Reviving River Yamuna

An Actionable Blue Print for a

BLUE RIVER

Edited by

H.S. Panwar

PEACE Institute Charitable Trust

2009

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This report is one of the outputs from the Ford Foundation sponsored project titled **Mainstreaming the river as a popular civil action 'cause' through** *"motivating actions for the revival of the people – river close links as a precursor to citizen's mandated actions for the revival of the life-line river in the city"*.

Research: Manoj Misra

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contents

abbreviations

BCM	Billion Cubic Metres
BOD	Biochemical Oxygen Demand
CETP	Common Effluent Treatment Plant
CGWA	Central Ground Water Authority
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
CSIR	Council of Scientific and Industrial Research
CWC	Central Water Commission
CWG	Common Wealth Games
D/S	Downstream
DDA	Delhi Development Authority
DJB	Delhi Jal Board
DMRC	Delhi Metro Rail Corporation
DND	Delhi-Noida-Delhi
DO	Dissolved Oxygen
DPR	Detailed Project Report
DTC	Delhi Transport Corporation
DTTDC	Delhi Tourism & Transport Development Corporation
DU	Delhi University
DUAC	Delhi Urban Arts Commission
EAC	Expert Appraisal Committee
EC	Environmental Clearance
EIA	Environment Impact Assessment
EPA	Environment Protection Act
EYC	Eastern Yamuna Canal
GIS	Geographical Information Systems
GNCT	Government of National Capital Territory
GOM	Group of Ministers
HC	High Court
HKB	Hathnikund Barrage
HNZ	Hazrat Nizamuddin
HP	Himachal Pradesh
HPC	High Powered Committee
HPPCL	Himachal Pradesh Power Corporation Ltd
IIC	India International Centre
IIT	Indian Institute of Technology
INTACH	Indian National Trust for Art and Cultural Heritage
IOA	Indian Olympic Association
IP	Indraprastha
ITO	Income Tax Office
JBIC	Japan Bank for International Cooperation

JJ	Jhuggi Jhopri
Km	Kilometer
LPCD	Litres Per Capita per day
MCD	Municipal Corporation of Delhi
MM	Milli meter
MoEF	Ministry of Environment & Forests
MoU	Memorandum of Understanding
MP	Madhya Pradesh
MP	Member of Parliament
MPD	Master Plan of Delhi
MPN	Most Probable Number
MoUD	Ministry of Urban Development
MoYAS	Ministry of Youth Affairs and Sports
NCT	National Capital Territory
NCTD	National Capital Territory of Delhi
NEERI	National Environmental Engineering Research Institute
NGO	Non Government Organisation
NH	National Highway
NIE	National Institute of Ecology
NMML	Nehru Memorial and Museum Library
NRCD	National River Conservation Directorate
PIL	Public Interest Litigation
PMO	Prime Minister's Office
PWD	Public Works Department
RRZ	River Regulation Zone
RTI	Right To Information
RWA	Residents Welfare Association
SC	Supreme Court
SLP	Special Leave Petition
SPCB	State Pollution Control Board
STP	Sewage Treatment Plant
TOR	Terms of Reference
U/S	Upstream
UG	Upper Ganga
UKH	Uttarakhand
UP	Uttar Pradesh
UYRB	Upper Yamuna River Board
WTP	Water Treatment Plant
WYC	Western Yamuna Canal
YAP	Yamuna Action Plan
YFJ	Youth For Justice
YJA	Yamuna Jiye Abhiyaan
YRDA	Yamuna River Development Authority
YSC	Yamuna Standing Committee

preface

गंगाच् क्षिप्रा यमुना सरस्वती
गोदावरी वेत्रवतीच् नर्मदा
साचन्द्रभागाच वरूणाच गंडकी
कर्मेसु सर्वम् मम सुप्रभातम्

वेत्रवतीच्

O! Ganga, Kshipra, Yamuna, Saraswati, Godavari, Vetravati, Narmada,
Along with Chandrabhaga, Varuna and Gandaki
I invoke you all! Make my morning blissful!

Thus goes the invocation for times immemorial of the rishis and saints and commoners alike every morning as they have gone about their morning chores including bath, be it a dip in a river, a lake or a *bawari* or now increasingly under a shower in home. Revering rivers like a mother deity succeeding generations have called upon the rivers to make one's day blissful by providing fresh water.

But can one dare take a dip in what is today river Yamuna (sadly stinking and festering sewer) in its stretch through the national capital city of Delhi and still have a heart to recite such an invocation?

Why so? Ponder along the truths that this booklet lays bare and invoke the powers that be to return the 'blue water' Yamuna (Shyama) to you. Fortunately it's still possible without compromising the dependent stakeholders' genuine interests.

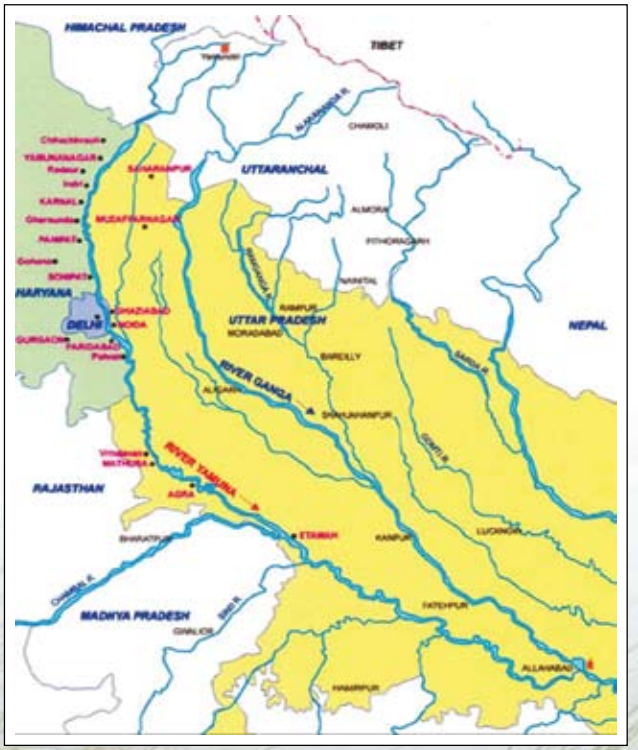
This booklet has six Chapters. The first four deal with bare facts about Yamuna, and how over abstraction and diversion of water from the river, unbridled pollution of the river and rampant encroachment on its floodplains have adversely impacted it. Chapter 5 presents the proposed blue print for action for reviving the Yamuna to its original 'Shyama' state. Chapter 6 is about *Yamuna Jiye Abhiyaan* as an example of a peoples' movement to focus the issues.

chapter 1

Fact File of Yamuna

Fact File of Yamuna

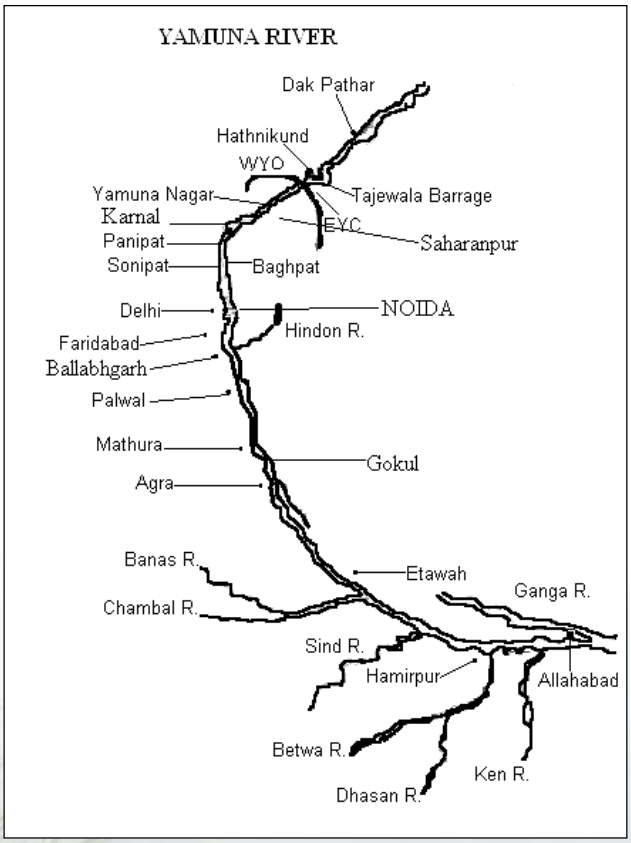
Yamuna is a river of glacial origin forming into a stream at the foot of the Yamunotri glacier. A host of tributaries from the Himalayas, Sivaliks, Aravalis and Vindhyas join her along its 1,376 km length before it commingles with the Ganga at Prayag, the pious confluence of the Ganga, Yamuna and the now invisible Saraswati at Allahabad. By that time its traverse has spanned the States of Uttarakhand, Himachal Pradesh, Haryana, National Capital Territory of Delhi and Uttar Pradesh. Its tributaries fetch waters from besides the above states, also from Madhya Pradesh and Rajasthan.



Map of Yamuna

Major human habitations on the river Bank

Hundreds of villages and number of towns and cities occupy both banks of the river. Notable on the west bank are Paonta Saheb, Yamuna nagar, Karnal, Panipat, Sonipat, New Delhi, Faridabad, Vrindavan, Mathura and Agra and those on the right bank are Dehradun, Saharanpur, Baghpat, Delhi (east), NOIDA, Greater NOIDA, Gokul, Etawah and Allahabad.



Towns on the banks of river Yamuna

Floods in Delhi 21 August 2008

History of floods in the river

In tune with the character of the Indian rivers Yamuna is given to monsoon floods when besides rain in its catchment it also draws significantly from the Himalayan snow melt. Mythology records that *Janmashtami*, the day Lord Krishna took birth, was a high flood day. In recent recorded history the years 1924, 1947, 1976, 1978, 1988, 1995, 1998, 2008 were some of the high flood years in Delhi **(Appendix 8)**.

The river forms inter-state border

In its run it forms interstate border between

- Uttarakhand and Himachal Pradesh
- Haryana and Uttar Pradesh
- Delhi and Uttar Pradesh
- Uttar Pradesh and Haryana

All these states except the largest contributing Uttarakhand and Himachal Pradesh, claiming Yamuna water by 'virtue' as a riparian state, claim and use its water but conveniently evade responsibility and accountability to take care of the river – its quality and quantity of water.

A case in point are the water sharing agreements between the riparian states, which have provided to apportion the river waters without any concern for the water flow in the river itself. The first such water sharing agreement between the then state of Punjab and Uttar Pradesh was made on 12 March 1954; effective 1 April 1950 and held binding on both parties for a period of 50 years from 1 April 1950. This agreement remained in force even after the formation of the state of Haryana on 1 November 1966. A Memorandum of Understanding (MoU) regarding allocation of surface flow of Yamuna was signed on 12 May 1994 between the Chief Ministers of Uttar Pradesh, Haryana, Rajasthan, Himachal Pradesh and Uttar Pradesh in the presence of the Union Minister of Water Resources. **(Appendix 2).** This MoU made only lip service to maintain flow in the river in following words:

"And whereas the States have agreed that a minimum flow in proportion of completion of upstream storages going upto 10 cumec shall be maintained downstream of Tajewala and downstream of Okhla headworks throughout the

year from ecological considerations, the upstream storages are built up progressively in a phased manner".

Since the proposed upstream storages are undesirable as they involve huge social and environmnetal costs, the said conditional MoU has little in it to help the river maintain its flow.

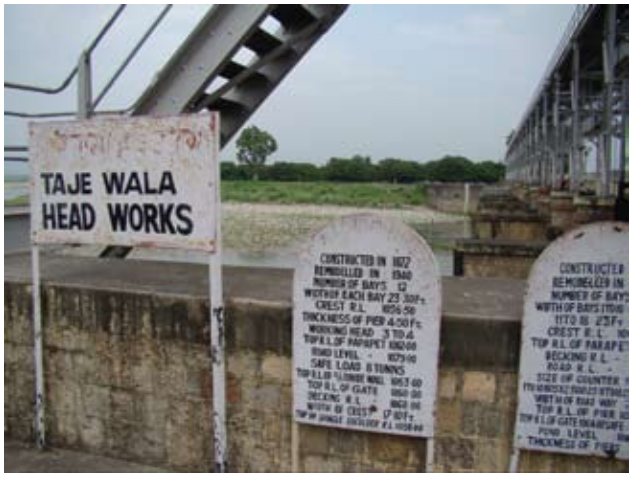
Long history of canal system

Western Yamuna Canal is one of the oldest canal systems in the country. It is reported that it was utilized as a canal in one of the river creeks since 1356 AD. Regular control structure and shaping of canal was done from 1626 AD and reconditioning in the shape of canal was done in 1819 AD for Delhi Branch and in 1825 AD for Hansi Branch. Piecemeal remodeling schemes were initiated between 1870 AD and 1882 AD. The large scale water logging; swamps and unhealthy conditions were overcome by implementation of systematic remodeling by 1908 AD. (WAPCOS, 2003).

It was the construction of a new barrage (HKB) at Hathnikund in 1999 to replace the existing barrage at Tajewala that has led to increased withdrawal from the river and hence little water is left in the river. It is seen from the following progressive increase in discharge of Western Yamuna Canal:

Year	Discharges of WYC (Cumec)
1842	142
1900	182
1940	228
1953	397
1976	453
Post HKB operation* (1999)	715

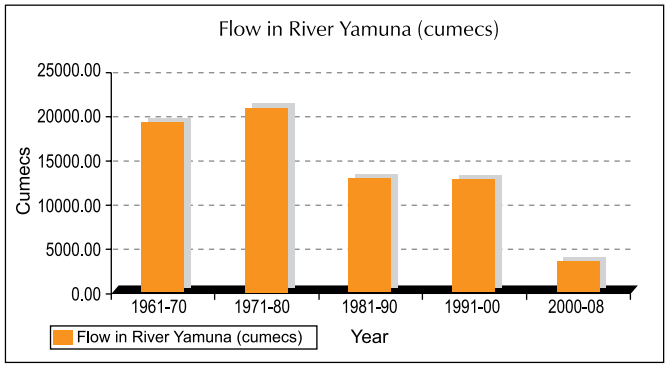
*WAPCOS 2003. *HKB became operational only after 2002.*



Tajewala Barrage constructed in 1872

The river was alive till the late 1970s

It is an eye opener to see how the decadal average flow in the river downstream of Tajewala – Hathnikund Barrage (HKB) system has decreased over the decades.



RTI response from Haryana Irrigation Department in October, 2008.

Clearly the reason why the river was alive till late seventies was the fact that reasonable quantity of unpolluted water was allowed to flow down the river round the year. This got drastically reduced through increased abstraction at the Tajewala - Hathnikund Barrage during the eighties and nineties. Eventually the abstraction at these structures is total and leaves no flow at all in the river for almost nine months of the year.

Strangely yet and in the face of the above factual scenario the state governments keep on treating as if river Yamuna still carries surplus waters that can be utilized!

EXCERPTS FROM ECONOMIC SURVEY OF HARYANA (2008-2009):

IRRIGATION AND FLOOD CONTROL

3.122 *To utilize the surplus water available in river Yamuna, the capacity of Western Jamuna Canal Main Line Lower (WJCMLL) is being increased from 13500 cusecs to 19557 cusecs. The work is in progress and most of the works are likely to be completed during the current financial year.*

3.124 *To utilize the surplus water in river Yamuna during monsoon for recharge of the Ground Water, construction of Dadupur Shahbad Nalvi Irrigation Scheme costing to Rs. 267.00 crore has already been taken up and as per the latest decision only feeder channels are to be constructed for the time being. The balance work on construction of minors shall be taken up subsequently after watching the success of feeder channels.*

3.125 *For providing recharge and irrigation facility to Ambala and Naraingarh area with the surplus Yamuna water a scheme namely Ambala Irrigation Scheme has been envisaged.*

Delhi stretch (22 Km) of the river has the dubious distinction of being the most polluted stretch of any river in the country

The Delhi reach, located between two barrages, has practically no perennial flow of its own and receives partly treated and untreated wastewater effluents from Delhi. Therefore, this stretch is the most polluted segment of the river.

Polluted state of the river Yamuna in Delhi

- It has the **lowest value** of Dissolved Oxygen (DO) at **.1 mg / lit** of all the rivers in the country

DO – is the amount of dissolved oxygen in mg / lit of river water to sustain the aquatic life in water body. (**Bathing quality standard is 5 mg / lit**)

- It has **one of the highest** Biochemical Oxygen Demand (BOD) of all the rivers in the country at **36 mg / lit**

BOD – is the amount of oxygen in mg needed by bacteria to oxydise one litre of organic waste (**Bathing quality standard is 3 mg / lit**)

- It has the **highest count** in the country of Total Coliform Numbers and Faecal Coliform Numbers at **2.6 billion MPN/100 ml** and **1.7 million MPN/100 ml** respectively

*Faecal Coliform number – number of disease causing bacteria counted in 100 ml of water. Origin of these bacteria is faecal matter. (**Bathing quality standard is 500 per 100 ml of water**)*

Yamuna water downstream of Okhla barrage up to the confluence with the Chambal River is eutrophicated and BOD loads at Mazawali and Agra downstream is above 30mg/l. This prohibits the usage of the river Yamuna as a source of water for potable water scheme in Agra and the water of the river Ganga needs to be transported to Agra by a 138 km pipeline.

Regulatory agencies are without any teeth!

Regulatory agencies like Upper Yamuna River Board (UYRB); Yamuna Standing Committee (of CWC); Delhi Urban Arts Commission (DUAC); Central Ground Water Authority (CGWA); Water Quality Assessment Authority (WQAA) and the like with mandate for the river, have only advisory role and hence are often prevailed upon by the 'developmental' interests much against the interests of the river and the dependent people downstream. Following observations (General Remarks) made by the Chairman of the Yamuna Standing Committee at its 68th meeting held on 16 March, 2005 bears testimony to the above:

"the Chairman expressed concern about the tendency of various developmental agencies to encroach upon the flood plains of river Yamuna".

Water Quality in the river (2007)

Site	State	BOD Level	Remarks
Tajewala / Hathnikund	Haryana	1	Bathing quality
Kalanaur	Haryana	1	Bathing quality
Sonipat	Haryana	1	Bathing quality
Palla	Delhi	2	Bathing quality
Nizamuddin Bridge	Delhi	27	**Unfit for any use**
Agra canal	Delhi	10	Unfit for bathing
Mazawali	Haryana	32	**Unfit for any use**
Mathura u/s	UP	6	Unfit for bathing
Mathura d/s	UP	6	Unfit for bathing
Agra u/s	UP	6	Unfit for bathing
Agra d/s	UP	39	**Unfit for any use**
Bateswar	UP	7	Unfit for bathing
Bawah	UP	6	Unfit for bathing
Auriya	UP	2	Bathing quality

Project Management Consultants for YAP II, 2007; u/s: Upstream; d/s: Downstream.

River Yamuna at Panipat

Two sides of the same coin!

7 August, 2009

12 September, 2009

chapter 2

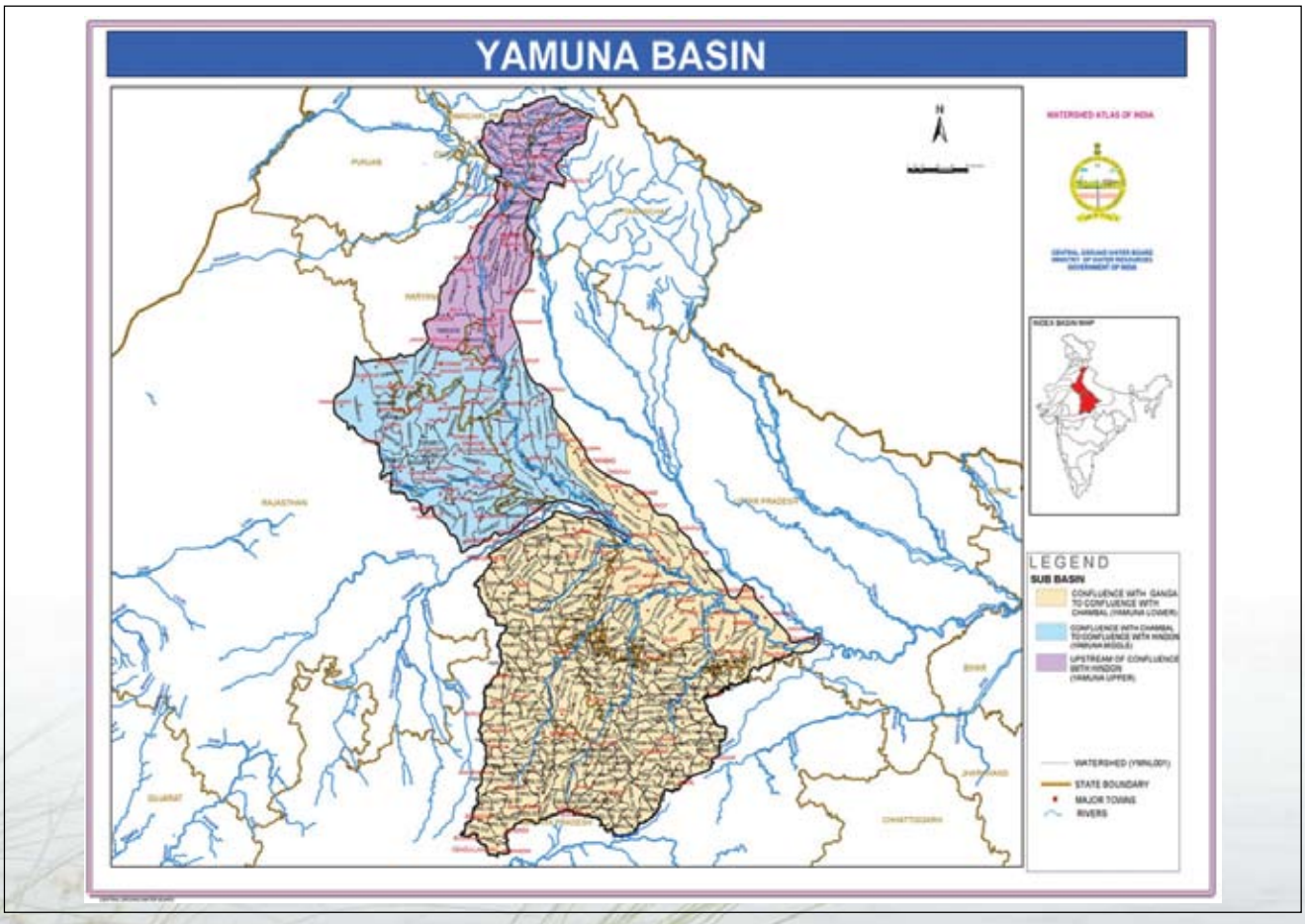
Diversion and over Abstraction of Water from the River

chapter 2

Diversion and over Abstraction of Water from the River

Limited founder Basin

With a founder basin that is unusually restricted, river Yamuna required much greater circumspection on the part of the authorities involved before water abstraction structures on the river were planned so that the flow, which is the very basis of a perennial river like the Yamuna did not get unduly curtailed. Even after the abstraction structures came, the appropriating states are and must be made accountable to leave a downstream discharge from such structures such that the river remains viable.



River Yamuna Basin

Diversion of water

Water from the river Yamuna has been diverted for power generation, irrigation and drinking water purposes at various places all along its length–

Site	Structure	State	Purpose	State of river
Dak Patthar	Barrage	UA	Power generation	Water diverted into canal
Asan	Barrage	UA	Power generation	Water diverted into canal
Hathnikund	Barrage	UP / Haryana	Irrigation and drinking water	Water diverted into WYC and EYC (**No water flow downstream in lean season**)
Wazirabad	Barrage	Delhi	Drinking water	Generally no water flow down stream in lean season
ITO bridge	Barrage	Delhi	Water supply to power plant	Water available mainly from drains
Okhla	Barrage	Delhi / UP	Water supply into Agra Canal	Generally no water flow down stream in lean season
Gokul	Barrage	UP	Water supply to Mathura and Agra	–

Adapted from CPCB, 2000. WYC – Western Yamuna Canal; EYC – Eastern Yamuna Canal

Few Tributaries

There are no tributaries of any significance of river Yamuna, except for a seasonal stream called *Somb Nadi,* upstream of Yamuna Nagar in Haryana, (which has been barraged at Dadupur), and heavily polluted river *Hindon* (joining it close to Greater NOIDA in UP), for a distance of around 750 km of its flow in the plains, till the river Chambal meets the river Yamuna at Bawah near Etawah (UP). So whatever water that one finds in the river south of the Hathnikund Barrage is either from ground water accrual or the waste water drains joining the river from towns like Yamuna Nagar, Karnal, Panipat, Sonepat, Faridabad, and Ballabhgarh in Haryana and Saharanpur, Baghpat, Ghaziabad, NOIDA, Vrindavan, Mathura, Agra and Etawah in UP. In Delhi the water is brought into the river by 22 waste water drains (many of which were originally river's tributaries flowing in from the ridge) that empty into it**.**

River Somb barraged at Dadupur (9 8 09)

Over abstraction and pollution of water

According to a study (WAPCOS, 2003) the normal high flow at Tajewala / Hathnikund Barrages is of the order of 7079 cumecs whereas minimum flow is 70 cumecs.

River studies on Yamuna have found that the main abstraction barrage at Hathnikund-Tajewala do not discharge any water down stream except when the river is in flood whence it becomes necessary for the security of the structure to release water. The table (on facing page) shows how the states have abdicated their responsibility for keeping the river alive despite clear knowledge that no significant augmenting streams join the river downstream of these structures.

River Yamuna outflow vs inflow downstream of Hathnikund Barrage (December, 2002)

West Bank of River	River ↓	East Bank of River
	Hathnikund Barrage (HKB) ***82 cumecs***  **Impounds the river**	
WYC 67.5 cumecs  **Services areas in Haryana and NCT (Abstraction)** ←	**Downstream of HKB** **2.7 cumecs**  **There is hardly any flow in the river d/s of HKB**	**EYC 12 cumecs**  **Services areas in UP (Abstraction)** →
Escape at Dhanaura (d/s of Yamunanagar – **(inflow)** 	**No flow into the river**	**No inflow into river from east**

Indri Escape (Karnal) – **(inflow)** →	**No flow into the river**	**No inflow into river from east**
Munak Escape (u/s of Panipat) and Drain No 2 – **(inflow)** →	**1.0 + 6.5 cumecs of fresh water enters the river from Western Yamuna Canal** 	– do–
Drain No 8 (Sonipat) – **(inflow)** →	**.9 cumecs of fresh water from Western Yamuna Canal enters the river at village Palla** 	– do–
Delhi water supply (Wazirabad WTP) – **(Abstraction)** ←	**11 cumecs of fresh water abstracted to feed NCT of Delhi**	– do–
	Wazirabad Barrage  Little fresh water d/s in lean period	

Najafgarh Drain (Supplementary Drain) – **(inflow)** →	**25 cumecs of polluted water enters the river** 	**No inflow into river from east**
Civil Mill Drain **(inflow)** →	**3 cumecs of polluted water enters the river**	– do–
	IP Barrage (ITO)	
Power House Drain **(inflow)** →	**.5 cumecs of polluted water enters the river**	– do–
Sen Nursing Home Drain **(inflow)** →	**1.5 cumecs of polluted water enters the river**	– do–
Barapula Drain (**inflow**) →	**3 cumecs of polluted water enters the river**	– do–
	26 cumecs enters the river sourced from river Hindon ↓	Hindon Cut **(inflow)** ← 
Agra Canal **(Abstraction)** ← 	**60 cumecs abstracted from the river to irrigate areas in western Haryana and UP**	**No inflow into river from east**

	Okhla Barrage  Supplies water to Agra Canal	
	5 cumecs of polluted water enters the river	Shahdara Drain **(inflow)** ←
Ali Nala **(inflow)** →	**Another source of polluted water into the river** 	**No inflow into river from east**
Buriya Nala **(inflow)** →	**.4 cumecs of polluted water enters the river** 	— do—

	.75 cumecs of polluted water enters the river	Hindon river **(inflow)** 
Gonchi Drain **(inflow)** →	**.7 cumecs of polluted water enters the river**	**No inflow into river from east**
	Fresh water from Upper Ganga (UG) Canal into the river ↓	UG Canal **(inflow)** Mat ←
Vrindavan Drain **(inflow)** →	**Polluted water enters the river** 	**No inflow into river from east**
Mathura Drain **(inflow)** →	**Polluted water enters the river** 	– do–

	.8 cumecs abstracted from the river	Gokul Water supply **(Abstraction)** →
	Gokul Barrage  **Provides water to Mathura and Agra**	
Agra Water Supply **(Abstraction)** ←	**3 cumecs abstracted from river**	**No inflow into river from east**
Agra Drain **(inflow)**  →	**1.7 cumecs of polluted water enters the river** ↓	– do–
Etawah Drain **(inflow)** →	**.2 cumecs of polluted water enters the river**	– do–

Chambal Confluence **(inflow)** with Yamuna at Bawah, (Etawah) U.P.

90 + cumecs fresh water revives the river ultimtaley

No inflow into river from east

.74 cumecs of polluted water enters the river

Allahabad Drains **(inflow)**

Adapted from various sources including Kazmi et al, 2007

Course of the river

Flow into the river

Outflow from the river

WYC : Western Yamuna Cannal

EYC : Eastern Yamuna Canal

Clearly till the river Chambal joins with enough fresh water (90 + cumecs), the river between Hathnikund and Etawah witnesses either major abstractions or inflow of sewage water from various cities on its banks.

chapter 3

Unbridled Pollution

chapter 3

Unbridled Pollution

Pollution of water

It is well known that river **Yamuna is today one of the most polluted rivers in the country**. Domestic, agriculture as well as industrial pollution sources contribute to it.

The monitoring stations of Central Pollution Control Board (CPCB) on river Yamuna up till Delhi have thrown up the following water quality data (Table below). This information is to be seen against the use linked water quality ratings provided by CPCB in the next Table.

Name	Location	Description	Class
Hathnikund	2 km upstream of Tajewala Barrage	Gives water quality of almost pristine Yamuna	A & B
Kalanaur	7 km east of Yamuna nagar at Yamuna Bridge on Yamuna nagar – Saharanpur Road	Provides impact of Som Nadi on the river water quality	C
Sonipat	20 km east of Sonepat city at Yamuna bridge on Sonepat – Baghpat road	Impact of discharges from Karnal and Panipat cities	C
Palla	23 km upstream of Wazirabad barrage	Impact of discharges from Sonipat district. **Raw water quality for Delhi**	C & D
Nizammudin	13 km downstream of Wazirabad	Impact of wastewater discharge from Delhi	**E**
Agra Canal	26 km downstream from Wazirabad Barrage	Impact of discharge from Delhi after Okhla Barrage	**E**

CPCB, 2000.

Primary water quality criteria for various uses of fresh water

Designated best use	Class	Criteria
Drinking water source without conventional treatment but after disinfections	A	* Total coliform organisms MPN/100mL shall be 50 or less. * pH between 6.5 and 8.5 * Dissolved oxygen 6 mg/l or more * Biochemical oxygen demand 2 mg/l or Less
Outdoor bathing	B	* Total coliform organisms MPN/100ml shall be 500 or less * pH between 6.5 and 8.5 * Dissolved oxygen 5 mg/l or more * Biochemical oxygen demand 3 mg/l or Less
Drinking water source with conventional treatment followed by disinfection	C	* Total coliform organisms MPN/ 100ml shall be 5000 or less * pH between 6 and 9 * Dissolved oxygen 4 mg/l or more * Biochemical oxygen demand 3 mg/l or Less
Propagation of wild life, fisheries	D	* pH between 6.5 and 8.5 * Dissolved oxygen 4 mg/l or more * Free ammonia (as N) 1.2 mg/l or less
Irrigation, industrial cooling, controlled waste disposal	E	* pH between 6.0 and 8.5 * Electrical conductivity less than 2250 micro mhos/cm * Sodium absorption ratio less than 26 * Boron less than 2mg/l

CPCB, 2000.

Sources of Pollution:

Domestic pollution

Urban centres in the state of Uttarakhand (Dehradun), Haryana (Yamuna Nagar, Karnal, Panipat, Sonepat, Kundli, Faridabad, Ballabhgarh), UP (Saharanpur, Muzzafarnagar, Baghpat, Gaziabad, Noida, Mathura, Agra) and Delhi are the major sources of domestic pollution in the river.

Increasing water requirement for domestic uses and the impact of resultant waste water discharge in form of sewage (especially since the latter has not been efficiently treated and managed) on the receiving river has deteriorated the water quality.

Domestic uses that pollute the river include cattle wading, bathing, open defecation and washing of clothes in the river.

Puja offerings

A major source of domestic pollution in Indian rivers is the offerings and remnants of religious ceremonies performed in individual houses and in public places.

Pragati Power Plant on the river bank as reflected in the river in Delhi

Industrial pollution

According to CPCB (2000) there were 22 industrial units in Haryana, 42 units in Delhi and 17 units in Uttar Pradesh which were found to be directly discharging and polluting the river. These industries include paper, sugar, chemical, leather, distillery, pharmaceuticals, power etc.

Agricultural pollution

Agricultural pollution is mainly sourced from agricultural residues, fertilizer and pesticide use and cattle wading in the river.

Farming in the river bed in Delhi and elsewhere need to become organic

Water Quality Assessment Authority

Government of India constituted (**Appendix 6**) in 2001 the Water Quality Assessment Authority (WQAA) to exercise powers under various sections of the Environment Protection Act 1986. The WQAA is authorized to issue directions and take measures to reduce pollution in surface and ground water bodies. The enforcement of pollution control norms and measures require routine and reliable monitoring of water quality in water bodies. With a view to standardizing the methods of water quality monitoring and to ensure the quality of measured data, MoEF has brought out a Uniform Protocol on Water Quality Monitoring order 2005 vide gazette notification S.O 2151 dated 17 June, 2005.

chapter 4

Rampant Encroachment in Flood Plains

chapter 4

Rampant Encroachment in Flood Plains

Understanding river as an ecosystem

Rivers are unique ecosystems that have positive impacts not just within banks but spread over the whole basin. Those planning interventions must understand the river ecosystem for exercising judicious restraint and discipline not just for the sustainability of desired benefits of such interventions but also for the larger good of the humans and others living in the basin. River beds and flood plains are an integral part of a riverine aquatic ecosystem and play important ecological functions elaborated below:

- Ensuring smooth flows of river water in all seasons;
- Regulating flood waters so as to minimize damage to human life and property – floodplains act as buffers by holding flood waters within the banks of the river;
- Supporting growth of aquatic and bank vegetation from micro (plankton and algae) to massive trees on the banks;
- Sustaining diverse aquatic fauna from insects to large fishes and crocodilians besides supporting varied waterfowl; and last but not the least
- Recharging ground water aquifer year round but importantly during the monsoon flood regime where the spread of water over the floodplains has a critical role in such recharge.

Encroachment over river bed and the flood plain

Any encroachment on river bed or the flood plain resulting in a change in land use results in hindering of one or all of the above functions. Especially, encroachments that restrict flows and hamper spread of flood waters over the natural flood plains and thereby undermine ground water recharge are extremely damaging in urban/ metropolitan localities.

In Delhi, Zone O and part of Zone P (Between the two embankments on west and east of the river) has been identified as the river Yamuna spread over an area of around 97 sq km. Of this 16 sq km is under water and the rest around 81 sq km is the river flood plain as shown in the Table below:

Place of Yamuna in Master Plan Zoning within Delhi NCT

Zone	Description	Area (ha)
Zone P	Area north of Wazirabad Barrage	3600
Zone O	Area south of Wazirabad Barrage	6100
Total		**9700**

Over a period of time areas in the flood plain have been converted or are in the process of conversion on either side of the river for various alternate uses as under:

Diversion of floodplains from Yamuna in Delhi NCT

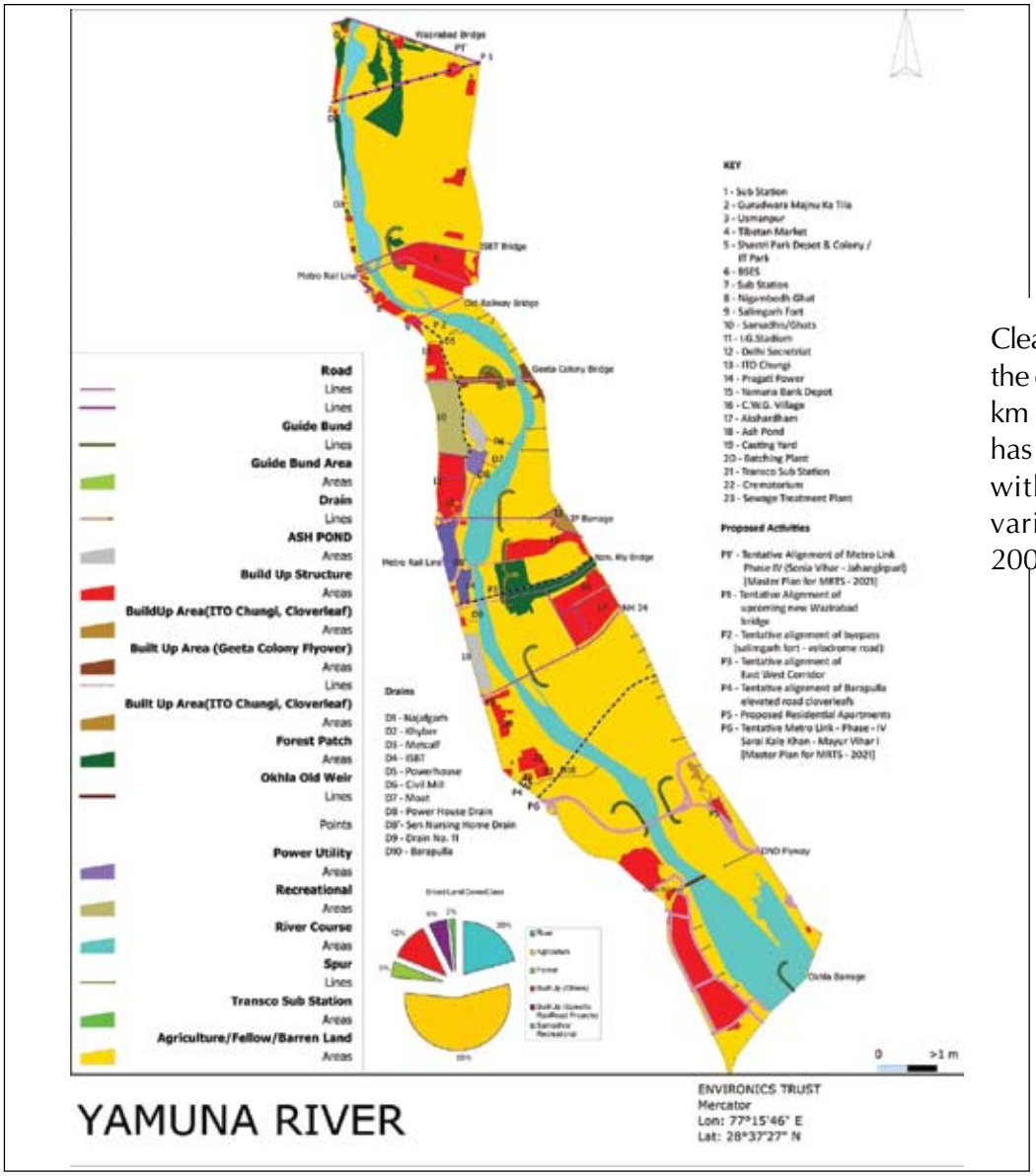
Stretch of river flood plain	West Bank	East Bank
NCTD boundary – Wazirabad Barrage	JJ colony, Water works	Sonia Vihar, Khajuri Khas, CRPF camp, Sonia Vihar DJB water works
Wazirabad Barrage – Shahdara Bridge	Metcalfe House, Majnu ka Tila, Signature Bridge (proposed)	220 KV ESS (Power distribution station)
Shahdara Bridge – ITO Bridge (Yamuna Barrage)	JJ colonies (**since removed**), Electric crematorium, Samadhis (Vijay Ghat, Shanti Van, Shakti Sathal, Rajghat), Rajghat and IP power station and house, Yamuna Velodrome, IG Indoor Stadium, Delhi Secretariat,	Shastri Park Metro station and head quarters, IT Park, JJ colonies (**some since removed**), Geeta Colony Bridge (under construction), Highway and clover leaf (under construction),
ITO Bridge – Nizamuddin Bridge	Pragati Power station, JJ colonies (**since removed**), Petrol pump	Yamuna Metro depot and station (under construction), Metro bridge and Embankment (under construction), Akshardham, CG 2010 Village (under construction), JJ Colonies (**since removed**)
Nizamuddin Bridge – DND	Land fill, Petrol Pump, Electric crematorium, Delhi Transco Limited, Barapula Elevated Road (under construction) Times Global village **(since removed)**	JJ colonies (**since removed**), DTC depot (temporary-proposed), Extension of DND till Mayur Place city centre.
DND – Okhla Barrage	JJ Colonies and other residential colonies (Batla House and extension) Defence services Sailing club, Kalindi Kunj bye pass road (under construction), Abul Fazal Enclave	—
South of Okhla Barrage	Indian Oil Bottling Plant, Resettlement colonies (Madan pur Khadar)	Amity University (UP)

Adapted from MPD 2021

DMRC footprints on Yamuna

As metropolitan Delhi and its population grow exponentially and unbridled, its need of water steadily mounts and has reached levels that challenge the city planners to keep pace. An expedient recourse that is being recklessly used is over drawing of ground water that is leading to perilous sinking of ground water levels year after year. In the face of this ongoing sharp fall in the ground water level, it is common sense that river bed of Yamuna including its surviving floodplains are treated as sacrosanct and out of bounds for any diversionary land intervention.

Yet diversions go unchecked unfortunately with state sanction. The biggest Delhi Metro construction is going on near Shastri Park, just across the river from ISBT, where a huge landfill has served as a bed for the Metro Rail's central operational area. This construction on the



Clearly as can be seen that the entire flood plain in 22 km of river bed in NCTD has been honeycombed with constructions of various kinds. (Anon, 2009)

GIS generated picture of constructions in river bed of Yamuna in 22 km, NCT of Delhi

riverfront is bound to destroy biodiversity and its habitat.

The Delhi Metro Railway Project has also done harm to the ground water level because thousands of heavy stones have been filled into the pores alongside the river that prevents the water movement beneath the land and contributes to depletion of ground water level. The COD and BOD levels are very high at this location and Methane, H_2S and various other dangerous gases were leading to continuous fermentation in the river that negate the possibility of aquatic life in and around the river. There was totally anaerobic condition and sediments were coming out from the bottom of the river. (Kumar, 2004).

As if the appropriation of flood plain in Shastri Park area was not enough, another Metro complex (Depot, stations, lines and residential colony) called 'Yamuna Bank' has come up down stream of IP Barrage cum road (ITO) over 40 ha area in the eastern bank.

chapter 5

There is Hope for Yamuna – An Actionable Blue Print for Revival

There is Hope for Yamuna – An Actionable Blue Print for Revival

It has been established that greedy and reck less appropriation of water and irresponsible use of the river as a channel for urban sewerage and untreated industrial effluents has been contributing to the death of the river by first restricting its natural 'flow' and then choking her water of life giving oxygen.

Yet hope glimmers at the horizon if the Central government fulfills its expressed will as under of reviving rivers of India by translating it into a firm strategy with potent mechanisms for riparian states to comply and cooperate. In response to a question on "Bacterial Contamination of Indian Rivers" the Parliament was informed in 2008 that:

> *"The Central Government has initiated an exercise for revamping the river conservation strategy to promote a holistic and integrated approach. The proposal for revamped strategy includes among others, focussing on quantity of the river water as much as on the quality, redesigning institutional arrangements at the National and State levels, developing suitable indicators for measuring water quality, integration with urban development plans".*

With the above as a background the following is proposed.

FUNDAMENTALS OF RIVER REVIVAL 'BLUEPRINT'

a) Ensure freshwater flow during lean period in the river

- Regular flow in a river is integral to all perennial rivers
- Structures (Barrages, dams etc) on the river must ensure year round downstream flow of adequate and reasonable quantum of water

b) No sewage / effluent or solid waste in the river

- Sewage and other non industrial waste water from human settlements must be treated and diverted (for irrigation purposes) and not allowed to drain into rivers.
- Industrial facilities ration and recycle their water use and treat and safely dispose their non recyclable effluents away from the river channels.
- There is no place for human solid waste in river channel

c) Secure flood plains

- River flood plains are not waste lands. They play an extremely critical hydrological function in safe spread and passage of flood waters and recharging of ground water.

- They are an integral part of a river ecosystem and are as important for humans as they are for other beings living in or depending on the river.
- In city limits flood plains of rivers are welcome spread of open spaces that help moderate thermal currents in cities. This role of flood plains gains criticality in the light of large cities becoming 'heat sinks' and unable to cope with the uncertainties associated with the impacts of climate change.

d) Abstraction of fresh water primarily for drinking and domestic use

- First charge on fresh water flowing in rivers is of dependent humans (for drinking and other domestic use) and other life forms.
- Humans must economise on their use of fresh water for domestic use.

The secret of revival of river Yamuna lies in our:

- ability to ensure adequate lean season 'flow' in the river downstream of Hathnikund Barrage.
- ability to 'fix' the pollution burden on the river within 22 km of Delhi stretch of the river, as well as in Mathura and in Agra.

Any one of the above in the absence of the other would be of little help as has also been determined by experts through water quality modeling of the river.

"It was found by modeling that pollution control schemes for Delhi and Agra city under YAP II are not sufficient to improve the water quality to its desired level.

In addition to that release of a minimum of 10 cumesec fresh water downstream from Wazirabad barrage and 20 cumesec discharge from Okhla barrage is necessary for the improvement of river quality during low flow months".

Water Quality Modeling for Yamuna Action Plan Phase II (Kazmi et al, 2007)

Accordingly following measures are suggested

Critical Measures

1. *Constitution or strengthening of a statutorily empowered and fully enabled executive body with basin wide jurisdiction*

While agencies like the "*Upper Yamuna River Board*" (UYRB) exists these have clearly failed to revive the river as the key focus of UYRB has remained only in ensuring allocation of water abstracted from the river at Hathnikund/Tajewala Barrage as can be made out from a perusal of the minutes of one of its recent meetings held on 30 December 2008. (**Appendix 4**)

Fortunately, in the "*Yamuna River Development Authority*" (YRDA) as created under the Prime Minister's authority by the Cabinet Secretariat on 24 August 2007 lies the seed of the creation of a ***River Yamuna Revival Authority*** or any such appropriately titled but fully enabled (including penal powers) Central agency with jurisdiction over the entire river basin area in the states of UKH, HP, Haryana, UP, Delhi, Rajasthan and MP. It is notable that one of the mandates of the YRDA is to "*suggest the design for a statutory framework*". (**Appendix 1**)

2. *Moratorium on any new abstraction scheme (dams, barrage, canal etc) on the river or any of its tributaries till the River Revival Authority (as suggested above) has reviewed any such plans including conduct of comprehensive and fully inclusive RISK analysis including their (water abstraction schemes) cumulative impact if any on the river proper***.**

As has been seen before that the riparian states continue to plan (in isolation of one another) water abstraction schemes based on illusionary 'surplus water' available in the river Yamuna. Unless this practice is halted as a centrally mandated action any rear guard ameliorative action once these schemes have been 'announced' shall remain a pipe dream primarily on political grounds.

3. *Promulgate the River Regulation Zone (RRZ) notification under the Environment Protection Act, 1986.*

It has been seen that for lack of legal protection available to river bed and flood plains, encroachments of all kinds and environmentally incompatible land use changes in them are rampant in Delhi, Mathura and in Agra. In particular it has been seen that the rivers' flood plain south of the Okhla barrage on either side both in Haryana and in UP is getting increasingly encroached upon in the name of either institutional developments or for the construction of highways and associated commercial developments.

4. *Promulgation of an ordinance by the Parliament to provide for a provisional minimum flow of 10 / 20 cumecs downstream of Wazirabad / Okhla Barrage as recommended both by SC appointed High Powered Committee (1998) (**Appendix 5**) and Water Quality Modeling experts for YAP II (2007)*

Notwithstanding constitutional limitations (if any), political parties of all hues should see good sense in such an action for the revival of the river, which all would agree lies far above any man made system or statute.

5. *At least 3 days in a month in the lean season months of November till May the river be allowed to run free (all along its length) of all the Barrages on it*

It has been seen (based on analysis of mean monthly flows in the river since 1961 accessed using RTI Act) that the river was fine till there was a flow in it in its lean season months, a situation that existed in the river till early nineteen seventies. Such flow while on one hand helps dilute pollution in the river, on the other facilitates a continuous sub surface flow in the river, recharging ground water and adding to the surface flow at places in the river. It has also been observed that when there is good flow in the river its impact stays over a number of days beyond the full flow period. Letting the river flow unfettered for just three days in a month should not be a problem with the managers of the existing water abstraction structures on the river. But such an action might prove extremely critical for the maintenance of adequate water regime in the river and benefit as well the people dependent downstream on it.

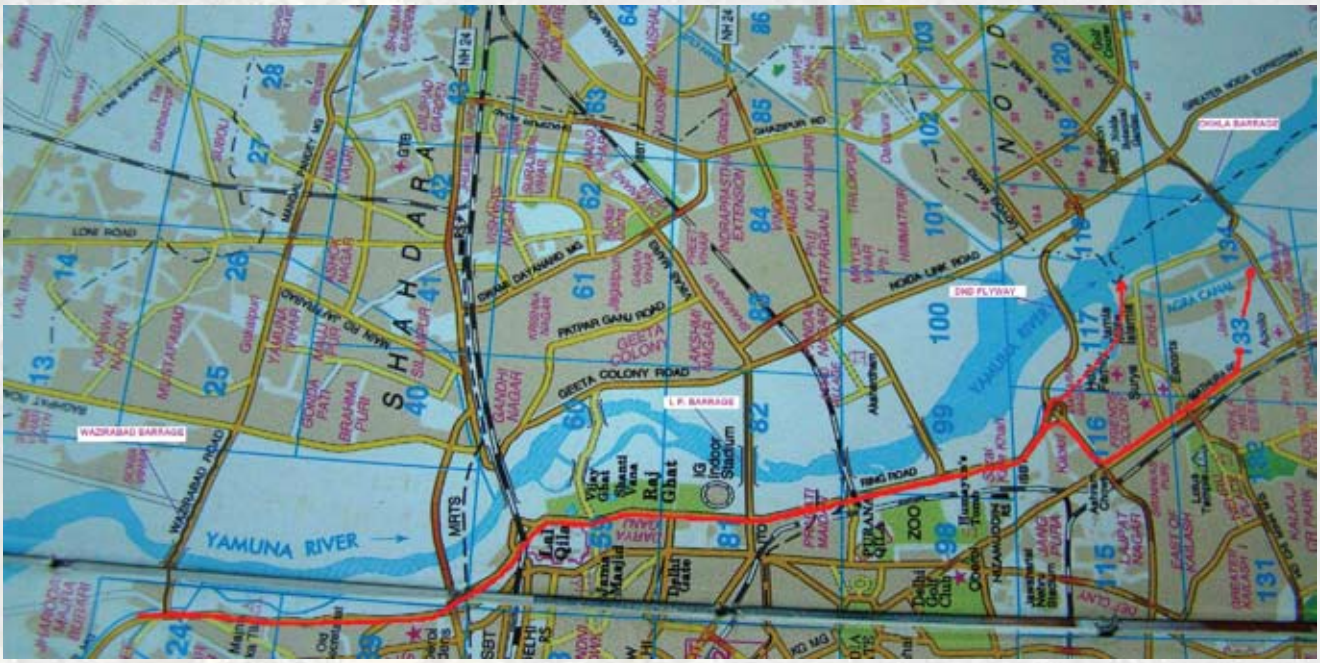
6. *Redirect city's wastewater away from the river into STPs and further for irrigation purposes from all the major cities on Yamuna (Yamuna nagar; Karnal, Panipat, Sonipat, Delhi, NOIDA, Faridabad, Mathura, Agra and Etawah)*

Waste water drains originating west of the river in Delhi should be made to drain into a canal running alongside (and under the ring road where required) parallel to the river and meet directly the Agra Canal

Presently the 22 km length of the river in its urban stretch in NCT of Delhi is being used only as a drainage and passage way for the sewage and other waste waters of Delhi (brought in from 18 drains originating from the city) to be ultimately released into the Agra Canal from the storage at the Okhla Barrage. This near pondage of sewage waters between the Wazirabad and the Okhla Barrage for almost 9 months of the year results on one hand in creation of a delusion of the river still being in place in the city but on the other results in avoidable pollution of ground water with toxic elements.

It is thus suggested that a canal (or even a pipe line) of requisite capacity (around 50 cumecs) as a continuation of the Supplementary Canal and running all along the outer ring road between Wazirabad and Okhla, parallel to the river, should take away the waste waters to meet directly the Agra Canal taking the water away for irrigation purposes. Two options are suggested:

- The suggested parallel canal takes an alignment (full red line) till Okhla STP from where the treated water is drained into the Agra Canal.



Map showing suggested alignment (red line) of a canal parallel to river Yamuna in the west bank, NCT, Delhi

- The parallel canal from DND flyway takes an alignment (broken red line) skirting the human habitation to drain directly into the Agra Canal.

This suggestion is in tune with the following observations of the SC appointed High Powered Committee (HPC) of Chief Secretaries of Delhi, Haryana, HP, UP and Rajasthan (**Appendix 5**):

> *"According to the policy of the Ministry of Environment and Forests, treated water is to be used for irrigation purposes and not to be released in the river as the river is already suffering for want of dilution capacity".*

Implications

Such diversion of waste waters away from the river would on one hand help insure that the riparian states do indeed maintain a minimum flow of fresh water in the river and on the other reduce drastically the pollution load in the surface water in the river and in turn in the ground water which sustains a large part of the citizenry in the city.

Complementary Measures

1. *Renegotiate a water sharing agreement between the riparian states of river Yamuna establishing an 'unconditional' minimum environmental flow in the river*

It may be noticed that para 5 of the current MoU (**Appendix 2**) signed on 12th May, 1994 between the riparian states of UP (including UKH), HP, Haryana, Delhi and Rajasthan provided for:

> *"And whereas the States have agreed that a minimum flow in proportion of completion of upstream storages going upto 10 cumec shall be maintained downstream of Tajewala and downstream of Okhla Headworks throughout the year from ecological considerations, as upstream storages are built up progressively in a phased manner".*

Such 'conditional' pious words have failed to help revive the river in any manner, with the riparian states more interested in abstraction rather release of fresh water into the river. This is despite the Supreme Court on 21st July, 1999 over ruling the conditionality as above on the recommendations of its High Power Committee (HPC) as under:

"By our order dated 14th of May, 1999, we had, inter-alia, directed that the High Powered Committee shall take a decision with respect to the share of riparian states and the said decision would be implemented by the concerned riparian states "forthwith". The High Powered Committee met on 25th May, 1999 and took a decision and determined the share of respective riparian states. The share of State of Haryana was indicated as 56.7%. In the affidavit dated 17th July, 1999 filed on behalf of State of Haryana it is indicated that the decision of the High Powered Committee was implemented by them with effect from 23rd June, 1999 and with effect from that date it has started releasing 5.67 cumecs of water in river Yamuna for maintaining its minimum flow. The decision of the High Powered Committee was thus not implemented for almost a month which being the months of May and June were the most crucial period so far as the requirement of water in river Yamuna was concerned. We, therefore, direct a notice shall be issued to the Chief Secretary, Stated of Haryana requiring him to show cause why action of contempt be not taken against him".

2. *Industry must be legally obliged to recycle its water needs and treat and safely dispose (away from water bodies including rivers) its effluent that it cannot recycle*

It is well known that industrial sources of pollution are often little understood, difficult to monitor and assess and yet carry far greater health risk than other sources of pollution.

3. *Revival Plans for river Hindon and other smaller tributaries in the basin to be taken up along with river Yamuna*

It is tributaries that make up a river. Thus it is important that concerted efforts are made to revive and clean all the existing (Hindon etc) as well as former tributaries of the river Yamuna.

4. *Social scientists and ecologists to sit on every river related body/ies*

Since ecological and social impacts of river training and water abstraction structures are profound it is important that all river related policy and regulatory bodies have experts from relevant sectors represented on them.

Research Measures

1. *Socio-economic and ecological impacts (RISKS) of canal systems (eg WYC) require in-depth investigation followed by appropriate policy and legal measures*

It is being increasingly felt and understood that canal systems originating from barrages and dams have important socio economic and ecological consequences that have not yet been fully researched and factored into policy and regulatory mechanisms extant in the country.

As a beginning it is thus suggested that an in depth post facto 'risk analysis' of the Western Yamuna Canal (it being one of the oldest canal systems in the country) be carried out.

Note: *Yamuna Jiye Abhiyaan* had suggested **(Appendix 7)** a number of research topics in response to a solicitation for the same from general public by the Hon'ble Lt Governor of Delhi in his capacity as the head of the Yamuna River Development Authority (YRDA). Many of these remain valid and urgent**.**

Educational Measures

1. *Massive public education campaign to ration water use (Domestic, Irrigation and Industrial) and to shun waste and pollution*

Water is a finite and yet life sustaining entity. It is thus important that with rising human numbers 'rationing' and 'wise use' of water becomes a way of life. This can only be achieved through a sustained formal and informal educational campaign.

Advocacy Measures

1. *Public campaigning for rivers in general and Yamuna in particular*

Rivers for their revival are in urgent need of well researched and sustained advocacy campaigns. *Yamuna Jiye Abhiyaan* (Chapter 6) is one example of such a campaign.

Yamuna Jiye Abhiyaan

chapter 6

Yamuna Jiye Abhiyaan – An Example of Civil Society Action

chapter 6

Yamuna Jiye Abhiyaan – An Example of Civil Society Action

Introduction

Who can deny the right of the citizens of Delhi (or of Vrindavan, Mathura and Agra etc downstream of Delhi) to adequate quantity of clean water and healthy life? Is it not ironical that situated on the banks of the mighty and pious Himalayan river Yamuna, the powers that be in Delhi and elsewhere acquiesce into the river's conversion into a metropolitan sewerage and surrender its prevailing all important aquifer value to the different hues of commercial interests and projects of much lesser public significance? How can an aware State that claims to be the champion of the wellbeing of citizenry allow the city's lifeline to turn into a festering sewer and undermine its floodplains that primarily recharge its massive ground water aquifer during the rainy season as well as secure the city from the fury of recurrent monsoon floods? How can a welfare state (sic!) get the poor 'slum dwellers' to evacuate the *jhuggis* on river floodplains while allowing state 'authorized' encroachments to come up there like the State Secretariat, a number of power plants, Delhi Metro stations and depot not to speak of the sprawling Akshardham? Not that these structures are not required in a metropolis of Delhi's dimensions, but it is raising them in the river bed, the city's lifeline, that is a self inflicted tragedy.

YJA also unravels how the State responsible as well as accountable for securing the genuine concerns and wellbeing of the people, mortgages both behind a façade of short-term flashy benefits.

Aware Delhi citizens have long been worried about the pollution in Yamuna by the discharge of industrial waste water and city's sewerage into the river. Yet, numerous events of diversion of floodplains for a number of development activities earlier had not registered strongly with them. This facet of encroachment on the river hit with a bang when the activities for the "Times Global Village" in the floodplain area started by the side of the DND flyover in December 2006. Close on heels in the beginning of 2007 came the lifting of the veil of secrecy on the Commonwealth Games (CWG) village site also on Yamuna floodplain by the side of Akshardham. Though an obscure board displayed at the now under construction CWG village site did say it was a possible site (*sambhavit sthal*)' there was no prior information on its being the only site considered by DDA for the CWG 2010 village and that the facility would come up in the form of permanent structures. This news surfaced quite innocently through an advertisement asking a short listed galaxy of big real estate players to apply for prequalification for offering bids for the construction of the CWG village.

The YJA took birth soon after as a citizens movement against the location of the two sites in Yamuna floodplains. YJA has all along hailed the holding of the CWG village in Delhi but the selected site for the Games village was wholly unacceptable because it meant yet another encroachment on the river, given the critical values of the floodplains for the city and learning that a host of such diversions had been made earlier for a variety of so called public purposes. YJA campaigning against the Games Village for the CWG 2010 and the Yamuna Metro Depot and other structures in the river bed suggested alternate sites, which indeed should have been considered at the outset by the DDA and other concerned authorities on their own as required by the Environment Impact Appraisal (EIA) process. Having failed in prevailing upon the authorities to change the site, it pleaded for non-permanent structures to be raised so that the Yamuna floodplain area wrested from the river could be restored to it after the conclusion of the 10-day CWG Delhi event. This plea was in accordance with what was laid down by the initial conditional environmental clearance (EC) accorded to the DDA by the Ministry of Environment & Forests (MoEF) on 14th December 2006. How the MoEF later succumbed to lobbying by the Delhi Development Authority (DDA) is a sad commentary on how the very custodians of public interest fall in line with the vested interests represented by the trinity of politicians, bureaucrats and commercial forces behind the pretext of 'too little time left' for the constructions as a constraint. There is an important learning from the YJA expose of the modus operandi and the sordid strategy adopted by such a trinity. This is first to while away precious time until the deadlines draw perilously close and then use State's own commitment for timely preparations for an important mega event, in this case the CWG 2010, to meet their ends. The ultimate seats of dispensing justice to the citizenry seemed to have fared no better as it eventually turned out to be in the case of the CWG 2010 village.

The *Yamuna Jiye Abhiyaan*

Yamuna Jiye Abhiyaan as the name in Hindi signifies is a peoples' movement to revive the river from an already advanced and continuing onslaught on the ecological, geological, hydrological, aesthetic, cultural and social-security values of the Yamuna river system in Delhi and in the upstream and downstream stretches of its basin.

NGOs and individuals concerned for the river were shocked by two closely sequenced instances in time of attempts at organized wresting of floodplains from the river bed. This shock induced them to come together on 7th February 2007 in India International Centre (IIC) in New Delhi and *Yamuna Jiye Abhiyaan* was born as a peoples' movement for sustainable revival of Yamuna. The YJA set off straightaway by starting research and campaign planning and soon began its advocacy for influencing decision makers to be able to see the wrongs and act to stop wrong activities and initiate mitigation measures against the past wrongs. Soon it became apparent that the pleas to the authorities largely fell on deaf ears. This gave rise to a felt need of further research and direct action to inform people about how the state actions were causing serious adverse impacts on their life. Using RTI Act; consulting different subject matter specialists like eminent architect Kuldip Singh, technocrats like Prof. A K Gosain and KT Ravindran; influential individuals like Kuldip Nayar, Prof. MGK Menon, SK Misra, Samar Singh amongst others, and conducting field research at various 'development sites' and on societal aspects in participation with local people proved to be strong means of unraveling the truth. This revealed how the river ecosystem and the vital interests of the people were being compromised by an uninformed and even callous state system. The researched information was regularly shared in a 150 strong email group initiated by YJA and was also used in advocacy. The print and television media also helped inform people of how the values vital for them were being compromised.

YJA and its member NGOs (Toxics Link, CMS Environment, LIFE, Matu People's Sangathan, Paani Morcha, Ridge Bachao Andolan, PEACE Institute) and individuals associated with it had adopted a multi-pronged course of actions several of which were and are running concurrently.

Research and Action

YJA research started from the barrage on river Asan (a tributary of river Yamuna) in Dehradun (Uttarakhand) upstream of Poanta Sahib (Himachal Pradesh) where Yamuna leaves Himalayas and enters the Gangetic plains meandering through the Siwalik hills. This field research extended from there along the river through Haryana and National Capital Territory (NCT) of Delhi up to Etawah in Uttar Pradesh where Chambal after traversing through Madhya Pradesh and Rajasthan meets and revives the all but dead Yamuna with a substantial freshwater inflow, it (Chambal) brings. Some salient findings of relevance for Delhi are:

- The river Yamuna, passing as a lifeline through the nation's capital, has immense importance for several reasons: the city was created on its back and developed over centuries. It brings the most needed water for its survival. It has withstood and absorbed careless dumping of wastewater and solid waste which otherwise could create serious hygienic problems for the people. It has recharged the groundwater aquifers on an annual basis.
- The main source of water for Delhi is river Yamuna. About 87 % of the total water supply is met by the river.
- The Central Ground Water Authority (CGWA) has notified the Yamuna Flood plain in Delhi as protected under the Environment Protection Act 1986 vide notification dated 2 September, 2000.
- That a study was conducted on the Ecosystem Services of Flood Plains of the Yamuna River in Delhi by the Institute of Economic Growth. The study highlights the importance of flood plains and the ecosystem services provided by the river Yamuna. The Report specifically states that:
  - Riverbed is one of the biggest channels of recharging underground water. As water tables in Delhi are witnessing a sharp fall in ground water level, the Yamuna Riverbed becomes almost sacrosanct;
  - The ecological services provided by the wetlands in the river corridor region provide immense benefit to human society
  - Reduction of area under inundation as a result of channelisation of the river adversely affects the underground water recharge capability.
  - To maintain the groundwater recharge potential of flood plains it is imperative to prevent any fresh civic structures to come up in these areas. Any human activity impairing the water recharge functions of the flood plain ecosystem will create problems not only for the present but the future generations as well.
- A water budget study for the city carried out by Prof. Vikram Soni of National Physical Laboratory and his team has found that the river Yamuna flood plain in the city of Delhi is providing a service of around Rs 10,000 crores per year for only its ground water recharge function. All other ecological services of the river flood plain including passage of flood waters, habitat to numerous life forms, economic activity by occasional farmers etc is additional to the above and have not yet been properly quantified in monetary terms.
- According to a report by the Central Ground Water Board the ground water availability in the territory (NCT) is controlled by the Hydro-geological situation characterized by occurrence of alluvial formation and quartzite hard rocks. The primary source of annual recharge of ground water during the monsoons is the Yamuna floodplains.

Continuing its research and direct action to bring people on board the YJA during March-December 2007 steadily armed itself better with information and authoritative knowledge on the mechanics of the cumulative adverse impacts of past and ongoing wrong actions. YJA also found out about the lack of positive action where it was needed

and continued meeting authorities at individual and group levels in order to persuade them to see reason and make amends before it was too late. The dignitaries YJA met included the President of India, Dr APJ Abdul Kalam, Cabinet Ministers Arjun Singh and Mani Shankar Iyer as well as the 13 member Group of Ministers (GOM) headed by Arjun Singh for overseeing preparations for CWG 2010 that included besides Jaipal Reddy, the Lt Governor and Chief Minister of Delhi. Presentation was made before this GOM and was received well. It ended with an assurance for examining the matter, though as it proved later nothing came out of it. YJA also met several Members of Parliament *viz.* Dr Karan Singh, Suresh Prabhu, K. P. Singh Deo and Brinda Karat. It also made a presentation to the Usha Mehra Committee appointed earlier by the Delhi High Court to monitor removal of encroachments from the Yamuna river bed. In its bid to promote awareness the YJA made numerous presentations to citizens and societal luminaries at institutions like the IIC, INTACH, NMML, DUAC, DU, JNU, IIT, CPR as well as to the children of Sri Ram Schools.

The *Yamuna Satyagrah*

On 31st July 2007 it was learnt that an event had been planned on 10 August 2007 at the proposed Games Village site to mark the official launch of the constructions. It was decided to start a *dharna* at the impugned site to signify peoples' protest through direct action. An hour before midnight on the same a day, however, a telephonic conference led to a decision to assemble in *brahma muhurt* at 4 AM on the 1st August 2007 at the proposed CWG Village site and to initiate tree planting (as the most appropriate activity) at the impugned site. Arranging logistics for the planting and informing all those involved with the cause took the remainder of the night and at 4 AM on 1st August about 12 people gathered under the only large tree of shisham (*Dalbergia sissoo)* at the site with plants and implements. Plant *puja* was performed, pits were dug and 22 plants were planted by 6 am.

Those who gathered at 4 AM included Rajendra Singh, Ramesh Sharma, Manoj Misra, Shraddha Bakshi, Sudha Mohan, Anand Arya, Devyani,

Launch of Yamuna Satyagrah at the impugned site of CWG village in the river bed (1st August 2007)

Vinod Mishra. As the day advanced more and more people gathered at the site and joined the *dharna* including the farmers from nearby settlements cultivating the floodplain area. The latter were indeed an important stakeholder group whose major part of livelihoods rested on cultivating the floodplain as water receded after monsoons every year. Among the notables who came included Kuldeep Nayyar, Prof Satya Prakash (a retired Prof of Delhi University) in his nineties and a knowledge powerhouse on Yamuna, Prof. Vikram Soni, Prashant Bhushan (noted lawyer), Radha Bhatt, Sanjay Kaul and Diwan Singh. DDA and the Police officials came too.

Satyagrah took roots thereafter through a regular *darna* under the shisham tree and a large variety of people, children and youth came to join on different days. Every day there were discourses, discussions and chants in the name of Yamuna, besides YJA sharing information regularly as its research made progress. Kishori Bhai a farmer from a *khadar* village who started composing and rendering *bhajans* on Yamuna. Vinod Mishra who was a good singer joined too. Satyagrah was participated by Jal Biradari, YJA, Ridge Bachao Andolan, Vimalendu Jha of Swecha and Sanjay Kaul of Peoples' Action and NN Mishra of East Delhi RWA. On 10th August, 2007 though no formal function was held by Delhi Administration or the DDA but the DDA initiated fencing of the CWG area which was resisted by the satyagrahis resulting in the arrest and later release by Police of a Satyagrahi (Sri Omkareswar).

On 11th August, 2007 on Shiv Ratri day puja was offered to River Yamuna by the Satyagrahis and villagers and on 15th August, 2007 the Satyagrahis which included Rajendra Singh, Radha Behan and Vandana Shiva hoisted the National Flag near the River.

On *rakhi* day on 28th August, 2007 Rakhi was tied to the trees in the flood plain of river Yamuna by the citizens of Delhi and the Satyagrahis and on 4th September, 2007 Janmashtami festival was celebrated by the citizens of Delhi while the

Flag hoisting on river bank on 15th August, 2007

Satyagrahis marched from the site towards the bank of river Yamuna with a message to Lord Krishna to save the river, as he had earlier saved the river from the 'Kalia Nag'. On 2nd October 2007 on the Gandhi Jayanti day the Satyagrahis offered puja to Lord Krishna to save the river from the modern 'Kalia Nag' i.e. Commonwealth Games Village, Metro, Mall, Heliport and allied constructions. On 30-31 October 'Yamuna Parliament' was organized under the stewardship of 'water man' Rajendra Singh by Yamuna Satyagraha and people from all over the country participated therein. On 14th November the Children's Day, school children from Ryan International School, NOIDA visited the site and walked to the banks of river Yamuna and college students from Kamala Nehru College visited the Satyagraha Site. 35-40 people from all over the country attending a Centre for Science & Environment (CSE) Workshop visited the Satyagraha site and joined the discourse. Youth For Justice (YFJ) a youth group had by then become very active in the Satyagrah activities.

The *khadar* farmers (under the auspices of Dilli Peasant Multipurpose Cooperative Society) came to form the backbone of the *Satyagrah,* which has been going on. There was good coverage in both print and television news media of the Satyagrah and also of YJA research findings revealing the plight

Journalist interviewing Rajendra Singh and others

and degraded status of Yamuna in its entire stretch from Yamunotri to Etawah where Chambal meets and revives it. Presentations to the decision makers with the strong backup of researched findings were also picked up by the media well. The Prime Minister formed the Yamuna River Development Authority, headed by the Hon'ble Lt Governor of Delhi on 24th August, 2007. Within a year of *Satyagrah* during which researched presentations to the higher level decision makers continued, the Lt Governor of Delhi announced his decision to the media to impose a moratorium on any new construction in the floodplains of river Yamuna.

Legal action by YJA and associates

Times Global Village case

The first direct legal action initiated by the YJA in association with some other NGOs was a Public Interest Litigation (PIL) against the "Times Global Village" project filed in the Delhi High Court. The project was meant to be a month long event of shopping extravaganza every year for ten years starting 2007. The players behind this were the company owning DND flyover, a Dubai based firm (e4 entertainment), Delhi Tourism and the Times of India Group. The stretch of the river floodplain on 99-year lease from Delhi Government to the DND Company and situated next to the DND flyover was the site for this unimaginative initiative. Work had started on this on a massive scale though the structures being raised were temporary in nature. Alarmed by this, urgent YJA research revealed that there was an earlier Delhi High Court order forbidding any new work within 300 meters of the river. Manoj Misra and Anand Arya (an environmentalist keenly interested in the varied aquatic bird life of Okhla Bird Park) of YJA, accordingly filed a PIL through their lawyer Sri Ritwick Dutta against this illegal project in February, 2007 in Delhi High Court, which the HC passed on for factual report to the Usha

Mehra Committee earlier appointed by it to monitor removal of encroachments upon Yamuna. The Committee came to the site and found the flagrant violation of the earlier HC order and gave its report to the HC. However, by the time the HC order in the case came on 4th May 2007 the event had concluded on 1st of May, 2007. The HC order decided that the project was illegal and should never have been allowed in the first place. Anyway, the positive impact of the order was that the event that was meant to be an annual feature for ten years was not pursued in subsequent years.

The case of Commonwealth Games and DMRC Depot

Meanwhile the MoEF apparently wavering under the pressure of DDA issued a third Environmental Clearance (EC) order on 2nd April, 2007 allowing DDA to undertake permanent constructions at the CWG village site. This overruled its earlier EC allowing only temporary structures at the site. On the other hand there was an utter lack of positive action in the matter of CWG 2010 village from any quarter *viz.* DDA, Lt Governor of Delhi, MoEF or MoUD. This new EC violated the new Environment Impact Assessment (EIA) Rules that had come in force in 2006 under the Environment Protection Act (EPA) bringing constructions in environmentally sensitive areas under the purview of detailed EIA study. This required that the Environment Appraisal Committee (EAC) would examine the EIA study and give its reasons and expert recommendation for or against before the MoEF could consider according or rejecting environmental clearance to any such proposal. This requirement of the EIA Rules had been violated by the Ministry by first accepting the recommendations and allowing temporary structures for the CWG and then permitting permanent structures without going back to the EAC.

This caused the NGO group *viz.* INTACH, Rajendra Singh (Jal Biradari), Manoj Misra (YJA) and Sanjay Kaul to take recourse to filing a PIL on 1st October 2007 in the Delhi High Court praying for ensuring security of the integrity of the Yamuna river bed in Delhi from destructive activities. The PIL was admitted on 10th October 2007. A two member HC Bench headed by Justice A. K. Sikri with Justice Rekha Sharma took up the case and initiated regular hearing twice every week. The respondents in the case were Govt of Delhi, DDA, DMRC, MoEF, MoUD and MoYAS. The petitioners informed the Court that massive construction works had started on the impugned site to which the Court's response was, "*Let them build at their own risk*". On 3rd January 2008 the Bench came for a site visit where massive earth work preparatory to the construction was underway.

As it was later revealed through perusal of DDA's affidavit submitted before the HC that on 8th January 2008 the Union Minister for Science & Technology took up a meeting of Vice Chairman of DDA and Director of NEERI (which is an institution under the MoST). On 15th January 2008, DDA wrote to NEERI raising some leading questions asking what was the opinion of NEERI on the CWG village site while referring to the the MoEF clearance and the existence of a flood bund on Yamuna protecting Akshardham and the site of the CWG village. On 27th January 2008 NEERI sent a report saying that it was not aware at the time of preparing its September 2005 report that such a flood protection bund existed. NEERI also opined that due to the existence of this bund the CWG site was *no longer deemed to be a floodplain* of Yamuna. The respondents pleaded that that NEERI's new report proved that the CWG 2010 site was not on Yamuna floodplain and prayed for rejection of the PIL petition.

Petitioners countered this by pleading that this new report of NEERI amounted to contempt of the Court as neither DDA had the propriety to ask for nor did NEERI have any propriety to send a new report without the prior permission of the Delhi High Court when the matter was *sub judice* before it. Then in early February 2008 the petitioners filed an affidavit exposing NEERI's new report as full of lies and based on second thought because it (NEERI) was well aware of the prior existence of the bund constructed in 2002 while preparing its October 2005 report as a photograph

of that bund featured at various places in its 2005 report. Petitioners pleaded that this new NEERI report being the result of an afterthought was based on falsehoods and was patently prepared to help respondents' untenable case. They averred that this new report was prepared to help DDA's case in an illegitimate manner and prayed for initiating contempt proceedings against DDA and NEERI.

Last hearing in the case was held in Delhi High Court on 8th February 2008 and the judgement was reserved. At that stage no actual construction of buildings had begun at the site. It was, however, only after eight months that the HC announced its judgement on 3rd November 2008 with the two judges viewing the case differently in the run up to the verdict, one favouring the integrity of the river and another highlighting the importance of hosting the CWG. But in the post script the other judge also eventually agreed with the former judge's findings in favour of the river. The verdict announced had two principal findings. The first was that NEERI 2008 report was a trash prepared in afterthought and with an intent of helping the respondents through a back door route and hence did not merit consideration. The second was that the Bench needed an expert committee headed by noted environmentalist Dr R. K. Pachauri to advise it on the impacts on the ecology of the river including upon the recharge of ground water aquifer from the past and ongoing constructions on the floodplains of the river. It passed its order accordingly requiring the Committee to study and come up with a report within three months. The HC asked both petitioners and respondents to suggest three names each for potential members for the committee and the HC would then decide upon the committee's constitution.

The case shifts to the Supreme Court

On 15th December, 2008 when the petitioners appeared in the Delhi HC with suggested names for the committee DDA produced a stay order on the HC judgement obtained from the Supreme Court (SC). The arena then shifted to the SC, where petitioners on both sides submitted Special Leave Petitions (SLP) incorporating their written versions of interpretation of facts and contents of the HC judgement making their respective prayers. The hearing in the case in SC was completed in a single day on 15th July 2009 and the judgement was delivered on 31st July 2009. Somehow the SC placed reliance on NEERI's January 2008 report and held that with the construction of the flood protection bund for Akshardham in 2002 the CWG village site, which also was situated on the same side of the bund as the Akshardham, was no longer a floodplain. The SC also placed reliance on a 1999 notification of the Ministry for Urban Development that had merely allowed land use change from "agricultural and water body' (A-4) to 'public and semi public facilities" and observed that the petitioners should have raised their objections at that time. The petitioners had made a plea that the 1999 change in the land use did not apply to the site in question and that the MoEF in its earlier EC issued on 14th December 2006 had allowed constructions of only a temporary nature with a scope of restoration of the affected area after the 10-day CWG event to the river was valid under the EPA. But this was not considered.

The petitioners' case is that the April 2007 EC issued by MoEF allowing permanent constructions violated the EPA and was not maintainable. It was mandatory for the MoEF to first have the EAC study a proper EIA report prepared on the impacts of the Akshardham bund and of the existing and permanent constructions upon the river ecology and ground water recharge as well as upon the efflux resulting from these interventions in the river bed including the floodplains. Yet this valid plea was not taken into account in the SC judgement placing reliance on the NEERI report as aforesaid, which the Delhi HC had trashed in strong terms.

Akshardham flood protection bund as the name implies was made to restrain floods from entering into Akshardham complex. This essentially implies that not just the Akshardham complex but all the land enclosed by the Akshardham bund was but the floodplain of Yamuna. Engineered structures like this bund cannot alter the ecological status of

what belongs to the river as its floodplain. In fact given Delhi's well understood dependence upon Yamuna floodplains for ground water recharge and for moderating flood impacts exposes DDA's crass bid to wrest the floodplain from Yamuna and compromise vital concerns of Delhi citizenry. This position was understood by the EAC and initially also by the MoEF as apparent from the first EC issued by it on 14th December 2006.

With a sinister design of future commercial use in view the DDA had planned the bund to cover a far larger area than was needed by Akshardham. It is in this area that in the name of the CWG now the commercial constructions e.g. luxury apartments, metro mall complex, swimming pool and mini-stadium are being raised. The east and west bunds of Yamuna were made in the 1950s firstly at a time when environmental impacts were little understood in India and more over these were quite a way far from the dry season course of the river and left extensive floodplains intact. If bunds like the Akshardham bund are justified even in the third millennium, it implies that our decision making structures are either naive or are incapable of controlling the actions of the trinity of corrupt politicians, bureaucrats and developers that essentially undermine vital public interests for their profit. Wresting the floodplains even in a metropolis from an Indian river and that too like Yamuna which has a glacial origin drawing substantial flows from snow melt together with torrential monsoonal rains in the overall catchment cannot be justified under any circumstances. Such actions expose the city to created water shortage in the dry season and make it prone to flood fury in the monsoon months.

Metropolitan towns in India are growing at menacing rates and Delhi leads from the front. Its requirement of space for expansion is understandable though it is high time it quickly decided upon limits of such expansion. Delhi's needs of water have grown exponentially and it cannot afford to compromise its most potent source of water, the river Yamuna. The aspects of hydrological ravage of Yamuna by riparian states including the NCT of Delhi present another sad story and are discussed in this report elsewhere. Yet it is necessary to question here how Delhi can ill afford to pollute its river to the stage of a festering sewer and divest it of its floodplains in the name of metropolitan development when they have been estimated to potentially recharge ground water that meets half its total freshwater requirements.

Yamuna Yatra – *Qutub se Taj tak*

The Yamuna Satyagrah organized a Yamuna Yatra from Delhi to Agra and back from 5th June, 2008 to 13th June, 2008.

Yamuna Yatra called 'Qutub se Taj tak' was undertaken principally by YJA and Youth for Justice with active participation of a number of volunteers (CMS 2008). The objective of the Yatra was to understand the attachment, dependency, faith and the culture of the Yamuna flood plains (people and the river). During initial discussions water quality was considered as a primary component for understanding anthropogenic pollution. Hence, in the process Environics Trust joined the Yatra as a technical team having responsibility to assess following things:

- State of water of the river (water quality and quantity)
- State of flood plains
- Drains if any that pollutes the river
- Quality of drinking water
- Any other notable feature

The main mode was to study the quality and quantity of water in the river and use of its water by the villages and towns *en route*. Interacting with villagers and learning from them about traditional image of the river, the history of its degradation and the disadvantage that urbanization has inflicted remained at the focus of the Yatra.

The Yatra started from the Satyagrah Sthal and was essentially carried out on motor bikes with two support vehicles. The Yatra kept close to the river course and frequently stopped at river side villages

Start of Yamuna Yatra - 'Qutab se Taj tak' from Yamuna Satyagrah Sthal on 5th June 2008

and temple-ashram complexes making it convenient to spend nights on 'as was where was' basis. The villagers and temple-ashram chiefs were all cooperation and help but in several places the paucity and quality of facilities was taken sportingly by the participants. The interaction with villagers was very friendly and *Jamunaji* proved to be a strong bridge and soon gatherings in villages led to informed discussions and chants of *raginis* and bhajans in which both villagers yatra participants participated with abandon. The gatherings with these attributes proved to be a strong source of bonding as well as learning from one another.

The following were the main findings from the Yatra

The most important and upfront finding was that if the river is not further strained by load of urban and industrial affluent it can substantially redeem itself. This was in candid evidence as Yamuna not burdened after Kosi Kalan downstream up to Vrindavan, stretch of 100 km, purifies itself through oxygenation and the ghats at Vrindvan and Mathura have bathing quality water, though not fit for drinking. Downstream of Mathura again the river is loaded by effluents from Mathura, Vrindavan and the Mathura oil refinery and reverts to the status of a festering sewer. Other findings:

- Encroachments into the flood plains abound either in form of agricultural farms (villages) or constructions (towns)
- Canals and drains stink and carry polluted water
- Kids swim and play in polluted waters
- Cities remain the major polluter and encroacher of the river
- It is important that cities first effectively treat the sewer and industrial waste water before discharging into the river.
- It is critical that the NCT of Delhi in the river's 22 km urban stretch between Wazirabad and Okhala barrages collects sewerage in a large drain skirting the Ring Road and discharge it into the river only downstream of Okhla Barrage but only after effective sewerage treatment.
- Villages are by and large without any concern for hygiene or proper drainage or security of their johads (local water bodies)
- Sewerage Treatment Plants (STP) appear of hardly any help to the river
- Religious heads and Panchayats are the most influential local institutions and can influence local peoples' attitudes and participation in action. Both government and NGOs should work on improvement of the river condition with the people with a strong role for these institutions and individuals.
- Yamuna Action Plan activities are conspicuous but they do not appear to be effective as the health of the river continues to deteriorate.
- Residential, Institutional and industrial areas continue to be developed by the state in or close to the river bed all along NCT of Delhi, Haryana and Uttar Pradesh.
- Every major human settlement (Delhi, Faridabad, Vrindavan, Mathura and Agra) lies on the right bank, which stands on a somewhat higher plain.

How people felt

- People whether in villages, towns or cities are fully aware of the unfortunate state of river Yamuna and more than keen to lend a helping hand, but are unable to put their fingers on how of it.

- Religious sentiments associated with the river are pretty strong in the Braj region, which encompasses more than 60% of the area in question
- People tend to blame Delhi for most of the ills facing the river
- People have little faith in the ability or the intent of the government to change the river's situation for the better
- Farmers knowingly feel trapped and compelled to irrigate their lands with polluted / toxic water currently flowing in canals / drains / river
- People are aware to the falling ground water levels as well as the fact that it is only the deep bore which now carries sweet potable water, but not for long
- People have a deep sense of failure and disappointment with the actions taken till date for the river by the state under the Yamuna Action Play (YAP)
- People have a distinct recall of the great deluge of 1978 which spread over vast areas on either bank of the river
- People's vision of a clean river is one in which a coin can be easily seen and recovered from the bottom
- People have a clear idea of the extent of khadar (flood plain) and bangar (beyond the flood plains) of the river, but have either encroached upon or been allotted land to farm with in the khadar by the state
- People have little idea of the quality of water that they consume for domestic purposes
- Folk songs (ragini) for the river and otherwise remain a popular medium of recreation in the village and suggests itself as a strong medium to promote awareness and elicit people's help in reviving the river
- People have little sense of connect between the health of their johads (village pond) and the river
- People are aware and quite unhappy with but feel helpless about the state's designs to convert their lands into industrial or institutional uses
- People maintain a deep religious association with the river

NGO presence and effect

- There are notable NGOs present and active in Vrindavan, Mathura and Agra
- Brij Foundation is active over the entire Braj area and seems a natural ally
- Other NGOs include Friends of Vrindavan, Food for Life (ISKON), Chaturvedi Samaj (Mathura)
- Large number of religious heads (Mahant, Mathadheesh, Akhara dheesh (etc.), are present and could prove to be a potent force for the revival of the river.
- Knowledgeable, influential and interested individuals like Sri Raman ji (Agra), Ravi ji (Agra), Kishan Chaturvedi (Mathura), Gopesh Chaturvedi (Mathura), Srivats Goswami ji (Vrindavan), Mahant Ashwini Kumar ji (Agra) are the key contacts.

River and its water quality

- River meanders frequently
- Large number of drains carrying sewage and industrial wastes drain into the river all along
- Water quality is dangerous till Faridabad district, improves till Vrindavan and then deteriorates once again till Agra
- Drinking water from hand pumps is not suitable at most places
- Water augmentation into the river in the stretch is from river Hindon (polluted form) and a distributory of the Upper Ganga Canal (both draining from the east)

Learnings

- A river is much more than flowing water. It consists of its channel, flood plain and the riparian zone.
- There is no other natural ecosystem on earth like a river. For it alone 'flows' and in its wake creates suitable conditions (niche) for various life forms (both flora and fauna) to thrive. (There are examples galore of different life forms that have originated in rivers and would not life forms that have originated in rivers and would not thrive in enclosed water bodies like ponds, lakes and reservoir.)
- Inhibiting a river form flowing is akin to killing

it. (This is what dams, embankments, barrages and pseudo bridges do).

- If only the rivers were allowed to flow freely with their full complement of water all its ills can be taken care of naturally by its own rejuvenation powers. It has done so over the millennia. We were witness to this wonderful phenomenon at Chirghat where the river regained bathing quality short of Vrindavan after the river had flowed unmolested for almost 100 km.
- If only all sewage (and only sewage) from towns and cities and even villages was trapped (sieved of plastic and other solid waste) and then fed entirely into the agricultural fields.
- If only industrial effluents were recycled and not allowed to fall into the river unless fully treated
- If only domestic needs of water were met from direct lifting from the flowing and hence little polluted river and the lakes, ponds and the ground water
- If only the religious heads could be persuaded to give a clarion call to their followers for the river (the exact nature and the wordings of the call would need careful drafting)
- It doesn't really involve much expense to organize such a Yatra if one stays and eats with local people.

HNZ Bridge Vigil for the River

Background

It is well known that the urban stretches of river Yamuna in places like Delhi, Mathura and Agra are in worst shape in terms of the pollution of its waters as well as the threatened state of the river's flood plain.

Of the many causes of rampant pollution in the river, like number of drains bringing sewage and other pollutants into the river from the cities, one which has an important role, but not much appreciated is the dumping of household waste (principally, left over from religious ceremonies) into the river from the number of bridges that straddle the river in these cities. It may be recalled that to prevent such a practice the government has under the Yamuna Action Plan (YAP) raised metal wire mesh fence on either side of a number of these bridges. Unfortunately these fences have little prevention value left since miscreants have cut windows at strategic places in them and some people would still prefer vaulting polythene bags full of household refuse over the fence into the hapless river.

We at the Yamuna Jiye Abhiyaan, have endeavoured to observe and document these practices on the HNZ Bridge cum Road (NH 24) since January 2009 in order to try and understand the practice as narrated above with an objective to work towards a workable strategy that could prevent such pollution of the river.

Then on 14th of August 2009 (The Janmashtami day) we tried to test run a preventive methodology with an aim to practice it over a prolonged duration as an experiment cum educational campaign. Enthused by the people's response on that day we decided to launch a month long vigil for the river at the HNZ Bridge during the month of September 2009 as a citizen's initiative that goes beyond merely lamenting and blaming the state agencies for the sad state of the river.

The reason why we chose this month was the fact that most religious ceremonies / functions beginning with Ganesh Chaturthi, Shraddh, Dussehra and Durga Puja fell in this month.

Later on 27th of August 2009, we held a half day brainstorming session with local pujaris in east Delhi to get their inputs into our plans.

The Purpose

- Use the experience of a days' test run to persuade people from not throwing things into the river and hand over the things to our volunteers for safe disposal
- Observe and document the state of the river in an ongoing manner
- Utilize the immense visibility of a bridge to

reach out to people with river conservation messages.
- Reach out and network with relevant government agencies.
- Involve other NGOs, schools and interested individuals in the vigil.

Methodology

The vigil was held daily (except on Sundays and such rainy days when it became impossible to keep the vigil) from 9 am – 12 noon and again from 2 pm – 5 pm beginning September 1, 2009 up till September 30, 2009.

Volunteers put up each day the banners at a suitable height on the Bridge's fence and stood at predefined strategic locations on the bridge with bamboo baskets (to collect the material) on the ground and placards hanging around their necks.

Each evening, after the vigil was over, the collected material was segregated (into organic and non-

organic) and the organic matter (garlands, hawan samagri, food stuff etc) was interned into pits for composting and non organic (polythene bags, idols, paper matter, earthen pots, framed pictures, glass material, metallic pieces etc) material was further segregated and stored safely for planned recycle purposes.

The school children, when they participated, stood vigil for over an hour or so, and then they were requested to draw or write about the 'Yamuna of their dreams'!

The vigil was regularly documented and the photographs were taken from time to time.

Key Observations

- Misuse of bridges (at least the HNZ Bridge on NH 24) for dumping things (mainly household waste) into the river is rampant.
- Based on a sample estimate of number of vehicles stopping at the traffic junction for over a minute, we estimated that between 75,000 – 100,000 people use the bridge on a normal day.
- People were seen to come in cars, buses, auto-rickshaws, taxis, bicycle and on foot for vaulting used puja materials into the river . Even government vehicles and vehicles with press stickers were seen to be used for the same.
- Majority of people (almost 95%) needed little to nil convincing before they handed over their packets (polythene bags, cloth bags, paper bags etc) to the volunteers. Towards the end of the vigil it was heartening for us to note that it was just a small minority of people (1 in 4) who did not deposit the packets on their own into the baskets (without a volunteer manning the site) placed at various places on the pedestrian passage on the bridge.
- There is some organized gang of miscreants who have a vested interest in opening the windows in the fence to facilitate people to throw things

Polluted river Yamuna upstream of Hazrat Nizamuddin Bridge

into the river.

- There is a significant population of labour class people working either in the nearby fields or nurseries, or with construction companies who use the area under the bridge or close to it to live in shanties and eke out a living. Their children often loiter and frequent the bridge and act as conduit (for a few coins) for throwing the things into the river.
- People were by and large appreciative of the effort with some stopping and complimenting the volunteers. There were phone calls from a few with suggestions and some even visiting us at the Hanuman temple for personal interaction with us. The pujaris at the Hanuman temple (vigil headquarters) were a source of great encouragement and help throughout the vigil.
- It was encouraging to find relevant government agencies (PWD and MCD) supportive and appreciative of the effort.
- It was purely coincidental that over a period of just a month we witnessed the river change from being a stinking sewer drain into its natural vibrant self (thanks to the floods) and back to its sewer status.
- It was heartening to see school children from a number of schools in the city (some from even as far away as Dwarka) actively participating in the activity.

Learnings and Findings

- Majority of people at the Nizamuddin Bridge come from various parts of East Delhi to dump their offerings into the river.
- If festive season is not counted, then majority of people who visit and dump things into the river are doing so on the advice of a pujari or some such person (including elders in the house).
- It was a very small minority (4-5%) for whom immersion was a compelling necessity. Such people would just not rest till their offering/s was well into the river. The state of river mattered little to them.
- Interestingly it was only plastic which many people considered as a source of pollution and hence (about 40%) would take care to not throw it along with the puja material.
- Interestingly people from all walks and placements (lawyers, police personnel, staff from DJB, MCD and DDA, Press staff, Priests, Businessmen, public and private service class etc) were seen to visit the bridge for this purpose.
- On a non festive day an average of 50 to 80 people came to the HNZ Bridge to deposit their things into the river. As against on a festive day

the number exceeded 300 going up to more than 500 on the Ashtami and Dashami day.

- Interestingly and unfortunately it was not just religious offerings but all sort of domestic waste that people were found to dump into the river. These included things like movie tickets, flour and tea packaging, newspaper bundles, shampoo and gutkha pouches, cough syrup bottles, body care products, tablet wrappers, broken bulbs, switches, shoe polish lotion, ball pens, artificial teeth set, marriage invitations cards, books etc, etc.
- Children who habitually loiter on the bridge, create nuisance and assist people in throwing things into the river. In their presence convincing people becomes a bit tough. This practice needs to be discouraged as in the ultimate analysis while this may be seen as being an opportunistic income for the family, it turns the children into kind of beggars and discourages them from attending nearby schools where at least some of them are enrolled.
- There are well-equipped gangs who occasionally damage the fence.
- Expert divers living under and around the bridge despite obvious ill effects from the polluted waters on their health are least bothered and primarily interested in the collection of valuable metal pieces and coins thrown into the river.
- It was disheartening to note even the MCD staff pushing the swept material from the bridge down into the river through the cracks in the pavements on the bridge.
- Following is the estimate of the over-all collection from the vigil. It may be noted that this is just from a month long vigil and from a single bridge over the river. This can be safely multiplied by a factor of 4 to factor in the impact on the river from at least 4 other high use bridges (Wazirabad, Gita Colony, ITO, DND) in the city.
- For people used to observing such activities as nothing more than a one off event, it came as quite a surprise to see the volunteers of Yamuna Jiye Abhiyaan at it day after day.
- Educational placards worn by volunteers on their person were found to be far more effective as an outreach mode than mere placards hung on the fence.
- Quite a number of people advised us to work on 'fixing' the drains falling into the river and polluting it.
- As an experiment, it was quite a successful effort and can be easily replicated by any other interested agency including an NGO in Delhi or in any other place where such misuse of bridges is noticed.

Estimate of collected waste over the month

Items	No. of Sacks	Amount
Polybags	22	180 kg
Paper	18	220 kg
Cloth	7	80 kg
Glass	1	30 kg
Paintings	5	300 pieces
Idols	10	250 pieces
Earthen Pots		500 kg
Organic waste	50	1000 kg

Recommendations

- It is suggested that MCD may like to take up such an activity (regular vigil using volunteers) over all the bridges in the city for at least a period of couple of months at a stretch so that people get used to depositing their used puja materials at designated sites at the beginning of the bridge or at any other suitable location close to the bridge.
- MCD having resources for the outreach component of Yamuna Action Plan (YAP) as well as a number of NGOs associated with can take up the replication of this effort.
- In any case, MCD is duty bound under a Delhi High Court order from 2006, to create suitable locations close to the river where the puja left over materials could be safely deposited without further polluting the river.
- There needs to be a law to discourage people from dumping non religious material into the river.

Major milestones of *Yamuna Jiye Abhiyaan* (YJA)

S. No.	Date	Description
1.	7 Feb 2007	Meeting of interested organisations and individuals at IIC, New Delhi. YJA formalized as a non formal consortium for river Yamuna
2.	18 April 2007	Met Hon'ble President of India
3.	4 May 2007	High Court Order on the Times Global Village Case
4.	5 May 2007	Met Hon'ble Minister of Sports and Youth Affairs
5.	10 May 2007	Met Sri Suresh Prabhu, Hon'ble MP
6.	27 May 2007	March from Wazirabad to the proposed Commonwealth Games Village site (near Akshardham complex).
7.	5 June 2007	Presentation for the public on the event of World Environment day at IIC, Delhi
8.	27 June 2007	Presentation at DUAC, New Delhi
9.	4 July 2007	Presentation for the Governing Body of the INTACH, Delhi
10.	27 July 2007	Presentation at Nehru Memorial Museum Library, Delhi
11.	1 August 2007	Plantations at the proposed Commonwealth Games Village site and Satyagraha started on the site under the guidance of Sri Rajendra Singh.
12.	6 August 2007	Met Vice Chairman, DDA and other officials
13.	10 August 2007	Requested DDA and Emaar MGF builders to stop the construction work in the river bed.
14.	15 August 2007	Satyagrahis hoisted the National Flag near the River Yamuna.
15.	20 August 2007	Presentation made to Usha Mehra Committee, Delhi
16.	22 August 2007	Presentation made to Sri Tejendra Khanna, Hon'ble Lt. Governor of Delhi under the leadership of Sri Kuldip Nayar, eminent journalist, diplomat and statesmen
17.	28 August 2007	Rakhi tied to the trees in the flood plain of river Yamuna by the citizens of Delhi and the Satyagrahis.
18.	8 September 2007	Met Sri Arjun Singh, Hon'ble Union Minister of Human Resources.
19.	4 September 2007	Janmashtami festival celebrated by the citizens of Delhi and Satyagrahis at the site and a rally was taken out till river Yamuna.
20.	2 October 2007	Citizens from Delhi and students and Professors from Aravali Institute of Management, Jodhpur, marched from Satyagraha site to Raj Ghat to pay tribute to the Father of the Nation on his birthday.
21.	5 October 2007	Met Hon'ble LG of Delhi, Sri Tejendra Khanna
22.	10 October 2007	PIL by Rajendra Singh & Others admitted at the High Court of Delhi.
23.	12 October 2007	Presentation made at Raj Niwas for the Yamuna Development Committee members which was Chaired by Hon'ble Lt. Governor of Delhi and Co-Chaired by Hon'ble Chief Minister of Delhi.

(contd...)

(contd...)

S. No.	Date	Description
24.	17 October 2007	Met Dr Karan Singh at Nehru Memorial Fund
25.	30 October 2007	PIL heard at HC of Delhi and fixed 20 November 2007 as the date for arguments in the case.
26.	30–31 October 2007	'Yamuna Parliament' was organized by Yamuna Satyagraha and people from all over the country participated.
27.	8 November 2007	Deepavali celebrated on the banks of river Yamuna.
28.	14 November 2007	School children from Ryan International School, NOIDA visited the site and walked to the banks of river Yamuna. College students from Kamala Nehru College visited the Satyagraha Site. 35-40 people from all over the country visited the Satyaragraha site from CSE workshop.
29.	19 February 2008	Delhi High Court reserved the judgement in the PIL.
30.	5 – 13 June 2009	Yamuna Yatra on motorcycle from 'Qutub se Taj Tak' along the river.
31.	31 July 2008	Yamuna Satyagrah celebrated its completion of 365 days. 365 plants were planted in the Yamuna flood plains.
32.	3 November 2008	Delhi High Court delivered the judgement after 8 long months
33.	5 December 2008	DDA filed a SLP in Supreme Court for stay against the Expert Committee to be formed as advised by the HC bench in their judgement.
34.	12 December 2008	Yamuna Satyagrah celebrated completion of its 500th day.
35.	14 December 2008	Protest march took place at Jantar Mantar
36.	February 2009	Filed an SLP in Supreme Court against the ongoing constructions in the Yamuna flood plain
37.	10 May 2009	Protest against Yamuna Metro Depot in the flood plains of river Yamuna
38.	30 July 2009	SC judgment in the Yamuna Case
39.	1 August 2009	Yamuna Satyagrah completed 2 years.
40.	30 September 2009	YJA completed 1 month of 'Yamuna Vigil' on the HNZ Bridge.

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APPENDIX 1

CONSTITUTION OF YAMUNA RIVER DEVELOPMENT AUTHORITY

No. 731/2/1/2007-Cab-III
Government of India
Cabinet Secretariat
Rashtrapati Bhawan

New Delhi, dated the 24th August, 2007

OFFICE MEMORANDUM

Sub: Constitution of Yamuna River Development Authority

As approved by the Prime Minister, it has been decided to constitute a High Powered Committee for Yamuna River Development Chaired by the Lt. Governor, Govt. of NCT Delhi with the Chief Minister of Delhi as Vice-Chair. The composition of the High Powered Committee would be as follows:

1)	Lt. Governor, Delhi	-	Chairperson
2)	Chief Minister, Delhi	-	Vice Chairperson
3)	Secretary, M/o Urban Development	-	Member
4)	Secretary, Ministry of Environment & Forests	-	Member
5)	Secretary, Ministry of Water Resources	-	Member
6)	Chief Secretary, GNCT of Delhi	-	Member
7)	Pr. Secretary, Urban Development, GNCT of Delhi	-	Member
8)	CEO, Delhi Jal Board	-	Member
9)	Vice-Chairman, DDA	-	Member

2. The terms of reference of the High Powered Committee shall be as follows:

a) Commission studies on different aspects of the development of the river, viz. hydrology, ecology, environmental pollution, sustainable use of the river front, etc. to feed into the policy framework.
b) Develop a policy framework and prepare an integrated plan addressing issues of both quantity in terms of river flow and quality in the Yamuna river.
c) Develop an operational plan for implementation of the river action programme.
d) Effect inter-sectoral coordination for planning and implementation until such time as a statutory arrangement is in place.
e) Suggest the design for a statutory framework.

3. The Committee would be free to co-opt expert members as felt by the Committee.

4. The Committee would submit a three-monthly report on action to the Prime Minister's Office through the Cabinet Secretary.

(Rajive Kumar)
Joint Secretary to the Govt. of India

APPENDIX 2

MEMORANDUM OF UNDERSTANDING (MoU) BETWEEN UTTAR PRADESH, HARYANA, RAJASTHAN, HIMACHAL PRADESH AND NATIONAL CAPITAL TERRITORY OF DELHI REGARDING ALLOCATION OF SURFACE FLOW OF YAMUNA

1. Whereas the 75% dependable notional virgin flow in the Yamuna river upto Okhla has been assessed as 11.70 Billion Cubic Metres (BCM) and the mean year availability has been assessed as 13.00 BCM.
2. And whereas the water was being utilised by the Basin States Ex-Tajewala and ex-Okhla for meeting the irrigation and drinking water needs without any specific allocation.
3. And whereas a demand has been made by some basin states on this account and the need for a specified allocation of the utilisable water resources of river Yamuna has been felt for a long time.
4. And whereas to maximise the utilisation of the surface flow of river Yamuna a number of storage projects have been identified.
5. And whereas the States have agreed that a minimum flow in proportion of completion of upstream storages going upto 10 cumec shall be maintained downstream of Tajewala and downstream of Okhla Headworks throughout the year from ecological considerations, as upstream storages are built up progressively in a phased manner.
6. And whereas it has been assessed that a quantum of 0.68 BCM may not be utilisable due to flood spills.
7. Now therefore, considering their irrigation and consumptive drinking water requirements, the Basin States agree on the following allocation of the utilisable water resources of river Yamuna assessed on mean year availability.
   1. Haryana 5.730 BCM
   2. Uttar Pradesh 4.032 BCM
   3. Rajasthan 1.119 BCM
   4. Himanchal Pradesh 0.378 BCM
   5. Delhi 0.724 BCM

Subject to the following

i) Pending construction of the storages in the upper reaches of the river, there shall be an interim seasonal allocation of the annual utilisable flow of river Yamuna as follows :

States	Seasonal Allocation of Yamuna waters (BCM)			
	July-Oct	Nov-Feb	March-June	Annual
Haryana	4.107	0.686	0.937	5.730
Uttar Pradesh	3.216	0.343	0.473	4.032
Rajasthan	0.963	0.070	0.086	1.119
Himachal Pradesh	0.190	0.108	0.080	0.378
Delhi	0.580	0.068	0.076	0.724
Total	**9.056**	**1.275**	**1.652**	**11.983**

Provided that the interim seasonal allocations will be distributed on ten daily basis.

Provided further that the said interim seasonal allocations shall get progressively modified, as storages are constructed, to the final annual allocations as indicated in para 7 above.

ii) Separate agreement will be executed in respect of each identified storage within the framework of overall allocation made under this agreement.

iii) The allocation of available flows amongst the Beneficiary States will be regulated by the Upper Yamuna River Board within the overall framework of this agreement.

Provided that in a year when the availability is more than the assessed quantity, the surplus availability will be distributed amongst the States in proportion to their allocations.

Provided also that in a year when the availability is less than the assessed quantity, first the drinking water allocation of Delhi will be met and the balance will be distributed amongst Haryana, U.P., Rajasthan and H.P. in Proportion to their allocations.

8. This agreement may be reviewed after the year 2025, if any of the basin States so demand.

9. We place on record and gratefully acknowledge the assistance and advice given by the Union Minister of Water Resources in arriving at this expeditious and amicable settlement.

New Delhi, the 12th May, 1994.

-Sd-
(Mulayam Singh Yadav)
Chief Minister
Uttar Pradesh

-Sd-
(Bhajan Lal)
Chief Minister
Haryana

-Sd-
(Bhairon Singh Shekhawat)
Chief Minister
Rajasthan

-Sd-
(Virbhadra Singh)
Chief Minister
Himachal Pradesh

-Sd-
(Madan Lal Khurana)
Chief Minister
Delhi

In the presence of :

-Sd-
(Vidyacharan Shukla)
Minister (Water Resources)

APPENDIX 3

CONSTITUTION OF UPPER YAMUNA RIVER BOARD (UYRB)

Introduction

In pursuance of the provision or the Memorandum of Understanding (MoU), 1994 the States of Uttar Pradesh, Haryana, Rajasthan and NCT of Delhi finalized a draft agreement on the constitution and functions of the Upper Yamuna River Board (UYRB) in an inter-state meeting held on 2nd September, 1994. Himachal Pradesh suggested a modification in the draft regarding exclusive right to the non-consumptive use of Yamuna waters of basin States within their respective territories. The modified draft agreement was signed by H.P., U.P., Haryana and NCT of Delhi in an inter-state meeting held on 6th November, 1994. Rajasthan has not yet concurred with the modifications incorporated in the draft already signed by other basin States on 2nd September, 1994. Meanwhile the Supreme Court, in a Writ Petition filed by Comdr. Sureshwar D. Sinha, directed the Union of India on 25th January, 1995 that the Upper Yamuna River Board should be constituted and made to start by March 15, 1995. Keeping in view the time limit fixed, the Hon'ble Court expected the States of Rajasthan and Himachal Pradesh to sort out their differences within three weeks regarding setting up the Upper Yamuna River Board. The Hon'ble Court requested Union Minister for Water Resources to take personal interest in this matter and have the UYRB constituted and made operative before March 15, 1995. Accordingly concerted efforts were made by Ministry of Water Resources to sort out difference between Rajasthan and Himachal Pradesh in inter-State meeting. Rajasthan had not concurred with the modified draft agreement signed by Uttar Pradesh, Haryana, H.P. and NCT of Delhi on 6th November, 1994. In pursuance to the direction of the Hon'ble Apex Court Govt. of India, UYRB was constituted by a Govt. Resolution on 11th March, 1995 based on the MoU dated 12.5.1994 and the agreement signed between the aforesaid five basin States to set up the UYRB to the extent agreed by them. The Hon'ble Supreme Court in its order dated 31.3.1995 had observed that the Board have been legally constituted, the MoU had become executable under law. As the State of Uttranchal has since been created w.e.f. 9th November, 2000 in accordance with the Uttar Pradesh Reorganisation Act 2000, under Section 84(2) of the Act, the State of Uttranchal was also inducted as a member of UYRB on the appointed day as a member of UYRB

Constitution

The Board consists of Member, CWC as part-time Chairman and one nominee each , not below the rank of Chief Engineer, from the States of U.P., Rajasthan, H.P., Haryana, Uttranchal and NCT of Delhi and a Chief Engineer of Central Electricity Authority and respresentatives of Central Ground Water Board and Central Pollution Control Board as part time Members. A full time Member Secretary of the Board is required to be appointed by Central Government for a period of 3 years at a time. Further, the expenditure on UYRB is to be shared equally by the aforesaid basin States viz U.P., Uttranchal, Rajasthan, H.P., Haryana and NCT of Delhi.

Functions

The functions of UYRB include:

a) The regulation and supply of water from all storages and barrages upto and including Okhla Barrage, having regard to the agreements entered into or the arrangements made between the Governments of Basin States in pursuance of MoU dated 12.5. 1994 with the proviso to resolve any dispute with the approval of Review Committee.
b) Maintenance of minimum flow, in proportion of completion of upstream storages, going upto 10 cumec downstream of Tazewala/Hathnikund and downstream of Okhla headworks throughout the year from ecological considerations.
c) Monitoring return flows from the waters withdrawn by Delhi from Yamuna after allowing for consumptive use for the Municpal and drinking water purposes as agreed to and after providing treatment to ensure the proper quality of the effluent as per standards of Central Pollution Control Board.
d) Monitoring return flows from the water withdrawn from Yamuna by the States of U.P. and Haryana for the purpose of silt exclusion.
e) Monitoring flows from tail race of Khara hydel station into river Yamuna upstream of Hathnikund.
f) Framing of Rules and Regulations for water accounting and determination of the shares of water for each State for every 10 days for regulation.
g) To maintain records of flow of the river Yamuna at all stations and determination of volume in river Yamuna in water year.

h) To maintain record of withdrawls for irrigation, domestic, municipal and industrial or any other purpose or water going down the river below.
i) To ensure delivery of supply to all concerned States in accordance with their entitlements.
j) Coordination of activities relating to and giving all appropriate directions for the following.
   1. Construction of different works.
   2. Integrated operation of the schemes for various uses including withdrawls.
   3. Monitoring conservation and upgrading quality of surface and ground water.
   4. Smooth implementation of inter-State projects.
k) Overview of plans for catchment area treatment, water shed management, rehabilitation and conservation of environment.
l) Monitoring and review of the progress of all projects upto and including Okhla Barrage.
m) Monitoring and exploitation of ground water in Upper Yamuna catchment and formulation of regulations to prevent over-exploitation.
n) Submission of annual report to Central Govt. and Basin States.

The Board is a subordinate office of the Govt. of India under the Ministry of Water Resources with its headquarters in National Capital Region (presently temporarily located at New Delhi). For the functioning of the Board, a total of 58 posts in various categories were approved for creation. Recruitment Rules for 50 Group A, B, C & D posts to be filled up by deputation, have since been notified in the Gazette of India and recruitment process is currently in motion.

Upper Yamuna Review Committee

Originally Upper Yamuna Review Committee, comprising the Chief Ministers (Governor in case of President's Rule) of the five basin States under the Chairmanship of the Union Minister/Minister of State for Water Resources, was constituted by the Govt. and became functional with effect from 22nd April, 1995 to supervise the working of the Upper Yamuna River Board and to ensure implementation of the MoU dated 12.5.1994 regarding allocation of surface flow of Yamuna and issue directions as may be necessary for the proper development and management of the upper reaches of the Yamuna river basin upto Okhla. The Resolution constituting the Board provided that disagreement, if any, on the decisions of the Board may be referred to the Review Committee by a Member or the Review Committee. Chairman of the Upper Yamuna River Board is the Secretary of the Upper Yamuna Review Committee. The Chief Minister of the newly created basin State of Uttranchal (Governor in case of President's Rule) has also been included in the Upper Yamuna Review Committee.

APPENDIX 4

RELEVANT EXCERPTS FROM THE MINUTES OF 34TH MEETING OF UPPER YAMUNA RIVER BOARD HELD ON 30TH DECEMBER, 2008 AT NEW DELHI

The 34th meeting of the Upper Yamuna River Board was held on 30th December, 2008 at 11:30 a.m. at New Delhi under the Chairmanship of Chairman, Upper Yamuna River Board. List of the participants is enclosed at Annex-I. The Chairman welcomed the participants and then requested Member Secretary, UYRB to take up the agenda for discussion.

34.1 Confirmation of the Minutes of 33rd meeting of the Board held on 27th March, 2008

The observations of Chief Executive Officer, Delhi Jal Board, NCT of Delhi on "Item No. 33.10 : Status of implementation of Renuka, Kishau & Lakhwar-Vyasi projects in Upper Yamuna basin" of the Minutes of the 33rd meeting of the Board held on 27th March, 2008 were considered in the meeting. After deliberations, the Minutes, as circulated vide letter No. UYRB/Tech-17/2008/511-537 dated 31st March, 2008 were confirmed without any modification.

34.2 Implementation of Renuka, Kishau & Lakhwar-Vyasi projects in Upper Yamuna Basin

The Member Secretary apprised the Board that the draft Agreements for construction of Renuka Dam and Kishau Dam were not signed by Rajasthan in 1994 and the question on the legality on these Agreements was, therefore, raised by some Basin States on various occasions. As such, the legal opinion was sought from Ministry of Law and Justice (Department of Legal Affairs), Government of India on legality of these draft Agreements on the following issues:

i) Whether the Agreements on Renuka and Kishau Dams signed by co-basin States (except Rajasthan) in 1994 are valid and enforceable in respect of signatory co-basin States?
ii) In case Rajasthan signs the Agreements now, whether these Agreements would be valid and enforceable Agreements in respect of all the signatory co-basin States ?

The legal opinion provided by the Ministry of Law and Justice (Department of Legal Affairs) in this regard is as under:

i) The agreements on Renuka Dam and Kishau Dam signed by co-basin States (except Rajasthan) in 1994 are not valid and enforceable Agreements.
ii) If the State of Rajasthan signs the Agreements now, even then the Agreements signed by other States in the year 1994 will not be valid and enforceable. Fresh agreements are required to be signed among the states which are party to the Agreement.

Member Secretary then apprised of the status of the Renuka, Kishau and Lakhwar-Vyasi projects and the efforts made by CWC/UYRB during last six months for expeditious implementation of these projects. He also stated that the Government of India had decided that Renuka, Kishau Lakhwar-Vyasi projects would be having the status of "National Projects" wherein financial assistance could be provided to the extent of 90% as grant towards the irrigation & drinking water supply components of the project cost after the accord of techno-economic clearance of the Detailed Project Report by the Advisory Committee and investment clearance by the Planning Commission in respect of these projects. He also informed that the guidelines for providing financial assistance to such projects were under finalization.

Thereafter, the discussions on Renuka, Kishau Lakhwar-Vyasi projects were taken-up one by one.

Renuka Project

The Chairman requested Himachal Pradesh / Himachal Pradesh Power Corporation Ltd. (HPPCL) to apprise the latest status of the implementation of Renuka Project.

The Representative of Himachal Pradesh / HPPCL informed that the process of acquisition of land for the project was already under progress. As regards forest clearance, he informed that the proposal for the same would be sent to Ministry of Environment & Forests by the end of January, 2009. The revised EIA and EMP reports would also be submitted to Ministry of Environment & Forests during the first week of January, 2009. He expressed that the work for the project was being planned to be awarded in June, 2009. He further informed that NCT of Delhi had paid Rs. 200 crore to Himachal Pradesh recently, however, more funds were required immediately for acquisition of land etc. for the project.

Representative of Haryana stated that they would share the cost and water from the project. However, Haryana would not insist on sharing of power from this project.

Representative of Rajasthan stated that they would share the cost as well as the benefits of 'water' & 'power' from the project in proportion to the allocation of water to Rajasthan as per the MoU of May, 1994.

Representative of Uttarakhand stated that they had no issue regarding sharing of cost and water from the project.

Member of NCT of Delhi put for the following points:

a) He cited the minutes of the First Meeting of the Steering Committee held on 29th September, 2006 wherein it was recorded as "Regarding the sharing of water from Renuka Dam, Chief Executive Officer, Delhi Jal Board (DJB) stated that in accordance with the agreement signed in 1994 by the States of Delhi, U.P., H.P. and Haryana, the releases from Renuka Dam will be used for meeting the drinking water needs of Delhi and that the regulation of releases will be carried out by UYRB. This arrangement will be in place only until other storages are created, at which stage releases from Renuka Dam shall be carried out keeping in view the overall allocation of Yamuna water as per MoU of May 1994. In response to a query from the already agreed Delhi shall bear the cost and provide necessary funds implementation schedule framed by the state of H.P. The Secretary (WR), Rajasthan stated that they would also like to share the benefit from the Renuka dam, the representative of the state of Rajasthan expressed that the state can consider the signing of the agreement if the picture of sharing of benefit from the project is made clear to the state. The Principal Secretary (Irrigation), U.P. stated that the post-dam construction release should be such that any of the co-basin States should not be deprived of water on the construction of anyone of the projects.

   After discussions, it was agreed that the construction of the project may be taken up by the Government of H.P. at the earliest and sharing of water in the post dam scenario may be further fine tuned by UYRB Secretariat keeping in view the above decisions."

b) He also cited the Draft Agreement of 1994 on Renuka Dam, which provided that NCT of Delhi shall bear the full cost and provide necessary funds for the construction of the Dam initially of Himachal Pradesh and the regulation of releases from Renuka Dam would be carried out by the UYRB to meet the drinking water needs of Delhi. This arrangement would be only until other storages were created at which stage releases from Renuka shall be carried out keeping in view the overall allocation of Yamuna water as per MoU of 12th May, 1994 between the basin States.

   Member from NCT of Delhi further stated that in view of the above mentioned points, they were not agreeable to sharing of the cost by other co-basin States and would share entire cost of the drinking water supply component of the project. He further stated that the water stored in Renuka Dam should be

provided initially to NCT of Delhi to meet their drinking water needs. He further stated that if the agreement / draft agreement of 1994 was not valid, then an agreement would need to be made on the lines of the agreement of 1994.

Representatives of Haryana, disagreeing with the view of NCT of Delhi, stated that water was also required by them for meeting drinking water needs of the areas along the river Yamuna in Upper Yamuna basin in Haryana as well as their irrigation needs and therefore, would share the water from the project and as such, a fresh agreement needed to be made on the project accordingly. He further stated that the quality of return flow of water into river Yamuna by NCT of Delhi was very poor and was not at all meeting the standards prescribed by CPCB.

On the issue regarding quality of return flow of water raised by the representative of Haryana, Member from NCT of Delhi clarified that the work regarding treatment of sewage of Delhi had already been taken up by the Government of NCT of Delhi in a time bound manner and by the time Renuka project would come up, the effluent/return flow from Delhi would be meeting the standards prescribed by CPCB.

Representative of Uttar Pradesh stated that they also required water for meeting drinking water needs of the areas along the river Yamuna in Upper Yamuna basin in Uttar Pradesh and would share the cost as well as water from the project in proportion to the allocation of water to Uttar Pradesh as per the MoU of May, 1994. He further stated that the payment of Rs. 200 crore made by NCT of Delhi to Himachal Pradesh could be adjusted against the share of Delhi to the project. He further stated that polluted water should not be discharged into river Yamuna by NCT of Delhi.

Representative of Himachal Pradesh stated that they also needed their share of water from the project for meeting their drinking water needs. He further stated that the State had no objection, if the project was funded by all the States.

Member from NCT of Delhi expressed the view that the issue of sharing of costs and benefits from the project may be referred to the Steering Committee.

Kishau Lakhwar-Vyasi Projects

The Chairman requested Uttarakhand to indicate the latest status of implementation of Kishau and Lakhwar-Vyasi projects. Representative of Uttarakhand / THDC stated that a cost estimate for preparing revised DPR for Kishau project had recently been submitted to Ministry of Power and permission for going ahead with the updation of DPR had also been sought from them, which was awaited. He further stated that one & a half year would be required for completing the DPR. Representative of Uttarakhand stated that the State was also making all out efforts to implement Lakhwar-Vyasi project at the earliest.

Regarding signing of a MoU between Governments of Himachal Pradesh & Uttarakhand and THDC for preparation of revised DPR for Kishau Project, representative of Himachal Pradesh stated that the decision on the same was yet to be taken by the Government of Himachal Pradesh, considering the issues related to submergence in the State.

Representatives of Haryana, Uttar Pradesh and Rajasthan stated that they required share of 'water' & 'power' benefits from these projects in proportion to the allocation of water to them as per the MoU of May, 1994. Representative of Himachal Pradesh stated that they required their share of water from Kishau Project as per allocation in the MoU of May, 1994 and also a share of power from Kishau Project.

Representative of Rajasthan stated that there should be agreements on all the three projects at the same time so that sharing of total power from the three projects by the state could be taken care of.

Representative of Haryana suggested that a Management Board on the pattern of Bhakra Beas Management Board should be set up for the three projects.

Summing-up

All the basin States were in agreement for the construction of Renuka Project on priority for taking up Kishau and Lakhwar-Vyasi projects at the earliest so that the benefits from the projects get started. Since there was still no consensus on sharing of costs and benefits of the three projects, it was decided to refer the matter to the 'Steering Committee to expedite the Works on Renuka, Kishau Lakhwar-Vyasi projects in Upper reaches of River Yamuna'.

(Action: UYRB, H.P. & Uttarakhand)

Maintenance of full pond level at Wazirabad

The Member Secretary appraised that as a follow-up action on the decisions of the meeting taken by Chairman, Central Water Commission with the Basin States held on 27th March, 2008, as per the directions of the Hon'ble Supreme Court in its Order dated 23rd January, 2008,the matter was discussed during the last meeting of the Board also held on 27th March, 2008. During the last meeting of the Board, Haryana stated that the domestic water requirement for Delhi should be assessed and Delhi Jal Board had stated that the distribution of Yamuna waters to Delhi should be reckoned at Delhi/Wazirabad instead of that at Tajewala and, therefore, Delhi had asked for the review of their entitlement of Yamuna waters by the Board. It was decided therein that Delhi Jal Board would submit their domestic water requirement to UYRB, which had since been received by the UYRB and the same were circulated to all the members of the Board as a part of the agenda notes.

Member from NCT of Delhi stated that the water requirement of domestic needs had been considered as 172 litres per capita per day (lpcd) as per Manual on Water Supply and Treatment (1999) published by Central Public Health and Environmental Engineering Organisation (CPHEEO) and the total requirement of water for Delhi had been worked out as 274 lpcd (60 gallons per capita per day) considering other requirements. On this basis, the present demand of NCT of Delhi had been worked out to be 1020 million gallons per day (MGD) and the demand for the year 2011 and 2021 had been estimated as 1140 MGD and 1380 MGD respectively as per Master Plan for Delhi – Year 2021 which had been accepted by the Ministry of Urban Development, Government of India and was notified in the Gazette of India in February, 2007.

Representative of Haryana stated that the same norms as for NCT of Delhi should be adopted for the whole National Capital Region (Urban & Rural both) for assessing the domestic water requirements.

Representative of Uttar Pradesh also stated that the per capita demand of water for Uttar Pradesh should be the same as for NCT of Delhi while assessing the domestic water requirements.

The Member Secretary clarified that the norms for domestic water needs were required to be followed for urban & rural areas as prescribed in the "Manual on Water Supply and Treatment" published by Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development, which were already appended with the agenda notes.

Member from NCT of Delhi stated that in the MoU of 12th May, 1994, the point of withdrawal for any basin State had not been decided and the Basin States, such as Haryana, Uttar Pradesh and Rajasthan were distributed water as per their convenience. Therefore, distribution of Yamuna water to Delhi should be reckoned at Delhi / Wazirabad. He further stated that by implication, it needed to be clarified that enroute losses were not attributable to Delhi, and in fact were attributable to the common pool.

Representative of Haryana and Uttar Pradesh stated that the share of Yamuna water by the basin States was already being received either from Tajewala or from Okhla and, therefore, the distribution of water to the basin States was made by UYRB at Tajewala and Okhla. They opposed the preposition made by NCT of Delhi for distribution of Yamuna water to Delhi from Wazirabad instead of Tajewala as this would involve new issues.

After deliberations, it was decided to maintain the status-quo for the time being.

C) APPOINTED BY SUPREME COURT FOR MAINTENANCE MUNA

Yamuna is the non-availability of the minimum desirable flow in the ated by non-availability of minimum flow and to suggest remedial e under the Chairmanship of Member (Environment), Planning '98. The Chief Secretaries of Delhi, Haryana, Himachal Pradesh, s Committee. The Committee is required to carry out the following

um flow in the river Yamuna to facilitate restoration of the desired

ort-term and long-term) for maintaining the minimum flow in the river.

as had four meetings and suggested a number of measures to be asis in order to maintain a minimum flow of 10 cumecs in river . The measures suggested are as under:-

structing 15 Sewage treatment plants including two under Yamuna ent Plants (STPs) under construction in Delhi are expected to be IPC directed that the work on construction of STPs needs to be slippage in their budget. Immediate steps may be taken by the Delhi ent plants are utilised to their full capacity and they operate according

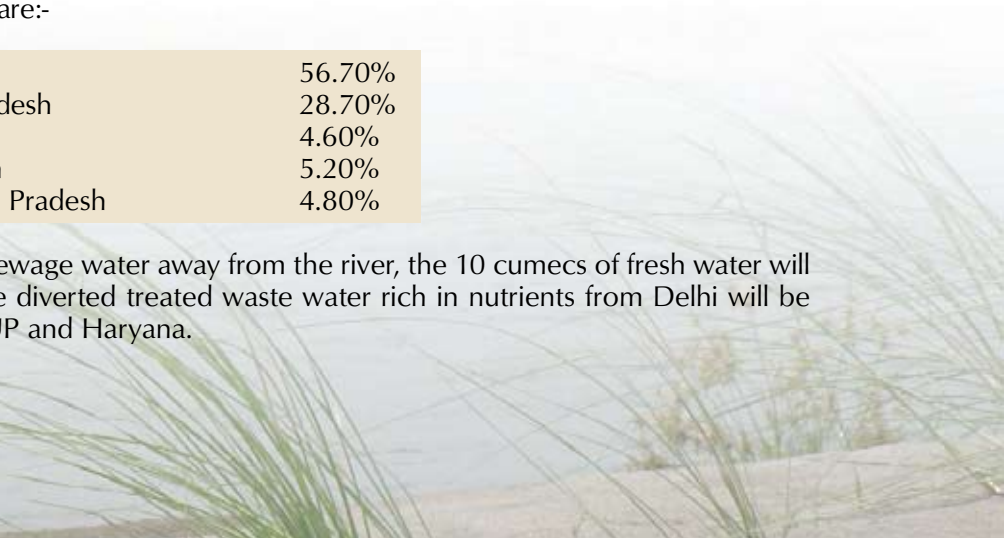
stry of Environment and Forests, treated water is to be used for ased in the river as the river is already suffering for want of dilution plore the possibility of using the treated waste water from different n purposes in a decentralised manner. As per the decision of HPC, sue of exchange of treated sewage with fresh water being presently al areas of Delhi. Delhi may give treated water from their existing le by the user farmers of Delhi and in lieu thereof, Haryana should oi water treatment plant.

for Delhi which runs for about 132 kms is heavily silted up and a first priority, Delhi should repair and rehabilitate this sewerage partly be tried through a soft loan from OECF, Japan under Yamuna

of 10 cumecs the riparian states are asked to provide fresh water in of sharing of Yamuna Water among these states. Accordingly, the are:-

	56.70%
desh	28.70%
	4.60%
	5.20%
Pradesh	4.80%

ewage water away from the river, the 10 cumecs of fresh water will e diverted treated waste water rich in nutrients from Delhi will be JP and Haryana.



e) Measures should be taken in the riparian states to improve the wate
its uses. This will be an important factor both in short-term and in th
system. Economy in water use is particularly recommended for De
f) From the experience it is found that the conventional systems of sev
affordable in developing countries like India and, therefore, it is ne
wherever possible. Government of Delhi may explore the possibilit
city. For this purpose, Delhi Government may carry out survey an
land could be made available for 5-6 eco-parks. Since the land along
may come up belong to DDA, they may be requested to take up su
g) Delhi, Haryana and CPCB to take necessary steps for –
a) expediting construction of CETPs; and
b) monitoring of water quality at various places as directed by the C

Long-term Measures

i) Under the long-term measures, early completion of the Renuka Dam
UP was found necessary. The project report of the Renuka Dam h
Commission and was likely to be cleared subject to the clearance of
(MOEF), the appaisal of which should also include the requirement
river Yamuna. HPC has directed Central Water Commission to pose th
from all environmental angles including the maintenance of minim
ii) The possibility of releasing water in river Yamuna at Tajewala from
examined and taken as an alternative for maintaining the minimum
iii) The completion of Satluj Yamuna Link, which is already 95% com
could greatly help in addressing most of the problems confron
maintenance of minimum flow in the river Yamuna. Due to non-com
quantity of water flows down to the neighbouring country on one ha
in several areas of Punjab on the other. Necessary directions to the C
HPC to take necessary steps to complete this project as early as po
iv) Under the National Perspective Plan, two links viz., Tajewala from
Canal have been proposed under Himalayan Rivers Developmen
Authority has been assigned with the responsibility to survey, inve
such proposed links. Since these proposed links could augment th
preparation of their feasibility reports should be expedited.
v) It is necessary to limit the extent of fresh water usage in major cities b
reverse migration of people from urban to semi-urban and rural are

Guidelines on Water Quality Monitoring Strategy under National Riv

The water quality monitoring (WQM) strategy for river Ganga was stip
This WQM programme has been reviewed by Expert Groups from time
May, 1999, the guidelines on WQM were revised by an Expert Group h
guidelines which shall have a three pronged strategy are as follows:

1. **For Rivers under National River Conservation Plan, where no p**
contemplated or initiated or where projects are not yet proposed
may rely on CPCB/SPCBs data for GEMS and MINARS.
2. **For rivers where proposals for pollution abatement works are being**

3. Monitoring strategy for towns/rivers where sewage treatment plants are nearly completed, completed or commissioned and operational:–

a) In addition to the surface monitoring, STP performance monitoring may be carried out once a month and data compared with that of the implementing agency.
b) The monitoring of drain/outfall may be closed.
c) Once a year, a sanitary survey including the characterisation of waste waters must be done.

4. The water quality monitoring for towns added as per the orders of the Hon'ble Supreme court may be monitored seasonally.

5. Site specific research studies should be taken up by NRCD.

6. The other recommendations given by the experts were as under:

a) The frequency of monitoring (except in cases where core activities are not undertaken) shall be once a month.
b) The parameters to be monitored should be restricted to core parameters and site specific heavy metals on monthly basis.
c) Once a year all the 42 parameters may be monitored.
d) The number of monitoring stations awarded to an institution should not be less than four, preferably.
e) Mid-course corrections i.e. review of water quality monitoring must be carried out at least once a year.
f) Analytical Quality Control on the participating laboratories must be carried out once a year. Random checks may be done by NRCD or by experts nominated by NRCD.
g) NRCD should organise training programmes on water quality monitoring, PFR preparations (where needed) and treatment ??technologies more frequently.

Members of the Expert Group on Water Quality Monitoring Strategy were:

1	Prof. J M Dave	Chairman
2	Prof. I C Aggarwal	Member
3	Prof. R P Mathur	Member
4	Prof. Halappa Gowda	Member
5	Prof. R H Siddiqi	Member
6	Dr. R C Trivedi	Member
7	Shri M C Chadha, Director, CWC	Member
8	Shri K Mohan, Adv., NRCD	Member
9	Dr. (Mrs) R Dalwani	Member Secretary

APPENDIX 6

THE WATER QUALITY ASSESSMENT AUTHORITY, ITS FUNCTIONS AND PRESENT STATUS.

The Water Quality is being monitored by several agencies in the country. The Central Water Commission and Surface Water Agencies in respective states while developing water resources through various projects mainly concerned with the requirements for irrigation and drinking water in terms of quantity and to some extent quality. The Central Ground Water Board (CGWB) and respective State Ground Water Agencies develop Ground Water resources depending upon the recharge potential with the similar objective. The Central Pollution Control Board and its State counter part are mainly concerned with the monitoring of water quality deterioration and responsible for prevention and control of pollution under Water Act, 1974 and Environment (Protection) Act, 1986. The National River Conservation Directorate (NRCD) under this Ministry also monitors the Water Quality to evaluate the implementation of pollution abatement schemes for river conservation. Network of water quality monitoring stations frequency and parameters monitored are available with the Authority**.**

In view of the multiplicity of agencies involved in water quality management in the country with no virtual coordination among them, the problem of pollution of national water resources has become the matter of serious concern. To circumvent the situation, the Ministry of Environment and Forests has c onstituted a Water Quality Assessment Authority (WQAA) with effect from 29th May, 2001 through a Gazette Notification dated 22nd June,2001.

The Authority is empowered to exercise the powers under section 5 of the Environment (Protection) Act, 1986 for issuing directions and for taking measures with respect to matters referred to in clauses (ix), (xi), (xii) and (xiii) of subsection 2 of section 3 of the Environment (Protection) Act, 1986.

The mandate of this Authority is to direct agencies to standardize water quality monitoring methods, ensure proper treatment of wastewater to restore the water quality of surface and ground waters, take up R&D activity related to water quality management and promote recycling and reuse of treated wastewater.

The Authority will also direct the concerned agencies to draw up Action Plan for quality improvement in water bodies and monitor and review implementation of schemes launched including optimum water abstraction, maintain minimum discharge in the riverine system. The detailed terms of reference of the Authority is included in the Notification.

The Water Quality Assessment Authority has so far performed the following tasks:

a) Constituted the Expert Group for review of the present Water Quality Monitoring programme forformulating a monitoring protocol. The protocol has been finalized.
b) Constituted the State Level Water Quality Review Committees to review the monitoring practices at the state level and to highlight the important state issues for consideration by the Authority. So far 33 state level committees have been constituted.
c) Co-ordination cell in MoWR has been created for servicing the Authority.

Expert Group

An Expert Group on Water Quality Monitoring System was constituted under Water Quality Assessment Authority with a view to unifying and streamlining the widely varying Water Quality Monitoring Systems being followed at present by various Central and State agencies. Some of the important recommendations of Expert Group for its uniform implementation are:

i. The recommended protocol identifies different types of stations both under surface and Ground water category viz. Baseline, Trend and Trend cum- Surveillance/impact for implementation. This categorization is based on the extent to which the water at site is polluted, the Baseline station being the least polluted

by the human activity. Number of parameters and its frequency for monitoring differs at each type of stations.

ii. There is an urgent need for developing two referral laboratories, one with Central Water Commission and the other with Central Ground Board.

iii. Quality assurance test viz. analytical quality control test 'within laboratory' and 'interlaboratory' must be performed by all laboratories for ensuring reliability in data generation.

WATER QUALITY REVIEW COMMITTEES IN STATES:

So far, Water Quality Review Committees are constituted in 33 States/UTs out of 35 States/UTs in the country.

CO-ORDINATION CELL IN MOWR

The co-ordination cell performs the following functions:

1. To work as Secretariat for WQAA meetings.
2. To work as Secretariat for WQ Monitoring Committee.

In the second meeting held on 14th May 2003 the Authority generally accepted and approved the report of the Expert Group, which is being subjected to scrutiny from technical and operational angle before Notification under Environment (Protection) Act, 1986.

Under the Water Quality Assessment Authority various Task Force/Groups have been constituted. These are:

1. A Water Quality Monitoring Committee has been constituted under the Chairmanship of Additional Secretary and Project Director, Ministry of Environment and Forests. This Committee assists the WQAA in its functions.
2. A Task Force chaired by the Chairman, CPCB has been constituted to deal with matter relating to coordination, use and dissemination of data, review of water quality monitoring network, accreditation of water quality laboratories. The Task Force has submitted its report.
3. A Working Group has been constituted with Member, Central Water Commission (CWC) as a Chairman. **This group deals with issues relating to minimum flows in rivers.**

APPENDIX 7

SUGGESTIONS BY *YAMUNA JIYE ABHIYAAN* (10TH September, 2007) IN RESPONSE TO HON'BLE LT. GOVERNOR, NCTD ASKING THE CITIZENS TO SUGGEST STUDIES FOR THE RIVER

RIVER ECOSYSTEMS

Rivers are not merely channels that transport water; they are complex ecological systems which interact with their drainage basins collecting from them water, nutrients and organic matter and redistributing these downstream.

They support large biological diversity, support the humans and their activities, and provide several services that no other ecosystem can.

The rivers, especially in tropical and monsoon driven countries like India are dynamic, three dimensional systems dependent upon longitudinal, lateral and vertical transfers of water, material, energy and biota.

The structure and functions of river ecosystems are determined by following inter-linked and delicately integrated five elements:

1) The physical character (Terrain, location etc)
2) Water quantity
3) Water quality
4) Condition of the riparian zone and floodplain
5) Diversity and population of plants and animals living in the stream.

Change in any one of the above is bound to impact the other.

River management, conservation or restoration must ensure that all the five components are taken into consideration together in an integrated manner.

It is fundamentally flawed and wrong to even talk in terms of 'developing' a river which in effect means killing a river slowly but surely!

Indian rivers are not European rivers and vice versa. So one is comparing 'apple' with 'oranges' when one getting over awed with images of 'developed' river fronts in western rivers attempt to ape the same here without realizing its dangerous implications.

For its revival the river needs an ecological restoration plan which highlights the value of its services and not any developmental plan which looks upon floodplain as a wasteland waiting to be developed and reclaimed as real estate / river front.

REVIVING RIVER YAMUNA IN DELHI AS WELL ITS UPSTREAM AND ITS DOWN STREAM

First and fore most this river needs the following two urgent steps to be taken by the executive:

a) **It needs its own water flow**
The 1994 MoU and Supreme Court order of 1999 for maintaining minimum flow in the river till Okhla barrage between riparian states (UA, UP, HP, Haryana, Rajasthan and Delhi) needs to be implemented with a sense of urgency and purpose.

b) **An immediate clamping down of a stay and moratorium on any ongoing or planned construction** in Zone O (including part Zone P) in Delhi so that any additional part of the river bed is not lost any more to 'developmental' pressures led by vested interests.

Studies that this river demands for its complete understanding:

Nature	Title	Rationale	Remarks
Standard Studies	*Hydrology of the river including contribution of drains to it*	The water, its source, quantity, quality and its dynamics is the basic element that defines any river.	Many of these exist in some form and only need to be updated or refined
	Geology of the river including underground formations	A river is a three dimensional entity and hence to understand it fully one needs to trace its geological origins, changes over time and trends as they are perceptible at present.	
	Seismic peculiarity of the river	River Yamuna bed in and upstream of Delhi being one of the most susceptible regions due to unstable substrata in the event of an earthquake (located in Zone IV)	
	River as source of annual recharge of ground water	River Yamuna in Delhi and upstream is a major source of ground water needed and extracted for various uses including domestic and agricultural consumption	
	Cultural and economic role of the river	The river Yamuna is an integral part of Indian mythology, culture and finds a prominent mention in our national anthem. It has played and continues to play an important role in the lives of millions of farmers whose livelihood is dependent on its flood plains	
	Past and present status of aquatic and riparian life forms (flora and fauna) in the river and its flood plain	River Yamuna like any other river has been a habitat to myriad life forms since ages and it is only now that it has become almost a lifeless water body due to over whelming pollution of its waters.	
	Lost or converted tributaries of river Yamuna in and around Delhi	Not many are aware that there were perennial rivulets (*Sahibi* and *Kushak* within Delhi which used to originate from the Ridge and beyond and feed the river proper	
	Past and present water bodies within the city and their role vis a vis the river Yamuna	Work done by several NGOs notably the Tapas has identified a large number of water bodies in the city with important links with the river	
Special Studies			Many of these are new but highly relevant and urgent
	State and rate of siltation of the river and impact on future floods	The river bed in the city has been greatly silted up and resultantly makes all previous studies done on it redundant and outdated in terms of their outcomes	
	Status, condition and land use change of the flood plains between the embankments (Yamuna Pushta in east and Ring Road in west) in Zone O	This is one of the most important studies for understanding and planning for the future of Zone O (river Yamuna) in the city	

(contd...)

(contd...)

Nature	Title	Rationale	Remarks
	Bridge cum roads over the river and their impact on the river's hydrology	Most unfortunately the fact is that none of the so called bridges over the river in the 22 km of the stretch in Delhi with the sole exception of Old railway cum road bridge is a true bridge which allows flood waters to flow down stream with ease. All new bridges are only raised roads which prove an impediment over water flow down stream and hence dangerous in the event of any devastating flood	
	Constructions in the river bed and their impacts on the river's basic role of safe passage of flood waters, spread of flood waters and recharge of ground water	Self explanatory	
	Sewerage system and the abuse of storm water drains in the city	It is most Unfortunate that most storm water drains in the city have been converted into sewage drains and even at places been encroached upon by constructions including those by the Delhi Metro (Mayur Vihar phase I) hence lost their original purpose.	
	Areas in the city which are specially prone to flooding and their mitigation measures if any	This is most important from planning for disaster prevention and management in the city	
	Traditional uses of the flood plains and their socio-economics	This is self explanatory. Majority of city's needs of vegetables, fruits and flowers is and can be met from seasonal farming (organic) in the flood plain	
	Legal situation and tenure cum ownership pattern and GIS mapping of the river flood plains and state's trusteeship role in the Delhi stretch of the river	It is a fact that for lack of any legislative regime there is no single easily identifiable agency or authority that owns and manages the river flood plains which has become the basis of all the ills facing the river flood plains all over	
	Role of flood plain as an 'open' space, regulator of thermal currents in the city and as a welcome buffer of human habitations on either side of the river in the city	Cities all over the world more so the megapolises like Delhi which have become huge 'heat sinks' in themselves are today starved of and looking for large open spaces and buffers to breath and rejuvenate themselves like living beings	
	Climate change and its likely impact on the river in future	This is becoming one of the most important reasons for least human intervention in natural systems like rivers. We need to understand it as best as possible before doing any kind of intervention in the flood plain.	

APPENDIX 8

LEARNING FROM THE YAMUNA FLOODS OF AUGUST, 2008

– Report dated 21st August, 2008 by *Yamuna Jiye Abhiyaan*

Background

Delhi has a history of floods in river Yamuna.

Regular flood monitoring in river Yamuna in Delhi started only in 1958 after the construction of the Yamuna Pushta (Left Marginal Bund) and the 'danger level' was then fixed at the Old Railway cum Road Bridge at 672 ft which on conversion to the metric system became 204.83 m. The 'warning level' has been fixed at 204 m.

Prior to 1958, although old timers recall that it used to flood almost every year during the monsoons, floods of 1924 and 1947 in the city is notable for the spread and damage.

Since then the notable flood years in Delhi have been **1967** (206.19 m on 29 July 67); **1975** (206.00 m on 12 September 75); **1978** (207.49 m on 6 September 78); 1988 (206.92 m on 27 September 88); **1995** (206.93 m on 8 September 88) and **1998** (206.18 m on 21 October 98).

The flood in 1978 is considered as the highest flood in recent memory and hence is assumed to be one in 100 yr floods. Floods in rivers are generally known to have a 10 yr, 25 yr, 50 yr and 100 yr cycle. Not many people unfortunately appreciate the fact that floods are as much a natural phenomenon during monsoon months (rainy season) as are high or low ambient temperatures during summer and winter months respectively.

From the above it becomes clear that till 1998 there has been an almost decadal (Once in every ten years) incidence of major (high) flood in river Yamuna in Delhi, when the flood level has touched or crossed the 206 m mark at the Old railway Bridge in the city. And the fact is that the city remains vulnerable to floods between the months of late July till October, with the most major (high) floods reported in the month of September.

How does it flood in river Yamuna in Delhi?

Not many know or appreciate the fact that the flood and subsequent damage there from in Delhi, post 1958 is as much man-made as from natural causes. 250 km upstream of Delhi is a barrage over the river at Tajewala (now rebuilt at Hathnikund) at a place where the river enters the plains from the hills. Built and managed by Haryana, two canals namely the Western Yamuna Canal and the Eastern Yamuna Canal emerge from the Barrage and diverts almost the entire non-monsoonal flow in the river towards Haryana and UP respectively.

But during the monsoon months when the water inflow into the barrage due to heavy rains in the river's catchment areas in Uttarakhand and Himachal Pradesh, over strains the holding capacity of the barrage, excess water is released into the river which reaches Delhi and its upstream and downstream in form of sudden floods. It is estimated that it takes anything between 36 to 48 hours for the water released from Hathnikund to reach Delhi.

So, if the floods are man made then why are there natural cycles of 10, 25, 50 and 100 years between successive high floods in Delhi?

This is because the floods depend on the amount of water that gets released at Hathnikund barrage and the amount of this water depends on the intensity and duration of the rainfall in the river's catchment which ofcourse has a natural cycle as above. The amount of water in the river also depends on the snow melt that

starts to take place from late August onwards and whose volume also depends upon the ambient temperatures and the amount of snow fall that had taken place in the higher reaches during the preceding winter months. The peaking of snow fall and rainfall in the catchment also has some kind of a natural cycle that combines to produce high floods.

Records tell us that discharges of the order of 7 lac cusecs (cubic ft per second) in 1978 (on 3.9.78); 5.77 lacs cusecs in 1988 (on 25.9.88) and 5.36 lacs cusecs in 1995 (on 5.9.95) from Tajewala (since reconstructed at Hathnikund) barrage produced the highest floods in recent times in Delhi.

FLOODS OF AUGUST, 2008

The year 2008 is ten years from 1998.

It snowed heavily during the winter months of 2007 with snow fall in western Himalayas stretching up till the month of March 2008 in some areas.

The summer in north India and in Delhi in particular was unusually subdued in 2008 with sporadic rain fall happening throughout the months of May and June, these being the peak summer months. And then there was early onset of monsoon in the city. North India and in particular the Yamuna catchment regions of Uttarakhand and Himachal Pradesh received heavy monsoon rains.

Clearly all climatic conditions were favourable to it being at least a decadal flood year during 2008 in river Yamuna.

So, it came as no surprise when the water in the river started to rise in the city from early August and flood warning was posted in the city on 16 and 17 August 2008. The peak of 205.71 m was reached on 20 August 2008 by which time deep flood waters could be seen in areas immediately downstream of the Wazirabad Barrage in east bank with flood waters gradually spreading over the entire available flood plain between the ring road in the west and the Yamuna Pushta (Left Marginal Bund) in the east. While the residents of Jhuggi Jhompris all over the flood plain relocated themselves away from menacing flood waters, the villagers of Usmanpur, Garhi Mendu and Bela estate were specially impacted as flood waters entered their houses and submerged standing crops. Even the residents of Mukherjee nagar were impacted as a result of backflow in the drain which had been closed by the authorities to prevent the flood waters entering the city from the several drains falling from the city into the river.

But what of course is surprising is the spread and damage experienced in the flood plain from a rather 'medium level' flood of 205.71 m as against all previous 'high' floods of 206 m and above.

Clearly the observations made in the NEERI 2005 report that *"the river has lost its carrying capacity and hence its remaining flood plains should not be compromised in any manner"* proved to be prophetic.

Allow us to add that all the impugned structures in the river bed (which could result in turning a medium level flood into high floods in terms of damage there from) like the Shastri Park Metro (DMRC) Complex, Akshardham, Yamuna Metro Complex (under construction), CW Games Village (under construction), Delhi Transco Ltd, and pseudo bridges like DND Flyway, Gita Colony bridge cum road etc have come up only after 1998 and hence it is only this flood which can and will show their impact on the flood situation in the city.

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