6 mg/l which is above the prescribed standard.

5.1.5 Ghaggar at Chandrapur Siphon (RP5): BOD concentration was above the prescribed standard i.e. 3.4 mg/l and BOD load was 8063.11 kg/day. The image of Ghaggar River at Chandrapur Siphon is shown in pic. 12.



Pic. 12: River Ghaggar at Chandrapur Siphon, Haryana

5.1.6 Ghaggar at Dabwali Road (RP6): High BOD load of 11515.35kg/day was observed at Ghaggar River at Dabwali Road.

5.1.7 Ghaggar at Ottu Weir: The river water is blocked at weir, as such the river does not have any water downstream. All river water was diverted to canal in Haryana. The BOD and DO level at this point was observed as 13 mg/l and 2.8 mg/l respectively.



Pic.13: River Ghaggar at Ottu Weir

5.1.8 Ghaggar in Rajasthan: The River does not have any water downstream of Ottu Weir, therefore it has become dried in Rajasthan as such sample was not get collected.

5.2 Pollution Assessment of River

5.2.1 Physico Chemical Parameters

The physico chemical parameters of samples collected during the study are presented in Table 7:

Table 7: BOD load for Pollution Assessment of River Ghaggar from various sources

S.No	Location	Description	Flow MLD	Parameters				BOD load Kg/day
				DO	BOD	COD	pH	
1	Kaushlalya River, H.P	Tributary of Ghaggar	38	7.8	1	2	7.5	38
2	River Ghaggar at Amravati, Haryana	After Parwanoo	127	7.4	1	5	7.5	127
3	Ghaggar at Mubarakpur	Carrying Sewage/Ind. waste of Baltana drain	127	1.8	14	37	7.7	1783
4	Markanda River U/S at Naryangarh, Haryana		294	4.6	6	17	7.7	1764.
5	Markanda River D/S, Shahbad, Haryana	Right Side at Haryana	0	5.6	6	18	7.8	0
6	Patiala River D/S Dhanor Village	Left Side at punjab	948	0	34	113	7.7	32228
7	Ghaggar at Chandrapur Siphon, Haryana	Entering into Haryana from Punjab	733	3.4	11	35	7.9	8063
8	Ghaggar at Dabwali Road		768	0.8	15	42	7.9	11515
9	Ghaggar at Ottu Weir	River was not flowing further and water was diverted to canal in Haryana		2.8	13	36	7.7	0

A critical review of the above table indicates that,

1. The BOD load in River Ghaggar at Mubarakpur which is estimated as 1783 kg/day is the main source of pollution problem in the river. The pollution is generated through Baltana Drain due to discharge of untreated waste. There is an urgent need to check the pollution load at Mubarakpur. In addition to augment of existing STPs, additional STPs need to be installed immediately in the adjoining areas of Haryana and Punjab.
2. Patiala River is contributing highest BOD load to River Ghaggar, which is 32228 kg/day. This accumulation is due to the contribution of both municipal as well as industrial untreated wastes. There is a need to install STPs in the adjoining areas of Punjab.

5.2.2 Microbial Pollution: Based on the findings of the study, assessment of Microbial Pollution in River Ghaggar are given in Table No. 8

Table 8: Microbial Pollution Assessment

S.No	Locations	Total Coliforms MPN/100 ml	Faceal Coliforms MPN/100 ml
1	Markanda U/S, Naryangarh, Haryana	2,40,000	4,100
2	Markanda D/S, Shahbad, Haryana	3,80,000	6,000
3	Patiala River U/S	11,70,000	57,000
4	Patiala River D/S	95,00,000	5,60,000
5	Parwanno U/S, Ghaggar River (Kaushalya), H.P.	97,000	2,100
6	Amravati, R. Ghaggar, Haryana	95,000	2,000
7	Mubarakpur, R. Ghaggar, Punjab	1,21,000	2,400
8	Tiwana Village, R. Ghaggar, Punjab	5,10,000	37,000
9	Chandrapur Siphon, R. Ghaggar, Haryana	4,80,000	2,300
10	Sirdulgarh, R. Ghaggar, Punjab	1,01,000	2,200
11	Dabwali Road, R. Ghaggar, Haryana	5,00,000	2,700
12	Ottu Weir, R. Ghaggar, Haryana	4,50,000	4,000

A critical review of the above table indicates that,

1. Maximum Coliform values are lying at down stream of Patiala River.
2. Coliform values are also found exceeding the desired level.

5.3 Historical Observations of quality of Ghaggar River

The quality of Ghaggar River has been monitored by the CPCB under National Water Quality Monitoring Programme and provided for the period starting from 2004-2008. The results of BOD parameter monitored during the above stated period at Mubarakpur (Punjab), Tiwana Village (Punjab), Chandarpur Siphon (Haryana), Sardulagarh (Punjab), Dabwali Road (Haryana), Ottu Weir (Haryana) and Ghaggar River entering in Rajasthan is illustrated in Table No. 9.

Table 9: BOD Profile of River Ghaggar during 2004-08

Locations	2004			2005			2006			2007			2008		
	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	Min	Max	Mean
MUBARAKPUR (Punjab)	0.8	2.6	1.5	1.0	3.2	2.1	1.2	4.4	3.3	0.8	3.4	2.1	3.6	10	5.4
Tiwana Village, Punjab	0.6	3	1.7	2.4	8.0	4.3	8.0	10.0	9.3	4.2	16.0	8.2	4.2	32	18.1
Chandarapur Syphon, Haryana	7	28	15.7	8.0	18.0	13.0	12.0	20.0	16.0	11.0	42.0	25.3	9	40	22.3
Ghaggar AT U/S Sardulgarh, Punjab	1.2	20	11.7	5.0	22.0	16.3	16.0	27.0	20.3	5.0	18.0	10.4	8	45	25.8
Ghaggar Sirsa, Debwali Road, Haryana	8	15	10.3	8.0	11.0	9.8	14.0	20.0	17.0	8.0	68.0	26.3	8	33.2	17.1
Ghaggar at Otu Weir, Haryana				6.0	9.0	7.0	10.0	18.0	14.0	6.0	81.0	26.3	7	50	25.3
GAGGAR RIVER ENTERING RAJASTHAN	0.5	0.5	0.5	1.4	1.4	1.4									

5.4 Water Quality Profile of River Ghaggar during 2004-09 (Min, Max, Mean Values):

Temporal Graphs (Fig. 4-9) placed below describe the BOD profile of River Ghaggar during 2004-2009. The results of BOD parameter monitored during 2009 is illustrated in Table No. 10. Spatial Graph placed at figure no.10 describes the mean concentration of BOD during 2004-2009.

BOD Profile of River Ghaggar

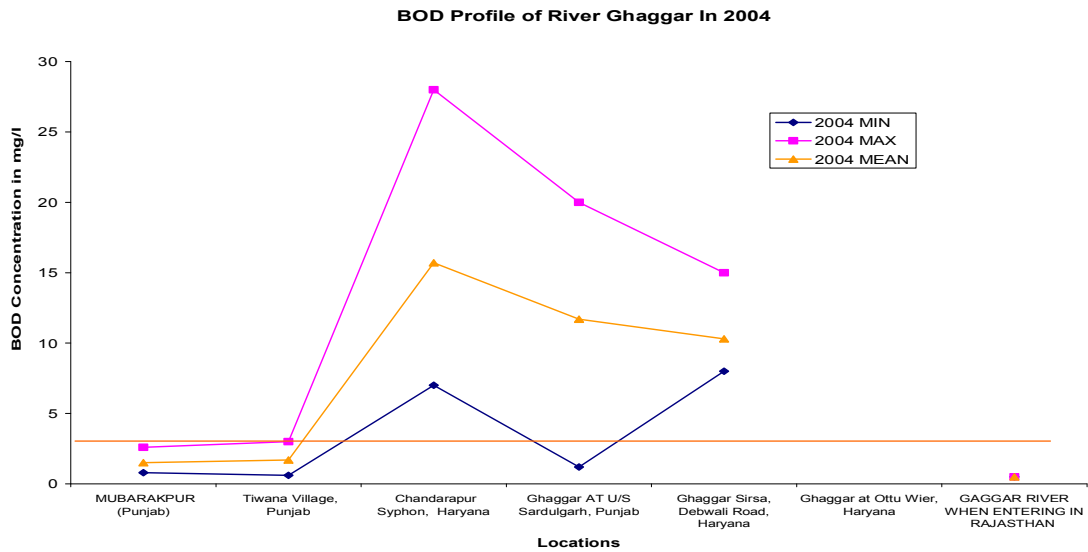


Fig 4: BOD Profile of River Ghaggar in 2004

Maximum BOD concentration was observed at Chandrapur Siphon. Maximum and mean value of BOD, show the same trend, as concentration drops down at Debawali Road, Sirsa, whereas the minimum value increasing after Sardulgarh, Punjab.

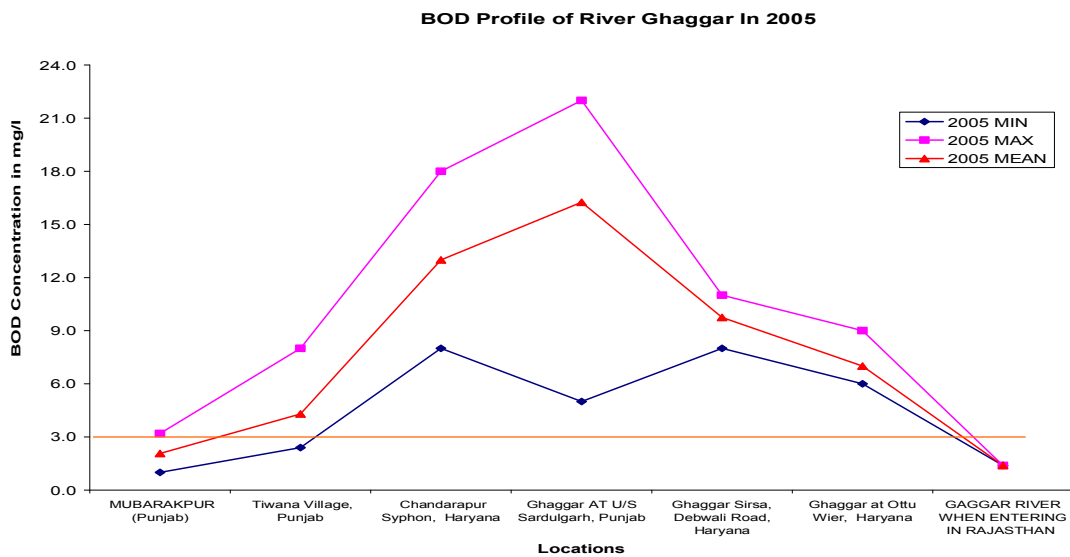


Fig 5: BOD Profile of River Ghaggar in 2005

In 2005, an upward trend was observed in terms of Maximum and Mean concentration of BOD in the stretch of Mubarakpur, Punjab to Sardulgarh, Punjab; whereas a different trend was observed for Minimum value of BOD. At Mubarakpur, Punjab BOD concentration was found below the prescribed standard.

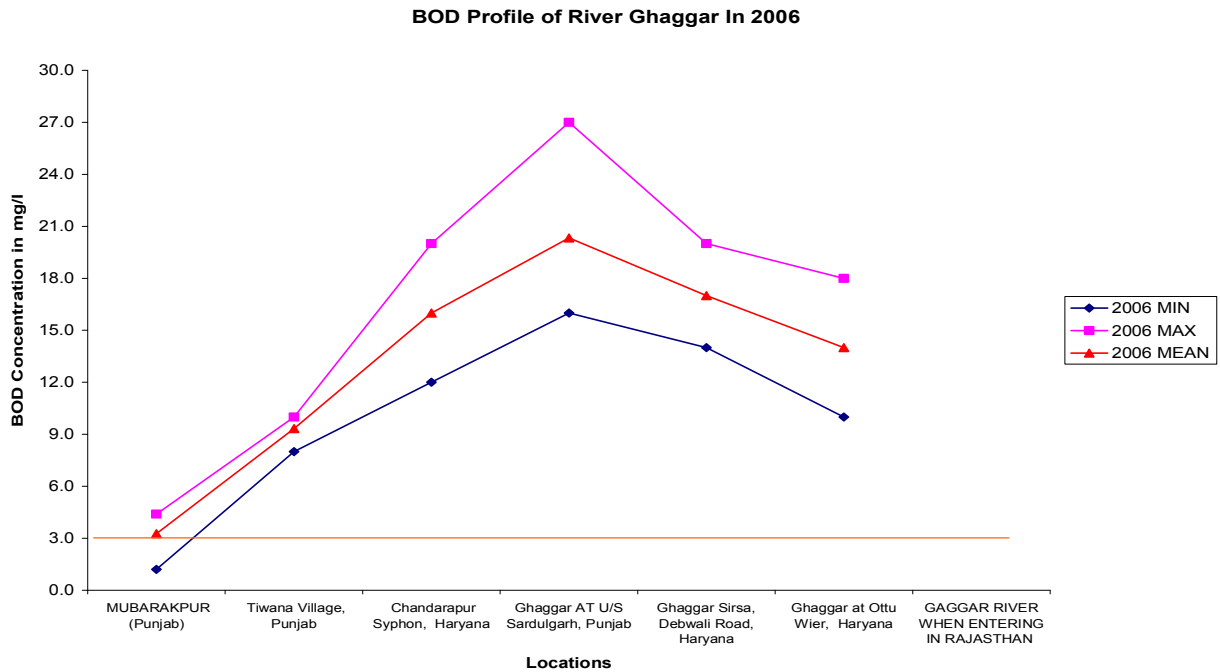


Fig 6: BOD Profile of River Ghaggar in 2006

In 2006, Maximum concentration was observed at Sardulgarh, Punjab. Maximum and Mean values of BOD were always above the prescribed standard.

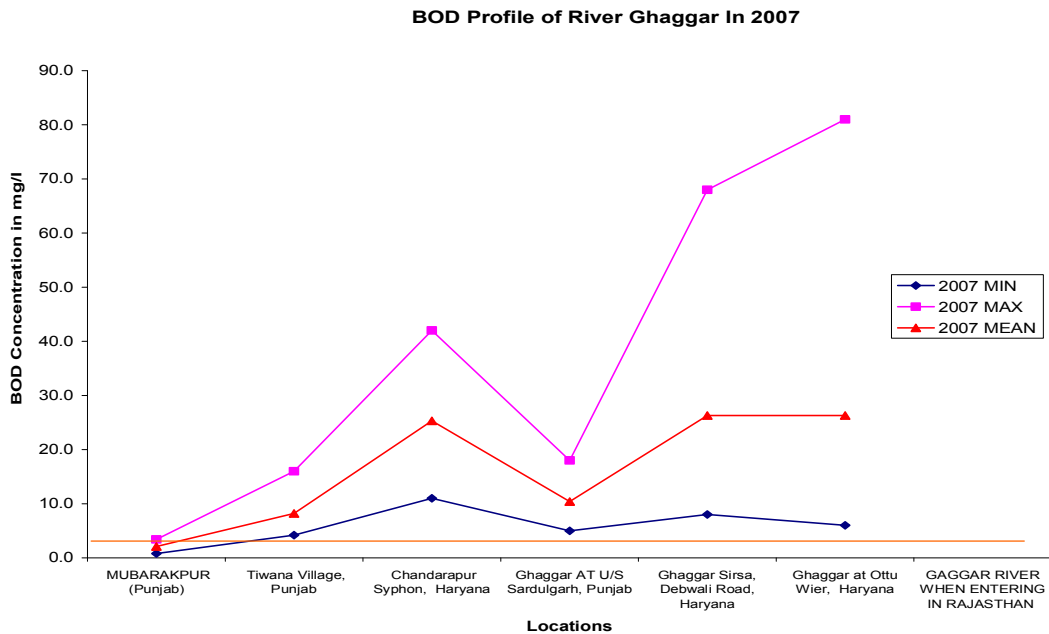


Fig 7: BOD Profile of River Ghaggar in 2007

In 2007, different variations were observed. Peak values were found at Ottu Weir, Haryana. However, beyond Chandrapur Syphon, BOD concentration drops down after Sardulgarh, Punjab.

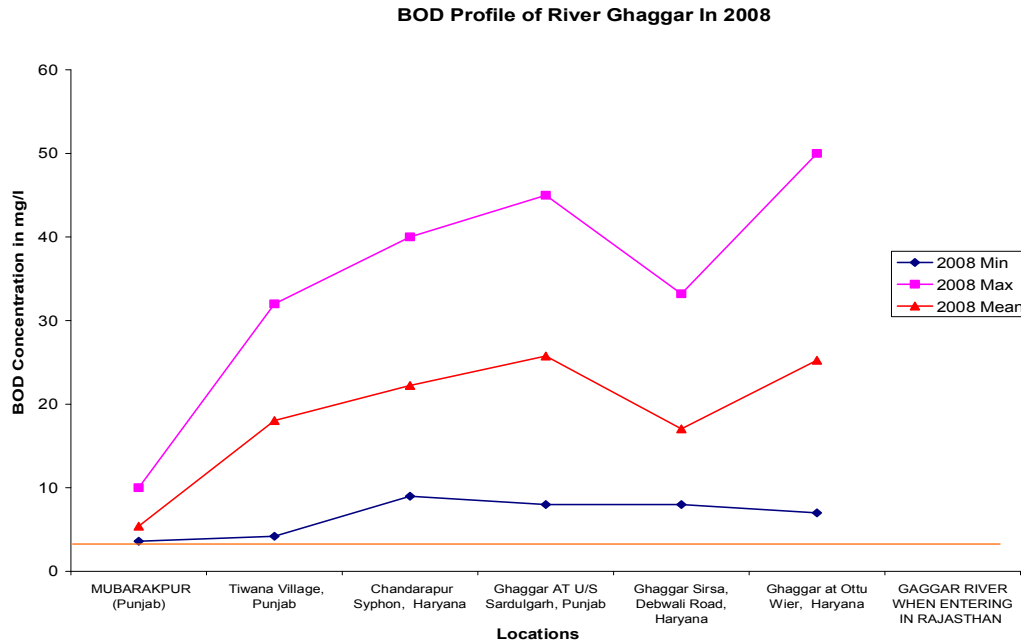


Fig 8: BOD Profile of River Ghaggar in 2008

In 2008, peak concentration of BOD was observed at Ottu Weir. All values were always found above the prescribed standards. Similar pattern was observed in all locations.

Table 10: BOD Profile of River Ghaggar during 2009

Locations	2009		
	MIN	MAX	MEAN
Parwanoo U/S (H. P.)	1	27	6
Parwanoo D/S , Amravati, Haryana	1	27	6
Mubarakpur (Punjab)	3	24	11.85
Tiwana village (Punjab)	2	46	17
Chandrapur Siphon (Haryana)	4	95	26
Sirdulgarh (Punjab)	3	84	29.28
Sirsa Dabwali Road (Haryana)	2	128	36.8
Ottu Weir (Haryana)	2	70	26.5

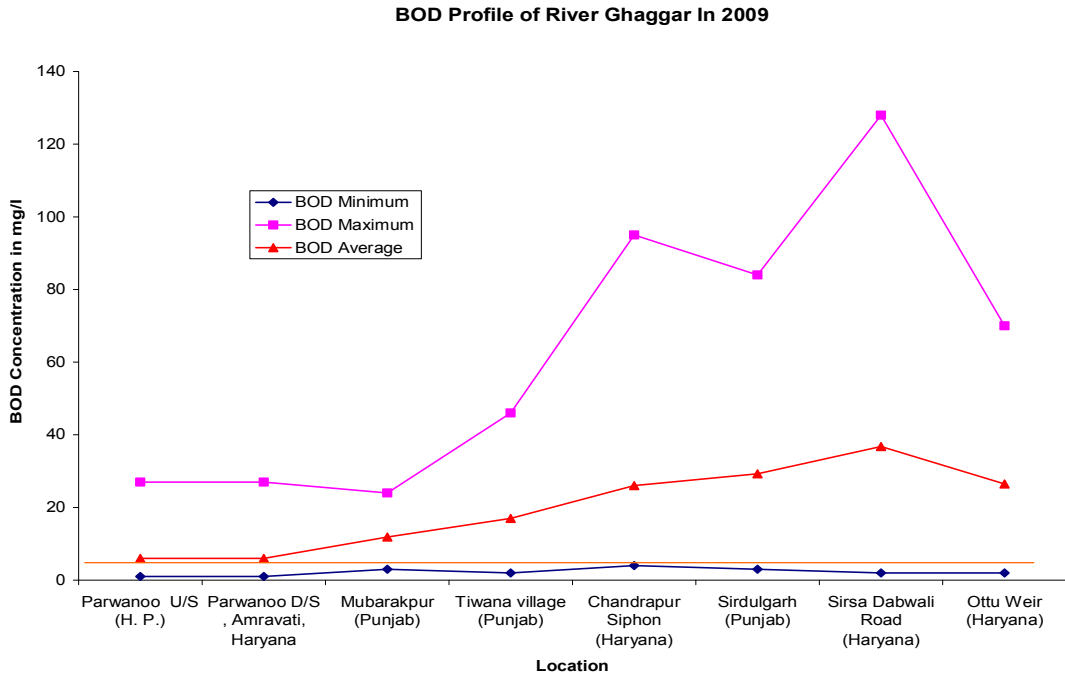


Fig 9: BOD Profile of River Ghaggar in 2009

It may be revealed from the above that in Sardulgarh, Punjab BOD concentration was maximum during 2005-09 except 2007 and in Chandrapur Siphon, Haryana Maximum concentration was observed during 2004. The main problem of pollution arised after Parwanoo downstream, Amravati, Haryana.

5.5 Water Quality Profile of River Ghaggar during last six years (2004-09):

The water quality of river Ghaggar assessed during the year from 2004-09 is shown in fig.10

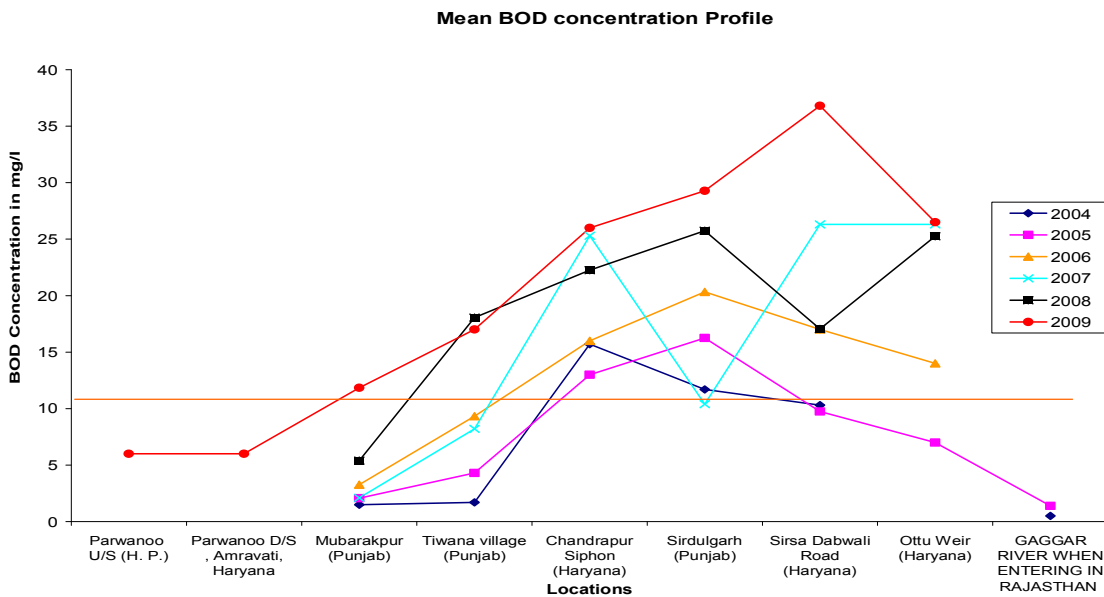


Fig 10: Mean BOD Concentration Profile

It may be revealed from the above figure that during the assessed period, the BOD concentration was always found above the prescribed standard. In 2009, BOD level was observed as high as compared to previous years at all monitoring points. The highest concentration of BOD was observed at Sirsa Dabwali road during 2009 i.e. 36.8mg/l. However, in Ottu Weir (Haryana), BOD level decreased sharply as a common trend which was observed during 2004-09. The water quality of River Ghaggar starts deteriorated after Parwanoo downstream, Amravati, Haryana and increasing trend was observed there upon.

6.0 FINDINGS OF THE STUDY:

1. The problem of Pollution in river Ghaggar aggravates at Mubarakpur, due to discharge of untreated waste through Baltana Drain at the downstream of Mubarakpur. BOD load at Baltana Drain is 822 kg/day and BOD concentration 57 mg/l.
2. STP at Raipur Kalan having capacity for treatment of 5 MGD sewage is working at full efficiency and is receiving more than 5 MGD sewage of Punchkula, Chandigarh and Punjab. The untreated sewage of 5 MGD is being bypassed to the Baltana Drain which deteriorates the quality of water of Ghaggar River.
3. Ghaggar River at Mubarakpur has BOD load of 1783 kg/day and BOD concentration 14 mg/l.
4. STP at Kalka, Haryana and Diggian, Mohali-Chandigarh needs to be maintained properly. The results of treated effluent from these STPs are not meeting the prescribed standards in terms of BOD and TSS.
5. Jharmal Choe is receiving industrial and domestic sewage of Derabasi, Lalru and Zirakpur. Flow of the choe could not be measured due to heavy rain. The BOD concentration at Jharmal Choe is 17 mg/l.
6. BOD concentration at Dhakansu Drain is 57 mg/l. Flow at this point was very high, which could not be measured due to heavy rains.
7. BOD concentration at Jacob Drain is 76 mg/l and TSS level four times above the prescribed standards. This drain directly meets the Patiala River. Flow at this point could not measured due to heavy rains.
8. Patiala River is contributing highest BOD load i.e. 32228 kg/day to River Ghaggar. This accumulation is due to the contribution of untreated municipal as well as industrial wastes. Faecal Coliform values observed at this point are very high i.e. 15,60,000 MPN/100 ml and other parameters are also above the prescribed standards.
9. Jatawalla Nalla downstream of Haryana has very high level of COD & TSS concentration which can be attributed to industrial discharge.
10. BOD load at Markanda River is high i.e.. 1764 kg/day but the flow at this point was adequate thus BOD concentration was 4.6 mg/l which is above the prescribed standard.
11. River Markanda is polluted due to Jatawallah Nala. The flow of river at Shahbad was not observed due to abstraction of water for irrigation purpose, but BOD concentration at this point is 5.6 mg/l and Dissolved Oxygen (DO) nil.
12. BOD load of Ghaggar River at Dabwali Road is high i.e. 11515 kg/day and DO level as 0.8 mg/l. Other parameters are also not meeting the prescribed standards.
13. Samsabad drain discharges into Ghaggar River. BOD load at Samsabad drain is 6879 kg/day. This is due to discharge of untreated sewage. BOD concentration of this drain is 81 mg/l and TSS level is 440 mg/l. This is far exceeding the prescribed standards. Fecal Coliform values are also observed high i.e. 2,700 MPN/100 ml, which is higher than the prescribed standard.

7.0 SPECIFIC ACTION TAKEN BY CPCB TO CURTAIL POLLUTION OF GHAGGAR RIVER:

- Based on the complaint received from the Govt. of Rajasthan, CPCB conducted a joint inspection during 1996 and identified major polluting sources in Haryana, Punjab, Chandigarh and Himachal Pradesh. Based on the findings, CPCB issued directions under Section 18(1) (b) of Water (Prevention & Control of Pollution) Act 1974 to Haryana State and Punjab State Pollution Control Boards on 12.03.96 ensuring that no untreated effluent will be discharged into the Ghaggar River. CPCB further issued specific directions to Haryana State Pollution Control Board under Section 18 (1) (b) of Water (Prevention & Control of Pollution) Act, 1974 for controlling pollution at Sirsa vide its letter no. Legal/139 (23)/90, dated 23.04.96.
- Subsequently, closure directions were issued to M/s Ruchira Paper Mills, Kala Amb, Himachal Pradesh on June 26, 1998 under Section 5 of Environment (Protection) Act, 1986 being a continuous defaulter.
- During the year 2000, CPCB convened a meeting of all the riparian SPCBs/PCCs officers to control pollution in Ghaggar River and took several decisions. The decision taken in the meeting were communicated by the chairman CPCB to all the riparian SPCBs/PCCs officers vide their letter no. CCB/79/2000 dated 27.10.2000 with a request to initiate actions on the measures required to restore water quality in the river.
- Again in pursuant to a complaint received from Govt. of Rajasthan, CPCB conducted a joint inspection in the year 2001 and identified major polluting sources in Haryana, Punjab, Chandigarh and Himachal Pradesh. Based on the findings of the report, CPCB issued directions under 18 (1) (b) of Water (Prevention & Control of Pollution) Act, 1974 to Haryana State Pollution Control Board, vide letter no. A-14011/1/2001/SUR dated 06.02.2001/12.02.2001 for initiating actions against polluting industries and municipalities.
- Further, CPCB issued directions to Himachal Pradesh State Pollution Control Board under Section 18 (1) (b) to initiate actions against defaulting industries vide letter no A-14011/1/2001, dated 15.06.2001.
- CPCB also issued closure order to M/s Patiala Distillers and Manufacturers Ltd being a perpetual defaulter, vide letter no. B-16/PCI-III -2K01/5040, dated 21.03.2001
- CPCB again called a meeting of all the riparian SPCBs/PCCs officers to take appropriate measures for containment of pollution of river Ghaggar. Several actions were identified and agreed upon by the concerned SPCBs/PCCs. The minutes of the meeting were circulated, vide letter no. A-14011/1/2001-SUR/7652 dated 23.04.2002 for taking necessary actions on various decisions taken in the meeting.
- CPCB again called a meeting of all the riparian SPCBs/PCCs officers on May 31, 2004 to take appropriate measures for containment of pollution of river Ghaggar. Several actions were identified and agreed upon by the concerned SPCBs/PCC. The minutes of the meeting were circulated vide letter no. A-14011/1/2004-SUR/0960, dated 29.06.2004 for necessary actions on various decisions
- CPCB issued directions to M/s Ruchira Paper Mills, Kala Amb, Himachal Pradesh under Section 5 of Environment (Protection) Act, 1986 to install Chemical Recovery Plant as

committed under CREP by 31.12.2005, vide letter no. B-23012/1/PCI-III, dated 26.08.05. The industry was persuaded to comply with the above directions by 31.03.07 vide letter no. B-23012/1/PCI-III dated 03.04.2006 however, the industry could not install the chemical recovery plant.

- CPCB further issued direction to M/s Ruchira Paper Mills, Kala Amb, Himachal Pradesh under section 5 of Environment (Protection) Act, 1986 to install chemical recovery boiler by 31.12.2007 vide letter no B-23012/1/PCI-III dated 02.04.07
- Central Pollution Control Board has carried out recent inspection for compliance of the above directions in September 2007 and observed that all the units of Effluent Treatment Plants were operating. The industry has taken adequate initiatives to comply with the stipulated standards including provision for chemical recovery plant.
- During 2007-08, CPCB conducted joint monitoring with concerned SPCBs at Interstate Boundaries of River Ghaggar and arranged review meetings with the SPCBs/PCC. Action Plans were prepared for remedial measures. The results were placed on CPCB