No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL RIVER CONSERVATION DIRECTORATE (NRCD)
MINISTRY OF ENVIRONMENT AND FORESTS

THE STUDY
ON
WATER QUALITY MANAGEMENT PLAN
FOR
GANGA RIVER
IN
THE REPUBLIC OF INDIA

FINAL REPORT

VOLUME III MASTER PLAN FOR PROJECT CITIES

VOLUME III-5 NON-SEWERAGE SCHEME
VOLUME III-6 SOCIAL CONSIDERATION AND HYGIENE EDUCATION PLAN
VOLUME III-7 RECOMMENDATIONS ON SOLID WASTE MANAGEMENT
VOLUME III-8 GIS DATA MANAGEMENT
VOLUME III-9 INSTITUTIONAL DEVELOPMENT PROGRAMME
VOLUME III-10 FINANCIAL AND ECONOMIC EVALUATION

JULY 2005

TOKYO ENGINEERING CONSULTANTS CO., LTD.
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Foreign Exchange Rate:

Master Plan
US$ 1 = JPY 109.09
US$ 1 = Rs 45.33
(As of March 2004)

Feasibility Study
US$ 1 = JPY 103.66
US$ 1 = Rs 43.70
(As of February 2005)

FINAL REPORT
ON
WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER
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ABBREVIATIONS

BOD	Biochemical Oxygen Demand
CBO	Community-based organization
CTC	Community Toilet Complex
DA	Development Authority
DUDA	District Urban Development Agency
EIRR	Economic Internal Rate of return
EWS	Economically weaker sections
FIRR	Financial Internal rate of return
GAP	Ganga Action Plan
HH	Household
HUDCO	Housing and Urban Development Corporation
IHL	Individual Household Latrine
JBIC	Japan Bank for International Cooperation
KSDF	Kanpur Slum Dwellers Organization
LCS	Low Cost Sanitation
LIG	Low income groups
NEDA	Non-Conventional Energy Development Agency
NGO	Non-government organisation
NN	Nagar Nigam
O&M	Operation and maintenance
PIA	Project Implementation Agency
STP	Sewage Treatment Plant
ULB	Urban Local Body
YAP	Yamuna Action Plan

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

The urban sources of river pollution can be classified into point and non-point as follows;

Point sources:	(i)	Untreated domestic sewage
	(ii)	Untreated industrial wastewater
Non-point sources:	(i)	Open defecation and urination from non-toilet household
	(ii)	In-river activities (bathing, washing cattle in the river (cattle wallowing), washing of clothes, throwing of half-burnt/un-burnt dead bodies and offering of flowers, fruits etc into the river)

The main reasons for deterioration of river water quality are point sources of discharge of untreated domestic sewage at the urban cities/towns located along the river banks and untreated industrial effluents. Another main source is runoff from open defecation classified in non-point source.

While the discharge of point pollution load is main reason for deterioration of the river water quality, the pollution contribution from in-river activities is rather insignificant. However, these factors directly and indirectly influence hygienic and aesthetics conditions of the river front, especially along the bathing stretches. Dumping of solid waste in the river and ghats also influence the aesthetic condition.

The measures to tackle the urban non-point sources were identified and interventions were proposed to ameliorate the situation in River Action Plans. Schemes in this category have been called Non-core schemes or Non-sewerage schemes.

The major impacts of pollution source and its countermeasures are summarized in Table 1.1. The key objectives of non-sewerage schemes of in-river activities are to maintain a good hygienic and aesthetic condition of the river along the bathing stretches rather than to reduce pollution load in the river. While low cost sanitation of non-sewerage scheme aimed at reducing of pollution load and improving sanitary condition of the cities through tackling open defecation and urination.

In this volume of the report, non-sewerage schemes including low cost sanitation and in-river or ghat-area activities, which are marked in a bold frame in Table 1.1, are discussed and appropriate plans and /or programs to improve the exiting conditions are proposed together with recommendations. Solid waste management and public participation and public awareness (PP/PA) are discussed in separate volumes, Volume III-7 and Volume III-6, respectively.

Table 1.1 Urban Pollution Sources, Cause of Pollution and Major Impacts

Urban pollution sources	Scheme	Type of source	Magnitude of pollution load	Place	Cause of river pollution	Major impact
Household connecting sewer	Sewerage	Point	Heavy	City	Discharge to nala and river through sewer without treatment	• **Deterioration of river water quality** • Unsanitary condition
Household connecting drain or nalla	Sewerage	Point	Heavy	City	Direct discharge of domestic wastewater to nala and river	• **Deterioration of river water quality** • Unsanitary condition
Open defecation and urination	Non-sewerage	Non-point	Middle	City	Open defecation on the bank and in river and nala	• **Deterioration of river water quality** • Unsanitary condition
Bathing at ghat	Non-sewerage	Non-point	Insignificant	Ghat only	Offering (Open urination and defecation)	• None • (Unhygienic condition)
Washing cloth at traditional dobhi ghat	Non-sewerage	Non-point	Insignificant	Ghat only	Soap and detergent and some organic pollution from dirty cloth	• Unhygienic condition
Cremation at ghat	Non-sewerage	Non-point	Insignificant	Ghat only	Throwing un-burnt and half burnt body in river, using huge amount of woods	• Unhygienic condition • Loss of forests
Cattle wallowing at gaht	Non-sewerage	Non-point	Insignificant	Ghat only	Cattle wallowing and caw dung	• Unhygienic condition • Disturbance of bathing
Solid waste	Non-sewerage	Non-point	Insignificant	City	Free damping at ghat Free damping in nala and sewer	• Unaesthetic conditions • Choking nala and sewer
Industrial effluent	Industrial pollution control	Point	Heavy to light depending on industrial profile	City	Discharge to nala and river through sewer Direct discharge to nala and river	• River pollution • Unsanitary condition

CHAPTER 2

LOW COST SANITATION

CHAPTER 2 LOW COST SANITATION

2.1 INTRODUCTION

Open defecation and urination is rampant in many cities in India, especially in slum area and along the bank of rivers and nalas, which is the main cause of creation of unsanitary and unhygienic living conditions, river water pollution and poor river front environment.

2.1.1 Low Cost Sanitation (LCS)

There is no clear definition of low cost sanitation. The most general definition of low cost sanitation may be the affordable sanitation system for low-income groups and poor people. Some of the major sanitation systems have been summarized in Table 2.1. Systems that are less expensive than conventional systems may be usually called low cost sanitation. Therefore, low cost sewerage system such as settled sewer and simplified sewer could also be categorized under low cost sanitation. These systems usually require an expensive treatment plant at the end, making it at times unaffordable for the low-income families. As for the on-site system, septic tank is expensive sanitation option, making it unaffordable for poor people, though pit latrine and dry latrine may be categorized under low cost sanitation but they are extremely unhygienic and unsanitary. Pour-flush toilet is low cost and more sanitary option. Community toilet complex (CTC) or common public toilets may be the least cost option.

Table 2.1 Sanitation System

Type	Sanitation
Off-site	• Conventional sewerage • Settled sewer or shallow sewerage • Simplified or condominial sewerage
On-site	• Pour-flush toilets, water borne latrine with/without septic tank • Pit latrine, dry latrine • Two-pit flush latrine • Compost toilet
Others	• Community toilet complex with septic tank or sewer connection

2.1.2 Urban Sanitation Facility in India

The Survey in 1991 (Table 2.2) shows that approximately 36 % of the households in urban area and as many as 91 % in rural area do not have adequate toilet facilities in India. The 54th round of National Sampling Survey (NSS) in 1999/2000 reported that 35% use septic tank, and 22 % is covered by the sewerage system in urban areas. This indicates that as many as 43 % of households either had no latrine or no connection to a septic tank or sewerage, namely, nearly half of households in urban area do not have any wastewater disposal facility. Most of the people from these households defecate in open space and some rely on community toilet complex.

The 1991 and 2000 figures indicate that households without any wastewater disposal facility have increased by 7 %, caused by rapid increase in urban population, resulting in cropping up of slums and squatters in urban areas.

Table 2.2 Housing Units by Toilet Installation by Rural and Urban Cities in 1991

	Total occupied housing unit	With toilet of any type	Without toilet of any type	With toilet of any type	Without toilet of any type
Total	151,111,383	35,819,780	115,291,603	23.7 %	76.3 %
Urban	39,523,184	25,236,449	14,286,735	63.9 %	36.1 %
Rural	111,588,199	10,583,331	101,004,86	9.5 %	90.5 %

Source: Ministry of Agriculture, http://www.indiastat.com/

Three types of systems are generally prevalent for disposal of human wastes in urban areas;

- Conventional Sewerage system
- Sanitary water flush latrines with individual disposal systems, like septic tank, leaching cesspool and collection well, in other words, water borne latrine, which is constructed in the houses having water closets and fitted with flushing cistern (or hand flushing).
- Dry type of latrines with manual scavenging i.e. Scavengers manually remove human excreta from house to house.

2.1.3 Low Cost Sanitation Programs

There are several schemes for the promotion of low cost sanitation at the national and local level, in which a number of organizations are involved. Some of the schemes that have been identified are:

- National government program through Housing and Urban Development Corporation (HUDCO)
- River Action Plans
- Scheme of member of parliament quota
- Scheme of local government bodies such as Nagar Nigam

The centrally sponsored scheme of Urban Low Cost Sanitation started in 1980-81 to liberate scavengers. According to an estimate prepared by a Committee constituted by Planning Commission, there were approximately 400,000 scavengers and 5.4 million dry latrines in urban areas in 1989, and the practice of manual scavenging continues in 3,117 towns.

The main objective of the scheme are to convert the existing dry latrines into low cost pour flush latrines and provide alternative employment to the librated scavengers. The scheme of low cost sanitation also includes construction of community toilets.

Low cost sanitation scheme is seen as;

a) An important solution to the dehumanising practice of carrying night-soil, and the legislation prohibiting manual scavenging
b) Strengthening the movement for installation of sanitary latrines in urban areas
c) The appropriate solution where resources do not permit the provision of sewerage system or septic tanks.

The scheme covers all the households, which have dry latrines, and households including those in the slums and squatter colonies having no sanitation facilities.

Under the scheme, HUDCO simultaneously extends loan and subsidies from the Central govt. Subsidy is graded according to economic status, being set at 45 % for economically weaker sections (EWS), 25 % for low income groups (LIG), and nil subsidy for middle and high income groups. Loan is also given for construction of community latrines on ‘pay and use’ principle, shared latrines in slums, housing chawls.

The progress of the scheme as on 15 March 2002 is as follows:

- Scheme sanctioned: 847
- No. of towns covered: 1,317
- Total units sanctioned: 3,553,585
  - Conversion: 1,705,701
  - Construction: 1,847,884
  - Community toilets: 3,966
- No. of units completed : 1,458,274
- No of community toilets completed : 2,982
- No. of schemes in progress
  - Conversion: 105,619
  - Construction: 212,987
  - Community toilets: 185
- Towns declared scavenger free: 387 persons
- Scavengers liberated: 37,430 persons

2.2 LOW COST SANITATION IN RIVER ACTION PLANS

Since the commencement of the centrally sponsored programe on river pollution control in 1985, more than 70 sewage treatment plants have been constructed under the Ganga Action Plan (GAP) and Yamuna Action Plan (YAP). In addition, the programmes also included a component on low-cost sanitation for the urban low income communities as well for the floating population in urban centres. The key objective of this component has been to reduce open defecation and thereby control non-point discharge of waste into the river system. The approach adopted in this component focused on creation of community level sanitation facilities i.e., community toilet complexes and mobilisation of the community in their increased utilisation. In spite of large intervention, it is reported that due to a variety of reasons utilisation of these communal facilities is low. The target population still continues to defecate in open and as a result, the objective to reduce loads on river system has not been achieved.

2.3 SANITATION AND LOW COST SANITATION IN FOUR CITIES

2.3.1 Sanitation Facility

Table 2.3 shows the results of the household survey on toilet installation in the four cities as per the National Census Survey 2001. It shows that 20 - 30 % of the households do not have any toilet facility in their house, which indicates that around about one forth of the population defecate in open space.

Table 2.3 Household by Toilet Installation in 2001

Area	Toilet household	Non-toilet household
Lucknow urban area	73.0%	27.0%
Kanpur urban area	74.1%	25.9%
Allahabad urban area	79.2%	20.8%
Varanasi urban area	79.7%	20.3%

Source: 2001 Census. http://www.indiastat.com/

A detailed breakup of the population as per the existing sanitary conditions has been estimated for Kanpur urban area in Table 2.4. It is observed that 38% of population is covered by the sewerage system, 30.5 % and 8.8 % use septic tank and community toilet complex respectively; the rest of 22.7 %, or about 600,000 inhabitants defecate in open space.

Table 2.4 Toilet and Community Toilet Complex Beneficiary and Estimated Open Defecation Population in Kanpur Urban Area

Sl. No.	Description	Numbers	Benefited Populations (Approximate)	Percentage (%)
(a)	Personal Toilets with Sewers	130,000	650,000	24.7
(b)	Toilets with Septic Tanks	160,000	800,000	30.5
(C)	Community Toilet Complex	240*	231,000	8.8
(d)	Personal Toilets with Sewers in Armapur Cantonment State and IIT.	70,000	350,000	13.3
		Total	2,031,000	77.3
		Total population (Census in 2001)	2,626,918	100
		Estimated open defecation population	595,918	22.7

Note: *The number is different from Table 2.6. This is the number of CTC constructed by Kanpur Nagar Nigam, not including CTC by other organisations.
Source: Estimated from 2001 National Census and data ((a) to (d)) from Kanpur Nagar Nigam

Table 2.5 shows the number of latrines in four study cities. The number of dry latrines is high in Lucknow and Allahabad. No data is available for Varanasi.

Table 2.5 Number of Water Borne and Dry Latrines

Name of town	Number of latrines		
	Water borne or pour flush	Dry	Others
Lucknow	25,502	32,300	0
Kanpur	729*	95*	37
Allahabad	20,139	25,498	10,365
Varanasi	N.A.	N.A.	N.A.

Note: *These numbers look too small.
Source: National Census in 2001

2.3.2 Survey Results of Sanitation and Community Toilet Complex in Study Four Cities

The JICA Study Team carried out the following surveys to identify the existing sanitary conditions in the four cities and the existing facility conditions of CTC. The results of first two surveys are described in Volume V in detail. The results of the surveys are summarized below.

1) Public awareness survey: sample questionnaire survey regarding sanitation to the public (Volume V)
2) Facility user survey: sample questionnaire survey to facility users (Volume V)
3) Facility inventory survey: questionnaire survey for all facilities (Appendix A, Annex 1)
4) Sample facility survey: questionnaire survey for sample facilities: the sample size is about 30 % of all facilities (Appendix A, Annex 2)

(1) Existing Facility

The facility inventory survey identified following community toilet facilities in the four cities in Table 2.6.

Table 2.6 Community Toilet Complex in Four Cities

City	Total number of CTCs	Construction Body	Major O&M body	Closed or locked CTC
Lucknow	143	Lucknow Nagar Nigam, Development Authority, DUDA	NGO contract	2
Kanpur	366	Sulabh Internationa, NGO, NEDA, Kanpur Nagar Nigam, others	NGO contract	17
Allahabad	111	Allahabad Nagar Nigam and DUDA	NGO contract	10
Varanasi	80	Varanasi Nagar Nigam	NGO contract	14

Note: NEDA: Non-Conventional Energy Development Agency
DUDA: District Urban Development Agency
Source: Facility inventory survey, JICA Study Team

(2) Sanitation Facility Availability

The JICA Study Team conducted survey for existing toilet status in the four cities. Table 2.7 shows the survey results of toilet facility of households. All households of high-income group have proper toilet facilities, mostly pour flush toilet. While 36 to 77 % of households of middle and low income groups have adequate toilet facilities. Public toilets are used by 45 % of low-income groups in Varanasi, but in other three cities, utilisation is relatively low. Lucknow has the highest percentage of open defecation, around 46 % for low-income group.

Table 2.7 Toilet Facilities

(%)		Where do you go for toilets?							Type of Toilet (for own toilet)				
		Own toilet	Public toilet	Open field	Rivers	Others	Combination	N	Pour Flash	Kuccha	Bore hole	Others	N
Lucknow	LIG	40.5	5.4	45.9	2.7	0.0	0.0	5.4	90.0	10.0	0.0	0.0	0.0
	MIG	39.5	7.6	29.7	0.5	20.5	0.0	2.2	99.4	0.0	0.6	0.0	0.0
	HIG	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Kanpur	LIG	77.4	14.8	5.2	0.0	0.0	0.9	1.7	60.7	18.0	1.1	1.1	19.1
	MIG	46.8	14.1	31.4	0.0	7.1	0.0	0.6	86.7	1.3	0.7	0.0	11.3
	HIG	100.0	0.0	0.0	0.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	0.0
Allahabad	LIG	43.7	1.6	38.9	15.9	0.0	0.0	0.0	85.5	10.9	0.0	0.0	3.6
	MIG	50.0	17.4	29.9	0.0	2.1	0.0	0.0	97.1	2.2	0.7	0.0	0.0
	HIG	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Varanasi	LIG	35.5	45.2	13.7	4.0	0.0	0.8	0.8	81.8	11.4	2.3	0.0	4.5
	MIG	61.9	0.7	35.4	0.0	2.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	HIG	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0

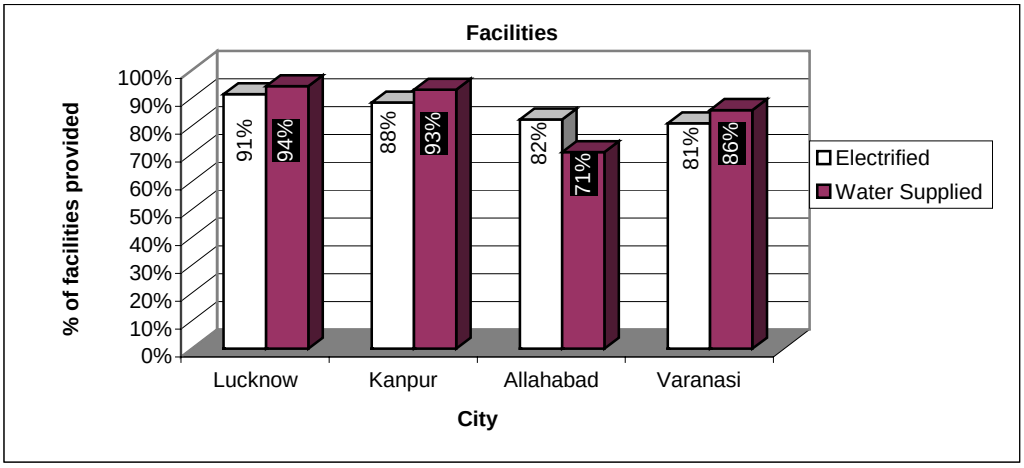
Note: "N" stands for "No Answerer"
"Kuccha" toilet means temporally toilet
Source: Facility user survey, The JICA Study Team

(3) Results of Sample Facility Survey for CTC

The observations and findings for CTC through the sample facility survey are summarized below.

(a) Electricity and Water Supply

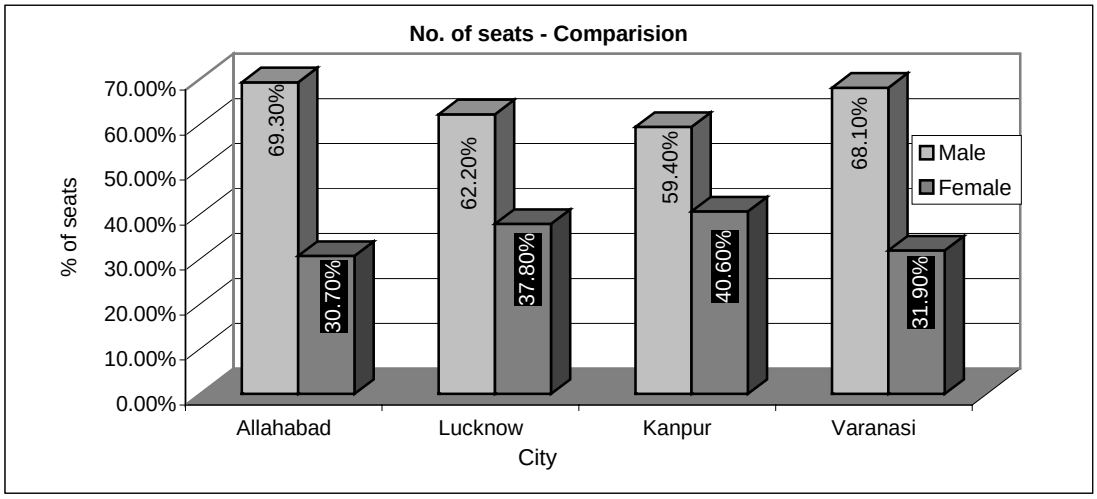
Not all the CTCs facilities are supplied with water and electricity. In Allahabad, water supply situation is worse; about 30% of CTCs are not supplied with water. In Allahabad and Varanasi, electricity supply is worse; about 20 % is not supplied with electricity.



Source: Sample facility survey, JICA Study Team

(b) Average number of seats in CTC

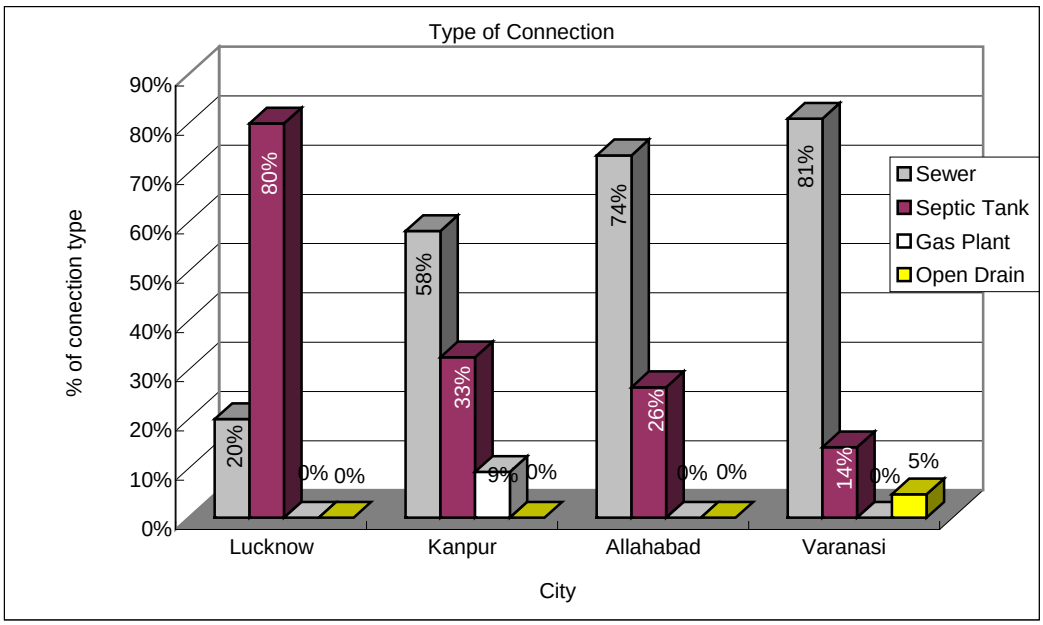
The figure below shows the city wise average number of seats for males and females. It was observed that the seats of public toilet for male are nearly just double in comparison to seat of public toilet for female. In Kanpur the female toilet's seat is more as compared to the other cities (41% of the total number) and the minimum is in Allahabad (31%). While as per comparison of average total number of seats for one toilet complex it was found more for Lucknow & Kanpur i.e. 14.



Source: Sample facility survey, JICA Study Team

(c) Type of connection

Sewer connection with the public toilet is found more in Varanasi (81%) whereas least in Lucknow (20%). Septic tank connection is high in Lucknow while less in Varanasi. Gas plant connection was found only in Kanpur. Similarly open drain connection of the toilet facility was found in Varanasi (5%).



Source: Sample facility survey, JICA Study Team

(d) Fee

The fee charged at the CTC for the four cities is given in Table 2.8. The user fee in Varanasi is highest; 67 % of the CTCs charges Rs. 2 for both male and female. That in Lucknow seems lowest; 70 % of the CTCs charges Rs. 1 for male and free for female. The user fee also affects frequency of users of the complex. With cheaper fee, more people use the CTC. As per the public opinion, family or monthly pass is more preferable for users.

Table 2.8 Fee Categories Charged at Four Cities

Fee Categories	Lucknow	Kanpur	Allahabad	Varanasi
M1F0	69%	37%	0%	0%
M1F1	9%	23%	79%	24%
M1F2	0%	5%	0%	0%
M2F0	6%	5%	0%	0%
M2F1	9%	7%	3%	0%
M2F2	0%	7%	6%	67%
Free	6%	0%	9%	0%
Family Pass	0%	16%	3%	0%
Others	3%	0%	0%	10%

Note:

Fee categories	M1F0	M1F1	M1F2	M2F0	M2F1	M2F2	Free	Family Pass
Clarification of Category	Male- Rs.1 Female - Free	Male- Rs.1 Female - Rs. 1	Male- Rs.1 Female - Rs. 2	Male- Rs.2 Female - Free	Male- Rs.2 Female - Rs. 1	Male- Rs.2 Female - Rs. 2	Male- Free Female - Free	Rs. 25/- to Rs. 40/-

Source: Sample facility survey, JICA Study Team

2.4 ISSUES OF EXISTING CONDITIONS OF CTCS

Existing conditions of CTCs are analysed by the facility user survey. Table 2.9 shows problems of CTCs. The main problem of CTCs is cleanliness, followed by inadequacy of water supply and

electricity.

Table 2.9 Problems of CTCs

(% of the respondents)

	Lucknow	Kanpur	Allahabad	Varanasi
Not clean	64.1	51.1	68.9	38.9
Water supply problems	21.4	17.8	18.0	20.6
Electricity problems	5.1	7.8	8.2	12.0
No problem	5.1	11.1	-	13.1
Others	4.3	12.2	4.9	15.4

Source: Facility user survey, JICA Study Team

Table 2.10 shows reasons why the respondents do not use CTCs. The main reason is the location of CTC, they feel the location is too far from their residence. The demand for toilet facility near the resident area is high. Another main reason is inadequate operation and maintenance (O&M) of the facility and the many feel CTC is dirty.

Table 2.10 Reasons for not using CTCs

	Lucknow	Kanpur	Allahabad	Varanasi
Among the respondent who answered "No" for using CTC				
Too far	25.4 %	41.6 %	35.1 %	20.0 %
Not clean	20.6 %	30.1 %	33.1 %	12.5 %
Among the respondents who go outside field for defecation				
Too far	47.1 %	39.2 %	40.2 %	16.7 %
Not clean	5.9 %	44.3 %	37.0 %	8.3 %

Source: Facility user survey, JICA Study Team

In addition, the facility inventory survey and sample facility survey identify the same problems; poor O&M, damaged facilities (seat, door, wall, roof etc.), dirtiness of toilet and bathroom space, inadequate water and electricity supply. These issues are common in all four cities. The other problems of O&M as follows were identified in the facility survey;

- Due to lack of water supply, bathrooms are not in use
- Some water closet are full of garbage
- Solid waste and cattle in front of the facility
- Some bathrooms are used as store room of caretakers

The higher usage rate per CTC per day is found in Kanpur and Lucknow whereas least in Allahabad as shown in Table 2.11. It is found during the sampling survey that the utilisation level was more where the CTC maintenance and sanitation was proper and less where CTC was found dirty and ill maintained. Water scarcity and electricity problem also affected the number of users. As seen in Table 2.12, the facility furnished with water and electricity has the high usage rate.

Table 2.11 Average Number of Users

	Lucknow	Kanpur	Allahabad	Varanasi
Average number of users per CTC per day	261	275	97	195
Average number of users per seat per day	19	20	9	15
Average seats per CTC	14	14	11	13

Source: Sample facility Survey, JICA Study Team

Table 2.12 Average Number of Users by Furnished Utility

	Lucknow	Allahabad	Varanasi
Water supply and electricity	286	157	194
Water supply only	-	71	150
Electricity only	157	60	144
No water and electricity	164	72	24

Source: Facility Inventory Survey, JICA Study Team

2.5 SLUM SANITATION

Table 2.13 shows the number of slums that were identified by JICA Study Team. Many slums have no toilet facility and some of the slums have CTC. The slum residents without individual nor CTC go outside for defecation, though they understand the open defecation is hazardous for their health and environment. Most of the respondents of the facility user survey think it necessary for public toilets in their area to prevent the river pollution and they are willing to pay for using public toilets once the public toilets to be facilitated. The demand for CTC is very high, especially among the low income group.

Table 2.13 Number of Slums in Four Cities

	Lucknow	Kanpur	Allahabad	Varanasi
Nos. of slum	N.D.	390	185	224

Note: Identified by JICA Study Team
N.D. stands for "No data"

2.6 LESSONS LEARNT FROM EXISTING ACTION PLANS

Since the commencement of the centrally sponsored programme on river pollution control in 1985, Ganga Action Plan (GAP) and Yamuna Action Plan (YAP) were implemented. Under these plans, a component on low cost sanitation for the urban low-income communities as well as floating population in urban centres was conducted. The objective of this component was to reduce open defecation and thereby control non-point discharge of waste in to the river. The approach adopted in this component was community level sanitation facilities, i.e. CTC, and individual household latrines (IHL) on a limited scale.

Community sanitation facilities, CTCs generally suffer from the lack of maintenance and are often, as a result, in a high state of unhygienic conditions and some facilities are not being used. Individual sanitation facilities, IHL are, however, much better. Based on the experience from YAP, GAP and slum improvement projects in other area of India, IHLs under a community led demand driven programme should be promoted wherever IHLs are available and suitable.

2.6.1 Community Toilets Complexes (CTC)

A large number of LCS/CTCs facilities have been created under YAP-I but it has been felt in due course that there is no or very little acceptance of these facilities by people. This aspect is exhibited in the form of low utilisation level of the common facilities and continued practice of open defecation by a large fraction of the target population in low-income communities.

Some of the reasons for underutilisation of CTCs were listed below:

(1) Institutional Aspects

1) Lack of people's involvement in the earlier stage of planning of the project. The facilities were provided irrespective of the level of demand of the community.
2) Non-cooperation of Urban Local Bodies of the towns.
3) Lack of socially motivated O&M operators. Caretakers are mostly come from other area, not from community where CTC locates.
4) Low participation by communities in construction / O&M of CTCs

(2) Technical Aspects

1) Improper site selection like distant location of toilets from the habitation, in-appropriate approach to the toilets, etc.
2) Low quality of O&M of the toilets.
3) Improper supply or unavailability of water and intermittent supply of electricity. (in some CTCs process of installation of tubewells was delayed due to delay in sanction; in areas with electricity shortage, cost of running complexes on DG sets (diesel) is high)

(3) Socio-economical aspects

1) Lack of sensitivity towards religion, gender, age, disability and dignity related issues while designing the toilets.
2) High perceived user charge and unwillingness to pay.
3) Non-willingness of users to pay the fee. Most of the CTCs have seen less number of users per day and they are unable to meet the recurring costs of O&M.
4) Availability of open defecation land nearby.
5) Low public awareness of health benefits and poor understanding of the relationship/link between sanitation and health
6) Unwillingness to use after dark by women
7) Preference for a free of cost, other older complex nearby even if it is in very poor condition
8) Low preference for bathing in public places

Sustainability of the created facilities is dependent on the key inputs of water, electricity and manpower for operation, maintenance and keeping the place clean. Very often the facilities are abandoned due to lack of cleanliness which is dependent on the three above mentioned inputs.

The construction of CTC was carried out by Project Implementation Agency (PIA) who was not supposed to be eventual owners of these facilities. The PIA did not completely involve Urban Local Body (ULB) in planning and implementation stages of CTC, though ULB is responsible for O&M of CTC. Currently, the ULBs express their sense of exclusion from the process and this aspect has still not generated necessary level of commitment required for O&M of the assets.

Little efforts were made to involve the community (individuals / formal or informal community based organizations) or seek their participation in design, planning and O&M of CTC. The CTCs were designed and constructed by the PIAs based on locational priorities being accorded by the ULBs. The O&M contracts were also finalized by PIA without any community participation. As a result, CTCs are by and large being operated and maintained by agencies external to the community (ULB, NGO or contractors), who typically will have low motivation in providing a well run facility as per the needs of the community that it is intended to serve. Public awareness activities to induce sanitation and health related attitudinal and behavioral changes were ineffective.

According to the report of "Evaluation of Ganga Action Plan", under GAP, 68 CTCs were constructed in Allahabad, CTCs located at public utilities, like bus stands, hospitals, markets, ghats are better utilized, adequately cleaned and are provided with water and electricity. However, many CTCs located in interiors of the city in lanes / by lanes are poorly maintained and underutilised. They also refer that the present system of O&M by Sulabh International (NGO) needs review and modifications / changes to improve the levels of cleanliness inside toilets leading to more extensive use.

2.6.2 Individual Household Latrines (IHL)

Individual household latrines (IHL) were constructed on a limited scale under the two river action plans. Under GAP, IHLs were constructed mostly in the towns of UP and West Bengal. Under YAP, the IHL component was limited mostly to Agra where about 3000 pit privy latrines were converted into pour flush latrines.

Connected to the behavioral aspect, the general preference for an individual or personal toilet is higher than having to share the facility with a large number of users, some are strangers. The level of hygiene and cleanliness maintained in an IHL is also much higher than what is typically seen in a CTC. This is closely related to the responsibility and sense of ownership towards an IHL, which relatively lack in CTC.

According to the case study report of LCS (JICA Study Team [2004a]), a field review carried out in 1995 found that about 50 % of the surveyed IHLs under GAP were being utilized properly. Especially in West Bengal, the usage was found to be as high as 90 %. However, the rest of IHLs were found to have been abandoned or dismantled. In general, the usage varied across communities and towns depending on their level of education, motivation, awareness and socio-economic profile. Typically low usage in some communities was attributed to, among others, a combination of following reasons, (i) low availability of water for flushing, (ii) lack of superstructure, (iii) low of knowledge of operation and maintenance, etc.

Based on the experience from urban slum improvement projects in other parts of the country as well as in other countries in the region, promotion of IHLs under a community led demand driven programme turns out to be more successful strategy than working on the supply side by constructing community latrines.

2.6.3 Major Factors to be considered for Low Cost Sanitation

The communities without toilet facility have more or less heterogeneous members, different socio-cultural conditions, diversified preference for sanitation facility, availability of space for sanitation facility, and different existing provision of infrastructures such as water supply, electricity, nearby sewer line. The following factors may be considered in planning and designing.

1) Justification for LCS requirement should be based on number of users, slums & floating population
2) IHLs should be considered first, and if it is not feasible, then there should be an adjacent communal latrine.
3) For convenience to users, CTC shall not be located more than 100-125 m from the habitants. People tend not to walk more than 5 minutes for defecation, especially in the nighttime and so far as availability of open defecation land nearby.
4) Local residents / slum dwellers / users and stakeholders such as municipal organizations should be involved at the very beginning of the planning of facility, finance, and O&M.
5) Check the availability of land for both CTC and IHL, water & electricity supply, and disposal system
6) Prepare the appropriate O&M plan (NGO or CBO)

2.6.4 Institutional Arrangement of CTC

The key issue of CTC is O&M, and the possible options for institutional arrangement for O&M of CTC, which learnt from the past experiences, are briefly described below.

Consultation with the communities at the planning stage is essential to establish exactly what they are willing and able to do and to define roles and responsibilities, both of user groups and the managing

agency. It would also help in ascertaining whether community toilets are needed by the community or whether some other acceptable solutions, such as individual latrines, would work best. Ideally the project should be developed such that it is responsive to communities expressed desires / needs and that test recipients' willingness to contribute for providing and maintaining those facilities. This is based on the premise that people pay for services and use them responsibly if they value what is provided to them. In this context, a participatory and collaborative demand driven strategy to identify needs has been demonstrated to be the most sustainable approach to provision of sanitation facilities. For this, health and hygiene awareness creation activities may need to precede the provision of toilets to stimulate demand.

2.7 PROPOSED LOW COST SANITATION PROGRAM

2.7.1 Objectives of Low Cost Sanitation Plan/Program

Open defecation and urination is rampant in the whole cities, especially in slum community and the bank of river and nala, which directly and indirectly pollutes the water bodies and causes deterioration of water quality of the rivers as well as discharging untreated domestic sewage. The other main impact of open defecation and urination is deterioration of hygienic and sanitary condition in living environment.

The objectives of low cost sanitation plan/program are;

- To reduce non-point pollution and
- To improve unhygienic and unsanitary conditions in the cities, especially in slum and ghat.

2.7.2 Planning of Pilot Project

As mentioned in existing reports and analysed in the previous section, existing LCS programs show disappointing results because most of the programs adopted a supply-driven approach. It is recommended that new sanitation facilities should be planned and constructed based on the demand and needs of users, but not supply driven.

The demand-driven LCS program is proposed to provide appropriate sanitation mode for the communities without toilet, most of which are slum communities. The proposed LCS program is composed of;

1) Implementation of pilot project

(i) Preparation of a standard framework of planning and designing, in which needs and demandsof slum dwellers shall be reflected and by which a technically, institutionally, financially, economically and environmentally feasible and sustainable plan can be selected

(ii) Application of this framework to some slum communities and ghat areas to prepare an appropriate sanitation plan and design

(iii) Implementation of pilot project

2) Implementation of the full scale project, if the pilot project succeeds

(i) Extending this framework to all the slum communities in four cities and prepare a appropriate plan

(ii) Implementation of the plan.

The proposed procedure of pilot project is described as follows and shown in figure 2.1.

1) Preparation of Pilot Project

Step 1: Selection of slum communities and ghat areas
- Four slums in sewered and un-sewered area
- Selection of the slums shall be consulted with relevant organizations such as Nagar Nigam, UP Jal Nigam, and Development Authority.

Step 2: Baseline survey of communities
The data / information written below should be collected through personal interview, questionnaire survey, etc.
- Basic information, such as number of household, population, income level, health / sanitation condition, etc.
- Need for sanitary facility of residents
- Condition of slum, such as water and electricity supply, main road and lane width, type of drain, sewered area or un-sewered area, distance from nearest sewer, etc.
- Institutional status
- Others

Step 3: Design (Preparation of Sanitation Alternatives)
Alternative plans of appropriate sanitation mode with advantage and disadvantage should be prepared, considering the results of baseline survey
- Type of sanitation (IHL, CTC or others)

<In case of IHL>
- Treatment and disposal methods (on-site or off-site)
- Water and electricity supply
- Training plan for O&M of IHL

<In case of CTC>
- Location of CTC
- Disposal system (on-site or off-site)
- Required facilities (water and electricity supply, water tank, care taker's building, etc.)
- O&M plan (contract out to NGO, establish CBO etc.)
- Financial and economic planning
- Others

Step 4: Holding workshop (Need assessment survey)
The workshop should be held to identify the needs and demands of the residents on sanitation mode, showing the alternatives. All the stakeholders such as community leader, dwellers, health officer, related government people, NGO, etc. should be invited.

Step 5: Detail planning
Based on the results of workshop, prepare an appropriate plan
- Sanitation facility (location, alignment, length, etc.) with preliminary design drawing
- Construction and O&M cost estimation
- Tariff level, user charge, level of subsidies required
- Financial and O&M plan
- Environmental consideration
- Monitoring mechanism for appropriate use

Step 6: Holding of workshop
The workshop should be held to show the plan to the stakeholders and obtain comments, consensus.

Step 7: Finalization of design and plan

2) Implementation of Pilot Project

Step 8: Implementation of sanitation facility plan as a pilot base
Step 9: O&M training and hygiene/environmental education campaign
Step 10: Evaluation of usage of constructed sanitary facility

3) Preparation of Guidelines and Manuals

The guidelines and manuals to be prepared shall include followings:

- Standard methodology and approach to select appropriate LCS mode
- Technical alternatives of LCS including standard design drawings and criteria
- Disposal and treatment options
- O&M plan
- Construction and O&M costs
- Cost and Benefits
- Affordability, tariff level, user charge, cost recovery
- Institutional and organizational setting up
- Environmental considerations
- Monitoring system for sustainability
- Public participation and awareness plan

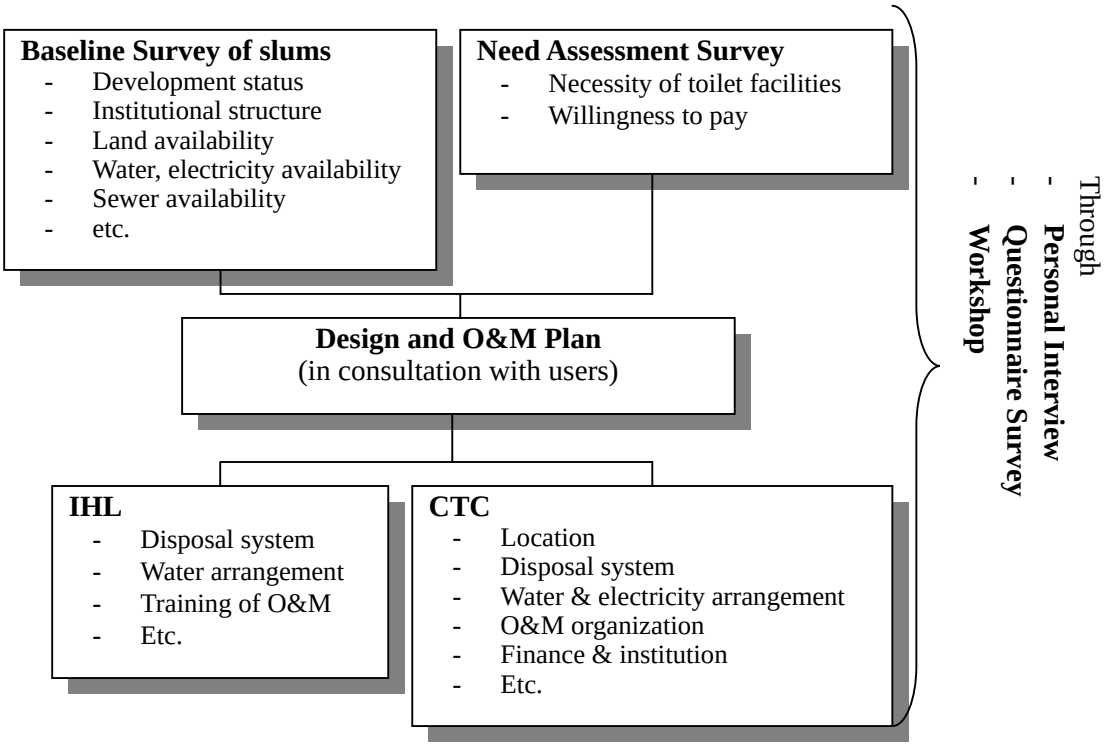


Figure 2.1 Design Flowchart of Low Cost Sanitation

2.7.3 Implementation Schedule and Cost Estimation

(1) Unit Cost Estimation

The unit costs of construction for CTCs and IHLs are estimated as follows.

Table 2.14 Cost Estimation for CTC

(Unit: Rs.)

No. of seats	Disposal by Septic tank & soak pits	With Sewer connection
5 seated	375,000	325,000
10 seated	7,00,000	600,000
20 seated	1,300,000	1,100,000

Source: Sulabh International, as of April 2004

Table 2.15 Cost Estimation for IHL

(Unit: Rs.)

No. of Users	Type of pit	Cost upto plinth level			Superstructure	Total costs
		Soak pits	Sub-structure	Total		
5	Circular	3,100	2,300	5,400	5,200	10,600
	Rectangular	3,600	2,300	5,900	5,200	11,100
10	Circular	4,700	2,300	7,000	5,200	12,200
	Rectangular	5,000	2,300	7,300	5,200	12,500
15	Circular	5,800	2,300	8,100	5,200	13,300
	Rectangular	6,300	2,300	8,600	5,200	13,800

Source: Sulabh International, as of April 2004

(2) Implementation Schedule

The following schedule is proposed to implement the LCS program.

Table 2.16 Implementation Schedule

	2005	2006	2007	2008	2009	2010
1. Pilot project						
i) Preparation		▬				
ii) Implementation		▬▬				
iii) Evaluation/monitoring			▬			
2. Full scale project						
i) Preparation			▬	▬▬	▬	
ii) Implementation				▬▬	▬▬	▬

(3) Implementation Cost of Pilot Project

The following costs are estimated for implementation of the Pilot Project.

Table 2.17 Pilot Project Cost Estimation

	Cost (Rs. thousand)
Construction cost (600,000@5 CTC)	3,000
Cost of detailed design (15 %)	450
Physical contingency (20 %)	600
Price contingency (10 %)	300
Training, campaign and evaluation of program	1,000
Total	5,350
4 Cities Total	21,400

Base year: 2004

2.7.4 Operation and Maintenance Cost

The cost of running a CTC involves expenses for electricity, water, cleaning chemicals and salary and wages for the supervisors, attendants and sweepers and repairs, etc. Among all the cost heads, the main component are found to be wages. A typical calculation for one such facility operated by Sulabh International is presented in Table 2.18.

Table 2.18 The costs of O&M of CTC

No. of seats in CTC	No. of household users	O&M cost per month					Total O&M cost per month	O&M cost per annum
		Man Power (2 persons)	Electricity & water	Cleaning material	Sludge disposal	Repairs & replacement		
5	15	4900	800	500	350	850	7,400	88,800
10	30	4900	1150	1000	450	1650	9150	109,800
20	60	4900	1900	2000	600	3200	12600	1,51,200

2.7.5 Institutional Recommendations

As seen in the above analysis, O&M of the CTCs is a key issue of their utilisation. This issue attributes to institutional arrangement of CTC. Current institutional arrangement for O&M of CTCs is through NGOs / private contractors. Two options for institutional arrangements for CTCs are considered and recommended, and their advantages and disadvantages are discussed in the following paragraphs.

Option 1: O&M of CTC by NGO

This option is built upon the current institutional arrangement in various cities where the construction and O&M contract has been extended to NGO. Lessons learnt from engaging NGO on YAP and GAP indicate that many of the NGO are actually private contractors who may have the construction capacity but not much experience in O&M or conducting public awareness activities. As a result unable to sustain the CTC, many NGO have abandoned the facilities. In this option, NGO is referred to an organization which demonstrates adequate ability in O&M of sanitation facilities, community participation activities and has a social focus. A careful assessment of NGO needs to be done before handing over the CTC.

In this process, it is important that communities are consulted with respect to their demand / need and willingness to pay at the construction stage. This will ensure their participation and acceptability to the toilets being provided. This activity can be the responsibility of the same NGO contracted for O&M of the CTCs, which has experience in community mobilization / participation activities.

The merits of this arrangement are below:

- Takes advantage of the NGO prior experience in O&M of sanitation facilities
- Helps in keeping the ULB lean by avoiding the need for inducting / regularizing workers on payroll
- Prevents unionisation
- Decreases overhead establishment costs and achieves better work efficiency at lower costs
- Keeps the focus of ULB on supervisory function

The demerits:

- Being external agencies to the community, NGO have a lower motivation to run these facilities well
- External NGO tend to have low accountability with the local population and quality control may be difficult to ensure
- Taking legal action against an NGO is difficult as compared to a registered contractor
- Identification of competent NGO may be difficult since different NGO have different capacities and areas of interest depending on their size and experience
- There may be concerns relating with transparency in operation

For improved performance by NGO, it is suggested that:

- Rigorous and competitive selection of NGO is undertaken to assess competency and track record
- Clear criteria for performance evaluation is evolved
- Ascertain capability in conducting public participation activities
- Legal penalties are included in the contract and imposed for non fulfilment of obligations
- Incentives / awards in cash or kind for say “Best run CTC” are introduced.

Option 2: O&M of CTC through community management

In this option, a community based organization (CBO) is given the responsibility of O&M of CTC, by issue of a contract directly to such a group of users. A CBO can be identified out of the existing groups such as women groups, self help groups, savings groups, youth groups etc. If suitable CBO do not exist, then efforts should be directed in forming such organisation or creating capacity of existing credible though weak structures. Ideally the group should have involvement of women as they are the key stakeholders / beneficiaries. In a community managed scheme, users may do the maintenance work themselves, or they could play a managerial role, raising funds for maintenance and paying the utility. The group would be responsible for running the CTCs, raising enough revenue to cover the operating expenses. In the long run, the community based group would manage their revenue and operating surplus, maintain bank accounts, and pay salaries and bills. Such community managed contracts have been successfully implemented for O&M of rural piped water supply shemes in UP and Orissa in India and primary collection of solid waste in urban areas. Similarly, water standpoints in urban areas are being managed by user committees in Dhaka and Swayambu in Nepal.

In India, examples of sustainable and efficient sanitation services being provided by CBO are few, however, they provide valuable insights in successful processes and innovative approaches. It is learnt that in Pune, such a practice has become popular and achieved a reasonable level of success. Similarly, in Kanpur, a CBO called Kanpur Slum Dwellers Organization (KSDF) has made efforts to build and operate community toilets, assisted by National Slum Dwellers Federation, Mumbai and an NGO, SPARC. KSDF is now active in 30 slums either directly or indirectly through government programs as well as small group initiatives. KSDF first mobilizes the community, followed by assessment of users’ needs. Based on the interest of the slum leaders, a door to door survey is conducted and the findings are then discussed in the community, with regard to problems, possible solutions and strategies. KSDF has played a facilitating role in community mobilization and encouraging the community to construct CTCs themselves and operate and maintain them on pay and use basis. In one such community, a part time caretaker and a sweeper was employed from the community. The caretaker is the cigarette shop

owner next to the toilet, whose job is to collect money from users, supervise cleaner's work and maintain accounts. The toilet is running on a significant profit, due to its proximity to a commercial area. The community has, since then, reduced monthly charges for the residents, and used the monthly savings for replacing the toilet's roof and constructing a community centre.

As evident from the case studies in the Appendix, the success of community based approach depends on mobilizing the community, encouraging them to plan and work together as a cohesive group and engineer. Effective community participation skills are required to facilitate this process, for which NGO can be engaged. A successful community managed contract for O&M of CTC would involve (1) identification and selection of suitable communities that indicate willingness to participate in such an activity, (2) facilitation in formation of suitable CBO, or building on the ones that may already exist, (3) capacity building of the CBO in various aspects of the project, (4) taking over the contract and setting up mechanisms for O&M. This could be carried out in association with a partner NGO.

The merit of CBO:

- Harnessing local knowledge and/or resources. In case of O&M of CTCs, people from within the community can be hired as caretakers or sweepers, who, apart from being more responsible towards the complexes, could be useful in motivating individuals or the community to use and pay for the toilets.
- Putting resources back into the community. For example, it may generate employment or equipment for minor repair may be bought from the community shops. It also creates opportunities for profit/ income that can be plowed back into the project or used in a suitable manner for the community.
- Improving quality control as users have a vested interest in the service.
- Reduced cost of works. In Kanpur, where the community built the structure, an investment saving of 40% was made due to absence of profits margin, overhead costs of contractor/ formal institution and some amount of free labour from the community.
- Encouraging a more socially responsible standard of operation, without profitability being the criteria for operation
- Being a more transparent system with a greater sense of control over matters
- Realizing social benefits by involving the community and helping promote the community management in the long term.

Disadvantage of CBO:

- CBO may be a temporary management structure
- CBO may be prone to internal social conflicts or unable to agree on priorities and terms, may dissolve.
- CBO may be dominated by influential individuals, who may mislead or dictate terms.
- Community leaders who put in a lot of effort in promoting the project or instrumental in success of the group, may start to raise the question of payment for their efforts or members may turn dishonest and steal revenue.
- Local political leaders, under threat of erosion of their support base, may influence the community not to pay for the services ("government would provide free services") or channel services to influential sections of the community
- CBO may be weak and unable to take on all their responsibilities

For the above, an evaluation and monitoring criteria and mechanisms for assessing performance will have to be evolved. Moreover, suitable measures for integrating and coordinating the work of CBO with municipal organizations would have to be evolved.

This path breaking approach is new and involves a long and slow process. It is, therefore, recommended piloting this option in a selected number of communities to test its feasibility and develop the process. Once successful, it can be replicated on a larger scale in the second phase. It would be easier to implement first in small communities where cohesive and effective community

organisations exist with broad community awareness. This entire process can be led by an experienced lead NGO, which based on the lessons learnt from the pilots, can replicate on a city wide basis.

In conclusion, it is prudent to mention that community initiatives can be a complicated and a slow process. Moreover, community management is clearly not an easy option and may be only one of a range of actions required. Generally, there is an emerging need for more flexible service arrangements and partnerships whereby all players make their contribution: service providers, users, NGOs, and private sector. One possible variation can be giving O&M of CTC to such a NGO which can, in the first phase, run the toilet, concurrently mobilise the community / develop CBO capacity and subsequently hand over the toilet to the CBO. Specific solutions, that are viable and realistic, will, of course, vary from place to place.

2.7.6 Economic and Financial Evaluation of LCS Program

The LCS Program to construct CTCs is proposed in this Study. This Program will be carried out at two steps; Pilot Project and Full Scale Project if the Pilot Project succeeds. The objective of this evaluation is to analyse economic and financial feasibility of the Pilot Project. A 20-seat CTC is used to evaluate the feasibility.

Detailed economic and financial evaluation for the CTC project is attached in Appendix D. The followings are summary and recommendations.

(1) Economic Feasibility

The provision of a 20-seat CTC will be economically feasible if around 600 persons use it for Lucknow, Kanpur and Varanasi but 800 to 900 persons for Allahabad assuming the target Economic Internal Rate of Return (EIRR) of 10 %.

(2) Financial Feasibility

1) Person-visit charging system

Assuming a user charge of Rs.2 per visit, the number of users per day for a 20-seat CTC is calculated to gain 10 % of Financial Internal rate of Return (FIRR). If 500 to 600 persons per day pay and use the CTC, it will be financially feasible recovering both the initial and O&M costs.

2) Family pass system

Monthly family pass may be a preferable option for payment to use CTC. The users should pay Rs.260 per month per household for a family pass to recover both the initial and O&M costs assuming 120 pass holders, equivalent to about 840 person-visits per day. The users should pay around Rs.130 per month per household for family-pass to recover the O&M costs only, assuming 100 pass holders, equivalent to about 700 person-visits per day.

3) Affordability

According to the Household Survey by JICA Study Team, the average monthly household income for the low income group in the four cities are as follows:

City	Household Income in Rs.		
	Average	Max.	Min.
Lucknow	3,382	25,000	500
Kanpur	3,047	14,000	1,000
Allahabad	2,660	8,000	500
Varanasi	3,017	18,000	600

Source: Sample Household Survey by JICA Study Team, 2003

Assuming Rs.3,000 of the average income for the low income group, Rs.130 of a family pass is equivalent to 4.3 % of the total income. The surveyed low income group has diversity in household income consisting of higher income to much lower income. This charging level may be affordable for the higher income households in low income group but not the average to lower income households. Most of the much lower income households may not have any toilet in their household. To provide these households with a toilet, some measures including the followings should be taken. However, to keep self-sustainability, subsidy from local governments shall be avoided.

- Reduction of O&M costs, especially for care takers, by using community human resources
- Increase the number of users
- Charging system preferable for lower income households
- Subsidy from local governments

2.7.7 Pollution Reduction and Required Number of CTCs

(1) Reduction of Pollution Load Discharged from Open Defecation

To estimate future BOD pollution load and forecast the impact of the LCS Program, the followings are assumed;

- Current percentage of non-toilet households remains same
- The population projections by JICA Study Team (Volume III)
- BOD pollution load is 45 g/ person/day
- Assumed percentage of non-toilet households (Table 2.19) without and with LCS program

Table 2.19 Assumptions to Estimate BOD load with and without LCS Program

Name of City (Urban area)	Non-toilet households (%)					Population Projection by JICA Study Team (persons)		
	Current	Without LCS program		With LCS program				
	2003	2015	2030	2015	2030	2003	2015	2030
Lucknow	27.0	27.0	27.0	**15**	**5**	2,441,300	3,480,293	5,143,899
Kanpur	25.9	25.9	25.9	**15**	**5**	2,819,827	4,342,031	5,629,081
Allahabad	20.8	20.8	20.8	**15**	**5**	1,151,213	1,576,702	2,215,544
Varanasi	20.3	20.3	20.3	**15**	**5**	1,279,328	1,824,215	2,490,952

The estimated BOD pollution load with and without the program is calculated in Table 2.20. The BOD pollution load discharge with the LCS program will be 1/4 of that of without the program in 2030.

Table 2.20 BOD Pollution Load form Non-Toilet Household

(unit: kg/day)

Name of City (Urban area)	Current BOD load	BOD load discharge without LCS program		BOD load discharge with LCS program	
	2003	2015	2030	2015	2030
Lucknow	29,700	42,300	62,500	23,500	11,600
Kanpur	32,900	50,600	65,600	29,300	12,700
Allahabad	10,800	14,800	20,700	10,600	5,000
Varanasi	11,700	16,700	22,800	12,300	5,600

(2) CTC Requirements

To achieve the above percentage of non-toilet households in 2015 and 2030, LCS facilities should be provided for the following population.

Table 2.21 Population requiring LCS facility

Name of City (Urban area)	Population for LCS to be provided by the year (persons)	
	2015	2030
Lucknow	417,700	1,131,700
Kanpur	473,300	1,176,400
Allahabad	91,500	350,000
Varanasi	96,700	381,200

To estimate the number of CTCs required for this program, the followings are assumed:

- CTC will be provided Half of the planned population in Table 2.21
- The rest of planned population will install individual household latrines.
- 50 persons share one toilet seat
- One CTC compose of 20 seats

Based on these assumptions, the number of CTC required is estimated in Table 2.22. In 2015 and 2030, 540 and 1,520 CTCs are required for the 4 cities.

Table 2.22 The Number of CTC to be provided in 2015 and 2030

Name of City (Urban area)	The Number of CTCs to be provided	
	2015	2030
Lucknow	209	566
Kanpur	237	588
Allahabad	46	175
Varanasi	48	191
Total	540	1,520

CHAPTER 3

GHATS SANITARY IMPROVEMENT PLAN

CHAPTER 3 GHATS SANITARY IMPROVEMENT PLAN

3.1 INTRODUCTION

Ghat is a river bank facility with steps or slopes leading to the river and has great religious and historical importance, especially in Varanasi and Allahabad, where Hindu people worship and bath in the Holy River and conduct cremation ceremony. Besides, the ghat is used as a place for washing clothes and cattle wallowing in a daily life.

Due to increasing population, huge urban agglomeration and industrial developments along the rivers, these gradually led to extensive pollution load on rivers mainly by domestic waste water discharge flowing to rivers through drains and sewers.

While the discharge of point pollution load is main reason for deterioration of the river water quality, the pollution contribution of in-river activities is rather insignificant. However, these factors directly and indirectly influence the hygienic and aesthetics conditions of the river front, especially along the bathing stretches. In-river activities includes bathing, washing cattle in the river (cattle wallowing), washing of clothes, throwing of half-burnt/un-burnt dead bodies and offering of flowers, fruits etc into the river, dumping of solid waste in the river and ghats also influence the aesthetic condition.

The hygienic and sanitary conditions at the ghats are not satisfactory due to the in-river activities. There is a need to create facilities for sanitation, garbage disposal, prevention of commercial laundry activity and cattle wallowing, etc and enhance aesthetic conditions. In addition, the proper O&M of ghat by responsible organization is required.

To tackle non-point source pollution and improve unhygienic conditions in ghats, the non-sewerage schemes have been implemented in River Action Plans, comprising follow components;

1) Low cost sanitation schemes to reduce open defecation
2) Electric and improved wood crematoria to reduce throwing of un burnt / half-burnt dead bodies into the river
3) Construction of dhobi ghats to reduce pollution of washing cloths in the river
4) Tackling non-point, non-measurable pollution such as dumping of solid waste and
5) River front development schemes

Non-sewerage schemes play a significant role in the improvement of River's environment and hygiene standards besides reducing the pollution load on river. However, the various non-sewerage schemes implemented under the River Action Plans including GAP and YAP, are not being utilized for the purpose they have been created due to various reasons; main important being the erroneous O&M conditions, lack of public awareness & participation and technical unsuitability in terms of the local needs etc.

In-River Activities

(1) Traditional Cremation

The performance of last rites is extremely important from the religious points of view for all segments of Hindu population. As per the tradition, it is preferred to be done on pyre along the bank of river. According to Hindu tradition fire is the most pious and great purifier, thus dead bodies are cremated on pyre of wood. However, the traditional cremation requires huge quantity of wood (500 - 300 kg per body). Inappropriate cremation due to insufficient woods results in un-burnt and half burnt bodies and these bodies are thrown into the Ganga, polluting the River. Traditional cremation also contributes to the loss of large number of trees and the huge loss on ecology and environment.

In the public awareness survey, three quarter of the respondents answered that water quality of the river was contaminated, many people was aware that traditional cremation pollutes river water, or the major cause of river water contamination was cremated remains and answered that electric crematoria was better for reduction of pollution.

(2) Traditional Dhobi Ghat

River water is used for washing clothes at dhobi ghats and waste water flows into river and contaminate the Ghat area, where people take bath. Detergent and soaps are also used for washing clothes, which contribute to prosperous pollution of river although the pollution load is insignificant. Through the public awareness survey (see Volume III-6) conducted by JICA Study Team, many think that commercial laundry activities are one of the cause of water quality pollution and the demand for the constructed dhobi ghats of dhobis are quite high.

(3) Cattle Wallowing

Through public awareness survey, a quarter of the respondents answered livestock waste is one of the major causes of river water contamination, and boatmen in the ghat areas also have the opinion that cattle wallowing make the ghat dirty and unhygienic.

3.2 EXISTING CONDITIONS

The current status of ghat facilities in four cities is shown in table below and the inventory data of the facility are attached in Appendix A. The number of ghat users by regular and occasional use was also surveyed and estimated through interviews at ghats.

Table 3.1 The Number of Ghats in Four Cities

Items	Lucknow	Kanpur	Allahabad	Varanasi
Bathing Ghat	9	16	14	78
Cremation Ghat		4	6	2
Electric	1	3	2	1
Traditional	4	3	5	2
Improved wood	1			0
Dhobi Ghat	15	8	14	35
Constructed	3	4	5	3
Traditional	12	4	9	32
Ghat where cattle wallow	2	6	14	26
Estimated Nos. of daily regular users (person/day)	713	555	18,650	24,090

Note: The numbers were identified by JICA Study Team through site survey.

The existing conditions of these facilities and activities are described in the following section by city and facility wise.

3.2.1 Lucknow

(1) Bathing Ghat

In Lucknow, 9 bathing ghats are identified by JICA Study Team along the Gomti River. Around 700 people come and use them for bathing per day. The sanitary / hygiene condition of bathing ghats are not good due to pollution by discharging of untreated sewage, open defecation, cattle wallowing and laundry activities. The public awareness survey found out that only 25 % of the respondents use the

bathing ghat, most are living within one km from ghats, because of no other facility of bathing available (67.2 % of the users), followed by religious feeling (21.3 %). More than half of the users think the bathing ghats are not maintained properly. Ghats are owned by Lucknow Nagar Nigam (LNN). Some of the ghats are maintained by LNN and others are maintained by other agencies and associations. Most of the respondents answered the toilet facility and changing room should be provided in bathing ghats. In the survey, the following problems were observed by the surveyors:

- Dirty and unhygienic conditions are found at many ghats
- Siltation problems
- Plastics, flowers and other solid waste is being thrown to river through the ghats
- No amenities like toilet facility and changing room

(2) Cremation Ghat

Electric Crematoria

One electric crematorium has been constructed under the Gomti Action Plan Phase-I at the cost of Rs. 4.661 million, and is operated and maintained by LNN, it's working from 8 AM to 6 PM. The usage is low; average only 40 - 50 bodies are cremated per month. The awareness and acceptance of electric crematoria is low due to the lack of public awareness and consciousness, design of crematoria and others.

Conventional Crematoria

There are four conventional crematoria, working from sunrise to sunset. It takes three to five hours for cremation and costs Rs. 600 to Rs. 1,250 per body. The more than 1,200 bodies are cremated at conventional crematoria per month on average.

(3) Dhobi Ghat

There are two types of dhobi ghats; constructed dhobi ghat located in inland and traditional dhobi ghat located on the bank of the river.

Constructed Dhobi Ghat

In Lucknow there are two constructed dhobi ghats, Viloch Pura and Panni Wali Gali, constructed by DUDA, having 285 units of washing places. New ghat named Para Gram is now under construction. These ghats are operated and maintained by Dhobi Association and DUDA, water is supplied through well and wastewater discharged into drains. These washing facilities are relatively highly used, especially in Viloch Pura Ghat.

Viloch Pura ghat, situated in the residential area of old Lucknow, has total 110 units and one unit has two washing platform, thus 220 platforms in total. The total area is spread over approximately 1,000 sq meter. This was constructed by DUDA and is managed by Local Dhobi Association, which is a registered committee having a formal structure of its functioning having a president, general secretary and treasurer. According to the President, this ghat was constructed after hard and continuous efforts and follow up with government departments; it means this ghat was constructed based on the demand / need of dhobis. More than 300 dhobis come to use every day.

The water is supplied through a tube well provided by DUDA, and an additional tube well was installed by the association as the number of users was increasing. The additional one costs around Rs. 45,000, which was covered by contributions among the groups mobilized by the committee. The general O&M cost includes expenditure on electricity, water supply, cleaning and repairing of water pipes, cleaning of platforms etc., are paid by users and their own fund.

The significant points that lead O&M system very successful are:

- The facility was proposed by community based on their need, and also planned and finalised in consultation with the community and users.

- Before construction, DUDA and Local Dhobi Association agreed that O&M should be implemented by the association, and the association took over the O&M immediately after the construction was accomplished. There is no confusion regarding O&M.
- There was community involvement and participation right from the planning of the scheme.
- There is no dependency on government and other external agencies for the funds and financial requirements for the structure maintenance, as it is done immediately as and required by mobilizing it internally.
- People are motivated and there is a sense of ownership among the users, and the ownership is very important for the sustainability of facility.
- It is managed by a core group of members from within the user committee, who are active having entrepreneurial mind, and capable of influencing public perception.

Traditional Dhobi Ghat

There are 12 traditional dhobi ghats along the river Gomti, they have 574 units or washing stones. Around 1,000 dhobis use the traditional dhobi ghat. The ghats are mainly used for chickan embroidered clothes washing, traditional textile in Lucknow. Most of these facilities are free of cost, though some charge very small money like Rs. 10 per month, river water is used for washing and waste water flows into river directly. Around half of the ghats are operated and maintained by Local Dhobi Association, the other has no O&M body.

(4) Cattle Wallowing

Cattle wallowing in Lucknow is less seen in comparison of other target three cities, around 200 cattle are bathing per day. In the public awareness survey, no one answered cattle wallowing as the cause of river water contamination.

3.2.2 Kanpur

(1) Bathing Ghat

Since 1960s the River Ganga has shifted its course from the bank and the Ghats are not highly in use. There are 16 bathing ghats along the river Ganga, where around 700 people come and use for bathing per day. Due to the pollution and reduced flow of water in Ganga, all the ghats are in poor condition. The Ganga Barrage is being constructed by the Irrigation Department to bring the water to the banks. It was informed that the Barrage has completed 95 % as of March 2004. As the river water comes, the ghats would be used by people.

Open defecation, cattle wallowing, and washing of clothes are commonly observed at the ghats. The pubic awareness survey found that only 17.8 % of the respondents used bathing ghats, and 69 % of users answered the ghats was not maintained properly, There is no toilet facility and no changing room in many ghats and almost all the users answered toilets and changing room should be facilitated to the ghats.

In the inventory survey, the followings were observed by surveyors at almost ghats:

- Poor O&M,
- Polluted by liquid waste
- Lack of public toilets, even if any, toilets are in very bad conditions, poor O&M and dirty
- Dumping of solid waste
- Rampant open urination and defecation
- Silting problems
- No approach roods

(2) Cremation Ghat

Electric Crematoria

The three electric crematoria installed in Kanpur stretch of the river, at Bharon Ghat, Bhagwandas Ghat and Mishra Colony Unnao. It's working from 8 AM to 5 PM and costs Rs. 500 per claimed body, and Rs. 100 for unclaimed body. The usage is low; average only 20 - 30 bodies are cremated per month and most of them are unclaimed bodies, which were brought by police. The awareness and acceptance of electric crematoria are low, due to the lack of public awareness and consciousness, design of crematoria and others. In addition, the frequent break down have created notion among the people that crematoria are never functioning having a high adverse impacts its usage.

Bhagwandas Crematorium which has two furnaces, was repaired with electricity connection and supply in April 2003, till July 2003, crematoria did not receive even a single body; it reflects the low popularity among the people and user groups. However, as per the reports of staff, that around 10 to 15 bodies have started coming to these crematoria in month as a result of some initiatives and efforts to create favourable public consciousness against the dumping or un-burnt bodies to river.

Bhairon Ghat Crematorium was constructed by Kanpur Development Authority (KDA) in 1983 at a cost of approx. Rs. 18 lakhs. After the technical failure, this crematoria repaired by Kanpur Nagar Nigam (KNN) and it starts functioning in June 2003. The crematoria have started receiving 20 to 30 bodies a month, most are unclaimed bodies.

The crematorium at Mishra Colony has been closed since March 1997 due to non-payment of electricity bills.

According to the Eco Friends (a NGO in Kanpur), 15 to 20 dead bodies in various stages of decomposition are floating in 10 km stretch of Ganga. The Allahabad High Court has acknowledged the role of the Police in throwing unclaimed dead bodies also. When the High Court in its order of 31 March 1998 (Rakesh Jaiswal Vs State of U.P. & others) had directed that unclaimed bodies should be cremated free of cost at the Crematorium, but still unclaimed bodies are thrown into the river.

The followings were observations by the NGO on crematoria in Kanpur.

- The poor performance of electric crematoria in terms of O&M, and its acceptability that is also primarily influenced due to O&M, reflects that crematoria are not success in its objectives
- There have been no efforts to popularise the crematoria and its implication on river pollution and other advantages in terms of cost effectiveness, user friendliness etc.
- There are little or almost no efforts on public participation and general awareness especially from the implementing and O&M agencies. It is done to some extent by NGOs and volunteers but due to lack of resources, it also fails to continue the process in long run and the initiatives undertaken by NGOs and volunteers does not sustain.

Traditional Crematoria

There are three traditional crematoria, and costs Rs. 400 to 600 per body. Over 1,600 bodies are cremated at traditional crematoria per month on average.

(3) Dhobi Ghat

Constructed Dhobi Ghat

Kanpur city has four constructed dhobi ghats, constructed by DUDA having 145 units of washing places. Water is supplied through submerging pump through boring or river water and wastewater is discharged into nala or pond. One dhobi ghat is not used for two years because all water tanks are broken. Three ghats are used by around 150 to 180 dhobis, but the O&M of facilities are not satisfactory. In the facility inventory survey, the followings were observed:

- Some water tanks are broken, or have leakage problem
- Necessity of shading, as washing activities are under direct sunlight, and for rainy season.

- No place for drying clothes after washing
- Surrounding is dirty
- No toilet facility

Traditional Dhobi Ghat
There are four traditional dhobi ghats along the river Ganga, they have 34 units or washing stones. Total 75 dhobis use the traditional dhobi ghats with free of cost. Some O&M are done by local dhobi association.

(4) Cattle Wallowing

Cattle wallowing were seen near 6 ghats along the river side of the Ganga. The number of cattle is from 500 to 600. The number in the morning time (9 AM to 12PM) is especially higher than in other time. The cattle are brought by cattle owners and dairy farmers for drinking and bathing purpose, due to the lack of facility and place for cattle.

3.2.3 Allahabad

(1) Bathing Ghat

Allahabad City is famous for "Sangam", the area of confluence of three sacred rivers; the Ganga, the Yamuna and a mythical river named Saraswati. This area is surrounded by temples and ghats where pilgrims use to access the rivers for bathing. There are 14 bathing ghats along the river Ganga and Yamuna, where over 18,000 people come and use for bathing per day. In the survey, the followings were observed by surveyors:

- Unhygienic conditions due to open defecation and urination, cattle wallowing and laundry activities
- Dumping of solid and liquid waste generated out of the various commercial activities along the ghats and nearby residential buildings and houses
- Plastics, flowers and other solid waste are being thrown to river through the ghats
- Lack of toilet facility and changing room
- Approach road should be improved
- High load of visitors and users every day
- Siltation problems

(2) Cremation Ghat

Electric Crematoria
Two electric crematoria are operated and maintained by Allahabad Nagar Nigam (ANN), it's working from 10 AM to 10 PM and costs Rs. 350 per claimed body, but free of cost for unclaimed body. The usage is low; average only 15 - 20 bodies are cremated per month. The awareness and acceptance of electric crematoria is low due to the lack of public awareness and consciousness, design of crematoria and others. At the opposite side of electric crematoria, many claimed and unclaimed bodies are flown into river without burning and there have been no efforts to control this. If measures are taken to ensure that unburned bodies are not thrown into river directly, it will come to electric crematoria, which will enhance the usage and also have great impacts on controlling the river pollution and improving aesthetic conditions.

According to the report of Ministry of Environment and Forests, electric crematoria at Shankar Ghat in Allahabad were constructed under GAP, but the acceptability of electric crematoria is poor. Local "Doms and Pandas" need to be motivated so that they do not exploit the sentiments of sensitive Hindu Population. A control also need to be exercised on forest contractors who in order to sell their goods do not let the people reach the electric crematoria.

Conventional Crematoria

There are four conventional crematoria, working for the whole day. It takes three hours for cremation and costs Rs. 700 per body. Over 900 bodies are cremated at conventional crematoria per month on average.

(3) Dhobi Ghat

Constructed Dhobi Ghat

Allahabad city has five constructed dhobi ghats constructed by DUDA under the National Slum Improvement Programme, having 116 units of washing places. In facility inventory survey, the followings were observed:

- Water is not supplied to some water tanks
- Leakage problem in the water supply pipelines
- Necessity of shading, as washing activities are under direct sunlight
- No place for drying clothes after washing

The number of user are less than that of unit, it means some units are not used due to above reasons or others.

One constructed dhobi ghats at Mamphord Ganj is used at optimum level, as the O&M is run by a community based organization and the ghat is managed in self-sustained base (JICA Study Team [2004b]). The dhobi ghat is managed by the user groups through a committee formed with the members within the group. The physical conditions were observed well maintained with a clean surrounding, water was supplied by tube well, which is also maintained by users including repair of technical break down. These costs were covered by users group.

Some salient features, which were observed regarding the O&M of this facility and makes it to run success fully, may be outlined as;

- There was high degree of motivation observed among the users, they understand the importance of this facility for them as it was constructed on their demand after a great efforts. Users even provided voluntary labour contribution in its construction and were fully involved in the process of planning and construction.
- The committee was formed for its maintenance not only look after the cleanliness, and repair works, but also allocate time schedule for each users, collects funds as per the needs as and when arise for any maintenance work etc. In case of any problem related to time slot, the users amicably resolve it by discussing it within the group
- The usage is very high as all the units are utilised. People work in shift according to the time slot allotted to them and once one-person leave it is occupied and used by another person. The washing at this place start from early morning 4:30 – 5 AM and continues till late evening even by 9 – 10 PM some times.
- The group understands the impacts of washing clothes in river and the level of pollution it fetches. But, according to them more than concern for river pollution, it is more users friendly and convenient to operate here.
- The committee informed that they ensure instant cleaning of the wastes generated in process of washing emerged out of detergent and soap or other materials. After one group and batch complete the washing, they clean their unit and surrounding adequately before they leave and another batch joins it.

Traditional Dhobi Ghat

There are nine traditional dhobi ghats along the river Ganga and Yamuna, having 135 units or washing stones. Total 181 dhobis use the traditional dhobi ghat, 20 dhobis per ghat on average, and 48 clothes are washed by one dhobi. These facilities are free of cost. There is no O&M organization.

(4) Cattle Wallowing

Cattle wallowing were seen near 14 ghats along the river side of Ganga and Yamuna. The number of cattle is from 500 to 3,000 at one ghat, the number in the morning time (9 AM to 12PM) is especially higher than in other time. It was estimated that around 20,000 cattle per day came to for drinking water and taking bath in the rivers. Cattle owners and dairy farmers bring cattle in the rivers for washing them and drinking water to them due to the lack of facility and place. Municipality provides the water two times – in morning and in evening, but the water supplied is not enough for the cattle.

During the Kartik, the month of bathing festival, since many pilgrims and priest come to Allahabad for taking bath, ANN strictly prohibit cattle owners and dairy farmers to bring the cattle to the ghat. After the festival, ANN doesn't check the ghat and its condition. Some of cattle owners and dairy farmers will move to another places if any other facilities are provided nearby ghat.

3.2.4 Varanasi

(1) Bathing Ghat

General
In Varanasi, a pilgrimage city, bathing ghats are the main attractions. People in large numbers visit every day to take bath and worship in the temple built along the river bank. There are around 80 ghats in Varanasi on the western bank of the Ganga. Most of the ghats are ancient and have been built by Maharajas (Kingdoms) from different princely states of India. Around 25,000 people take bath in Ganga daily, and during festival, more than 300,000 people come and take bath.

Under the Ganga Action Plan phase-I, construction and renovation of some bathing ghats were undertaken by Irrigation Department, which may be listed out as follows;

Construction of platform and steps
1. Assi Ghat
2. Raj Ghat
3. Bhainsasur Ghat
4. Chauki Ghat
5. Pandey Ghat

Patch work and slope protection works
1. Dasashawmedh Ghat
2. Rajendra Prasad Gaht
3. Pryag Ghat
4. Sheetla Ghat
5. Tulsi Ghat
6. Teliyanala Ghat
7. Trilochal Ghat

Out of the above, Assi Ghat and Raj Ghat were the full-scale construction and development works, at Rajendra Prasad Ghat, renovation of steps and construction of platform were completed.

Problem Areas
The main problem areas, which were identified as a result of onsite physical observations, discussion with the representatives of community, user and beneficiary groups and residents, may be categorized in to two major categories. 1) Natural problems, which are naturally evitable and 2) usage related, which are behaviour concerned.

1) Natural Conditions

- Heavy siltation on ghats due to flood and high water level every year
- Breaking of stairs due to flood during rainy seasons
- De-silting burden after flood.

2) Usage Related
   - Pollution loads due to bathing, and throwing of offerings (flowers and other puja materials)
   - Unhygienic conditions emerging out due to rampant open defecation and urination, cattle wallowing and laundry activities due to lack of toilet facility
   - Dumping of solid and liquid wastes generated out of the various commercial activities along the ghats and near by residential buildings / houses.
   - Poor initiatives from the Varanasi Nagar Nigam (VNN) and Govt. agencies for handling the waste management and cleanliness
   - Lack of approach road and constructed steps
   - Lack of changing room

Operation and Maintenance of Ghat

While, construction and renovation works are to be taken up by Irrigation Department, cleanliness and maintenance of hygiene of ghats is the responsibility of VNN. The core issues that VNN is supposed to address with regards to maintenance of ghats are; provision of drinking water and toilet facilities, cleanliness of the ghats and its surroundings by effective solid waste disposal system, preventing cattle wallowing and movement of stray animals, and de-silting. The maintenance is currently not done properly. These are due to the limitation of fund and human resources of VNN.

There is no specific arrangement for the cleaning and disposal of waste materials at the ghats and the ward sweeper of the area and locality are supposed to clean the ghats as well as the residential areas and streets of that vicinity. Also, there is no active monitoring of the same. Some times, sweepers dump the garbage that they collect not only from the ghat but also from the nearby locality at some place or corner of the Ghat.

At some ghats, NGO, CBO or private company involve the O&M of ghats on volunteer base, like regular cleaning, collection of waste, supply safe drinking water, etc. These are made by some voluntary efforts, which are motivated by their own conscious. There is no private partnership initiatives started by VNN and government agencies.

Although VNN does cleans some important ghats at the occasions of festivals and also carry out de-silting works after rainy seasons, it is not sufficient to ensure the proper O&M of the ghats and are only symbolic.

Results of Public Awareness Survey and Facility User Survey

The public awareness survey conducted in the Varanasi Ghat area shows required improvements for Ghats as shown in figure 3.1.

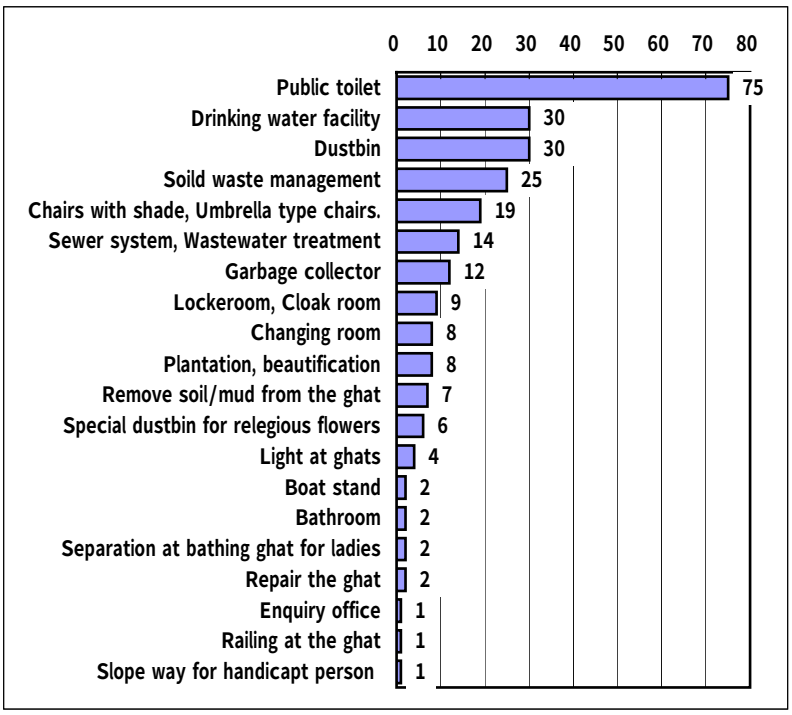


Figure 3.1 Requirement of Ghat Improvement (Effective Reply=258)

The requirements relating to prevention of river pollution and improvement of hygienic conditions are;

- Public toilet
- Dust bin, special dust bin for religious floors
- Solid water management, garbage collection
- Sewer system and wastewater treatment
- Removal of soil mud from gaht

Major requirements are public toilet and solid waste management.

According to the inventory survey, 63 ghats out of the 78 ghats surveyed have toilet facility, though the results of the public awareness survey indicate that more than 90 % of ghat users answered toilet facility was required at ghat in four cities.

Most of the respondents of the ghat survey answered that dustbin and garbage box at ghats was required. At present, there are hardly dustbins and garbage boxes in ghats and solid waste are dumped all around the ghats. There are some dustbins and garbage boxes, however, garbage are dumped all around the area due to low awareness and lack of environmental education of the public. The dustbin and garbage box should be installed at suitable places; the place should be decided in consultation with users, priests, pilgrims, etc. It is also necessary of awareness programmes to use dustbin and garbage box for disposal instead dumping on the public spaces.

Table 3.2 Condition and Necessity of CTC

City	No. of ghat*		Necessity of CTC among users**
	Total	Ghat without CTC (%)	
Lucknow	9	5 (55.6)	92.2 %
Kanpur	16	10 (62.4)	96.2 %
Allahabad	14	11 (78.6 %)	94.5 %
Varanasi	78	63 (80.8 %)	98.8 %

Source: * Inventory survey
** Public awareness survey

(2) Cremation Ghat

There are two traditional crematoria at Manikarnika Ghat and Harishchander Ghat, one electric crematorium at Harishchander Ghat in Varanasi along the Ganga.

Electric Crematoria
Electric crematoria at Harishchander Ghat are operated and maintained by VNN. Two units of Electric Crematoria are there but it is not in working condition from 1-1/2 year. Its firebricks are broken (cracked) and required to be changed. Varanasi has not been able to provide uninterrupted electricity for running the facilities and the conditions of these facilities are not satisfactory and not being maintained properly. It requires totally repairing. For renovation and repair, quotation is asked for by VNN mainly for firebricks. One body burning cost in electric crematoria is 500 Rs. but unclaimed bodies were also burnt in this free of cost.

Conventional Crematoria
There are two conventional crematoria at Manikarnika Ghat and Harishchander Ghat, working for a whole day. Since Varanasi city is one of the most sacred cities and many people come here for bathing and cremation. Around 50,000 bodies are cremated annually in Varanasi of which about 40,000 are cremated at Manikarnika and the rest at Harishchandra Ghat. It takes three hours for cremation and costs around Rs. 800 per one body.

(3) Dhobi Ghat

Constructed Dhobi Ghat
Varanasi city has three constructed dhobi ghats under Ganga Action Plan Phase-I at Konia, Nadesar and Baulia Pokhari constructed by Varanasi Development Authority (VDA). These ghats were constructed to stop the laundry activities in the river side by rehabilitating dhobis and shifting them to the constructed dhobi ghat. There are 532 units of washing places, against the number of unit, only 130 dhobis use them per day. The purpose of its construction is not met as less number of people than number of unit is using these dhobi ghats, and still large number of users prefers to go to river side. From discussion of users, these facilities are mainly used during rainy seasons only, because there is flood in the river and difficult to wash along the river, and not the main facilities.

Water is supplied by Jal Sansthan for two ghats and one by tube well, and one ghat charge dhobis for Rs. 800 per year as water charge from Jal Sansthan. These ghats should be operated and maintained by local dhobi association, but association has hardly any orientation on O&M. Thus the users are maintaining the facility, however, the general condition of cleanliness around the vicinity is not satisfactory as it is full with garbage and some times pigs roaming nearby. In the inventory survey, the following problems are observed:

- The location is far for dhobis
- Water is not supplied to some water tanks

- Leakage problem in water supply pipelines
- O&M is not satisfactory
- No shading, as washing activities are under direct sunlight
- No place for drying clothes after washing

Traditional Dhobi Ghat

In Varanasi, many commercial laundry activities are well seen along the riverbank of the Ganga and Varuna, contributing to the water quality pollution to some extent. There are 32 traditional dhobi ghats along the river Ganga (18) and Varuna (14) having 316 units or washing stones. More than 800 dhobis daily use the traditional dhobi ghat for commercial laundry service, and more than 20,000 clothes are washed in the rivers. These facilities are free of cost and river water is used at liberty for washing. Some of these facilities are operated by local Dhobi Association and others have no such organization.

(4) Cattle Wallowing

Cattle wallowing is a most prevalent practice in Ghat areas of Varanasi, as it may be seen in many ghats along the river bank of Ganga and Varuna. Thousands of buffalos from many parts of town come to the rivers every day. Its effect on water quality and hygiene of ghat is well known. In the morning time (9 AM to 12PM), the number of cattle is especially higher than other time. The cattle are brought by cattle owners and dairy farmers for drinking and bathing purpose, due to the lack of facility and place for cattle in their neighbourhood. The livestock waste is recognized as one major cause of river water contamination in the public awareness survey. The main reasons why they bring the cattle to river side are:

- Exhausting and closing of old ponds in the City and scarcity of water at personal level
- Lack of alternative facilities for cattle bathing and drinking
- Convenience for owners to handle large number of cattle as once, cattle enter in to water, and they remain there almost the whole day, so that owners find time to concentrate on other works, like selling milk, arranging fodders etc.

Cattle owners recognise that cattle wallowing hinder people from bathing, tourists from boating, and cow dung pollute the ghat area and worsen the environment. But they also said that in comparison with wastewater, directly flow into river Ganga from nala, cattle wallowing is quite insignificant in terms of realising as a source of river water pollution.

It was suggested from cattle owners that the old ponds, Pitrakund, Pichasmochan Kund, suraj Kund etc. should be rehabilitated properly so that the cattle wallowing will be minimized to a great extent.

There is a rule to prevent cattle wallowing, “Cattle Pass Act 1871”, this act has been applied in Varanasi and prohibits any cattle to walk freely on the road. If it is found or complain by any person, the owner may have to pay the penalty up to Rs. 1,000. But this act is not known among cattle owners and it has never been applied so far.

3.3 LESSONS LEARNT FROM EXISTING ACTION PLANS

3.3.1 Management of Bathing Ghat

Whether proper O&M are conducted depends on the O&M body, and it is said that community based organisation (CBO) is relatively good O&M body rather than Municipality (SAPI Study [2000]).

In West Bengal, 3 river front development plans were conducted under GAP Phase-I, and ghats were rehabilitated including construction of steps, waiting room, toilet facilities for ladies and gents and a shed with platform for performing the religious rites by the pilgrims.

These ghats are being managed by the local community including the CTC and other facilities under

the overall supervision and monitoring of the Municipality. The general observation of cleanliness at the ghat was observed to be impressive despite the fact that the vicinity is inhabited by the population of low-income groups who are the daily wageworkers, vendors and sweepers etc. and who are considered to be having low awareness and education level. The CTC is on pay and use system and it is charged Rs. 1 for water closet and 25 pise for urinals. It was encouraging to observe that people even pay for the urinal services and instead of going for open urination around the River Front areas.

Advantages of community based management for bathing ghat are:

- Regular and close watch on the problems issues and functioning of staff
- Good rapport with the community because of close association in the area.
- Temple Committee Localized approach and system of revenue collection and management.
- The O&M staffs are from within the community area, which has also control over the user groups.
- The active participation of people from the local area in the maintenance and cleanliness also had a noticeable effect on the motivation of residents and other user groups leading to better participation and cooperation in the management of cleanliness of facility and area.

3.3.2 Cremation

Many improved wood crematoria and some electric crematoria were constructed in YAP-1 and GAP-1. The usage of these facilities was evaluated in many studies such as SAPI study by JBIC, Centre for Social Research. The followings are key issues of improved wood crematoria in these studies.

- People expressed their preference for traditional crematoria over electric crematoria due to religious reasons, even though they knew the advantage of using electric crematoria, such as cheaper, less time and less pollution.
- Religious resistance for the electric crematoria and improved wood crematoria on the Hindu faith such as the elevated from ground, use of iron materials, comes and this should be changed if the use of these facilities is encouraged.
- The information dissemination regarding the cost, time and environmental effectiveness should be broadly informed to people, so that people aware the advantage of using electric and improved crematoria.
- The improved wood crematoria constructed under YAP are seldom used due to the design, the gap between the horizontal iron bars on which the dead bodies are supposed to be placed is too big and burned bones fall down.
- The improved wood crematoria saves the amount of wood, however, people do not want to compromise on the quantity of wood to be used for cremation of their near and dear ones.
- Correcting the inadequacies observed and spreading awareness could improve usage.

In Mathura, different from the above situation, improved crematoria is reported to be 100 % utilised (JICA Study Team [2004b]). This crematorium operated by community and has all the basic amenities such as sitting arrangement, prayer room, and hall for relaxation, drinking water, shower and water pump to clean the ashes after cremation. The entire area is very well maintained and clean, 3 regular staffs manage it. The fund mobilization is through voluntary contribution of the members and donation by general public and keen of the deceased who come to attend the funeral. Major issues observed to be the key elements of highly using is:

- Effective maintenance of the cremation place and popularity of wood based crematoria among various segments of population
- Higher consciousness for environment and pollution especially among the educated class
- The special interests and efforts by O&M agency. The staff and attendants communicate to users about the improved wood crematoria and its advantages like time save and their perception on being environment friendly.

There is another good example in West Bengal. Highly used electric crematoria is operated and

maintained by private contractor, which has responsibility of over all operation and maintenance that includes the electric operation and the cleanliness of the facilities. The key issue of good maintenance and highly usage is:

- Well-controlled and accountable system of O&M. The cost factors which is comparatively very less for the general maintenance like cleanliness, staff salary and others, also provides stimulus to the Municipal Organization for an effective monitoring and prompt maintenance.
- Active and continuous initiatives and participation of the Municipality leads to a very significant impacts on the user groups and general public, making the facility very popular. The local municipality disseminates the messages regarding the availability and advantages of electric crematoria among the people through its representatives such as ward inspectors, councillors at regular intervals.
- There is involvement of community-based organizations in the publicity of the facility and also public education, which is more close to the community and capable of influencing the public behaviour and practices.

3.3.3 Dhobi Ghat

As described above in existing condition, some constructed dhobi ghats are used at optimum level, but most of them are used by less number than expected. From the past experience of four cities, the key factor of success is described below:

- Plan should be considered based on the demand / need of dhobis
- Dhobis should be involved at the beginning of design and O&M planning
- O&M should be done by dhobi themselves or their association, and ownership of dhobis is important

3.4 RECOMMENDATIONS AND PROPOSED PLANS/PROGRAMS

3.4.1 Objectives of Ghat Sanitary Improvement Plan/Programs

In-river activities at ghats includes bathing, washing cattle in the rivers, washing of clothes, throwing of half-burnt/un-burnt dead bodies and offering of flowers, fruits, dumping of solid waste, etc into the river.

The pollution contribution from in-river activities is rather insignificant. However, these factors directly and indirectly influence the hygienic and aesthetics conditions of the river front and the hygienic and sanitary conditions at ghats are not satisfactory.

The objectives of ghat sanitary improvement plan/program are;

- To improve unhygienic and unsanitary conditions in ghats and
- To reduce non-point pollution

To tackle non-point source pollution and improve unhygienic conditions in the ghats, the following non-sewerage measures will be discussed;

1) Low cost sanitation schemes to reduce pollution load into the river and to improve hygienic conditions of bathing people through reduction of open defecation/urination
2) Construction of dhobi ghats to reduce pollution of washing cloths through prevention of commercial laundry activity along the river
3) Electric and improved wood crematoria to improve hygienic conditions of bathing people through eliminating throwing of un-burnt / half-burnt dead bodies into the river
4) Management of dumping of solid waste to maintain better hygienic conditions
5) Management of cattle wallowing to maintain better hygienic conditions

3.4.2 LCS Program

(1) Planning

The current number of CTCs in the ghat area is not enough and open defecation and urination is rampant in ghats. Appropriate number of CTC in the suitable places is required. The O&M and the conditions of existing CTCs are also not satisfactory. As explained in previous section, existing LCS programs show disappointing results because most of the programs adopted a supply-driven approach.

To provide CTC in ghat areas, it is recommended that new sanitation facilities should be planned and constructed based on the demand and needs of users, but not supply driven. The demand-driven LCS program is proposed to provide appropriate sanitation mode for the communities without toilet. The proposed LCS program is composed of;

1) Implementation of pilot project

(i) Preparation of a standard framework of planning and designing, in which needs and demand of slum dwellers shall be reflected and by which a technically, institutionally, financially, economically and environmentally feasible and sustainable plan can be selected
(ii) Application of this framework to some slum communities to prepare an appropriate sanitation plan and design
(iii) Implementation of pilot project

2) Implementation of full scale project, if the pilot project succeeds

(i) Extending this framework to all the ghats in four cities and prepare a appropriate plan
(ii) Implementation of the plan.

The proposed procedure of pilot project and full scale project to provide CTC in slum areas area was described in Low Cost Sanitation of Chapter 2. The same procedures should be adopted to CTC in ghat area.

This plan shall be carried out for Varanasi and Allahabad, where the demand of CTC is high because of the large number of visitors in the ghats.

(2) Cost Estimation

Table 3.3 Cost Estimation of Pilot Project of LCS Program for Ghat in Allahabad and Varanasi

Item	Cost (Rs. thousand)
Construction cost (600,000@2 CTC)	1,200
Cost of detailed design (15 %)	180
Physical contingency (20%)	240
Price contingency (10 %)	120
Training, campaign and evaluation of program	500
Total	2,240
2 Cities Total (Varanasi and Allahabad)	4,480

3.4.3 Dhobi Ghat

(1) Constructed Dhobi Ghat Program

To improve unsanitary condition in the bathing ghats caused by laundry washing activities, traditional dhobi ghats shall be moved to in inland area. However, the usage rate of existing inland facilities is not

satisfactory due to poor maintenance of the facility and improper provision of the facility. It is recommended that the facility should be planned and constructed based on the demands and needs of users but not supply driven approach. In planning, the following factors should be considered:

- Check the need / opinion of dhobis regarding constructed dhobi ghat
- Availability of land, water, disposal system
- Involve dhobis at the planning stage of facility, finance and O&M

The demand-driven Constructed Dhobi Ghat Program is proposed to provide appropriate laundry facility for dhobis. The proposed program is composed of;

1) Implementation of pilot project
   (i) Preparation of a standard framework of planning and designing, in which needs and demand of dhobis shall be reflected and by which a technically, institutionally, financially, economically and environmentally feasible and sustainable plan can be selected
   (ii) Application of this framework to some traditional dhobi ghats to prepare an appropriate plan and design
2) Implementation of pilot projects if the pilot project succeeds
   (i) Extending this framework to other traditional dhobi ghats and prepare a appropriate plan
   (ii) Implementation of the plan.

The proposed procedure of preparation of pilot project is shown in Figure 3.2.

1) Preparation of Pilot Project

Step 1: Selection of traditional dhobi ghats
- Two dhobi ghats
- Selection of dhobi ghats shall be consulted with relevant organizations such as Nagar Nigam, UP Jal Nigam, and Development Authority.

Step 2: Baseline Survey of Dhobi ghats
The data / information written below should be collected through personal interview, questionnaire survey, etc.
- Present conditions of traditional dhobi ghats
- Need for constructed dhobi ghat
- Approx proposed location for constructed dhobi ghat
- Institutional arrangement

Step 3: Design (Preparation of Preliminary Alternatives)
The alternative plans of constructed dhobi ghat with advantages and disadvantages considering the results of baseline survey
- Design alternatives
- Water supply, wastewater disposal
- Cost and benefit
- O&M plan
- Others

Step 4: Holding the Workshop (Need Assessment Survey)
The workshop should be held to identify the needs and demand of the dhobis, showing the alternatives. All the stakeholders such as Dhobi Association, dhobis, Jal Sansthan, Nagar Nigam, other related organizations should be invited.
- Show design alternatives
- Motivation to use the constructed dhobi ghats
- Operation and maintenance plan
- Willingness to move to the constructed dhobi ghats

Step 5: Detail Design Planning

Based on the results of workshop, prepare an appropriate plan

- Facility with preliminary design drawing
- Construction and O&M cost estimation
- Financial and O&M plan
- Environmental considerations
- Others

Step 6: Holding of workshop
The workshop should be held to show the plan to the stakeholders and obtain comments, and consensus.
Step 7: Finalisation of plan and design

2) Implementation of Pilot Project

Step 8: Implementation of 5 sanitation facility plan as a pilot base
Step 9: O&M training and hygiene/environmental education campaign
Step 10: Evaluation of the usage of constructed sanitation facility

3) Preparation of Guidelines and Manuals

The Guidelines and Manuals shall include followings:

- Standard methodology and approach to shift dhobighat from the Ghat area
- Technical alternatives including standard drawings
- Wastewater disposal options
- O&M aspects
- Cost and Benefits
- Tariff level, user charge, cost recovery
- Institutional setting up
- Environmental Considerations
- Monitoring system for sustainability
- Public participation and awareness plan

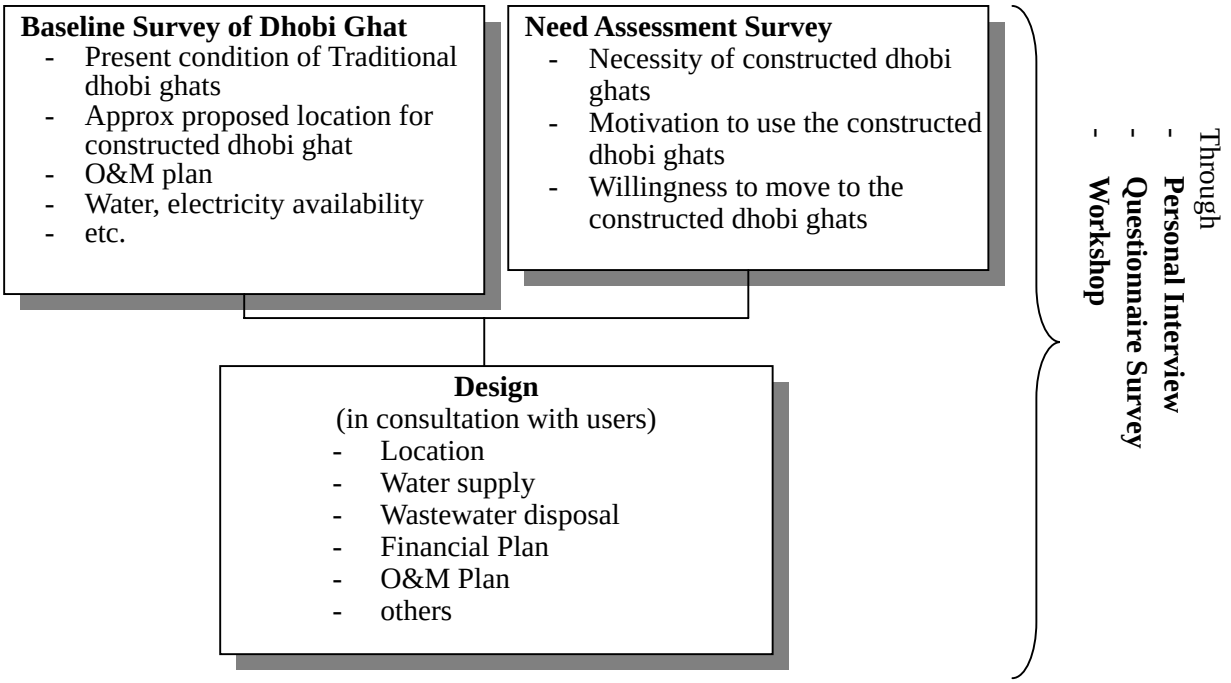


Figure 3.2 Design Flowchart of Constructed Dhobi Ghat

(2) Implementation Schedule and Cost Estimation

1) Unit Cost Estimation

The unit costs of construction for Constructed Dhobi Ghat are estimated as follows.

Table 3.4 Unit cost of 5 numbers of Constructed Dhobi Ghat

Items	unit cost per (1000 Rs.)
Civil works	172
Installation of submersible pump	44
Total	216
Base year 2003 (15 % price increase assumed)	250

Source: DUDA Kanpur, as of Sept 2000.

2) Implementation Schedule

The following schedule is proposed to implement Constructed Dhobi Ghat Program.

Table 3.5 Implementation Schedule of Constructed Dhobi Ghat Program

Item	2005	2006	2007	2008	2009	2010
1. Pilot project						
i) Preparation		—				
ii) Implementation		—	—			
iii) Training, campaign and evaluation			—			
2. Full scale project						
i) Preparation			—	—		
ii) Implementation				—	—	

3) Implementation Cost of Pilot Project

The following costs are estimated for Pilot Project of Constructed Dhobi Ghat Program.

Table 3.6 Implementation Cost for Pilot Project of Constructed Dhobi Ghat Program

Item	Cost (Rs. thousand)
Construction cost (250@4sets@2 locations)	2,000
Cost of detailed design (15 %)	300
Physical contingency (20%)	400
Price contingency (10 %)	200
Evaluation of program	500
Total	3,400
4 city total	13,600

Base year: 2003

3.4.4 Recommendations of Solid Waste Management in Ghat Area

As described in the previous section, solid waste management is the major issues in the Ghat area as well as the whole city area. The recommendations for improvement of solid waste management for the whole cities are described in Volume III-7. The following measures should be considered for ghat area.

(1) Dustbins and Garbage Boxes

Appropriate numbers of dustbins and garbage boxes at suitable places shall be installed in ghats and solid waste shall be collected by sweepers of Nagar Nigam periodically. The places and numbers should be decided in consultation with stakeholders; users, priests, pilgrims, etc.

(2) Hygiene and Environmental Education

Awareness programmes are required to use dustbin and garbage box for disposal instead dumping on the public spaces. Hygiene and environmental education is discussed in Volume III-6.

(3) Solid Waste Management System

The periodical cleaning and collection of solid waste in the ghats are required by Nagar Nigam. However, due to the paucity of fund of Nagar Nigam for solid waste management, a new management system of solid waste management for the ghat area may be appropriate to be developed, where NGO, CBO, or private company partnership system for regular cleaning and collection of waste without heavily relying on Nagar Nigam.

3.4.5 Recommendation for Cremation Ghat

The results of the public awareness survey and inventory survey and the experience in existing River Action Plans indicate that the electric and improved wood crematoria are not popular among the Hindu people, even they are aware of the facilities and advantage. It is recommended that new electric and improved wood cremation facilities be not constructed, unless awareness and acceptance of existing facilities enhance and the usage rate is increased. Therefore, awareness program to enhance the use of electric and improved crematoria are recommended.

The people need to be made aware of the new technology for the cremation of dead bodies. Since it is a very sensitive matter, if people feel the new technology hurts their religious sentiments and feelings, then it is very difficult to convince them to use. It may be required to involve religious leaders for awareness program. In addition, community level programmes also help to increase awareness. Plays and nukkad nataks can be organised to highlight issues such as how much money and time and how much volume of woods can be saved by using electric and improved wood crematoria. Local governments require checking the present technological anomalies, repairing the facilities and maintaining the same properly. The improvement of power supply is a prerequisite of provision of electric crematoria.

When the awareness and acceptance of electric crematoria are enhanced and the demand of facilities is increased, local governments should consider construction of new electric crematoria.

Improved wood crematoria, if required, can be introduced on pilot base to check the people's awareness and acceptance.

3.4.6 Prevention of Cattle Wallowing

The cattle owners would move their cattle to another place, if the facility such as ponds / Kunds for cattle wallowing is provided nearby their activities. The location of such facilities should be decided, if available, in corporation with local governments and cattle owners. If existing ponds and tanks are available but without proper water supply, the rehabilitation should be carried out. It's also necessary to increase awareness of cattle owners through public awareness campaign that cattle wallowing in the river cause unhygienic conditions for bating people as well as pollution of river water. There is currently no organised system and association to control and manage cattle wallowing, thus such monitoring system should be organised by Nagar Nigam.

[Reference]

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Appendix A

Appendix A.1 Survey Results of Sample Facility Survey of Low Cost Sanitation

Table 1 Inventry Data of Public Toilets in Lucknow City

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	Approx. No. of users/day for WC	Impression of surveyor (conditionof maintenance)
		M	F								
NN 1	Zoo (Inside)	7	3	3	Y	Y	Sewer Line	Sulabh International	Both	300-400	
NN 2	High Court	7	3	5	Y	Y	Sewer Line	Sulabh International	Non Resident	300-400	
NN 3	Udal Ganj	7	3	4	Y	Y	Sewer Line	Nagar Nigam	Resident	500-600	Hygienic & Well keep
NN 4	Takia Munshiganj	6	4	3	Y	Y	Sewer Line	Sulabh International	Non Resident	500-600	
NN 5	Fatima Hospital	5	5	5	Y	Y	Septic Tank	Sulabh International	Both	350-400	
NN 6	Alankar Takies	12	14	3	Y	Y	Sewer Line	Sulabh International	Both	500-550	
NN 7	Alambagh	12	6	6	Y	Y	Sewer Line	Nagar Nigam	Both	200	Unhygienic & illmaintained
NN 8	Mankemeshwar Mandir	6	5	5	Y	Y	Sewer Line	Sulabh International	Resident	70-100	
NN 9	Bhandeva	7	4	3	Y	Y	Sewer Line	Sulabh International	Both	300-400	
NN 10	Prag Narain Road	16	11	0	Y	Y	Septic Tank	Sulabh International	Resident	170	No provision of Bleaching powder, complaint of non cooperation from public.
NN 11	Aminabad	Under Renovation									
NN 12	Bairampur Hospital	14	2	8	Y	Y	Septic Tank	Sulabh International	Both	400-500	
NN 13	Queen Merry	16	4	6	Y	Y	Sewer Line	Sulabh International	Both	1200-1300	
NN 14	Medical College	3	2	3	Y	Y	Sewer Line	Sulabh International	Non Resident	30-50	
NN 15	Clay Square	5	2	3	Y	Y	Septic Tank	Nagar Nigam	Both	50	Maintained & Clean
NN 16	Qauserbagth	6	4	2	Y	Y	Sewer Line	Sulabh International	Both	200-300	
NN 17	Ram Nagar	6	4	2	Y	Y	Septic Tank	Sulabh International	Both	180	Clean & Hygienic
NN 18	Chhitwapur	8	6	0	Y	Y	Sewer Line	Sulabh International	Both	150-200	
NN 19	Charbagh Bus Stand	7	3	3	Y	Y	Sewer Line	Sulabh International	Both	500-600	
NN 20	Nishatganj	7	3	2	Y	Y	Sewer Line	Sulabh International	Non Resient	300-400	
NN 21	Neel Mattha	7	3	2	Y	Y	Septic Tank	Nagar Nigam	Non Resient	5-10	Request not maintained, using for personal housing, remains locked, dirty, unhygienic, not well kept, low facility
NN 22	Telibagh	6	4	1	N	Y	Septic Tank	Sulabh International	Both	50-100	
NN 23	Ahibaranpur	6	4	4	Y	Y	Sewer Line	Sulabh International	Resident	300-400	
NN 24	Chakpurwa	6	5	2	Y	Y	Septic Tank	DUDA	Both	300	C - T- Dinesh Pasi, Well maintenance & hygienic
NN 25	Timea of India	7	3	4	Y	Y	Sewer Line	Sulabh International	Both	400-500	
NN 26	D.M Office	7	3	3	Y	Y	Sewer	Sulabh International	Non Resident	300	Dirty & Unhygienic
NN 27	Buttler Palace	5	3	5	Y	Y	Sewer Line	Sulabh International	Both	150-200	
NN 28	Aminabad-2	18	6	5	Y	Y	Sewer Line	Sulabh International	Both	500-600	
NN 29	Rajajipuram Rekandipur	6	4	2	Y	Y	Septic Tank	Sulabh International	Non Resident	200-300	
NN 30	Pata Nala-1	16	4	7	Y	Y	Sewer	Sulabh International	Both	300	Hygienic, Well kept maintantained
NN 31	Chhitwapur-2	8	4	4	Y	Y	Sewer Line	Sulabh International	Both	200-300	
NN 32	Pata Nala-2	Not Found									

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	Approx. No. of users/day for WC	Impression of surveyor (conditionof maintenance)
		M	F								
NN 33	Sarkata Nala	12	3	6	Y	Y	Septic Tank	Sulabh International	Both	400	Dirty & Unhygienic
NN 34	Nirala Nagar	5	3		Y	Y	Septic Tank	Sulabh International	Resident	100-200	
NN 35	Akashvani	6	3	3	Y	Y	Sewer Line	Sulabh International	Both	250-300	
NN 36	Halder Canal	6	4	0	Y	Y	Septic Tank	Sulabh International	Resident	100	Dirty & ------- Maintained
NN 37	Buttler Palace	5	3	5	Y	Y	Sewer Line	Sulabh International	Both	150-200	
NN 38	Vazirganj	2	1	2	Y	Y	Sewer Line	Railway	Non Resident	150-250	
NN 39	Qaiserbagh Lat Chauraha	6	4	2	Y	Y	Sewer Line	Sulabh International	Both	250-300	
DA 1	Transport Nagar	11	9	2	Y	Y	Septic Tank	Development Authority	Both	250	Caretaker keeping the place clean & highly clean. Job is satisfactory & commendable.
DA 2	Fatehpur	7	4	3	Y	Y	Septic Tank	Sulabh International	Both	300-400	
DA 3	Hata mata Din	Not Found									
DA 4	G.P.O	10	2	9	Y	Y	Sewer Line	Sulabh International	Non Resident	100-150	
DA 5	Narhl	7	3	3	Y	Y	Sewer	Nagar Nigam	Resient	260	Unhygienic not well keep uncooperation
DA 6	Aminabad	5	4	4	Y	Y	Sewer Line	Sulabh International	Both	500-600	
DA 7	Rajendra Nagar (Raniganj)	12	4	3	Y	Y	Septic Tank	Sulabh International	Both	120	Clean & well maintained. Good & Clean Bathroom but caretaker say there is not any cooperation from Govt. & Local Authorities. Water was not available due to
DA 8	Aishbagth	8	4	4	Y	Y	Septic Tank	Sulabh International	Both	200-300	
DA 9	Kalaarbagh	16	4	3	Y	Y	Septic Tank	Sulabh International	Non Resident	400-500	
DA 10	Kail Charan	16	3	5	Y	Y	Septic Tank	Development Authority	Non Resident	600-750	
DA 11	Purania	70	3	5	Y	Y	Septic Tank	Sulabh International	Both	400	No maintenance material is being provided from DA all the money amount 350/- is given to Mr. Ashok Mall as tender for the
DA 12	Mavaiya	6	4	3	Y	Y	Septic Tank	Sulabh International	Both	300-400	
DA 13	Charbagh (Gurunanak)	15	5	8	Y	N	Sewer Line	Sulabh International	Both	500-600	
DA 14	Kursi Road	7	3	2	Y	Y	Septic Tank	D.A. (Secy.)	Both	150	Well kept hygienic
DA 15	Campbal Road	6	4	2	Y	Y	Septic Tank	Sulabh International	Both	125-150	
DA 16	Kailas Kunj	8	4	4	N	Y	Sewer Line	Sulabh International	Resident	300-400	
DA 17	Kanpur Road	7	3	3	Y	Y	Sewer	Sulabh International	Both	125	Clean & Hygienic
DA 18	NER Stadium	6	4	3	Y	Y	Sewer Line	Sulabh International	Non Resident	200-300	
DA 19	Hathi Khana	6	4	3	Y	Y	Septic Tank	Sulabh International	Both	300-450	
DA 20	Radha Gram	6	4	3	Y	Y	Septic Tank	Sulabh International	Both	30-50	
DA 21	Gomti Nagar-1	7	3	3	Y	Y	Septic Tank	Sulabh International	Both	50-100	
DA 22	Jankpuram-1	7	3	4	Y	Y	Sewer Line	Sulabh International	Resident	400-500	
DA 23	Rairtoasera	Not Found									

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	Approx. No. of users/day for WC	Impression of surveyor (conditionof maintenance)
		M	F								
DU 1	Lavakush Nagar	20	10	6	Y	Y	Bio Gas	Sulabh International	Resident	200	
DU 2	Rahim Nagar	18	12	2	Y	Y	Bio Gas	Sulabh International	Resident	150	Caretaker & Govind & Contractor Jai Kishan an keeping the unit well & clean & need commandation
DU 3	Lalkuwan	6	4	4	Y	Y	Septic Tank	Sulabh International	Resident		
DU 4	Lucknow Montessori	6	4	4	Y	Y	Septic Tank	Sulabh International	Resident	200	
DU 5	Hebluck Road	6	4	2	Y	Y	Septic Tank	Sulabh International	Resident		
DU 6	Beidari Lane	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	200	
DU 7	Hanuman Satu	6	4	4	Y	Y	Septic Tank	Sulabh International	Non Resident	90	Unhygienic & ill maintained
DU 8	Chopar Hospital	6	4	4	N	Y	Septic Tank	Sulabh International	Resident	100	
DU 9	Indir Nagari	6	4	4	Y	Y	Septic Tank	Sulabh International	Non Resident	175	
DU 10	Babboo Wall Gali	6	4	6	Y	Y	Septic Tank	Sulabh International	Resident	150	Well kept (Caretaker Mangoolal) (Tank Leakage)
DU 11	Choti Jugoll	6	4	4	N	Y	Septic Tank	Sulabh International	Resident	165	
DU 12	Ashrafabad	6	4	4	Y	Y	Septic Tank	Sulabh International	Non Resident	300	
DU 13	Hanuman Mandir	6	5	4	N	N	Sewer	Sulabh International	Non Resident	500	Clean & maintained
DU 14	Daulatganj (New Haiderabad)	6	4	4	N	Y	Septic Tank	Sulabh International	Resident	150	
DU 15	Dhobiyana	6	4	4	Y	Y	Septic Tank	Sulabh International	Non Resident	250	
DU 16	Khayaliganj	6	4	2	N	Y	Septic Tank	Sulabh International	Non Resident	300	
DU 17	Kudiaghat	6	4	0	N	Y	Septic Tank	Sulabh International	Resident	60	Not maintained
DU 18	Tahkurganj	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	175	
DU 19	Matabadal Hata (Tehrt Pulia)	6	4	4	Y	Y	Septic Tank	Sulabh International	Non Resident	350	
DU 20	Purenla	6	4	4	Y	Y	Septic Tank	Sulabh International	Both	375	
DU 21	Sarai Haaanganj	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	150	
DU 22	Niartinpurwa (Gomtinagar)	6	4	2	Y	Y	Septic Tank	Sulabh International	Resident	200	
DU 23	Ishwari Khare	6	4	2	N	N	Septic Tank	Sulabh International	Resident	75	
DU 24	Chillawan	6	4	3	Y	Y	Septic Tank	Sulabh International	Resident	90	
DU 25	Amausi	5	2	1	N	Y	Septic Tank	Sulabh International	Resident	70	Clean & Well maintained
DU 26	Barudkhana	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	150	
DU 27	Miahri Bagh	6	4	3	Y	Y	Septic Tank	Sulabh International	Resident	175	
DU 28	Rajendra Nagar-1	17	6	5	Y	Y	Sewer Line	Sulabh International	Both	500-600	
DU 29	Ishmalloganj (Munshipurwa)	6	4	3	Y	Y	Septic Tank	Sulabh International	Resident	150	
DU 30	Bhadi Khana	6	4	3	Y	Y	Sewer Line	Sulabh International	Non Resident	250-300	
DU 31	Bashtauil (Bhoot Nath)	6	4	4	Y	Y	Septic Tank	Sulabh International	Non Resident	400	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	Approx. No. of users/day for WC	Impression of surveyor (conditionof maintenance)
		M	F								
DU 32	Kasaila	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	75	
DU 33	Bapu Nagar	8	2	0	Y	Y	Septic Tank	Sulabh International	Resident	90	Dirty under renovation (Subash Prasad)
DU 34	Baraulia	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	130	
DU 35	Ghaslana	6	4	2	N	Y	Septic Tank	Sulabh International	Both	200	
DU 36	Gaughat	12	8	6	Y	Y	Septic Tank	Sulabh International	Resident	150	Maintained & Clean, Lekage in tank (Care taker- Mangoolal)
DU 37	Shram Vihar Nagar	6	4	2	N	Y	Septic Tank	Sulabh International	Resident	150	
DU 38	Kailan Kilat	6	4	2	N	Y	Septic Tank	Sulabh International	Non Resident	200	
DU 39	Ambedkar Raity Sthal	10	10	6	Y	Y	Septic Tank	Sulabh International	Non Resident	50	
DR 1	Khatikanapee	Not Found									
DR 2	Chintta Khara	7	3	3	Y	Y	Septic Tank	Sulabh International	Both	550	There is no salary for staff and facing problem in maintaining the site. Clean & well kept place.
DR 3	Barabirwa	10	3	3	Y	Y	Septic Tank	Sulabh International	Both	800-900	
DR 4	Itaunza	5	5	2	N	N	Septic Tank	Sulabh International	Both	0	
DR 5	Qaiserbagh 15 seat	6	4	5	Y	Y	Sewer Line	Sulabh International	Both	500-600	
DR 6	Bakhshi Ka Taiab	2	1	0	N	N	Septic Tank	Sulabh International	Non Resident	50-100	
DR 7	Shyama Pd. Mukherji Hospital	6	4	4	Y	Y	Sewer Line	Sulabh International	Both	350-400	
DR 8	Rajajipuram Taxi Stand	6	4	2	Y	Y	Septic Tank	Sulabh International	Non Resident	200-300	
DR 9	Saadatganj	6	4	5	Y	Y	Septic Tank	Sulabh International	Non Resident	380	Tank is full & need immediate cleaning. Non co-operation from government.
DR 10	lohla Park	6	4	5	Y	Y	Septic Tank	Sulabh International	Non Resident	800-900	
DR 11	Medical College	16	4	6	Y	Y	Sewer Line	Sulabh International	Both	1200-1400	
DR 12	Medical College	7	3	4	Y	Y	Sewer Line	Sulabh International	Both	250-300	
DR 13	Mallhabad	6	4	5	Y	Y	Septic Tank	Sulabh International	Both	30	This toilet is 38 km (one side) from Lucknow it is situated inside the hospital complex of Mallhi habad. The place is not reachable to common user is not used by villagers. Maintained is zero.
DR 14	Mohanlal Ganj	7	3	2	Y	Y	Septic Tank	Sulabh International	Non Resident	70-80	
DR 15	Garhi Peer Khari	6	4	3	Y	Y	Sewer Line	Sulabh International	Both	100-200	
DR 16	Maidan Elatch Khan	Closed & Locked									
DR 17	mohinipurwa	6	4	3	Y	Y	Septic Tank	Sulabh International	Both	50-100	
DR 18	Gopal Purwa	6	4	3	Y	Y	Septic Tank	Sulabh International	Resident	500	Unhygienic & dirty Directly near the complex
DR 19	Basheratganj	Closed									
DR 20	Odian Cenima	6	4	3	Y	Y	Sewer Line	Sulabh International	Both	450-500	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	Approx. No. of users/day for WC	Impression of surveyor (conditionof maintenance)
		M	F								
DR 21	munehi Purwa	Not Found									
DR 22	niraia Nagar Bartan Bha??	5	3	0	Y	Y	Septic Tank	Sulabh International	Resident	100-200	
DR 23	Martinpurwa	3	2	0	Y	Y	Septic Tank	Sulabh International	Resident	80	Clean & Well maintained
DR 24	P.R.D.	6	4	3	Y	Y	Septic Tank	Sulabh International	-	100-150	
DR 25	rakabganj	Not Found									
DR 26	Chtki Bhandai	6	5	4	Y	Y	Sewer Line	Sulabh International	Resident	25-50	
DR 27	Bangla Bazar	3	3	1	Y	Y	Septic Tank	Sulabh International	Both	25	Illmaintained, very dirty, not clean. Caretaker says he is paying 400/month to local coorporation, No provision of cleaning material.
DR 28	Chhitwapur	7	4	1	Y	Y	Sewer Line	Sulabh International	Both	150-200	
OT 1	Unitech -1	5	5	0	Y	Y	Septic Tank	Unitech	Both	20-25	
OT 2	Unitech-2	5	5	0	Y	Y	Septic Tank	Unitech	Resident	20-25	
OT 3	Gaushala	7	3	5	Y	Y	Septic Tank	Sulabh International	Both	500-600	
OT 4	library	7	3	4	Y	Y	Sewer Line	Sulabh International	Both	200-250	
OT 5	Balmiki Mohal	6	4	6	Y	Y	Septic Tank	C. Board	Resident	M - 150 - 200 F - 50 - 100	Unhygienic & non-cooperation & locked by caretaker - Dirty & Dmgy maintained.
OT 6	Lakri Mohal	6	3	3	Y	Y	Septic Tank	Sulabh International	Both	150-200	
OT 7	Top Khana	7	3	3	Y	Y	Septic Tank	C. Board	Both	M - 40 - 45 F - 60 - 75	Not maintained properly & unhygienic conditions prevail.
OT 8	Mahila Hospital	3	2	3	Y	Y	Sewer Line	Sulabh International	Both	35-50	
OT 9	Mankameshwar Mandir	6	4	2	Y	Y	Septic Tank	Sulabh International	Resident	65	Unhygienic & Dirty
OT 10	Zoo	5	3	2	Y	Y	Sewer Line	Nagar Nigam	Non Resident	100-150	
OT 11	mandi	16	4	5	Y	Y	Septic Tank	Sulabh International	Resident	800-900	
OT 12	Alam Nagar	6	4	2	Y	Y	Septic Tank / Sewer Line	Sulabh International	Non Resident	200-300	
OT 13	Indira Nagar	22	7	6	Y	Y	Septic Tank	Neda	Both	150-300	
OT 14	Shahnazaf Complex	3	2	0	Y	Y	Septic Tank	Trust	Resident	680	Very dirty & ill maintained

Note:

NN Nagar Nigam
DA Development Authority
DU DUDA (District Urban Development Agency)
DR DRDA (District Rural Development Agency)
OT Other Agency

Table 2 Inventory Data of Dhobi Ghat in Lucknow City

Sl. No.	Name of Dhobi Ghat	No. of unit	No. of Users /day	User fee	Water Supply	Waste water Desposal	O&M Organization	Remarks
[Constructed]								
1	Villoch Pura	110	175	No	DUDA Boring	Drain to Gomti River	Samiti & DUDA	-
2	Panni Wali Gali (Chowk)	65	60-65	No	DUDA Boring	Drain to Gomti River	Samiti & Samaj	
3	Para Gram, Ring Road	Under Construction						
[Traditional]								
1	Bauage (Left Bank)	5	10	No	River water	into river	None	Pacca Ghat Should be constructed & Security with drawing
2	New Hyderabad (Left bank)	22	50	No	River water	into river	Dhobi Samiti	Propel Steps & Press Room should be constructed proper license should be given.
3	Hanuman Setu Ghat	40	80	Yes (Same Pay)	River water	into river	-	-
4	Kudiya Ghat	55	250	No	River water	into river	Dhobi Samaj Kalyan Samiti	This is Traditional Dhobi ghat. Dhobies are generally involved in Chicken Cloth Washing coming from adjoining Chicken Industry of Hussainabad Trust. Dhobies Suggested that due to renovation work of Kala Kothi Ghat by Lucknow Nagar Nigam the place is being evacuated.
5	Antip ghat	100	300	No	River water	into river	Dhobi Samaj Kalyan Samiti	Basically 90% work is of Chicken Cloths. This Ghat lies on a large area, Dhobies requires development steps for their betterment.
6	Baloo Wala Ghat	50	50	No	River water	into river	None	This Ghat lies on Daliganj Area. Due to sand (Balloo) Dhobies are facing certain problems and requires a pucca constructed Dhobi Ghat. Electricity should also be provided.
7	Raj Ghat	17	30	No	River water	into river	None	Bank of th river becomes muddy which is the basic problem of dhobies. No. of Patte (Unit) should be increased so that more work can be done.
8	Gau Ghat	70	70	Rs. 10/- per	River water	into river	Gau Ghat Dhobi Samiti	Requires Pucca construction with proper electricity and water supply.
9	Pakaria Ghat	50	60	No	River water	into river	Rajak Sudhar Samiti	Here water is very dirty, Dhobies need a pucca constructed
10	Pakka Pul	60	40	No	River water	into river	Dhobi Samaj Kalyan Samiti	Adjoining area is very dirty, should be cleaned.
11	Potora Ghat	50	15	No	River water	into river	None	The ghat should be converted into a pucca constructed dhobi ghat with proper water and electricity. More attention should be taken for betterment.
12	Rauza Ghat	55	5	No	River water	into river	None	The Ghat Lacks of electricity and water facility therefore work time is limited (Sunrise to Sunset)

Table 3 Inventory Data of Bathing Ghat in Lucknow City

Sl. No.	Name of Ghat	Constructed Steps	Changing Room	Public Toilet	O&M Organization	Monthly O&M Cost	No. of Users/day	Sanitary Hygiene Condition, other problems	Requirement to be improved
1	Kudia Ghat	Under Improvement	No	Yes	Nagar Nigam	0	125	Dirty & habited by people, Cattle wallowing is there	Well known traditionally old ghat undergoing massive improvement and expansion well as beautification by Lucknow Development Authority. The project is so massive and good that once completed will be an eye opener for people of Lucknow. The Ghat (existing one) lacks changing rooms and approach road (under construction in Improvement plan) can be presented as an eye opener to visitors in Lucknow.
2	Rastogi Ghat	Yes	Yes	No	Nagar Nigam	500	150	Clean & Hygienic	This is also an old ghat presently in shadfly maintained lack Public Amenities and facilities need steps and approach road to beautify the space also suggested are anti enchrochment by the authorities. Situated just apposite the Medical Collage a premier institute of Uttar Pradesh.
3	Lalloo Mal Ghat	No	No	Yes	Lalloo Mal Bhagwan Das Agency	5,000	100	Dirty, unhygienic and not in well keep, Dirty toilet	This is a old religious ghat built by Late Shri Lalloo Mal Ji in dedication to Public Service, Dharamshala also been operational.
4	Shankar Bhawan Ghat	Yes	No	No	N.A.	N.A.	10	ill maintained & unhygienic	Can be improved with total revamping solution
5	Pipra Ghat	No	No	No	Canttonment Board	N.A.	15	ill maintained & unhygienic	Can be improved a potential to be construed into a tourist spot as it is near to Sahara Estate and has Vast Open space.
6	Kaliesh Puri Ghat	No	No	No	Mandir Samiti	N.A.	15	Natural Ghat no steps or rooms available can be constructed into a tourist decimation	Steps, Parking Space, Changing Room, Beautification, Approach Road.
7	Krondha Ghat	Yes	No	N.A.	Nagar Nigam	2,500	50	Unhygienic Condition, Damaged	Changing Room & Public Toilet has to be improved & added to the convinience of population
8	Shukla Ghat (Pucca Pul)	No	No	No	Vijay Mishra Samiti	2,000	200	Unhygienic Condition, Damaged, Used for personnal	Public Toilet and changing room should be provided
9	Maharaja Agrasen Ghat (Dali Ganj)	Yes	No	Yes	Samaj Samiti	750	50	Steps are there & not well kept need Improvement	Can be improved & made into a attraction spot. (Near Dali Ganj)

Table 4 Inventory Data of Crematoria in Lucknow City

Sl. No.	Name	LOCATION	No. of Unit	Time to burn / body	Status	O&M Oraganization	Operation (hrs)	Cost / body	Monthly O&M Cost (Rs.)	No of users /month	To be improved
1.	Gulala Ghat	Daulatganj	Conv. = 42	3-5 hrs	In use	LDA (Contract)	5 AM to 5 PM	Rs. 850 - 1,250	50,000/-	150 to 200	See comments
2.	Satya Ghat, Bala Gar	Balaganj	Conv.= 10	4 hrs	In use	Don't Know (LNN)	9 AM to 5 PM	Rs. 600/- per body	N.A.	10 to 15	Approach road and lighting (Worst Condition)
3.	Bai Kunth Dham (Bhaisa Kund)	Hajaratganj, Pa	Conv. = 20	3.5 hrs	In use	Sahara & Nagar Nigam	5 AM to 6 PM	Rs. 800/-	N.A.	500 to 1000	This is the most Preferred and sought after cremation Ghat in Lucknow not only by Local Population but also but the
4.	Pakri Ka Pul	VIP Road, Ala	Conv. =16	3 hrs	In use	Shanti Dham Sewa Samiti	8 AM to 5 PM	Rs. 800/-	1200/-	300 apprx	Parking Facility, Public toilets required, Beautification & other civic amendities, Good Road
5.	Electric Bekunth Dham	Bhaisa Kund	E.C.=3	3.5 hours	In Use	Nagar Nigam	8.00 AM to 6.00 PM	Rs 100 Rs. (for unclaimed body)	15000/-	40 to 50	Yearly Maintenance, Water Supply, Electric Supply

1. Gulala Ghat: Electric Crematoria should be added to the Ghats so as to benefit the poor people, step should also be constructed to beatify the place, Garden are also in place but lack of funds are hinderance to the maintenance, Shri Madan Lal Kapoor gave the above valuable suggestions. Public toilets can improved & added to the existing one. Approach road should be provided immediately. (No streetlight for safety). The amount of O&M cost is the figure which was told by the incharge Mr. Kapoor, as this amount of money is required to maintain this

2. Satya Ghat: Satya Ghat (Bala Ganj) - No approach road exist, the place is in itself dirty and unkept, No plateforms are there to burn the body. Most of time people say the place is encroched upon by the Drunkers. The place has the potential to be beautified & improved. The valuable suggestions were given by. Satyabir Singh, a relegious Pundit by proffession. The deplicable picture is because for last 10-15 years. No Funds have been made available for upkeep.

5. Electric Bekunth Dham: Generally it should take 1 to 1.5 hour but due to erractic Power supply and improper burning chambers it takes time. And that too result is not satisfactory. This is the rates as told by the attendant who is present there for Cremating the Bodies.As there was no senior person avilable for the information, The Amount (100/-) indicated in the column was told by a Junior Level staff. But on cross checking with other persons who were from the local Areas said this amount is for the Unclaimed Bodies. AS there is hardly any claimed body

Note: Conv.= Conventional Crematoria
E.C. = Electric Crematoria

Table 5 Inventory Data of Cattle Wallowing in Lucknow City

S. No.	Name of the Ghat	Approximate No. of Cattles per Day	Time			Ownership of the Cattles	Remarks
			9-12 AM	1-3 PM	4-6 PM		
1	Pipra Ghat	200	60	130	100	Shivpal Yadav Village (Near Lamatinier)	He said that there is no place in village to bath the cattle and feed the green fodder that is why he get the cattle daily here.
2	Kailash Ghat	15	-	15	-	Anjal Mishra	Residents of the Ghat that is why they use the place

Note : Only two ghats were found as per the information from Lucknow Nagar Nigam

Table 6 Inventory Data of CTC in Kanpur City

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
SI 1	Azad Nagar	15	6	6	Y	Y	Sewer	SI	Commuter	400	
SI 2	B.N.D.	6	5	4	Y	Y	Sewer	SI	Commuter	275	
SI 3	Badshahi Naka	21	10	5	Y	Y	Sewer	SI	Commuter	1500	
SI 4	Bhaisa Godam	10	10	5	Y	Y	Sewer	SI	Resident	600	
SI 5	Bhaira Ghat	7	4	4	Y	Y	Sewer	SI	Resident	275	
SI 6	Bajaria	18	7	11	Y	Y	Sewer	SI	Commuter	1100	
SI 7	Braham Nagar	12	8	5	Y	Y	Sewer	SI	Resident	700	
SI 8	Benajhabar	15	6	6	Y	Y	Sewer	SI	Resident	500	
SI 9	Babupurwa	14	8	7	Y	Y	Sewer	SI	Commuter	1100	
SI 10	Bagahi-1	14	6	6	Y	Y	Sewer	SI	Commuter	1000	
SI 11	Bagahi-2	12	8	5	Y	Y	Sewer	SI	Commuter	600	
SI 12	Banglow No. 115	6	5	1	Y	Y	Septic Tank	SI	Resident	220	
SI 13	Bhajja Purwa	12	7	4	Y	Y	Sewer	SI	Resident	600	
SI 14	Collectorgunj	32	20	15	Y	Y	Sewer	SI	Non-Resident	2500	
SI 15	Kuli Bajar	13	8	5	Y	Y	Sewer	SI	Commuter	700	
SI 16	Chataimohal	7	4	4	Y	Y	Sewer	SI	Resident	375	
SI 17	Choti Biwi Hata	14	6	2	Y	Y	Sewer	SI	Resident	500	
SI 18	Chaman Gunj	15	6	4	Y	Y	Sewer	SI	Commuter	700	
SI 19	Choti Gutaiya	10	6	5	Y	Y	Sewer	SI	Resident	450	
SI 20	Chuna Bhatia	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 21	Chabile Purwa	5	8	6	Y	Y	Sewer	SI	Resident	250	
SI 22	Bagahi Bhatta	7	4	4	Y	Y	Sewer	SI	Resident	275	
SI 23	Chandra Nagar	5	8	5	Y	Y	Sewer	SI	Resident	300	
SI 24	Chamdrika Lal Ka Hata	6	4	2	Y	Y	Sewer	SI	Resident	250	
SI 25	Dalel Purwa	14	6	7	Y	Y	Sewer	SI	Commuter	1000	
SI 26	Darshan Purwa A	15	6	7	Y	Y	Sewer	SI	Commuter	1000	
SI 27	Darshan Purwa B	6	4	4	Y	Y	Sewer	SI	Commuter	400	
SI 28	Darshan Purwa C	6	4	3	Y	Y	Sewer	SI	Resident	200	
SI 29	Depty Padao	5	5	4	Y	Y	Sewer	SI	Commuter	350	
SI 30	Dargah Shareef	7	4	5	Y	Y	Septic Tank	SI	Resident	200	
SI 31	Devi Ganj A	7	4	5	Y	Y	Septic Tank	SI	Resident	250	
SI 32	Devi Ganj B	6	4	4	Y	Y	Septic Tank	SI	Resident	250	
SI 33	Faithful Ganj	15	10	8	Y	Y	Sewer	SI	Resident	1000	
SI 34	Ganesh Garden	7	3	3	Y	Y	Sewer	SI	Commuter	500	
SI 35	Green Park	15	7	5	Y	Y	Sewer	SI	Resident	500	
SI 36	Gwaltoli	13	5	7	Y	Y	Sewer	SI	Resident	450	
SI 37	Ganga Marg	7	4	5	Y	Y	Sewer	SI	Resident	250	
SI 38	Goverdhan Purwa	5	3	3	Y	Y	Sewer	SI	Resident	160	
SI 39	Gora Bazar	15	6	7	Y	Y	Bio Gas	SI	Resident	600	
SI 40	Ghantaghar-I	22	10	6	Y	Y	Sewer	SI	Non-Resident	1600	
SI 41	Ghantaghar-II	7	4	5	Y	Y	Sewer	SI	Non-Resident	550	
SI 42	Gaushala	5	8	4	Y	Y	Sewer	SI	Commuter	300	
SI 43	Gajju Purwa	5	8	6	Y	Y	Sewer	SI	Resident	200	

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
SI 44	Golaghat	7	4	6	Y	Y	Septic Tank	SI	Resident	200	
SI 45	Hata Sawai Singh	15	5	5	Y	Y	Sewer	SI	Commuter	1000	
SI 46	Halet	14	6	7	Y	Y	Sewer	SI	Non-Resident	800	
SI 47	Harvansh Mohal	6	4	2	Y	Y	Sewer	SI	Commuter	400	
SI 48	Jaura	7	4	5	Y	Y	Sewer	SI	Resident	200	
SI 49	Jageshewar	13	9	6	Y	Y	Sewer	SI	Non-Resident	600	
SI 50	Juhi	5	10	6	Y	Y	Sewer	SI	Resident	500	
SI 51	Jatanpurwa	15	6	5	Y	Y	Sewer	SI	Commuter	700	
SI 52	Julhati A	12	8	6	Y	Y	Sewer	SI	Resident	500	
SI 53	Julhati B	23	20	5	Y	Y	Sewer	SI	Resident	1200	
SI 54	Kuserwas	6	5	5	Y	Y	Sewer	SI	Resident	200	
SI 55	Kacheri	22	5	5	Y	Y	Sewer	SI	Commuter	850	
SI 56	Khalasi Line A	16	5	4	Y	Y	Sewer	SI	Commuter	700	
SI 57	Khalasi Line B	20	11	5	Y	Y	Sewer	SI	Resident	600	
SI 58	Kalyanpur	7	4	4	Y	Y	Sewer	SI	Commuter	350	
SI 59	Colonelgunj	0	5	2	Y	Y	Sewer	SI	Commuter	175	
SI 60	Kidwai Nagar	15	6	6	Y	Y	Sewer	SI	Commuter	800	
SI 61	Kopargunj	7	4	5	Y	Y	Sewer	SI	Resident	250	
SI 62	Kumhar Mandi	12	10	5	Y	Y	Sewer	SI	Resident	400	
SI 63	Khatikana	12	8	4	Y	Y	Sewer	SI	Resident	400	
SI 64	Lathi Mohar	6	4	4	Y	Y	Sewer	SI	Commuter	300	
SI 65	Laxmi Purwa	10	10	5	Y	Y	Sewer	SI	Commuter	600	
SI 66	Loharan Bhatta	13	8	3	Y	Y	Sewer	SI	Resident	400	
SI 67	Lal Bangla	5	8	6	Y	Y	Septic Tank	SI	Commuter	300	
SI 68	Maniram Bagiya	7	5	4	Y	Y	Sewer	SI	Commuter	300	
SI 69	Machuwa Nagar	6	4	5	Y	Y	Sewer	SI	Resident	250	
SI 70	Moti Jheel	15	5	6	Y	Y	Sewer	SI	Commuter	600	
SI 71	Nagar Nigam	6	5	4	Y	Y	Sewer	SI	Non-Resident	100	
SI 72	Moti Mohal	10	10	5	Y	Y	Sewer	SI	Resident	500	
SI 73	Nanarau Park	15	7	6	Y	Y	Sewer	SI	Commuter	800	
SI 74	Nawabgunj	20	10	6	Y	Y	Sewer	SI	Resident	600	
SI 75	Naya Purwa A	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 76	Naya Purwa B	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 77	Nala Road	18	5	4	Y	Y	Sewer	SI	Commuter	1000	
SI 78	Narayan Purwa	14	7	8	Y	Y	Sewer	SI	Resident	600	
SI 79	Om Nagar	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 80	Om Purwa A	6	7	4	Y	Y	Sewer	SI	Resident	200	
SI 81	Om Purwa B	6	4	4	Y	Y	Sewer	SI	Commuter	250	
SI 82	Patkapur	15	6	4	Y	Y	Sewer	SI	Commuter	600	
SI 83	Pared	14	7	5	Y	Y	Sewer	SI	Commuter	1000	
SI 84	Permath	13	8	5	Y	Y	Sewer	SI	Resident	400	
SI 85	Permiya Purwa	7	4	5	Y	Y	Sewer	SI	Resident	200	
SI 86	Panki	15	6	5	Y	Y	Septic Tank	SI	Commuter	200	
SI 87	Parampurwa A	12	8	4	Y	Y	Sewer	SI	Resident	600	

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
SI 88	Parampurwa B	12	8	4	Y	Y	Sewer	SI	Resident	400	
SI 89	Purani Chungi	5	8	6	Y	Y	Sewer	SI	Commuter	300	
SI 90	Q-Block	12	8	6	Y	Y	Sewer	SI	Resident	600	
SI 91	Rani Ghat	7	4	5	Y	Y	Sewer	SI	Resident	250	
SI 92	Rawatpur	7	4	4	Y	Y	Sewer	SI	Commuter	300	
SI 93	R.A. Bajar	20	10	8	Y	Y	Sewer	SI	Resident	700	
SI 94	Rattu Purwa	13	8	5	Y	Y	Sewer	SI	Commuter	500	
SI 95	Rai Purwa	6	4	4	Y	Y	Sewer	SI	Resident	300	
SI 96	Sersaiya Ghat	15	6	7	Y	Y	Septic Tank	SI	Resident	600	
SI 97	Sutergunj	5	5	3	Y	Y	Sewer	SI	Commuter	300	
SI 98	Sant Lal Ka Hata	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 99	Suter Khana	11	10	4	Y	Y	Sewer	SI	Commuter	800	
SI 100	Shanti Nagar	13	8	7	Y	Y	Septic Tank	SI	Resident	500	
SI 101	Sheetla Bazar	5	5	4	Y	Y	Sewer	SI	Resident	200	
SI 102	Sidhnath Bazar	5	7	6	Y	Y	Septic Tank	SI	Resident	200	
SI 103	Subhash Park	5	8	4	Y	Y	Sewer	SI	Resident	300	
SI 104	Shiv Katra	5	8	4	Y	Y	Sewer	SI	Resident	250	
SI 105	Block-13, Ram Asrey Nagar	12	8	4	Y	Y	Sewer	SI	Resident	500	
SI 106	Ursala	14	7	5	Y	Y	Sewer	SI	Commuter	1000	
SI 107	Uncha Tilla	5	8	4	Y	Y	Sewer	SI	Resident	200	
SI 108	Vijay nagar	6	4	4	Y	Y	Septic Tank	SI	Resident	250	
SI 109	Bithur	5	5	3	Y	Y	Septic Tank	SI	Non-Resident	150	
SI 110	Ajeetgunj	6	4	3	Y	Y	Sewer	SI	Resident	250	
SI 111	Darshan Purwa D	6	4	3	Y	Y	Sewer	SI	Resident	200	
SI 112	Maiku Purwa	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 113	Tar Bagiya	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 114	Roti Godam	12	8	5	Y	Y	Sewer	SI	Resident	1000	
SI 115	Makhniya Bazar Chowk Sarafa	6	4	5	Y	Y	Sewer	SI	Resident	350	
SI 116	Faraskhana	6	4	4	Y	Y	Sewer	SI	Resident	400	
SI 117	Juhi Lal Colony	5	5	4	Y	Y	Sewer	SI	Resident	300	
SI 118	Baja Line	6	4	4	Y	Y	Septic Tank	SI	Resident	300	
SI 119	Tannery ka Hata	6	4	3	Y	Y	Sewer	SI	Resident	250	
SI 120	Om Purwa C	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 121	Bheri Khana	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 122	Bhusa Toli	6	4	4	Y	Y	Sewer	SI	Resident	300	
SI 123	Begum Purwa	5	5	4	Y	Y	Sewer	SI	Resident	300	
SI 124	Jiwan Lal Ka Hata	5	5	2	Y	Y	Sewer	SI	Resident	300	
SI 125	Khalai Line C	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 126	Dalepurwa	6	4	4	Y	Y	Sewer	SI	Commuter	250	
SI 127	Kali Badi	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 128	Rail Bazar	6	4	4	Y	Y	Septic Tank	SI	Resident	300	
SI 129	Ranjeet Nagar	6	4	2	Y	Y	Septic Tank	SI	Resident	200	
SI 130	Block-10, Govind Nagar	12	8	3	Y	Y	Sewer	SI	Resident	250	
SI 131	Bibi Pur	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 132	Lal Diggi	6	4	4	Y	Y	Septic Tank	SI	Resident	250	

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
SI 133	Chuna Bhatia	6	4	4	Y	Y	Septic Tank	SI	Resident	200	
SI 134	Allengunj	6	4	4	Y	Y	Sewer	SI	Resident	200	
SI 135	Transport Nagar	15	15	3	Y	Y	Bio Gas	SI	Commuter	1500	
SI 136	Narayanpurwa	14	7	7	Y	Y	Sewer	SI	Commuter	1400	
SI 137	Fool Bagh	6	4	4	Y	Y	Sewer	SI	Resident	250	
SI 138	Budha Park	11	10	7	Y	Y	Bio Gas	SI	Resident	200	
SI 139	Talwa Mandi	12	8	7	Y	Y	Bio Gas	SI	Commuter	1000	
NN 1	Begumpuwa (near idgah)	12	8	3	Yes	Yes	Sewer	Contructor	Resident	200-250	
NN 2	Bakerganj, Char road crossing	12	8	3	Yes	Yes	Sewer	Contructor	Resident	300-400	
NN 3	kidwai Nagar Sabzi Mandi	12	8	3	Yes	Yes	Sewer	Contructor	Non-Resident	300-400	
NN 4	Baradevi	12	8	3	Yes	Yes	Sewer	Contructor	Non-Resident	400-500	
NN 5	Harihar Nath Shastri Park (Juhi)	12	8	3	Yes	Yes	Sewer	Contructor	Non-Resident	150-175	
NN 6	Ambedkar Nagar (Rakhi Mandi)	12	8	3	Yes	Yes	Sewer	Contructor	Resident	250-300	
NN 7	Patel Vikas Mandal Naubasta	10	9	2	Yes	Yes	Soak Pit	Contructor	Non-Resident	200-250	
NN 8	Bagahi Bhatta	12	8	3	Yes	Yes	Sewer	Contructor	Resident	150-200	
NN 9	B.N. Bhalla Hospital	12	8	3	Yes	Yes	Sewer	Contructor	Resident	150-200	
NN 10	O Block near Anand Puri	12	8	3	Yes	Yes	Sewer	Contructor	Non-Resident	300-400	
NN 11	Sukkapurwa	12	8	3	Yes	Yes	Sewer	Contructor	Resident	100-150	
NN 12	Usmanpur	12	8	3	Yes	Yes	Soak Pit	Contructor	Resident	200-300	
NN 13	Dabauli	12	8	3	Yes	Yes	Soak Pit	Contructor	Resident	150-200	
NN 14	Sangawa Road (near Bypass road)	12	8	3	Yes	Yes	Soak Pit	Contructor	Non-Resident	100-125	
NN 15	Gujaini Village	12	8	3	Yes	Yes	Soak Pit	Contructor	Resident	25-50	
NN 16	Vijay Nagar (near shopping	12	8	3	Yes	Yes	Soak Pit	Contructor	Non-Resident	200-250	
NN 17	Sarai Meeta	Closed									
NN 18	Naubasta Bye pass-2 crossing	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	500-600	
NN 19	Saket Nagar (Near Parag Dairy)	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	90-100	
NN 20	Barra Buypass Crossing (near Barra Village)	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	100-125	
NN 21	Yashoda Nagar (250' crossing)	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	150-200	
NN 22	Krishna Nagar	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	40-60	
NN 23	Bheem Nagar	6	4	2	Yes	Yes	Septic Tank	Contructor	Resident	60-70	
NN 24	L.M.L. Crossing	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	5-10	
NN 25	CTI Crossing	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	200-250	
NN 26	Jarouli	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	40-50	
NN 27	Barra Village	6	4	2	Yes	Yes	Septic Tank	Contructor	Resident	10-25	
NN 28	Bhagwant ki Tatia	6	4	2	Yes	Yes	Septic Tank	Contructor	Resident	50-60	
NN 29	Juhi Garah	6	4	2	Yes	Yes	Septic Tank	Contructor	Resident	100-125	
NN 30	Govind Nagar Katchi Basti	6	4	2	Yes	Yes	Septic Tank	Contructor	Resident	100-125	
NN 31	Paharpur Village	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	10-15	
NN 32	Nauraiya Khera	6	4	2	Yes	Yes	Septic Tank	Contructor	Resident	90-100	
NN 33	Naubasta bye pass -2 (near kendranchal)	10	4	1	Yes	Yes	Septic Tank	Contructor	Non-Resident	-	
NN 34	Gujaini buypass Crossing	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	10-20	
NN 35	Panki Road (Zonal Pumping Station)	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	20-25	
NN 36	Near Indian Oil	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	10-15	

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
NN 37	Dada Nagar Crossing	6	4	2	Yes	Yes	Septic Tank	Contructor	Non-Resident	50-70	
NN 38	Govind Nagar Harizan Basti	6	4	2	Yes	Yes	Sewer	Contructor	Resident	100-125	
NN 39	F.C.I. Godown	6	4	2	Yes	Yes	Sewer	Contructor	Resident	100-125	
NN 40	Site No. 1 Kidwai Nagar	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident	250-300	
NN 41	Baba Ki Kutia (Harzan Basti)	6	4	2	Yes	Yes	Sewer	Contructor	Resident	10-15	
NN 42	Kanjaran Purawa	6	4	2	Yes	Yes	Sewer	Contructor	Resident	100-125	
NN 43	Bara Devi Near Bathm Hata	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident	200-250	
NN 44	Kidwai Nagar Near Chalish Dukan	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident	50-60	
NN 45	Kidwai Nagar Near 'D' Block	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident		
NN 46	Juhi 'S' Block	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident	200-250	
NN 47	Kidwai Nagar Near T.B. Hospital	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident	60-70	
NN 48	Darasanpurawa	6	4	2	Yes	Yes	Sewer	Contructor	Resident	200-250	
NN 49	Vidyarati Markete Govind Nagar	6	4	2	Yes	Yes	Sewer	Contructor	Non-Resident	25-50	
NE 1	Raja Purva	7	15	4	N	Y	Sewer	Private	Resident	500	
NE 2	Naya Purva, Kidwai Nagar	10	10	N	Y	Y	Septic Tank	Private	Resident	200	
NE 3	M-Block, Kaka Dev	15	15	2	Y	Y	Bio Gas	Contructor	Resident	1000	
NE 4	J.K. Cancer Institute	7	3	2	Y	Y	Bio Gas	Contructor	Non-Resident	50-60	Clean and good O&M
NE 5	Kacchi Basti, Govind Nagar	10	10	N	Y	Y	Septic Tank	Private	Resident	150	
NE 6	Shahpur Panki	15	15	4	Y	Y	Bio Gas	Contructor	Resident	250	
NE 7	Mannu Purwa	10	10	8	Y	Y	Bio Gas	Contructor	Resident	250-350	
NE 8	Barajdevi Juhi	10	10	1	Y	Y	Septic Tank	Contructor	Resident	100-125	Infront of facilty the place was found too dirty, Tank was overflowing, Biogas system was damaged.
NE 9	Munshi Purwa	10	10	10	Y	Y	Septic Tank	Private	Resident	600-700	
NE 10	Indra Gandhi, malin Basti, Shastri	12	8	1	Y	Y	Septic Tank	Private	Resident	70-80	
NE 11	Jai Prakash Nagar, Kakadev	15	15	3	Y	Y	Bio Gas	Contructor	Resident	150-160	
NE 12	C.C. Parav Cant	15	15	3	Y	Y	Bio Gas	Contructor	Resident	150-200	
NE 13	Juhi Baburahiya	15	15	3	Y	Y	Bio Gas	Contructor	Resident	1000-1100	
NE 14	Faithful Ganj	15	15	4	Y	Y	Bio Gas	Contructor	Resident	400-500	
NE 15	Gadriyanpurwa	15	15	2	Y	Y	Septic Tank	Contructor	Resident	450	
NE 16	Chamra Mandi	10	6	2	Y	Y	Sewer	SI	Resident	100-150	
NE 17	Kuli Bazar	10	10	2	Y	Y	Sewer	World Bank	Resident	200-30	
NE 18	M-Block, Kaka Dev-II	6	4	2	Y	Y	Sewer	Environet	Resident	150-200	
NE 19	Choti Juhi	15	15	2	Y	Y	Pond	World Bank	Resident	700-800	
NE 20	K.B. Govind Nagar-II	10	10	N	Y	Y	Tank	Private	Resident	250	
NE 21	Bagahi Bhatta	7	4	1	Y	Y	Sewer	SI	Resident	150-200	
NE 22	Ambedkar Nagar	10	10	2	Y	Y	Bio Gas	Contructor	Resident	400-450	Floor was broken
NE 23	Kabadi Market	19	11	3	Y	Y	Bio Gas	Contructor	Resident	150	
NE 24	M.S. Ka Purwa	6	4	2	Y	Y	Septic Tank	Private + Other	Resident, outside	150	
NE 25	Gadriyan Purwa (B.N)	5	5	2	N	Y	Bio Gas	Private	Non-Resident	150	Good facility of cleaning
NE 26	Parmiya Purwa (Khewra)	7	3	2	N	N	Septic Tank	SI	Both	100-150	No Facility of water & electricity, also it is too dirty
NE 27	Satti Chawra Ghat	15	15	4	Y	Y	Bio Gas	Contructor	Resident	200-250	
NE 28	Faithful Ganj-II	15	15	2	Y	Y	Septic Tank	Contructor	Both	300-350	Too dirty inside end and no cleaning arrangement. The way is also too dirty due to garbage.

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		M	F								
NE 29	Ram Mohan Ka Hata	15	15	3	Y	Y	Septic Tank	Contructor	Both	250-300	
NE 30	Sanjay Nagar	15	15	4	Y	Y	Septic Tank	Private	Resident	600-700	The site is too dirty end duly water filled around this side.
NE 31	Mahadev Nagar	15	15	N	Y	Y	Septic Tank	Private	Resident	500-600	
NE 32	Pahalwan Ka Purwa	15	15	2	Y	N	Bio Gas	Contructor	Both	100-150	
NE 33	Pratapgunj (Park)	30	30	3	Y	Y	Bio Gas	Contructor	Resident	1000-1200	
NE 34	Usmanpur	6	4	N	Y	Y	Septic Tank	Private	Resident	300-350	
NE 35	Juhi (Old Toilet)	14	14	2	Y	Y	Septic Tank	Contructor	Resident	60-70	
NE 36	Sarsaiya Ghat	5	5	1	Y	Y	Bio Gas	Contructor	Resident	25-40	
NE 37	Juhi Garha Park	14	14	2	Y	Y	Septic Tank	Contructor	Resident	60-65	No O&M the door is broken and no cleaning arrangement
NE 38	Dada Nagar (Bridge)	8	2	N	Y	Y	Sewer	Private	Resident	75-80	
NE 39	Mattaiyapurwa	15	15	4	Y	Y	Septic Tank	Contructor	Resident	250-300	
NE 40	Dada Nagar-II	10	10	2	Y	Y	Septic Tank	Private	Resident	150-200	
NE 41	Machuwa Nagar	16	14	4	Y	Y	Bio Gas	Contructor	Resident	50-60	
NE 42	Babupurwa (New Bridge)	20	10	4	Y	Y	Bio Gas	Contructor	Both	250-300	
NE 43	Pratapgunj	12	8	2	Y	Y	Septic Tank	Private	Resident	400	
NE 44	Sahdulla Pur	10	10	1	Y	Y	Septic Tank	Private	Resident	200	
NE 45	Gujaini	12	8	N	Y	Y	Septic Tank	Private	Resident	275	
NE 46	Harishganj Cant	15	15	4	Y	Y	Bio Gas	Contructor	Resident	500	
NE 47	Rail Bazar Cant	15	15	4	Y	Y	Bio Gas	Contructor	Resident	300-400	
NE 48	Ravidas Puram Park A	6	4	1	N	Y	Septic Tank	Private	Resident	40-50	
NE 49	Ravidas Puram Park B	5	5	N	Y	Y	Septic Tank	Private	Resident	40-50	
NE 50	Ravidas Puram Park C	5	5	N	Y	Y	Septic Tank	Private	Resident	50-60	
NE 51	Ravidas Puram Park D	6	4	1	N	Y	Septic Tank	Private	Resident	40-50	
NE 52	Bingawa	10	10	4	Y	Y	Septic Tank	Private	Resident	250-300	
NE 53	Sujatganj	15	15	4	Y	Y	Septic Tank	Private	Resident	400	
NE 54	Macharia	10	10	N	Y	Y	Septic Tank	Private	Resident	400	
NE 55	Slaughter House Fazal Gunj	5	5	N	Y	Y	Sewer	Private	Resident	100	
NE 56	Roadways Bus Stand, Chunniganj	Closed from 2 Months									
NE 57	Verma Sale, Fazalgunj	6	4	2	Y	Y	Septic Tank	Private	Resident	150	
NE 58	Chain Factory, Shastrinagar,	5	5	2	Y	Y	Septic Tank	Private	Resident	300	The door are broken and steps are broken. No arrangement of cleaning.
NE 59	Vijay Nagar Chauraha	6	4	2	Y	Y	Private Nala	SI	Resident	50-60	
NE 60	Babupurwa Site No-B	Closed									
NE 61	Police Line Kanpur	15	5	2	N	Y	Bio Gas	Private	Local Resident	3000	
NE 62	Benjhabar, Malin Basti	5	5	2	Y	Y	Bio Gas	Private	Local Resident	50-60	The doors are broken
NE 63	T.B. and Chest Hospital Raipurwa	7	3	2	Y	Y	Septic Tank	Private	Both	50-75	
NE 64	Juhi, Kanpur	15	15	2	Y	Y	Pond	Private	Resident	1000	The caretaker has not get the payment. However O&M is OK.
NE 65	Rattu Purwa Transport Nagar	10	10	N	Y	Y	Septic Tank	Private	Resident	80-100	One door was broken but faciltiy was cleaned
NE 66	Benjhabar Labour Colony	8	7	2	Y	Y	Sewer	SI	Resident	100-150	
NE 67	Sidnath Ghat	5	5	5	Y	Y	Septic Tank	Si	Both	30-35	
NE 68	Shivnagar Malin Basti	12	8	2	Y	Y	Septic Tank	Private	Resident	300-400	
NE 69	Sidnath Ghat	5	5	5	Y	Y	Septic Tank	Private	Both	30-35	

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		M	F								
NE 70	Shivnagar Malin Basti	12	8	2	Y	Y	Septic Tank	Private	Resident	300-400	
NE 71	Eidgah	7	4	2	Y	Y	Bio Gas	Contructor	Resident	70-80	
NE 72	K.L.T., in Fazalgunj Malin Basti	10	10	2	N	Y	Septic Tank	Private	Resident	300	No facility of cleaning in inside and no facility of garbage collecting.
NE 73	Afeem Kothi, Chauraha, Jhakarkati	6	4	2	Y	Y	Septic Tank	Private	Resident	200	The approaching road is bed condition. The doors are broken
NE 74	Indra Gandhi, malin Basti, Shastri	5	5	3	Y	Y	Bio Gas	Contructor	Resident	200-250	No facility of Pump.
NE 75	Sanjay Nagar, C.T.I.	15	15	4	Y	Y	Sewer	Private	Resident	300-400	
NE 76	Geeta Park	4	6	2	Y	Y	Sewer	Contructor	Resident	100-150	
NE 77	Khalasi Line	6	4	1	Y	Y	Sewer	Contructor	Resident	150-200	
NE 78	Makdi Kheda	5	5	N	N	Y	Septic Tank	Private	Resident	300	
NE 79	Pokherpurwa	Not Located									
NE 80	Bhaironghat	6	4	2	N	Y	Bio Gas	Private	Resident	30-40	No facility of Electricity
NE 81	Rajkiya Unnayan Basti Kalyan Pur	Not Located									
NN(2)1	Nawabganj	14	6	2	Y	Y	Sewer	SI	Both	30-40	
NN(2)2	K.D.A	5	5	2	Y	Y	Sewer	SI	Resident	30-35	The approaching way is not good. No facility of cleaning & Electricity and the LCS was closed in 6 pm evening
NN(2)3	Mehaya Park	4	4	N	N	N	Sewer	Private	Resident	50	
NN(2)4	Infront of Kaka Dev Sunder Patel	3	2	N	N	N	Sewer	Private	Resident	50	
NN(2)5	Infront of Kaka Dev Sri Ram Gulam	3	3	N	N	Y	Septic Tank	Private	Resident	400	
NN(2)6	P-Block, Kakadev	4	1	N	N	Y	Sewer	Private	Resident	150	
NN(2)7	Kakadev117/96-97	2	1	N	N	N	Sewer	Private	Resident	50	
NN(2)8	Kakadev117/138	2	1	N	N	N	Sewer	Private	Resident	100	
NN(2)9	Swaroop Nagar Ghantaghar	4	2	1	Y	Y	Sewer	Private	Resident	50	
NN(2)10	Dhobighat Road, Purana Kanpur	10	10	2	Y	Y	Bio Gas	Private	Resident	40-50	
NN(2)11	24-Quarter, Harizan Basti Kanpur	6	2	N	N	N	Septic Tank	Private	Resident	75-80	
NN(2)12	Green Park, Near Kali Mathiya Parmath	15	5	2	Y	Y	Sewer	SI	Resident	600	No facility of cleaning and steps were dirty and broken.
NN(2)13	Near Mayur Hotel, Sutergunj	5	5	2	N	Y	Sewer	SI	Resident	400	No electricity and no facility of cleaning.
NN(2)14	10/152 Settlement Khalasi Line	6	4	2	Y	Y	Bio Gas	Contructor	Resident	150	
NN(2)15	In Front of Narayan Purwa-120/65	13	7	2	Y	Y	Sewer	Private	Resident	300	
NN(2)16	Chain Factory Road	15	15	4	Y	Y	Bio Gas	Contructor	Both	100-150	The steps were broken. No facility of cleaning. The doors were not in good
NN(2)17	Geeta Nagar	6	4	1	Y	Y	Septic Tank	Private	Resident	250	
NN(2)18	Subji Mandi	21	9	1	Y	N	Sewer	World Bank	Both	1100-1200	
NN(2)19	Near Fazulgunj Police Station	19	11	3	Y	Y	Bio Gas	Contructor	Both	200	
NN(2)20	Near Kalpi Road Cinema	5	5	N	N	Y	Sewer	Private	Resident	1000	
NN(2)21	Fish Market, Fazalgunj	6	4	1	Y	Y	Sewer	Nagar Nigam	Both	200-250	
NN(2)22	Behind 21-Tin Road Colony, Vijay Nagar	12	12	2	Y	Y	Sewer	SI	Resident	400	
NN(2)23	In ward No. 14	16	16	2	Y	Y	Sewer	Nagar Nigam	Both	650-700	
NN(2)24	109/24 Jawahar Nagar	6	4	2	Y	Y	Sewer	SI	Resident	500	
NN(2)25	109/269 Ramkrishna Nagar	15	5	2	Y	Y	Bio Gas	Contructor	Both	150-200	The steps were broken but cleaning facility was good.

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
NN(2)26	107/29, Chandra Nagar	6	6	*	N	N	Sewer	Nagar Nigam	Nil	Nil	The LCS was closed and very bed condition.
NN(2)27	108/143 Sisamau	1	1	N	N	N	Sewer	N.A.	Nil	Nil	The garbage is filled outside
NN(2)28	12/445, Ahirana Gawaltoli	10	10	2	N	Y	Bio Gas	SI	Resident	100	The approaching road was in very bad condition; no electricity and the garbage was filled around the facility
NN(2)29	9/50, Naya Purwa	6	4	2	Y	Y	Sewer	SI	Non-Resident	150	
NN(2)30	9/50, Naya Purwa Near Hitkari	5	5	2	Y	Y	Bio Gas	SI	Resident	50-60	
NN(2)31	Two Public Toilets in ward no.19	Not Located									
NN(2)32	Lodhaura Chouk 103	4	3	1	N	Y	Sewer	Private	Resident	350-400	
NN(2)33	Basheergunj Chouk	Not Located									
NN(2)34	Nanhey Mian Ka Hata, Kasimgunj	12	8	1	Y	Y	Sewer	Private	Resident	200	
NN(2)35	Hansraj ka Hata, Kasimgunj	8	6	N	Y	Y	Sewer	do	Resident	250	
NN(2)36	105/690, Bhanananpurwa	6	4	3	Y	Y	Bio Gas	Contructor	Both	150	The approachng Raod was in bad condition but cleaning facility is good.
NN(2)37	105/55, Ghosiyana	14	6	2	Y	Y	Sewer	SI	Resident	300-350	The approachng Raod was in bad condition and no facility of cleaning
NN(2)38	3 Public Toilets in Ward No. 23	15	15	2	Y	Y	Septic Tank	Nagar Nigam	Resident	200-250	
NN(2)39	Ameengunj	6	4	2	Y	Y	Sewer	Contructor	Resident	100-150	
NN(2)40	Near Police Station Maharhala Adda Bass	16	10	4	Y	Y	Bio Gas	Contructor	Both	300-400	
NN(2)41	Addha Pahelwaan Ka Akhada, Pechbagh	15	15	4	Y	Y	Bio Gas	Contructor	Both	400-500	
NN(2)42	Bhanana Purwa, Acharya Nagar	6	6	N	N	Y	Sewer	Nagar Nigam	Resident	250-300	Sewer system were blocked. No facility of water and Electricity. The doors and steps
NN(2)43	Tejab Mil Hata, Gate No. 3	Not Located									
NN(2)44	Sarju Prasad Ka Hata, Jhakerkati	5	5	2	Y	Y	Sewer	Nagar Nigam	Resident	500	
NN(2)45	Navjivan Park, Gaderiyan Purwa	7	13	1	Y	Y	Sewer	Nagar Nigam	Resident	1000	
NN(2)46	Slaughter House Boundary,	8	2	N	N	Y	Septic Tank	Private	Resident	125	
NN(2)47	Block-2, Govind Nagar	Not Located									
NN(2)48	Harijan Basti, Govind Nagar	6	4	2	Y	Y	Sewer	SI	Resident	50-100	
NN(2)49	Vidyarthi Market, Govind Nagar	7	4	1	Y	Y	Sewer	SI	Both	250	
NN(2)50	Chawala Market, Govind Nagar	12	5	2	Y	Y	Sewer	SI	Resident	100-150	
NN(2)51	Block-7, Near Gurudwara	6	4	1	Y	Y	Sewer	SI	Resident	100	
NN(2)52	Block-4, Govind Nagar	Not Located									
NN(2)53	Block-5, Govind Nagar	Not Located									
NN(2)54	Block 8, 9 and 10, Govind Nagar	6	4	1	Y	Y	Sewer	SI	Resident	50-100	
NN(2)55	Juhi Gada	14	14	4	Y	Y	Sewer	Private	Resident	300-400	
NN(2)56	Kumaon, Juhi Gada	5	5	2	Y	Y	Sewer	Nagar Nigam	Resident	200-250	
NN(2)57	Sumwa Purwa	14	9	2	Y	Y	Sewer	Nagar Nigam	Resident	500-600	The water tank were broken and water shortage problem was found
NN(2)58	Dhakna Purwa	11	11	3	Y	Y	Sewer	SI	Both	300-400	
NN(2)59	48, Quarter, Harijan Basti	3	3	1	Y	Y	Sewer	Nagar Nigam	Resident	200-250	
NN(2)60	Aloo Mandi, Kidwai Nagar	6	4	1	Y	Y	Sewer	SI	Resident	150	
NN(2)61	Aloo Mandi, Kidwai Nagar	10	10	1	Y	Y	Sewer	SI	Both	300	
NN(2)62	Kuli Bazar	7	13	1	Y	Y	Sewer	Private	Resident	600	

Sl. No.	Site Name	No. of Seat (WC)		No. of Bath	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Remarks
		M	F								
NN(2)63	Shakkar Mil Khalwa	6	4	N	Y	Y	Sewer	Private	Resident	150-200	
NN(2)64	Near Laxmi Purwa Textile Mill Gate	10	10	1	Y	Y	Sewer	Private	Resident	100-200	Very bad condition, no facility of cleaning. Need again repairing and cleaning.
NN(2)65	25 Quarter Harijan Basti	3	3	2	Y	Y	Sewer	Nagar Nigam	Resident	300-400	
NN(2)66	Farwish Compound	Closed									
NN(2)67	Basmandi	6	7	1	Y	Y	Sewer	Nagar Nigam	Resident	80-90	Sewer line blocked and overflow. No facility of Cleaning.
NN(2)68	Moolgunj	6	N	N	Y	Y	Sewer	Nagar Nigam	Resident	150	
NN(2)69	Bangali Mohal	14	6	3	Y	Y	Sewer	World Bank	Resident	600-700	
NN(2)70	Mani Ram Bagiya	6	4	2	Y	Y	Bio Gas	Private	Resident	70-75	
NN(2)71	Near Tapeshwari Devi Mandir	3	6	N	Y	Y	Sewer	Private	Both	550	No facility of toilet and no facility of
NN(2)72	Harvansh Mohal (Near Bargad Wala Kuda	7	4	1	Y	Y	Sewer	Patana Energy	Both	150	
NN(2)73	Water Tank Chauraha, Canal Road	6	4	1	Y	Y	Sewer	Nagar Nigam	Both	300	
NN(2)74	Ghasiyari Mandi, Canal Road	12	8	3	Y	Y	Bio Gas	Contructor	Both	250-300	
NN(2)75	Infront of Dana Khoti 65/229, Sirucular Road	4	2	2	N	N	Sewer	Private	Non-Resident	180-200	
NN(2)76	67/114, Daulatganj	12	12	4	Y	Y	Bio Gas	Contructor	Both	300	
NN(2)77	Near Begum Purwa Kuda Adda	10	10	2	Y	Y	Septic Tank	Contructor	Resident	150	
NN(2)78	Begum Purwa Colony	10	10	2	Y	Y	Septic Tank	Contructor	Resident	150	
NN(2)79	Azad Nagar, Babu Purwa	10	10	3	Y	Y	Bio Gas	Contructor	Resident	300	The doors were in very bed condition.
NN(2)80	Bakar Gunj	6	4	N	Y	Y	Sewer	SI	Both	100-125	No facility of toilet and water problem. The approaching way was in bad condition.
NN(2)81	Khatkana Babupurwa	7	5	2	Y	Y	Sewer	SI	Resident	100-200	
NN(2)82	Gadiyana	6	4	2	Y	Y	Sewer	SI	Resident	100-125	
NN(2)83	Sidha Tatiya	7	3	2	Y	Y	Sewer	Nagar Nigam	Both	80-90	
NN(2)84	Bechura	5	5	2	Y	Y	Sewer	Nagar Nigam	Both	100-150	
NN(2)85	Bagwant Tatiya	6	4	1	Y	Y	Septic Tank	Nagar Nigam	Both	100-125	
NN(2)86	Near Shiv Prasad Bhartiya House,	6	4	2	Y	Y	Sewer	SI	Resident	250-300	
NN(2)87	Ghaukheda Southern Region	Closed									
NN(2)88	Gaukheda Southern Region	Closed									
Other1	Servodaya Nagar, Kakadev	14	7	2	Y	Y	Sewer	SI	Resident	200	
Other2	Verma Sale	Not Located									
Other3	Near Shitkara Water Tank	Not Located									
Other4	Fazal Gunj Railway Line	10	5	2	Y	Y	Sewer	Private	Resident	180-200	
Other5	Near Harvansh Mohal Raiway Line	16	4	2	Y	Y	Sewer	Si	Resident	400-500	
Other6	Mangli Prasad Ka Ahata	12	8	3	Y	Y	Bio Gas	Private	Resident	150	
Other7	Mani Ram Bagiya	13	7	2	Y	Y	Sewer	Private	Resident	100-125	
Other8	Ganga gunj (Shiv Katra)	5	5	2	Y	Y	Bio Gas	Private	Resident	50-100	
Other9	Wasiratgunj	Not Located									

Note: SI = Sulabh International
NE = NEDA (
NN = Nagar Nigam

Table 7 Inventory Data of Dhobi Ghat in Kanpur

Sl. No.	Name of Dhobi Ghat	No. of unit	No. of Users /day	User fee	Amount of Detergent / person	No. of cloths / person	Water Supply	Waste water	O&M Organization	Remarks
[Constructed Dhobi Ghat]										
1	Gola Ghat	15	50 - 60	No	1 kg detergent 1 p.c. soap	25 to 30	By Submersible Pump through Boring	Nala	Dhobi	Two platform is available, in each platform are five tanks installed, but out of all tanks only two tank are in good condition and other tanks having leakage probleems. Only first tank is working condition but water pressure is very low. Electricity, Toilet Room etc. is not available, so people are going to Ganga River for washing cloth. No arrangement for cleaning the ghat. Naresh, Ajay Kumar, Badlu Prasad, Radha Devi & Laxmi Parasad all are saying "here arrangement is not good, if electricity & water supply is available then we no need to go in the river side.
2	Bhairon Ghat	110	100	No	1kg detergent 1 p.c.soap	30	By pump through Ganga	Nala	All India Dhobi Association	Out of 110 units 25-30 are working condition and surrounding area is very dirty. Toilet is broken, no arrangement for electricity. Maximum tank/unit is not working. In the rainy season people cannot use the platform because the no roof. KNN was appoint one cleaner for cleaning the platform but about 7-8 month before he was retired. After him no body is coming to clean the ghat. All member are going to All India Dhobi Association office to given the problem, the association is trying to solve the problem for collection some money for every association member. They are dispose the water in the KNN nala.
3	Juhi Bamhuria	10	25 - 30	No	500 g detergent 1 - 2 p.c. soap	20	Pond	Pond	Nil	Dhobi ghat was consturcted in the middle of the city near the pond. The condition is very bed. Only 10 platform was constructed. No arrangement for water in the tank. Sorrounding the ghat area is very dirty. Here near about 20 to - 30 dhobi are coming for washing the cloths. In the ghat is area is available but no any arrangement in electricity, water, toilet & approach road, no arrangement for rainy season also. City nala is also discharge in the pond. With Dhobi Samaj (Sh. Sundar Lal, Dhani Ram, Babu Ram & Lal Ram) discussed, they laready send application to KNN, but nobody was solve the problem. If here given facilities than they will use the ghat. Totally 500-600 cloths are washing in the ghat.
4	Juhi Parampurwa	10	Not Used					Sewer	Nil	Dhobi ghat was consturcted before 2 years by KNN but not in use, because the all ten tanks was lekage.
[Tradittional Dhobi Ghat]										
5	Gola Ghat	Wall + 15 unit	30 - 40	N	500 g detergent 1 p.c. soap	40 - 50	-	-	Dhobi	They washing the cloth in Ganga river because the KNN was constructed few platform, they need more platform. Only the platform was made by 10-15 stone. Other people is washing cloths at Ganga Barrage wall. Everyday near about 20-25 people is coming. They are coming with cattle also. Average in the washing cloths near about 40-50.
6	Bhairon Ghat	10	20 - 25	N	500 g detergent 1 p.c. soap	30 - 35	-	-	-	Only the platform was made by 10-15 stone. Everyday near about 20-25 people is coming. Average in the washing cloths near about 40-50. They use 1kg. Detergent, and they also use the bleaching power and soda.
7	Maskat Ghat	5	7-8	N	500 g detergent 2 p.c. soap	20 - 25	-	-	-	Average is coming people for washing the cloths near about 7-8, some more people is coming (they staying near the ghat) for washing cloths also.
8	Koyala Ghat	3-4	6-7	N	500 g detergent 2 p.c. soap	15 - 20	-	-	-	Average is coming people for washing the cloths near about 8-10, the platform was made by 3-4 stone.

Table 8 Inventory Data of Bathing Ghat in Kanpur

Sl. No.	Name of Ghat	Constructed Steps	No. of Changing Room	No. of Public Toilet	O&M Organization	Monthly O&M Cost (Rs.)	No. of Users/day	Sanitary Hygiene Condition, other problems	Requirement to be Improved
1	Jageswartemple Ghat	Yes	1	N	-	N	N	solid waste, poor O&M, liquid waste, lack of public toilets, open defecation were visible on almost all the ghats. LCS is also very bad conditions from the point of view of O&M and cleanliness.	No idea
2	Karbata Ghat, Nawab Ganj	Yes	1	N	-	N	N		No idea
3	Rani Ghat	Yes	N	N	N	N	100		No idea
4	Bhairon Ghat	Yes	N	-	Sulabh International	-	300 to 400		No arrangement for sanitation (solid waste, liquid waste etc.), no pant was installed. No changing room, rent room from the ghat, no dustbin arrangement, need for proper disposed planning from the ghat. In the Kanpur city, every ghat nala is discharging in the river.
5	Mazeen Ghat	Yes	1	N	-	-	10 to 20		
6	Hospital Ghat	-	-	-	-	-	-		-
7	Permat Ghat	Yes	1	-	-	-	-		No idea
8	Hanuman Ghat	Yes	N	N	-	-	4 to 6		No idea
9	Lalha Ghat	covered with silt, no steps were noticed. Solid waste dumped all over the							No idea
10	Buriha Ghat	Yes	N	N	-	-	-		Water is dirty so nobody come here.
11	Sarsaiya Ghat	Not	N	N	-	-	-		Water is dirty so nobody come here.
12	Guptar Ghat	Yes	N	N	-	-	-		Water is dirty so nobody come here.
13	Bhagwat Dass Ghat	Yes	N	N	-	-	-		Water is dirty so nobody come here.
14	Gola Ghat	Yes	Yes	Yes			50 to 100		
15	Burihya Ghat	-	-	-	-	-	-		Water is dirty so nobody come here.
16	Sidhnat Htemple Ghat	Yes	Yes	N	-	-	100 to 120		

Table 9 Inventory Data of Crematoria in Kanpur

Sl. No.	Name of Crematoria	LOCATION	No. of Unit	Time to burn/body	Status	O&M Oraganization	Operation (hrs)	Cost of wood/body	Monthly O&M Cost (Rs.)	Nos of User/month	To be improved
1.	Bhairon Ghat	River bank	Conv.= 5	3 hours	Use	Sava Samati, KNN	8 to 5 (sunrise to sun set)	450	-	1200 to 1500	Approach road
			E.C. =1	1 hour	Use	Sava Samati, KNN		500		12 to 14	Approach road
2.	Bhagwatdas Ghat	River bank	E.C=2	1 hour	One is in use	KNN	8 to 5 (sunrise to sun set)	600	-	20 to 30	Clean Road
3.	Jajmau	River bank	Conv.	3 to 4 hours	Use	KNN	8 to 5 (sunrise to sun set)	400 to 600	-	110 to 120	No Road
4.	Shuklaganj (Opposite Side of River)	River bank	Conv.= 3	1 to 4 hours	Use	UNAO	8 to 5 (sunrise to sun set)	400	-	300 to 400	Road is not good.
			E.C. =2	1 hour	not in use	UNAO		500		-	

1. Bhairon Ghat:
(i) The operation & maintenance work is doing by Bharat Vikas Parisad.
(ii) KNN (E.C.) only working here five employees.
(iii) Here no govt. helps.
(iv) If the fees of cremator nation for one body less Rs. 500, than the user will use more of E.C.

2. Bhawan Das Ghat:
The river water is 2-3km far away from the ghat, only the water is available in rainy season. Than the Electric Crematoria was closed. 20-30 unclaimed body, and only one claimed body is burning in one month. KNN was deputing 8 employees, but they cannot work.

4. Shuklaganj Ghat:
The problem of electricity supply, so the E.C. was closed last 5-6 years. Out of 2 platforms only one is working condition. Toilet & rest room is very bed condition. Surrounding the platform is very dirty. Only here charge Rs. 100 per body for unclaimed body. Constructed by KNN.

Note: Conv.= Conventional Crematoria
E.C. = Electric Crematoria

Table 10 Inventory Data of Cattle Wallowing in Kanpur

S. No.	Name of the Ghat	Approximate No. of Cattles per Day	Time			Ownership of the Cattles	Remarks
			9-12 AM	1-3 PM	4-6 PM		
1	Parmat Ghat	100 - 150	100	20	10	Self	
2	Satti Ghat	50 - 75	40	5	5	Self	
3	Hospital Ghat	50 - 60	40	5	-	Self	
4	Muskan Ghat	70 - 80	50	10	5	Self	
5	Gola Ghat	50 - 60	50	5	-	Self	
6	Sorsaiya Ghat	150 - 175	120	15	-	Self	

Note: Above all ghat, the cattle's are coming at the morning 9:00 to 11:00, this time huge quantity of the cattle. They staying till afternoon 2:00 after 3:00 p.m. they are going back at home, after 4:00 p.m. to 5:00 p.m. they all return back at home. They all cattle's are coming at ghat for bathing.

Table 11 Inventory Data of Public Toilets in Allahabad City

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Disposal System	Agency Operating	Major user type	No. of users/day for WC	Remarks
		M	F								
[Constructed by Nagar Nigam]											
N1	Civil Line Bus Stand	10	3	2	Y	Y	Sewer System	SI	Non-resident	300	
N2	Anand Bhavan	6	4	3	Y	Y	Sewer System	SI	Both	200	
N3	Kamla Nehru Hospital	The employee of the facility ofenly goes out after locking the facility. The surveyor has gone there two days but find the lock both time.									
N4	Keetganj Choukhandi	6	4	2	N	N	Sewer System	SI	Non-resident	10 - 15	The users use the water from the handpump just outside the facility. The toilet place is too dirty
N5	Kothaparcha	10	5	2	Y	Y	Sewer System	SI	Resident	35-40	
N6	Khalasi Line	9	6	3	N	N	Sewer System	SI	Resident	20-25	Due to non-payment of the electricity bill the elctricity is non-providing since March 2003. No Connection of water supply in the facility so the water is supplied through private rental water pump.
N7	Neta Nagar	9	6	1	Y	N	Sewer System	SI	Resident	100	
N8	New Lashkar Line	6	4	3	N	N	Sewer System	SI	Resident	100	
N9	Khuldabad	6	4	2	N	N	Sewer System	SI	Non-resident	150	No Water Supply in the facility. People bring the water from handpum just outside the facility.
N10	Old Lashkar Line	6	4	1	Y	Y	Sewer System	SI	Non-resident	150	
N11	Sangam	12	11	6	Y	Y	Septic Tank	SI	Non-resident	150	
N12	Kachhari 1	10	3	2	Y	Y	Sewer System	SI	Non-resident	150	Female bathroom is not used and is use as storage purpose. The Tap at the male bathroom is unmaintained and broken.
N13	Kachhari 2	6	4	1	Y	Y	Sewer System	SI	Non-resident	60	
N14	Faquiraganj Katra	14	9	2	N	Y	Sewer System	SI	Resident	70-80	the seat of the facility is broken more than half and not in use. The electricity is used here illegally.
N15	Pani ki Tanki Katra	9	8	3	Y	Y	Sewer System	SI	Resident	250	
N16	Dilkusha Park	6	4	3	N	Y	Septic Tank	SI	Resident	35	
N17	Chilla	5	5	1	N	N	Septic Tank	SI	Resident	10	
N18	Bandpur Salori	Closed									
N19	Shaturkhana	5	4	3	N	N	Septic Tank	SI	Resident	10	
N20	Badi Baghia	5	5	1	N	N	Septic Tank	SI	Resident	100	
N21	Mamfodganj	5	4	2	N	N	Sewer System	SI	Resident	5 to 10	Very Poor Cleaning
N22	Taliarganj	6	4	2	Y	Y	Septic Tank	SI	Resident	100	
N23	Rasoolabad	12	8	6	N	N	Septic Tank	SI	Resident	50	
N24	Sewa Samiti	6	5	4	Y	Y	Sewer System	SI	Non-resident	500 to 600	
N25	High Court	8	2	2	Y	Y	Sewer System	SI	Non-resident	250	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Disposal System	Agency Operating	Major user type	No. of users/day for WC	Remarks
		M	F								
N26	Kali Sthan	14	9	1	N	Y	Sewer System	SI	Resident	50-60	The facility is too dirty and no maintenance is found there. There is no door in 8 male tolet seats and 2 female toilet seats
N27	Nurulla Road	8	5	2	Y	Y	Sewer System	SI	Resident	400	
N28	T B Hospital	7	5	3	N	Y	Sewer System	SI	Non-resident	40-50	
N29	Gau Ghat	5	4	1	Y	Y	Sewer System	SI	Resident	100	
N30	Alopibagh	6	4	0	Y	Y	Sewer System	SI	Resident	150	
N31	Tharnhill Road	10	3	2	Y	Y	Sewer System	SI	Resident	150	
N32	Lohia Marg	6	4	0	Y	Y	Septic Tank	SI	Resident	100	
N33	South Road	6	4	1	Y	Y	Sewer System	SI	Resident	50	
N34	Swarooprani Hospital	16	5	4	Y	Y	Sewer System	SI	Non-resident	350	There are two female bathroom but one is used as a store room.
N35	Cooper Road	6	6	3	Y		Sewer System	SI	President	35	Water is supplied by handpump
N36	Spru Road	6	4	0	Y	Y	Septic Tank	SI	Resident	80	
N37	Beli Road	6	5	2	Y	Y	Sewer System	SI	Non-resident	35-40	
N38	Rajapur First	14	9	2	Y	Y	Sewer System	SI	Resident	50-70	
N39	Rajapur Second	6	4	2	Y	Y	Septic Tank	SI	Resident	100	
N40	Rajapur Third	6	5	2	Y	Y	Septic Tank	SI	Resident	50	
N41	Board Office	10	3	6	Y	Y	Sewer System	SI	Resident	500	
N42	Myohall	7	3	2	Y	Y	Septic Tank	SI	Resident	20-30	
N43	Children Hospital	5	5	2	Y	Y	Sewer System	SI	Resident	80	
N44	Mutthiganj 2	13	12	1	Y	Y	Sewer System	SI	Resident	150	No water supply in the bathroom of both male and female and one door od female seat is broken, water is supplied by handpump
N45	P D Tandon Park	6	1	2	Y	Y	Septic Tank	SI	Resident	350	
N46	Khuldabad 2	5	10	1	N	Y	Sewer System	SI	Resident	300	
N47	Newada Harijan Basti	6	4	1	N	Y	Septic Tank	SI	Resident	15-20	
N48	Baluaghat	8	3	1	Y	Y	Sewer System	SI	Resident	120	
N49	Nirankari Ashram	6	4	2	N	N	Sewer System	SI	Resident	10 to 15	
N50	Hatia	9	6	2	Y	N	Sewer System	SI	-	50	
N51	North Malaka	6	4	3	Y	Y	Sewer System	SI	Resident	150	
N52	Naj Cinema	9	3	0	Y	Y	Sewer System	SI	Resident	500	
N53	Satti Choora	7	6	2	N	Y	Sewer System	SI	Resident	60-70	
N54	Malakraj Pei Depoo	5	4	1	Y	Y	Sewer System	SI	Non-resident	80-90	
N55	Heja Hospital	7	5	3	Y	Y	Sewer System	SI	Resident	50	
N56	Bai Ka Bagh	Closed									
N57	Ram Bagh Railway Station	10	5	2	Y	Y	Sewer System	SI	Non-resident	400	
N58	Daraganj 1	6	4	0	Y	Y	Sewer System	SI	Resident	125	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Disposal System	Agency Operating	Major user type	No. of users/day for WC	Remarks
		M	F								
N59	Daraganj 2	6	5	2	N	N	Septic Tank	SI	Resident	300	There were 25-30 baffalows found to kept near and infrontof the facility. The facility area is too dirty. The people use the water just from outside.
N60	L I C Tagore Town	8	6	5	Y	Y	Sewer System	SI	Both	10 to 15	
N61	Aloopi Bagh 2	6	4	0	Y	Y	Sewer System	SI	Both	400	
N62	Turaram Bagh 2	6	4	1	N	N	Sewer System	SI	Resident	100	
N63	Garisarai	5	4	1	N	Y	Sewer System	SI	Resident	50	
N64	Leader Road Railway Station	16	4	5	Y	Y	Sewer System	SI	Both	600	
N65	Karbala	6	4	1	Y	Y	Sewer System	SI	Resident	60-70	
N66	Lukerganj	12	8	1	Y	Y	Septic Tank	SI	Resident	200	
N67	Ladies Hospital	5	6	2	Y	Y	Sewer System	SI	Resident	60	
N68	Punjabi Dharmshala	6	5	3	N	N	Sewer System	SI	Resident	5 to 10	
N69	Gangaganj	7	4	5	Y	Y	Septic Tank	-	Resident	50	
N70	Mutthiganj	6	4	1	Y	Y	Sewer System	SI	Resident	50	
N71	Mandi Parisad 1	16	6	1	Y	Y	Septic Tank	SI	Resident	150	
N72	Mandi Parisad 2	10	4	4	N	Y	Septic Tank	SI	Non-resident	40-50	Water is supplied by handpump
N73	Transport Nagar	8	4	2	Y	N	Sewer System	SI	Non-resident	10 to 15	
N74	Moti Lal Hospital	6	5	3	Y	Y	Sewer System	SI	Non-resident	150	
N75	Kanhapur	6	3	0	N	N	Septic Tank	SI	Non-resident	50-60	
N76	Naini 1	5	5	2	Y	Y	Sewer System	SI	Resident	50	
N77	Naini 2	6	4	5	Y	Y	Sewer System	SI	Resident	50	
N78	Naini 3	6	6	2	N	Y	Sewer System	SI	Resident	50-60	
N79	Nehru Park	Closed									
N80	Shahganj	6	4	0	Y	N	Sewer System	SI	Resident	70-80	
N81	Dariabad Khatikana	7	5	0	N	N	Sewer System	SI	Resident	100	
N82	Kakarhaghat	6	4	3	N	N	Sewer System	SI	Resident	15-20	
N83	Mohsimganj	6	4	2	N	N	Sewer System	SI	Resident	150-200	The solid waste is generally thrown at just infront of the facility. The famale bath is used as store room ad no tap at male bathroom.
N84	Motipark	6	4	1	Y	Y	Sewer System	SI	Resident	15	
N85	Malviya Nagar	7	2	1	Y	Y	Sewer System	SI	Resident	125	
N86	Zeroroad Bus Stand	7	6	3	Y	Y	Sewer System	SI	Resident	300	
N87	Nagar Nigam Parisar	7	4	5	Y	Y	Sewer System	-	Non-resident	200	
N88	Garikala	5	3	1	Y	Y	Sewer System	SI	Resident	75	
N89	Karellabagh	Closed									
N90	Naini Rewa Road	Closed									
N91	Mohammati Park Chowk	6	4	1	Y	Y	Sewer System	SI	Non-resident	40-60	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Disposal System	Agency Operating	Major user type	No. of users/day for WC	Remarks
		M	F								
[Constructed by DUDA]											
D1	Mandoori	5	4	3	N	N	Sewer System	DUDA	Non-resident	45-60	
D2	Bhimnagar	6	4	2	Y	Y	Sewer System	SI	Non-resident	20-25	
D3	Main Basti Newada	5	4	0	N	Y	Septik Tank	SI	Resident	100	
D4	Andheri Bagh	Closed									
D5	Electric Crematoria, Daraganj	6	3	1	Y	Y	Septik Tank	DUDA	Resident	20	
D6	Aabkari Mamfordganj	6	4	2	N	Y	Septic Tank	DUDA	Resident	10	
D7	Fulwana Road Daraganj	6	4	2	Y	Y	Septic Tank	DUDA	Resident	500	No bulb is found in the facility. There is a drain of one side of the facility and the other side at the open area baffallows were kept. No Facility is provided for the urination there.
D8	Tulsipur	5	5	2	Y	Y	Sewer System	SI	Resident	200	
D9	Sadiapur	7	3	1	N	N	Sewer System	DUDA	Resident	75	
D10	Fafamau	Closed									
D11	Shankardhai naini	5	4	1	Y	Y	Sewer System	DUDA	Non-resident	50	
D12	Railway Crossing Naini	6	4	3	Y	Y	Sewer System	SI	Resident	20-25	
D13	Chakia Chaknirautul	Closed & Broken									
D14	Hasimpur	6	4	2	Y	Y	Sewer System	-	Resident	100	
D15	Khatri Pathshala	6	4	0	Y	Y	Sewer System	DUDA	Resident	30	
D16	Cotton Mill Tiraha	5	5	3	Y	Y	Sewer System	SI	Resident	40 - 50	
D17	New Katra Printing Technology	7	4	2	Y	Y	Septik Tank	DUDA	Resident	-	
D18	Attala	6	6	3	Y	Y	Septik Tank	Contract Basis	Resident	100	
D19	Daraganj Bakshi Bandh	Closed									
D20	Mamfordganj Sweeper Colony	5	5	1	Y	Y	Septik Tank	DUDA	Resident	150	

Note: SI = Sulabh International

Table 12 Inventory Study of Dhobi Ghat in Allahabad City

Sl. No.	Name of Dhobi Ghat	Location	No. of Unit/	No. of Users/ day	User Fee	Amount of Detegent / person/ day	No. of cloths / person	Water Supply	Waste water Desposal	O&M Organisation	Remarks
[Constructed Dhobi Ghats]											
1	Kanpur Road near Boys High School	Inland (constructed)	40	20 to 25	No Fee	1 Kg detergent, 3 piece soap	50	Jal Sansthan	Into Nala	Local Dhobi Association	1. Total No. of Tanks are 20 of each length 8 Feet. 2) 2 units at each tank. 3) Length of 20 Tanks (40 Units) is 160 Feet. 4) No water supply to 4 tanks as the pipeline is destroyed. 5) Leakage problem in the pipe line is found. 6) Need of shading, as the
2	Manfod Ganj	Inland (constructed)	29	25 to 30	No Fee	0.5 kg detergent, 1 piece soap	25	Tubewell	Into Nala	Local Dhobi Association	
3	Mori Daraganj	Inland (constructed)	16	8	No Fee	1.5 kg detergent, 1 Pc. Soap	60 to 75	Jal Sansthan	Into Nala	Local Dhobi Association	The Place was shaded but destroyed by Army.
4	Behind Medical College on Pannalal Road	Inland (constructed)	30	15	Rs. 800/- for electricity	1 kg detergent	40 to 50	Tubewell	Into Nala	Local Dhobi Association	1) The water is supplied by tubewell for washing. 2) The expenditure of electricity to drive the tubewell comes Rs. 800/- to Rs. 1000/-. 3) Only 4 tanks are shaded. 4.) There is no place for drying of cloths so the people used the side of roads to dry
5	Meenapur near Kalyani Devi	Inland (constructed)	10	8 to 12	No Fee	0.5 kg detergent, 2 Pc. Soap	30 to 35	Jal Sansthan	Into Nala	Local Dhobi Association	
[Traditional Dhobi Ghats]											
6	Balua Ghat	River Bank	10	15	No Fee	2 kg detergent, 3 pc. Soap	100	River water	Into River	No O&M Organisation	
7	Dariyabad Katahara near balua ghat	River Bank	22	50	No Fee	1 kg detergent, 5 pc. Soap	60-70	River water	Into River	No O&M Organisation	Only the Muslim Dhobi wash the cloths as they can not wash cloths at any other ghat so the washer are much here.
8	Dariyabad	River Bank	14	15-Oct	No Fee	0.5 kg detergent, 3 piece soap	20-35	River water	Into River	No O&M Organisation	
9	Kabargahiya Ghat, Yamuna	River Bank	30	20-25	No Fee	0.5 kg detergent, 2 Pc. Soap	35	River water	Into River	No O&M Organisation	
10	Meerapur Ghat, Yamuna	River Bank	18	20	No Fee	1 kg detergent, 2 piece soap	40-50	River water	Into River	No O&M Organisation	
11	Meerapur Baraged Ghat	River Bank	24	30	No Fee	0.5 kg detergent	25-30	River water	Into River	No O&M Organisation	
12	Karailabag Ghat, Subban	River Bank	5	8	No Fee	0.5 kg detergent, 1 pc. Soap	20	River water	Into River	No O&M Organisation	
13	Minto Park Ghat near bridge	River Bank	7	10 to 12	No Fee	1 kg detergent, 1 pc. Soap	50-60	River water	Into River	No O&M Organisation	
14	Minto Park Ghat	River Bank	5	8 to 10	No Fee	0.5 kg detergent	25 - 30	River water	Into River	No O&M Organisation	

Table 13 Inventory Data of Bathing Ghat, Allahabad City

Sl. No.	Name of Ghat	Constructed Steps	Chaning room	public toilet	O&M	Monthly O&M cost (Rs.)	No. of Users / Day	Sanitary Hygiene Condition, Other problems	Requirement to be improved	Remarks
1	Balua Ghat	Y	Y	N	No	No	100	Sanitary Hygiene Condition, Solidwaste, Liquidwaste, Cattle Wallowing	Approach Road	Plastics and other solid waste is being thrown to river yamuna through the Balua Ghat. The Ghat Platform is made of stones with total wide range of 100 Feet. 20 feet wide range of drain flows to the river just side the ghat. There are five changing room
2	Kakrahha Ghat Meerapur	Y	N	Y	No	No	500	Solid Wats, Liquid Waste	Approach Road	The platform of 15 feet wide is fild with silt more than half part. The O&M of the ghat is being doe by some residencial people. Near the Ghat at above side, there is a Public toilet facility but no electricity & water and also No cleaning is being done.
3	Rasoolabad Ghat	Y	Y	Y	No	N.A.	100	Solid Wats, Liquid Waste	Approach Road	The steps are constructed at the ghat but half of the part is covered with the silt and also due to the distance of the riverbank from the Ghat people don't bath at this ghat.
4	Dashaswamegh Ghat	N	N	N	No	No	3,000	Solid Waste, Cattle Wallowing	---	The solid waste is thrown too much at this ghat by residents and also the complain of deadbody flowing is found.
5	Sangam Nose Ghat	N	N	N	No	No	10,000	Solid Waste	Approach Road	Flower, Plastics and other solid waste is thrown at the ghat.
6	Sangam (Triveni) Ghat	N	N	N	No	No	3,000	Solid Waste	Approach Road	
7	Arail Ghat	N	N	N	No	No	200		Approach Road	
8	Junsi Ghat	N	N	N	No	No	1,000	Solid Waste, Liquid Waste	Approach Road	
9	Chatnag Ghat	N	N	N	No	No	200		Approach Road	
10	Gau Ghat	N	N	N	No	No	100	Solid Waste, Liquid Waste, Cattle Wallowing	Approach Road	Open defecation is too much at the ghat. Cattle wallowing at this ghat is found. The drains at the both side of Ghat is found which's dirty water flows directly to River Yamuna.
11	Phaphamau Ghat	N	N	N	No	No	200	Solid Waste, Liquid Waste	Approach Road	
12	Mankameshwar Ghat	Y	N	N	Mankameshwar Ghat Organisation	1,000	150	O&M - Temple People	Approach Road	There is a Temple naming Mankameshwar Mandir which is just upper side of the Ghat. The temple owners has made the 10 feet wide Ghat. The O&M is done by the temple owners.
13	Saraswati Ghat	Y	N	Y	Development Authority	5,000	N.A.	O&M - A.D.A, Allahabad	Approach Road	The constructed steps is made under water level of the river but there is siltation problem more than half of steps. The condition of Toilet facility is very poor, also there is no cleaning and no Water supply.
14	Neem Sarai Newa Ghat	N	N	N	No	No	100	Cattle Wallowing	Approach Road	

Table 14 Inventory Data of Crematoria in Allahabad City

Sl. No.	Name of Crematoria	No. of Unit	Time to burn	Status	O&M Organisation	Operation (hrs)	Cost / body	Monthly O&M Cost (Rs.)	Nos. of User/month	Remarks
[Electric Crematoria]										
1	Shanker Ghat (Tehliyar Ganj)	1	45 minutes to 1 Hr.	In Use	Nagar Nigam	10 AM-10 PM	350	Approx. 25,000	50-60	O&M is OK and 4 employees of Nagar Nigam is employed here.
2	Daraganj Ghat	1	50 minutes to 1 Hr.	In Use	Nagar Nigam	11 AM-10 PM	350	Approx. 27,500	90-100	At this ghat the O&M is ok.
[Traditional Crematoria]										
3	Mori Daraganj	100 meter area	3 Hrs	In Use	No	24 Hrs.	700	No	600 - 800	The ghat area ofenly changed due to the river water decrease and increase.
4	Rasoolabad Ghat	150 meter area	3 Hrs	In Use	No	24 Hrs.	700	No	120	The Ghat area is too dirty and very poor maintenance. Also the river water from the ghat is far. Electricity is arranged there but no bulb or sodium light is found.
5	Kakraha Ghat	50 meter area	3 Hrs	In Use	No	24 Hrs.	700	No	70-80	This Ghat is too dirty. Also this ghat is used to flow the dead body.
6	Neem Sarai	300 meter area	3 Hrs	In Use	No	24 Hrs.	700	No	30-40	The complain from the nearby residence is found that some times the dead body flows from the ghat also some times it is digged at the ghat.

Table 15 Cattle Wallowing Place in Allahabad City

Sl No.	Name of the Ghat	No. of Cattles Per Day	Time			Ownership of the Cattles	Remarks
			9-12 AM	1-3 PM	4-6 PM		
[Ganga River]							
1	Kanahipur Ghat	2000	1000-1200	500-700	300	Local President	
2	Neeva	3000	1500	1000-1200	300 - 500	Local President	
3	Chaphari Opposite Neeva	1500	700-800	500	200 - 250	Local President	
4	Begam Sarai Ghat	2000					
5	Neem Sarai Ghat	2500					
6	Bangrauli	800					
7	Draupadi Ghat	1200					
8	Yadavpur	900					
[Yamuna River]							
9	Balua Ghat	1000	500	300	200	Local Resident	In Summer, number of Cattles increased to 3000.
10	Meerapur Ghat	500	200	150	150	Local Resident	
11	Meerapur baragarh Ghat (Yamuna)	1800	1000	500	300	Local Resident	In Morning time, Cattle Number is higher
12	Karailabag Subban Ghat	1500	700	600	200	Local Resident	
13	Gau Ghat (Yamuna)	600	300	200	100	Local Resident	
14	Jamuna Kila Ghat	600	300	200	100	Local Resident	

Note: The cattle number is higher in Morning Time
In Winter Time the cattles go back from the ghat at the evening around 4 O,clock
The Cattles are of the local dairy owners.

Table 16 Inventory Data of CTC in Varanasi City

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Others
		M	F								
1	Navapura New Basti	Closed last 5 years									
2	Ghasiyari Tola	6	5	0	Y	Y	Sewer System	SI	Resident	100	Bathroom is available but water is not enough, so closed.
3	Maidagin	9	1	2	Y	Y	Sewer System	SI	Resident	-	Good arrangement and cleanness.
4	Tulli Garhi	14	5	4	Y	Y	Sewer System	SI	Resident	35	Some problem in water storage tank. Total bathroom (both ladies & gents) is four but not in use.
5	Omkaleshwar	Closed from 2 years									
6	Machoudhary	15	5	2	Y	Y	Sewer System	SI	Resident	600	1. No arrangement for water in bathroom, so nobody bath inside. 2. No arrangement for water in toilet, user use outside tank for water. 3. Female bathroom is constructed, but nobody using.
7	Cant Bus Stand	15	5	6	Y	Y	Sewer System	SI	Non-resident	600	
8	Nadesar	Closed from 3 years									
9	Herapura	13	7	0	Y	Y	Sewer System	SI	Resident	100	1. Electric wiring is not done properly. 2. One toilet is damaged. 3. No bathroom. 4. Need white washing.
10	Choti Piyari	12	7	3	Y	Y	Sewer System	SI	Non-resident	100	
11	Teliyana	6	4	2	Y	Y	Sewer System	SI	Resident	25	
12	Vijayanagaram	14	6	2	Y	Y	Sewer System	SI	Resident		1. No good arrangement for male & female bathroom. 2. Male bathroom is water supply not working.
13	Goal Gyada	15	5	2	Y	Y	Open Drain	SI	Non-resident	400	
14	Teliyabagh	14	6	1	Y	Y	Sewer System	SI	Resident	150	1. One toilet is not working. 2. Bathroom is available but not in use.
15	Day Yodhi Beer	14	6	1	Y	Y	Sewer System	SI	Resident	50	Out of 20 seat, 11 seat is not working, no water supply.
16	Hadda Sarai	6	4	3	Y	Y	Sewer System	SI	Resident	250	
17	Dail Wariya	6	4	0	Y	Y	Sewer System	SI	Resident	100	Water tank installed in roof so very difficult for water storage.
18	Bhadu Chungi	6	4	0	Y	Y	Sewer System	SI	Resident	75	1. Bathroom is not available. 2. No toilet board installed. 3. Permanent electric wiring is not fix.
19	Eassi Sewage Pump	6	5	2	Y	Y	Sewer System	SI	Resident	200	1. Joint the wall for Male bathroom and given the tank shape and then they store water. 2. The female bathroom is using a store room. 3. Electricity & water condition is not good. Seat was damaged.
20	Nagada Harijan Basti	5	5	0	Y	Y	Sewer System	Development Authority	Resident	85	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Others
		M	F								
21	Sikrull	6	4	2	Y	Y	Sewer System	Energy International	Resident	50	
22	Peetarkunda	6	4	2	Y	Y	Sewer System	SI	Resident	150	1. No arrangement for water in male toilet. 2. Seat was damaged, wall was damaged. 3. No water supply. 4. Water arrangement is good. 5. In the near toilet complex, the local people was throwing the garbage inside the toilet.
23	Ardali Bazar	6	5	0	Y	Y	Sewer System	SI	Resident	35	1. No store room. 2. Bathroom is available but no maintenance.
24	Senpura	6	4	3	N	N	Sewer System	SI	Resident	50	
25	Choti Maldhiya	6	4	2	Y	Y	Sewer System	SI	Resident	300	1. Arrangement is very poor, toilet room very dirty. 2. Female bathroom is full of garbage. 3. Male bathroom tap is not working. 4. No electricity supply.
26	Peechash Mochan	6	4	2	Y	Y	Sewer System	SI	Resident	100	1. Female bathroom is full of garbage, so no body use. 2. Male bathroom tap is not working, so no body use.
27	Bhulaytan	Closed from 1 year									
28	Maldhiya Harijan Basti	6	4	2	Y	Y	Sewer System	SI	Resident	400	1. Arrangement is very poor, toilet room very dirty. 2. Rooms wall and roof is damaged. 3. No electricity supply.
29	Shiv Prasad Gupta Hospital						Sewer System	SI	Non-resident	200	1. Only one special room, toilet and bathroom facilities is available, male and female both is using. 2. Female bathroom tap was broken, so water supply is not available. 3. In the toilet, no tap was installed.
30	Beshwanath Gali	1	1	0	N	Y	Sewer System	SI	Non-resident	150	
31	Lehartara	14	6	2	Y	Y	Septic Tank	SI	Resident Non-resident	100	
32	Sarnath Musium	6	4	0	Y	Y	Septic Tank	SI	Resident	70	1. No store room. 2. Bathroom is not available so user facing very big problem. 3. Sl. No. 6 male complex, one toilet is not working, so user facing problem, they cannot use.
33	B.H.U. Hospital	16	7	3	Y	Y	Sewer System	SI	Other	200	for hospital
34	Jalalipura	17	7	1	N	Y	Sewer System	SI	Resident	70	
35	Narkatia Garai	12	8	0	0	0	Sewer System	SI	Resident	0	Closed last 5 years. Local people wants destroyed the toilet. No need toilet here.
36	B.H.U. Vishwanath Mandir	7	4	1	Y	Y	Sewer System	Nagar Nigam	Resident	50	11 seat toilet is available. User facing problem for water & electricity. Need small repairing.
37	Kazipura Khurd	Totally broken									

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Others
		M	F								
38	Pandeyapur	10	4	1	Y	Y	Septic Tank	Nagar Nigam	Resident	400	1. Two Male & Two Female toilet was not working last two month, sewer pipe line is blocked. 2. Permanent electric wiring is not fix.
39	Karawdi Chungi	6	4	1	N	N	Septic Tank	Nagar Nigam	Resident	20	Toilet is available, but damage, not in good condition. No water arrangement. No door for ladies one toilet seat. Need water, electricity & cleanness.
40	Mental Hospital	6	4	0	Y	Y	Septic Tank	SI	Non-resident	100	1. Bathroom is available but closed. 2. Not connected to Septic Tank. 3. In the front of the toilet every time is garbage and water is there, so user facing big problem.
41	Pahariya Subzi Mandi	6	4	1	Y	Y	Septic Tank	SI	Resident	100	for shopkeepers
42	Sarai Surzan	12	8	2	Y	Y	Sewer System	SI	Resident	800	
43	Ram Nagar Hospital	7	3	2	N	Y	Septic Tank	SI	Resident	50	1. Male & Female toilet, water tap was broken, no water supply in the toilet, so not in use. 2. Ladies toilet full of garbage. 3. Toilet is very dirty. 4. No water supply at male toilet room
44	Shivpur Panch Pandava	7	3	0	N	N	Septic Tank	SI	Non-resident	5	No electricity and water supply in the toilet, so users facing problem.
45	Ranipur	6	3	0	Y	Y	Sewer System	SI	Resident	70	Bathroom is available but the caretaker is using it like store room.
46	Sankat Mochan	6	4	1	Y	Y	Sewer System	SI	Non-resident	200	
47	Sihvpurwa	3	2	1	Y	Y	Sewer System	Energy International	Non-resident	70	Need some construction work.
48	Nadesar Dhobi Ghat	7	4	2	Y	Y	Septic Tank	SI	Resident	300	
49	Behind Cant Bus Stand	7	3	2	Y	Y	Septic Tank	SI	Resident	50	
50	Tulasi Pur	5	5	1	Y	Y	Sewer System	SI	Resident	55	
51	Meer Ghat	Toilet is already constructed but Hotel Alka facing the problem so after Court order they demolished. But users need toilet in near the bathroom.									
52	Trilochan Ghat	The toilet complex was constructed at Gola Ghat. Main gate was closed. The toilet condition is not good. No other arrangement.									
53	Raj Ghat	6	4	0	Y	Y	Septic Tank	SI	Resident	20	Wall and roof is damaged, need some construction, bathroom is available but not in use.
54	Prahalad Ghat	6	4	2	Y	Y	Sewer System	SI	Resident	55	No bathroom in use, no water supply.
55	Malviya Ghat	6	4	0	Y	Y	Sewer System	SI	Resident	75	1. Bathroom is available but used like store room. People use ghat so only few users use the bathroom. 2. No arrangement of cleanness.
56	Eassi Ghat	6	4	2	Y	Y	Sewer System	SI	Resident	50	
57	Cow Ghat	4	6	1	Y	Y	Sewer System	SI	Resident	100	
58	Chowki Ghat	The toilet was not working last 4-5 years. No any arrangement. The toilet condition is not good.									
59	Raja Ghat	No any toilet complex was constructed at Raja Ghat. But the local public wants toilet complex.									
60	Bundi Parkota Ghat	5	5	0	N	N	Sewer System	SI	Resident	20	

Sl. No.	Site Name	No. of Seat (WC)		No. of Baths	Electrified	Water Supply	Desposal System	Agency operating	Major user type	No. of users / day for WC	Others
		M	F								
61	Dashwamegh Ghat	12	7	1	Y	Y	Sewer System	SI	Non-resident	800	
62	Harishchandra Ghat	7	0	0	N	Y	Sewer System	SI	Other	400	for people cremation
63	Manikarinika Ghat	7	3	0	Y	Y	Sewer System	SI	Non-resident	300	
64	Sindhiya Ghat	6	4	0	Y	Y	Sewer System	SI	Non-resident	150	
65	Hanuman Ghat	7	3	1	Y	Y	Sewer System	SI	Resident	115	
66	Shivala Ghat	8	6	0	Y	Y	Sewer System	SI	Resident	100	
67	Radha Mahal Ghat	The name of ghat is Rana Mahal Ghat. No any toilet complex was constructed here. But the local public wants toilet complex.									
68	Vishaswar Ghat	17	2	6	Y	Y	Sewer System	SI	Resident	1000	
69	I.D.H.	16	4	7	Y	Y	Sewer System	SI	Resident	300	1. Water supply is not properly.
70	Chohara	7	3	0	Y	Y	Sewer System	SI	Resident	45	
71	Jadoda Mandi	Closed from 3 years									
72	Beaniya Bagh	8	6	2	Y	N	Sewer System	SI	Resident	250	
73	Amebaya Mandi	7	3	0	Y	Y	Sewer System	SI	Resident	55	No. need for bathing ghat.
74	Aurangabad	16	6	2	Y	Y	Sewer System	SI	Resident	600	1. Arrangement is very poor, toilet room very dirty. 2. Female bathroom is full of garbage. 3. Male bathroom tap is not working. No water supply. 4. Hand pump already installed In the toilet.
75	Digiya	6	4	1	Y	Y	Sewer System	SI	Resident	60	
76	Aazad Park	7	3	0	N	Y	Sewer System	SI	Resident	50	1. No problem for bathing ghat. 2. Water tank is leakage, so water facing problem for water storage. 3. Need again construction.
77	Matra Sishu Rakha Kendra	Not found									
78	Badigaibi	5	5	1	Y	Y	Septic Tank	SI	Resident	55	
79	Sarnath - 2	6	4	2	Y	Y	Septic Tank	SI	Resident	125	1. Problem for sewer system. 2. Problem in water supply. 3. Construction work is very poor. 4. Only two toilet is available, need more.
80	Nariya Trimuhani	7	4	2	Y	N	Sewer System	SI	Resident	50	

SI: Sulabh International

Table 17 Inventory Data of Dhobi Ghat in Varanasi

Sl. No.	Name of Dhobi Ghat	No. of unit	No. of Users /day	User fee	Amount of Detegent / person	No. of cloths / person	Water Supply	Waste water Desposal	O&M Organization	Remarks
[Constructed Dhobi Ghat]										
1	Bauliya Pokhare	35	25	No fee	2kg detergent	70-80	Jal Sansthan	Sewer System	Dhobi Association & Nagar Nigam	Mr. Shastri, President of Dhobi Association staying at Sonarpur.
2	Nadesar	183	60	Rs. 800 Yearly	0.5-1kg detergent	50-60	Jal Sansthan	into Nara	Dhobi Association	1. Water tank installed, supply water by Jal Sansthan, they will charge Rs. 800 yearly. 2. Unit no. 182 is broken, need repairing. 3. Mr. Bhiya Lal Kanojiya is President of Dhobi Association.
3	Kunia	314	45	No fee	2kg detergent 4 p.c. soap	80-100	Tubewell	In the pond	Nagar Nigam & Dhobi Association	1. Total 314 unit was made here and only 157 tank installed. 2. 50 unit is working, because the water supply received only 25 tanks. 3. 132 tanks is not working, they was not received water supply.
[Traditional Dhobi Ghat along the River Ganga]										
G-1	Assi Ghat	6	10	No fee	750g detergent 1 p.c. soap	40-50	x	x	N	
G-2	Prabhu Ghat	7	14	No fee	2kg detergent 4 p.c. soap	50-60	x	x	Dhobi Association	
G-3	Shiwala Ghat	7	28	No fee	650g detergent	35-40	x	x	Dhobi Association	
G-4	Lali Ghat	20	60	No fee	750 g detergent	30-35	x	x	Dhobi Association	
G-5	Chouki Ghat	4	16	No fee	1 kg detergent	50	x	x	Dhobi Association	
G-6	Kashmeshwar Ghat	5	8	No fee	0.5-2kg detergent	70-100	x	x	Dhobi Association	
G-7	Raja Ghat	10	20	No fee	0.5-1kg detergent	50-80	x	x	Dhobi Association	
G-8	Babuwa Ghat	15	45	No fee	0.5-1kg detergent	40-70	x	x	Dhobi Association	
G-9	Shitala Ghat	12	48	No fee	2.5kg detergent	125	x	x	Dhobi Association	
G-10	Lal Ghat	6	24	No fee	1kg detergent 5 p.c. soap	25-30	x	x	Dhobi Association	
G-11	Hanuman Garhi Ghat	15	60	No fee	2kg detergent 3 p.c. soap	25-30	x	x	Dhobi Association	
G-12	Rani Ghat	17	50	No fee	1kg detergent 2 p.c. soap	60	x	x	N	

Sl. No.	Name of Dhobi Ghat	No. of unit	No. of Users /day	User fee	Amount of Detegent / person	No. of cloths / person	Water Supply	Waste water Desposal	O&M Organization	Remarks
G-13	Trilochan Ghat	11	33	No fee	4kg detergent 2 p.c. soap	70-80	x	x	Dhobi Association	
G-14	Gola Ghat	14	28	No fee	2kg detergent 2 p.c. soap	60-70	x	x	Dhobi Association	
G-15	Sakka Ghat	12	36	No fee	3kg detergent 2 p.c. soap	70-80	x	x	Dhobi Association	
G-16	Teliyanala Ghat	20	60	No fee	1kg detergent 2 p.c. soap	50-60	x	x	Dhobi Association	
G-17	Naya Ghat	11	35	No fee	750g detergent 3 p.c. soap	50	x	x	N	
G-18	Khirkiya Ghat	20	40	No fee	2kg detergent 4 p.c. soap	70-80	x	x	Dhobi Association	
[Traditional Dhobi Ghat along the River Varuna]										
V-1	Bagga Nala Near Hukulganj	6	24	No fee	2kg detergent 4 p.c. soap	60	x	x	x	
V-2	Nadesar Nene Varuna Bridge	11	20	No fee	0.5-1kg detergent	50-70	x	x	Dhobi Association	Mr. Bhiya Lal Kanojiya, President of Dhobi Association staying at near court.
V-3	Varuna Old Bridge	4	10	No fee	0.5-1kg detergent	60-70	x	x	Dhobi Association	Mr. Bhiya Lal Kanojiya, President of Dhobi Association staying at near court.
V-4	Sikkreul-I Emiliya Ghat	16	24	No fee	0.5-1kg detergent 2 p.c. soap	60-80	x	x	Dhobi Association	
V-5	Sikkreul-II Emiliya Ghat	8	16	No fee	0.5-1kg detergent	50-70	x	x	Dhobi Association	
V-6	Bajayanty Ghat	15	60	No fee	2kg detergent	50	x	x	Dhobi Association	
V-7	Ghowsabad near Chauka Ghat Bridge	9	12	No fee	0.5kg detergent	25-30	x	x	Dhobi Association	
V-8	Ghowsabad near Shiv Mandir	3	8	No fee	0.5kg detergent	-	x	x	Dhobi Association	
V-9	Dhobi Ghat near Sakhi Ghat near Chouka Ghat	9	18	No fee	3kg detergent 6 p.c. soap	80	x	x	Dhobi Association	
V-10	Amirpur Maiya	4	4	No fee	1kg detergent 2 p.c. soap	25	x	x	-	
V-11	Vishwanath Baba Akhara Delyariya Chuka Ghat	3	6	No fee	1kg detergent 2 p.c. soap	25	x	x	-	
V-12	Kakarha Ghat	10	10	No fee	6kg detergent 12 p.c. soap	150	x	x	-	
V-13	Lakhee Ghat	2	10	No fee	4kg detergent 8 p.c. soap	100	x	x	-	
V-14	Deen Dayalpur	4	8	No fee	5kg detergent 10 p.c. soap	120	x	x	-	

Table 18 Inventory Data of Bathing Ghat in Varanasi City

	Name of Ghat	No. of changing room	Public toilet	Name of O&M Organization	Regular user		Ocassionally user		Sanitary Hygiene Condition (SHC), Other problems	Requirement to be improved	Remarks
					No. of user/day (male)	No. of user/day (female)	No. of user/day (male)	No. of user/day (female)			
1	Assi Ghat	Y (2)	Y	VNN	1,800	600	13,000	12,000	Solid waste & liquid waste problems, Cattle wallowing near the ghat	To improve electricity management and drinking water facility is required	Clean, required to improve the ghat facility to the river bank. Solid & liquid waste management is required as flowers and other religious solid waste gethered at the ghat and make the riverbank dirty near the ghat.
2	Ganga Mahal Ghat	N	N	VNN	125	75	700	700			
3	Revan Ghat	N	N	VNN	40	60	1,300	1,800			
4	Tulsi Ghat	Y (1)	N	VNN	100	200	1,000	2,000			
5	Bhadeni Ghat	N	N	VNN	40	10	200	50			
6	Janki Ghat	Y (2)	N	Janki Temple (cleaning only)	150	100	500	400			
7	Annadi Mai Ghat	N	N	Mata Anand Mai Ashram	150	100	1,200	800	SHC is ok but solid waste problem and low O&M	Electricity improvement, drinking water facility, changing room, public toilet and approach road	Daily one time cleaning is done by Nagar Nigam but it required minimum two times; morning and evening,
8	Vacchraj Ghat	N	N	Ganesh Temple owner & VNN	175	125	1,700	1,300			
9	Jain Ghat	1	N	VNN	80	20	800	200			
10	Shri Neshadraj Ghat	N	N	VNN	60	15	700	100			
11	Panch Kot Ghat	N	N	VNN	65	15	700	200			
12	Prabhu Ghat	N	N	VNN	60	10	300	50			
13	Chet Singh Ghat	N	N	VNN	50	10	250	50			
14	Niranjani Ghat	N	N	VNN	80	20	400	100			
15	Mahanirvani Ghat	1	N	VNN	-	-	-	-			
16	Shivala Ghat	N	N	VNN	30	30	300	400			
17	Gularia Ghat	N	N	VNN	150	50	500	800			
18	Dandi Ghat	N	N	VNN	400	100	500	700			
19	Prachin Hanuman Ghat	N	Y	VNN	100	50	800	1,200			
20	Karnatak State Ghat	N	Y	VNN	50	-	125	25			
21	Harishchander Ghat	N	Y	VNN	-	-	-	-			
22	Lali Ghat	N	N	VNN	40	10	125	25			
23	Vijay Nagar Ghat	N	N	VNN	325	125	800	400			
24	Kedar Ghat	1	Y	Kedareshwar Temple owners & VNN	400	400	2,500	2,500			

	Name of Ghat	No. of changing room	Public toilet	Name of O&M Organization	Regular user		Ocassionally user		Sanitary Hygiene Condition (SHC), Other problems	Requirement to be improved	Remarks
					No. of user/day (male)	No. of user/day (female)	No. of user/day (male)	No. of user/day (female)			
25	Chowki Ghat	1	N	VNN	50	25	75	50			
26	Someshwar Ghat	N	N	Someshwar temple owner & VNN	70	30	300	200			
27	Mansarovar Ghat	N	N	VNN (dairy cleaning by local, shops, public)	70	30	350	250			
28	Narad Ghat	N	N	VNN	300	100	1,000	2,000			
29	Raja Ghat	1	N	hotel Clark	500	200	3,000	5,000			
30	Babuwa Pandey Ghat	N	N	VNN	100	50	300	400			
31	Pandey Ghat	1	N	VNN	450	50	500	1,500			
32	Dimpatiya Ghat	N	N	VNN	10	-	75	250			
33	Chwshahi Ghat	1	N	VNN	500	100	500	1,500			
34	Rajamahal Ghat	N	N	VNN	460	40	300	100	Very poor SHC, Solid waste problem, No O&M, No public toilet	Required sanitation improvement, Toilet Facility and daily cleaning, Drinking water facility.	Too dirty, due to absence of toilet facility public utilise the ghat plateform for toilet & urination purpose. Stairs are broken and skretched at many places and needed of repairement. Electricity and drinking water is also required in this ghat.
35	Munshi Ghat	N	N	VNN	280	100	2,800	1,200	Very poor SHC, Solid waste problem, No O&M, No public toilet	Requirement to improve the solid waste management, and O&M. Changing room, drinking water and toilet facility required.	Clean, but stairs need repairment near the river water and toilet, changing room, electricity and drinking water facility is required
36	Darbhnga Ghat	N	N	No O&M	350	20	1,500	10,000	Very poor SHC, Sewer water problem at ghat, No O&M, No public toilet	Need O & M agency, electricity improvement, toilet, changing room and drinking water facility required, maintenance of sewer required due to which the lekage wastewater flows near the ghat and contaminate river water	Ghat plateform is clean but sewer water make the river-water dirty so it may cause the skin disease problem and can affect health. Due to this sewer water, the water near the ghat looks too dirty.
37	Ahilyabai Ghat	1	N	VNN	50	75	3,000	4,000			

	Name of Ghat	No. of changing room	Public toilet	Name of O&M Organization	Regular user		Ocassionally user		Sanitary Hygiene Condition (SHC), Other problems	Requirement to be improved	Remarks
					No. of user/day (male)	No. of user/day (female)	No. of user/day (male)	No. of user/day (female)			
38	Sheetla Ghat	1	N	Low cleaning	75	100	1,500	2,500	Poor O&M, Soild waste problem, Low SHC	Requirement of daily cleaning of Ghat plateform & stairs, to improve solid waste management problem	The ghat Cleaning and soild waste mangement is poor as sweeper clean the ghat alternate day and only one time, also all the soild is thrown in the river. The shopkeeper & users at the ghat are also responsible for increasing solid waste as they throw the plastic bags and bottles in to river or ghat.
39	Prayag Ghat	2	N	Gagotri Sewa Samiti (GSS)	125	175	2,000	3,000	Poor SHC, Soild waste problem, plastic bottles & bags, flowers spread over the ghat	Need of daily cleaning and some dustbins for solid waste needed at the ghat, display required to make awareness for cleaning	Low O&M and cleaning while Nagar Nigam make cleaning but not daily, which cause the low cleaning ad all the soild waste is thrown in to the river after sweeping or washing the ghat.
40	Deshwamegh Ghat	2	Y	Gangotri Sewa Samiti (GSS) daily cleaning	1,500	2,000	40,000	60,000	Low SHC and O&M	Requirement of drinking water and solid waste management	Most famous religious ghat and is used maximum due to religious reason. The peole also come here for marriage & other functions and so cause the increase of solid wastes as plastics, polythene and water bottles there at the Ghat which then come down in the river during cleaning and washing.
41	Rajender Prasad Ghat	2	Y	Gangotri Sewa Samiti (GSS) daily cleaning	500	350	2,500	6,000	Poor SHC, Low O&M	to improve electricity management and drinking water facility is required, also O&M and cleaning required improvement.	According to the users, the solid waste collected is thrown in the mid riverwater by NGO- Gangotri Sewa Samiti which cause the increase of river water pollution, whereas NGO say that it throws it another side of the river and then burn the solid waste. The people also complained that there is no proper cleaning. A drain also meets the river near this ghat and required to treat the wastewater and then relocate it another place far from the ghat.
42	Maan Mandir Ghat	1	N	VNN	300	100	2,500	2,500			
43	Tripura Bharavi Ghat	2	N	VNN	200	100	1,700	1,300			
44	Meer Ghat	N	N	VNN	100	50	700	300			
45	Lalita Ghat	1	N	VNN	125	25	700	200			
46	Sindia Ghat	1	Y	VNN	250	100	1,500	1,500			

	Name of Ghat	No. of changing room	Public toilet	Name of O&M Organization	Regular user		Ocassionally user		Sanitary Hygiene Condition (SHC), Other problems	Requirement to be improved	Remarks
					No. of user/day (male)	No. of user/day (female)	No. of user/day (male)	No. of user/day (female)			
47	Manikrnika Ghat	1	N	VNN	350	50	4,000	1,000	Poor SHC, Soild waste problem, drinking water problem	Public toilet, Drinking Water facility, to improve O&M, to check of throwing unburn body and unburn wood into river	Need to improve soild waste problem and electric crematoria should be facilitated to minimise this as solid waste is due to the tradional cremation by which ash & unburn part of body is thrown in the river water which pollutes the river
48	Sankta Ghat	N	N	No	N	N	-	-	Very poor SHC, too dirty, liquid waste problem, Damaged	Need maintenance, improve the liquid waste management, Daily cleaning, public toilet, drinking water facility required. O&M agency should be employed	No O&M agency, Too dirty due to liquid waste, No one like to bath at this ghat even occassionally no one goes to ghat. So this ghat required for improvement.
49	Bohshala Ghat	N	N	VNN daily cleaning	25	25	400	600	Low O&M, Liquid waste problem from the Sankata Ghat, low SHC	Repairement required of damaged part of stairs, to improve solid waste management problem, Public toilet and drinking water supply required	Low maintenance, Required big repairement
50	Jalasen Ghat	1	N	VNN	60	15	400	100			
51	Gnagamahal Ghat	N	N	No	-	-	-	-	Dirty, No stairs, no O&M	Repairement required, also need of stairs till the river bank.	There is a big gap between river water and Ghat plateform, also no O&M so ghat is dirty and no one bath at this ghat.
52	Ganesh Ghat	N	N	VNN (but no O&M)	-	-	-	-			
53	Mehta Ghat	N	N	VNN	175	75	400	1,100			
54	Ram Ghat	N	N	VNN	60	40	600	1,400			
55	Jatar Ghat	2	N	VNN	75	25	600	200			
56	Raja Gwaliar Ghat	10	N	VNN	80	20	600	200			
57	Bala Ghat	1	N	VNN	150	50	700	300			
58	Panch Ganga	1	N	VNN	250	150	2,000	2,000			
59	Durga Ghat	N	N	VNN	300	100	3,000	2,000			
60	Brhama Ghat	N	N	VNN	200	100	1,200	800			
61	Bundi Parkota Ghat	N	Y	VNN	55	15	350	150			
62	Sheetla Ghat	N	N	VNN	125	75	400	300			
63	Lal Ghat	N	N	VNN	35	15	350	250			
64	Shir Hnuman Gharhi Ghat	N	N	VNN	400	150	2,500	2,000			

	Name of Ghat	No. of changing room	Public toilet	Name of O&M Organization	Regular user		Ocassionally user		Sanitary Hygiene Condition (SHC), Other problems	Requirement to be improved	Remarks
					No. of user/day (male)	No. of user/day (female)	No. of user/day (male)	No. of user/day (female)			
65	Cow Ghat	1	Y	VNN	300	200	2,000	3,000			
66	Badrinath Ghat	N	Y	VNN	200	100	800	1,200			
67	Trilochan Ghat	1	N	VNN	450	150	4,500	3,500			
68	Gola Ghat	N	Y	VNN	400	100	600	400			
69	Mehashwar Ghat	1	N	VNN	475	25	2,000	3,000			
70	Samka Ghat	N	N	VNN	150	50	200	800			
71	Teliyana Nala Ghat	N	N	VNN (poor cleaning, need repair of stairs)	150	75	1,500	4,000	Poor O&M, too dirty plateform, Cattle wallowing, Liquid waste through drain meets directly into the river near the ghat.	Public Toilet, changing room & drinking water facility, need to stop of collection of cattle dung which pollutes the river water and make the ghat dirty	The ghat is too dirty for this very few people use this ghat, required to improve the problems and strict rules and regulation should be there for cleaning the ghat to sweepers and to check the cattle wallowing
72	Naya Ghat	N	N	VNN	230	70	3,000	6,000			
73	Nishad Ghat	N	N	VNN	15	5					
74	Prahalad Ghat	1	Y	VNN	450	350	3,000	3,500			
75	Raj Ghat	2	Y	VNN	125	75	800	1,200	Solid waste at the river bank and ghat, Poor O&M, Dirty and unmaintained toilet facility	Electricity improvement, drinking water facility, public toilet facility improvemnet required.	Need daily cleaning and solid waste management, also to improve O&M, need of construction of stairs upto the river bank. It was found at the time of survey that the soild waste collected thrown in the mid of the river by Nagar Nigam workers.
76	Bhaisasur (Raj Ghat) Ghat	1	Y	VNN	50	10	250	50			
77	Khrikeya Ghat	N	N	No O&M	100	50	450	1,000	Dirty, No stairs, no O&M and public toilet, cattle wallowing is general	Requirement to build up of plateform and stairs. Public toilet, Drinkinh water facility	the ghat is too dirty, as no plateform & no public toilet is there, people use it for toilet purpose, all the place is filled with solid waste so very few people bath here.
78	Keshaw Ghat	N	N	No cleaning	150	40	3,000	12,000	Low SHC and O&M	Requirement to built the stairs near the water level, approach road, liquid waste management	The ghat is dirty and no O&M, VNN provide cleaning occassionally but no body cares for the solid waste collected during the occasion, which results the mixing of solid waste in the river. As no public toilet is facilated people go for defecation at river bank. Also the river water seems too polluted as domestic waste water froma drain meets the river water directly without treatment which contaminate the water.

Table 19 Inventory Data of Crematoria in Varanasi

Sl. No.	Name of Crematoria	LOCATION	No. of Unit	Time to burn (hours/body)	Status	O&M Oraganization	Operation (hrs)	Cost of wood/body	Monthly O&M Cost (Rs.)	Nos of User/month	To be improved
1.	MANIKARNIKA GHAT	River bank	Conv.= 20	Conv. 3 hours/body	Operation	NGO	Day&Night	Rs. 800 (wood: 300 kg)	1,500	2500-3000	Gali
2.	HARISH CHANDRA GHAT	River bank	Conv.=6	3 hours/day	Operation	NGO Nagar Nigam	Day&Night	Rs. 800 (wood: 300 kg)	1,500	800 - 900	Road
3.	HARISH CHANDRA GHAT	River bank	E.C.=2	45 minute to 1 hour	Not in Use (closed)	Nagar Nigam	-	Rs. 600	-	-	

1. Manikarnika Ghat: Total unit of conventional crematoria is 20. 8 to 10 unit is always in use. One body burning it takes 300 kg wood, for 1kg wood rate is Rs. 2.50. Totally expenditure of crematotion for one body is of Rs. 750 to Rs. 800. Totally 8 body per day are burning for one unit.

2. Harish Chandra Ghat: Total unit of conventional crematoria is 6. Its take time of burning of one body near about 3 hours. 4 unit is always in use. One body burning requires 300 kg wood. Totally expenditure of cremation for one body of Rs. 500 to Rs. 750. Totally 8 body per day are burning for one unit. Average for one month about 800 - 900 body are burning. In this ghat one Electric Crematoria is constructed but not working for some technical problem, so the EC was closed. The EC charge of Rs. 600/body.

3. Harish Chandra Ghat: one Electric Crematoria is constructed but not working for some technical problem, so the EC was closed. The EC charge of Rs. 600/body, but unknown bodies were also burnt in this free of cost. Two units of Electric Crematoria is there but it is not in working condition from 1-1/2 year. Its fire bricks are broken(Cracked) and required to be change. Also it requires totally repairing. Nagar Nigam is responsible for O&M. For rennovation & repairement, Quotation are asking for by Nagar Nigam mainly for firebricks.

Note: Conv.= Conventional Crematoria (Traditional Crematoria)
E.C. = Electric Crematoria

Table 20 Inventory Data of Cattle Wallowing in Varanasi

S. No.	Name of the Ghat	Approximate No. of Cattles per Day	Length	Time			Ownership of the Cattles
				9-12 AM	1-3 PM	4-6 PM	
[River Ganga]							
G-1	Samone Ghat	200-250 cattle	200 mtr.	250	200	200	Local Resident (Personal)
G-2	Assi to Nagwa Ghat	250-300 cattle	250 - 300 mtr.	300	250	250	Local Resident (Personal)
G-3	Shiwala to Nirangni Ghat	120-125 cattle	250 mtr.	125	110	100	Local Resident (Personal)
G-4	Kshameshwer Ghat	25-30 cattle	50 - 60 mtr.	30	20	20	Local Resident (Personal)
G-5	Man Sarover Ghat	70-80 cattle	80 - 90 mtr.	80	70	60	Local Resident (Personal)
G-6	Narad Ghat	30-40 cattle	50 - 60 mtr.	40	35	30	Local Resident (Personal)
G-7	Mankarnika Ghat	20-25 cattle	60 - 70 mtr.	25	20	20	Local Resident (Personal)
G-8	Ram Ghat	15-20 cattle	50 mtr.	20	15	15	Local Resident (Personal)
G-9	Jatar Ghat	15-20 cattle	25 mtr.	20	15	20	Local Resident (Personal)
G-10	Badri Narayan Ghat	40-50 cattle	50 mtr.	50	40	35	Local Resident (Personal)
G-11	Gola Ghat	120-130 cattle	130 - 150 mtr.	130	120	100	Local Resident (Personal)
G-12	Raj Ghat	100-125 cattle	150 - 200 mtr.	125	100	100	Local Resident (Personal)
G-13	Khidikiya Ghat	250-300 cattle	500 - 600 mtr.	300	250	250	Local Resident (Personal)
[River Varna]							
V-1	Varuna Sangam Ghat	50 - 60 apporx.	300mtr.	60	50	50	Local Resident (Personal)
V-2	Koniya Ghat	140 - 150 apporx.	300mtr.	80	70	70	Local Resident (Personal)
V-3	Mata Baru Ghat	100 - 120 apporx.	200mtr.	50	40	40	Local Resident (Personal)
V-4	Kakahara Ghat	150 - 160 apporx.	Approximate	90	60	60	Local Resident (Personal)
V-5	Karuna Barrage (Old)	60 - 75 apporx.	250mtr.	60	50	50	Local Resident (Personal)
V-6	Laxmi Ghat near Bridge	60 - 80 apporx.	400mtr.	90	40	40	Local Resident (Personal)
V-7	Dhalwarya	50 - 60 apporx.	250mtr.	60	50	50	Local Resident (Personal)
V-8	Iciswa Ghat	20 - 15 apporx.	300mtr.	15	20	20	Local Resident (Personal)
V-9	Chauka Ghat	100 - 130 apporx.	600mtr.	80	50	50	Local Resident (Personal)
V-10	Hukulganj	125 - 130 apporx.	500mtr.	140	100	100	Local Resident (Personal)
V-11	New Varuna Bridge-I	25 - 40 apporx.	250mtr.	20	25	25	Local Resident (Personal)
V-12	Kamliya Ghat	30 - 40 apporx.	300mtr.	40	20	20	Local Resident (Personal)
V-13	New Varuna Bridge-II	40 - 50 apporx.	300mtr.	50	40	40	Local Resident (Personal)

Remarks:

Above all ghat, the cattles are coming at the morning 9:00 to 11:00, this time huge quantity of the cattle. They staying till afternoon 2:00 after 3:00 p.m. after that they start going back, after 4:00 p.m. to 5:00 p.m. they all return back at home. They all cattles which are basically buffalows come to ghat for bathing.

Appendix A.2 Survey Results of Sample Facility Survey of Low Cost Sanitation

	Number				Percentage				
	Lucknow	Kanpur	Allahabad	Varanasi	Lucknow	Kanpur	Allahabad	Varanasi	
Public toilet complex									
Total	143	240	111	80	31%	18%	31%	31%	
Surveyes	35	43	34	21	24%	18%	31%	26%	of total number
Hygienic situation									
Hygienic & well maintained	17	27	4	2	48.6%	62.8%	11.8%	9.5%	of complexes surveyed
Dirty & ill maintained	14	14	23	17	40.0%	32.6%	67.6%	81.0%	of complexes surveyed
Others	4	2	7	2	11.4%	4.7%	20.6%	9.5%	of complexes surveyed
Number of seats									
Total	481	595	367	279					
for Male	334	370	218	190	69.4%	62.2%	59.4%	68.1%	of total seats
for Female	147	225	149	89	30.6%	37.8%	40.6%	31.9%	of total seats
Average number of seats per toilet									
Total	14	14	11	13					
for Male	10	9	6	9	69.3%	62.2%	59.4%	68.1%	of total average no. of seats per toilet
for female	4	5	4	4	30.7%	37.8%	40.6%	31.9%	of total average no. of seats per toilet
Approx. No. of users /day for water closet (WC)	9128	11835	3303	4105					
Average number of users per toilet per day	261	275	97	195					
Fee									
Male 1Rs, Female 0 Rs, Ch 0 Rs (10)	24	16	0	0	68.6%	37.2%	0.0%	0.00%	of total no. of participants at surveyed toilets
Male 1Rs, Female 1 Rs, Ch 0 Rs (11)	3	10	27	5	8.6%	23.3%	79.4%	23.81%	of total no. of participants at surveyed toilets
Male 1Rs, Female 2 Rs, Ch 0 Rs (12)	0	2	0	0	0.0%	4.7%	0.0%	0.00%	of total no. of participants at surveyed toilets
Male 2Rs, Female 0Rs, Ch 0 Rs (20)	2	2	0	0	5.7%	4.7%	0.0%	0.00%	of total no. of participants at surveyed toilets
Male 2Rs, Female 1 Rs, Ch 0 Rs (21)	3	3	1	0	8.6%	7.0%	2.9%	0.00%	of total no. of participants at surveyed toilets
Male 2Rs, Female 2 Rs, Ch 0 Rs (22)	0	3	2	14	0.0%	7.0%	5.9%	66.67%	of total no. of participants at surveyed toilets
Free (0)	2	0	3	0	5.7%	0.0%	8.8%	0.00%	of total no. of participants at surveyed toilets
Family Pass (30)	0	7	1	0	0.0%	16.3%	2.9%	0.00%	of total no. of participants at surveyed toilets
Others (10.5)	1	0	0	2	2.9%	0.0%	0.0%	9.52%	of total no. of participants at surveyed toilets
Total	35	43	34	21	100.0%	100.0%	100.0%	100.00%	
Type of connection									
Sewer	7	25	25	17	20.0%	58.1%	73.5%	81.0%	of total no. of public toilets
Septic Tank	28	14	9	3	80.0%	32.6%	26.5%	14.3%	of total no. of public toilets
Gas Plant	0	4	0	0	0.0%	9.3%	0.0%	0.0%	of total no. of public toilets
Others (Open drain)	0	0	0	1	0.0%	0.0%	0.0%	4.8%	of total no. of public toilets
Total	35	43	34	21	100.0%	100.0%	100.0%	100.0%	
Electrified	32	38	28	17	91.4%	88.4%	82.4%	80.95%	of total no. of public toilets
Water Supplied	33	40	24	18	94.3%	93.0%	70.6%	85.71%	of total no. of public toilets

Note: This table is based on sampling survey

Appendix A.3 Existing Low Cost Sanitation Plan of GAP-II Proposed in DPR

(1) Lucknow

There are several slums on either side of the river throughout its course starting from Hardinge Bridge to barrage. These slum dwellers defecate in open on the banks of the river located between the bunds. Apart from this, there are few localities near the bunds which are deprived of public toilet facilities because they cannot afford toilets of their own. Thus defecation on the banks of the river adds further to the pollution in the river. It has therefore been proposed to construct community toilet near these slums so that pollution in the river due to these slums / localities may be possible to be prevented. The community toilets have been proposed to be constructed on the available lands of Nagar Nigam along the banks of river. Hence no provision for land acquisition has been made. An investigation was carried out to make an assessment of the population residing in these slums / localities who defecate in open banks of river. Since land available is very confined at many places therefore at such places 5-seat toilets have been proposed and in the rest 10- seat toilets have been proposed. Total no of community toilets proposed are 21 out of which 12 are 10-seat & rest are 5- seat.
Cost: 109.79 lacs, including septic tanks, soak pits, provision for extra laying of sewers, provision extra laying of water mains.

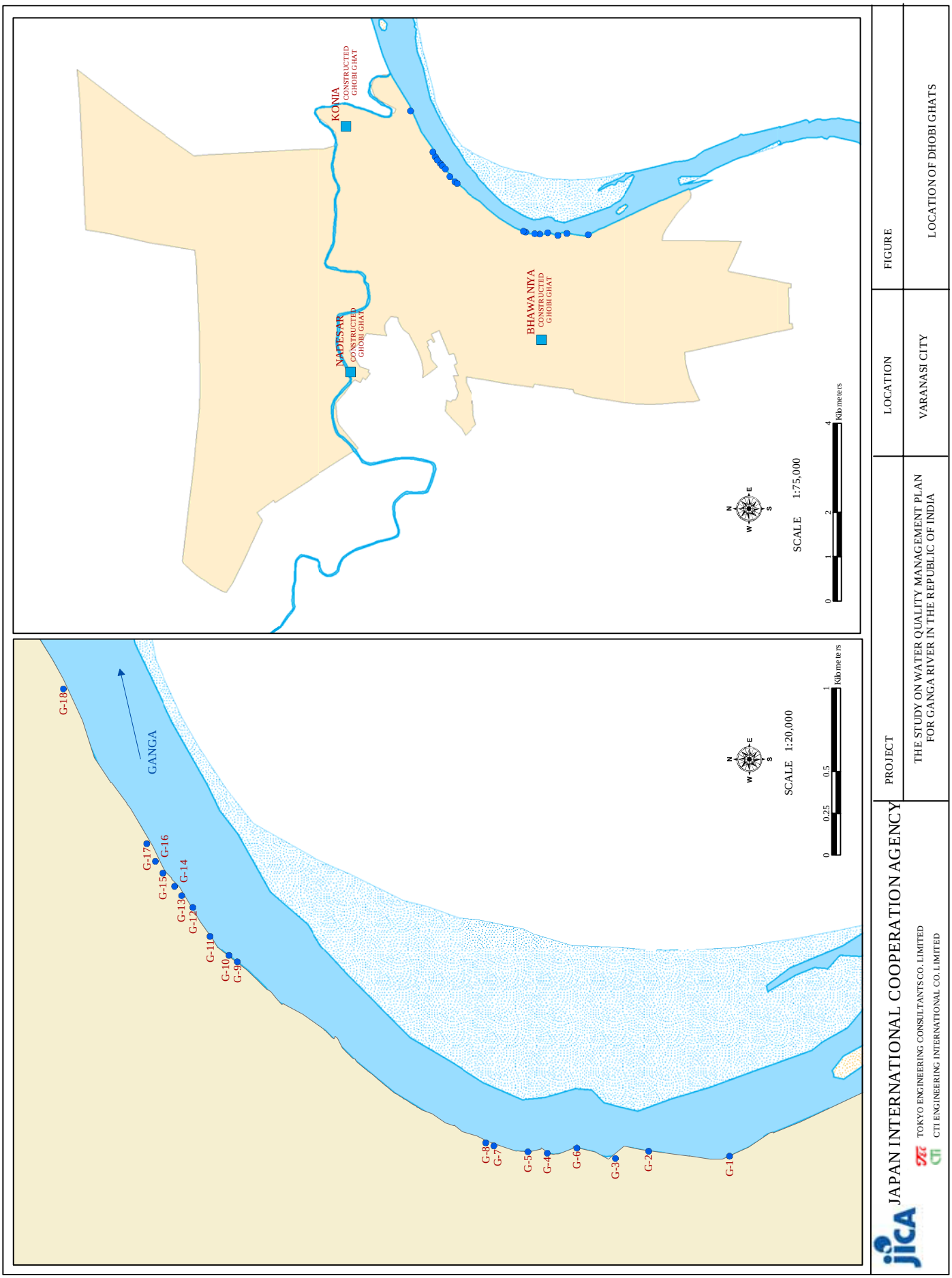
Source: (U.P. Jal Nigam [2002])

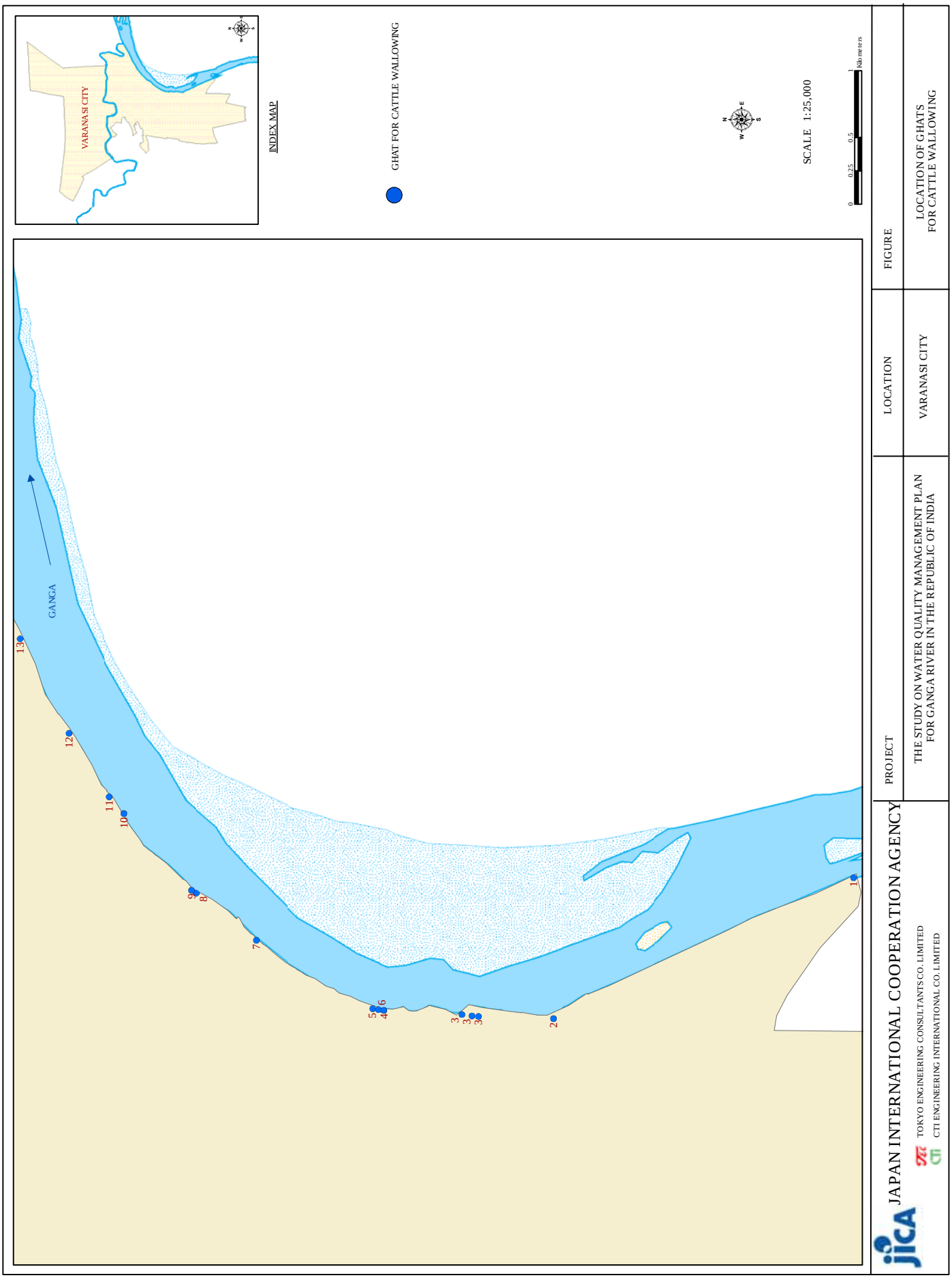
(2) Kanpur

On account of rapid growth of population, the development of unplanned colonies have come up in outer skirt or surroundings of city areas. These colonies have created so many problems such as lack of proper roads, drainage and sewerage etc although tried to overcome by providing the civic amenities through different schemes assisted by World Bank and Dutch Government. Following different types of Sulabh Complex have been proposed

1. 10 seated connected with sewers	50 nos	250.00 lacs
2. 10 seated connection with septic tails	40 nos	200.00 lacs
3. 20 seated connection with sewers	40 nos	280.00 lacs
TOTAL		730.00 lacs

Source: U.P. Jal Nigam [2003]


KONIA
CONSTRUCTED GHOBI GHAT
NADESAR
CONSTRUCTED GHOBI GHAT
BHAWANYA
CONSTRUCTED GHOBI GHAT
SCALE 1:75,000
Kilometers
GANGA
G-18
G-17
G-16
G-15
G-14
G-13
G-12
G-11
G-10
G-9
G-8
G-7
G-5
G-4
G-6
G-3
G-2
G-1
SCALE 1:20,000
Kilometers
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO ENGINEERING CONSULTANTS CO. LIMITED
CTI ENGINEERING INTERNATIONAL CO. LIMITED
PROJECT
THE STUDY ON WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER IN THE REPUBLIC OF INDIA
LOCATION
VARANASI CITY
FIGURE
LOCATION OF DHOBI GHATS


VARANASI CITY
INDEX MAP
GHAT FOR CATTLE WALLOWING
SCALE 1:25,000
Kilometers
0
0.25
0.5
1
GANGA
13
12
11
10
9
8
7
5
6
4
3
3
3
2
1
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TOKYO ENGINEERING CONSULTANTS CO. LIMITED
CTI ENGINEERING INTERNATIONAL CO. LIMITED
PROJECT
THE STUDY ON WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER IN THE REPUBLIC OF INDIA
LOCATION
VARANASI CITY
FIGURE
LOCATION OF GHATS FOR CATTLE WALLOWING

Appendix B

THE STUDY ON WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER IN THE REPUBLIC OF INDIA

CASE STUDY

ON

LOW COST SANITATION

UNDER

RIVER ACTION PLANS

FEBRUARY 2005

JICA STUDY TEAM
TOKYO ENGINEERING CONSULTANTS CO., LTD.
CTI ENGINEERING INTERNATIONAL CO., LTD.

APPENDIX B

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CHAPTER 1 INTRODUCTION

1.1 JICA Study Team is working on the JICA (Japan International Cooperation Agency) supported Ganga River Water Quality Management Plan specifically for the four cities of Lucknow, Kanpur, Allahabad and Varanasi in the state of UP. First phase of the study was carried out during the months of April – July 2003 which involved a detailed situation analysis covering identification and quantification of sources of pollution, mapping of the wastewater management infrastructure, water quality monitoring and modelling, impact of existing river action plans, national regulations, water quality norms, etc. Second phase of the study commenced from October 2003 which involves preparation of master plans for sewerage and storm water drainage for the four cities and assessing the feasibility of implementation of the master plan for one of the cities.

BACKGROUND

1.2 Since the commencement of the centrally sponsored programme on river pollution control in 1985, more than 70 sewage treatment plants have been constructed under the Ganga Action Plan (GAP) and Yamuna Action Plan (YAP). These plants are based on a range of technologies involving varying levels of mechanisation, energy inputs, land requirements, costs, skilled manpower etc. In the early stages, the selection of technology was based on past experience and its perceived performance efficiency. Moreover, at different stages of these Action Plans a number of technologies have been tried out on pilot scale and some of them have been scaled up for larger capacity plants. Over last 20 years a considerable experience and expertise has been built up within the country in this sector. However, the level of performance of these plants with regard to effluent quality, energy consumption, process stability, resource recovery, sustainability of initial and O&M costs etc. has been varied.

1.3 In addition, the programmes also included a component on low cost sanitation for the urban low income communities as well for the floating population in urban centres. The key objective of this component has been to reduce open defecation and thereby control non-point discharge of waste into the river system. The approach adopted in this component focussed on creation of community level sanitation facilities i.e., community toilet complexes and mobilisation of the community in their increased utilisation. In spite of large intervention, it is reported that due to a variety of reasons utilisation of these communal facilities is low. The target population still continues to defecate in open and as a result, the object of reduced loads on river system has not been achieved to the desired extent.

OBJECTIVES OF THE STUDY

1.4 In this context, JICA Study Team carried out a case study of community toilet complexes especially for works implemented under Yamuna Action Plan with the objectives to:

- Arrive at a set of guidelines for selection of appropriate technology options for on-site or off-site sanitation under the on-going master planning activity for the four cities in the project

In addition, the study also covers aspects relating to institutional arrangements, manpower and training.

STRUCTURE OF THE REPORT

1.5 Chapter 2 provides a summary of the study. Chapter 3 gives an assessment of technology options for urban sanitation implemented under the two river actions plans and offers strategic considerations and options for community and individual household latrines.

1.6 Chapter 4 describes a situation analysis on institution aspects of YAP I relating to the low cost sanitation component. The situation analysis includes a brief review of institutional arrangements

for both the construction as well as the O&M part of the facilities. Chapter 5 provides recommendations for institutional arrangements and strengthening for this component.

CHAPTER 2 EXECUTIVE SUMMARY

EVALUATION OF TECHNICAL ASPECTS

2.1 Under both the GAP and YAP the low cost sanitation model was characterised by the supply driven approach of constructing community toilet complexes irrespective of the level of demand from the community. This aspect is exhibited in the form of low utilisation level of the common facilities and continued practice of open defecation by a large fraction of the target population in low income communities. Besides the behavioural and hygiene education aspects, it is found that from technical point of view, sustainability of the created facilities is dependent on the key inputs of water, electricity and manpower for operation, maintenance and keeping the place clean. Very often the facilities are abandoned due to lack of cleanliness which is dependent on the three above mentioned inputs.

2.2 The sanitation approach needs to adopt a paradigm shift where it is demand driven and offers a balance between: community toilets and individual toilets; water consuming and dry sanitation options; off-site and on-site sanitation. The new approach should consider sanitation as a process rather than an engineering intervention of merely constructing latrines. It has to recognise that it is the personal 'construct' or 'behaviour' of the target population which needs to be changed from the current practice of open defecation towards adoption of the practice of fixed point defecation.

2.3 The community toilets should be considered as transition solutions which need to be backed-up by provision of a higher level of service in the form of individual household latrines. The latter approach can then look at on-site sanitation options such as VIP latrines, single pit or two pit latrines, double vault latrines, or septic tanks connected to small bore sewerage system. Of course it will require longer time horizons, stronger commitments, and more resources to achieve desirable coverage. However, this will offer a more sustainable solution than the current approach of CTCs and lead to reduction of organic loads on rivers.

2.4 In case of CTCs, it is found that among others, it is the availability and cost of water (energy) which affects the sustainability. A technology option which could be considered for reducing water requirement and which is very close to the current pattern is aqua privy. This involves conventional pan with out a water seal but with a chute dipping into the septic tank. It offers same advantage of odour control but at a reduced level of water consumption. However, its acceptability must be ascertained through field trials.

2.5 At the end it must be realised that whatever may be the technology of sanitation, it must meet user preferences and choices. From this point of view, no particular set of technologies can be prescribed but only the range of options can be expanded with experience considering ease in use, affordability, flexibility, sustainability and ease in replication.

INSTITUTIONAL ASPECTS OF LOW COST SANITATION

2.6 Overall utilization of the community facilities is found to be low due to a combination of factors. Construction of CTCs was carried out by PIAs without involving ULBs in planning and implementation stages which led to the latter feeling excluded. This got translated into low commitment from their side for O&M of facilities. A supply driven approach of constructing community toilets was adopted without either demand assessment or community participation of any nature in planning, design or O&M of the CTCs. This resulted in lack of ownership of the facilities by the community, a major factor contributing towards low usage. On the other hand, intensive public awareness activities failed to achieve impact due to poor planning, coordination and implementation. Communities fail to correlate availability of sanitation facilities, good hygiene behavior and improved health.

Operation and maintenance of CTCs

2.7 UPJN in UP, PHED in Haryana and MCD in Delhi were responsible for project implementation and were instrumental in making decisions regarding O&M contracts. All CTCs have been given on "pay and use" basis to NGOs. Involvement of the ULBs in UP and Haryana was limited to site identification and was minimal at the planning, finalisation of contract and construction stage. Construction of the CTCs was completely carried out by the PIAs through NGOs/ contractors in Haryana and UP. At the time CTCs were handed over to ULBs, the O&M contracts which were drawn between the PIAs and NGOs were transferred to the ULBs.

2.8 In most towns of UP and Haryana, ULBs have taken over the CTCs. In smaller towns, especially of Haryana, "taking over" of CTCs by Municipal Councils or Municipal Committees appears to have been formalised only on paper. Instead, it is understood that due to lack of staff or capacity in ULBs, the PIAs have been requested to continue occasional supervision work. Initial decision to engage Sulabh International, a mammoth NGO with monopoly in this sector for construction and O&M of CTCs, resulted in succumbing to their condition of an unusually long 30 year O&M contract. This may diminish their motivation for continued quality provision of services.

2.9 Areas of concern with regard to NGOs running the CTCs include low financial sustainability with little or no grant from the ULB, high cost of electricity and other inputs, inability to conduct effective public awareness activities, desire to maximize profits with many NGOs being typical private contractors, thus, providing poor services.

2.10 Alternative models involving higher inputs from the local community or CBOs have not been tried out. This arrangement has shown improved institutional sustainability elsewhere in the country. However, this requires longer software inputs at the community level to build up the capacity of interested CBOs.

Recommendations for low cost sanitation

2.11 A participatory and collaborative, demand driven strategy to identify needs has been demonstrated to be the most sustainable approach to provision of sanitation facilities. Consultation with the communities at the planning stage is essential to establish exactly what they are willing and able to do and to define roles and responsibilities, both of user groups and the managing agency.

OPTION 1: O&M of CTCs by NGOs

2.12 NGO is referred to an organisation which demonstrates adequate ability in O&M of sanitation facilities, community participation activities and has a social focus. It is important that communities are consulted with respect to their demand/ need and willingness to pay at the construction stage itself. This activity can be the responsibility of the same NGO contracted for O&M of the CTCs which has experience in community mobilisation/ participation activities.

OPTION 2: O&M of CTCs through community management

2.13 A community based organisation (CBO) is given the responsibility of O&M of CTCs by issue of a contract directly to such a group of users. The users may do the maintenance work themselves, or they could play a managerial role, raising funds for maintenance and paying the utility or a third party to do it for them. The success of community based approach depends on mobilising the community, encouraging them to plan and work together as a cohesive group and engineers a change in their behaviour.

2.14 In conclusion, it is prudent to mention that community initiatives can be a complicated and a slow process. There is an emerging need for more flexible service arrangements and partnerships

whereby all players make their contribution. Specific solutions, that are viable and realistic, will of course vary from place to place.

CHAPTER 3 ASSESSMENT OF TECHNOLOGY OPTIONS FOR URBAN SANITATION

3.1 This chapter provides a brief assessment of the low cost sanitation component implemented under the two river action plans with regard to the approach, the technologies and key issues affecting the performance and utilisation of the created facilities from technical point of views. It discusses issues related to on-site versus off-site sanitation, community versus individual latrines and concludes with suggestions on an alternative approach and appropriate technology options.

BACKGROUND

3.2 In the context of the river action plans, interventions in the area of low cost sanitation were taken with the main objective of controlling the widely prevalent practice of open defecation among the low income communities and thereby check the flow of wastewater into the rivers. Although the objectives of improved environmental sanitation and public health were inherent, they were not highlighted. The approach under both GAP and YAP was similar where low income communities and floating population were targeted and it comprised creating common sanitation infrastructure in the form of community toilet complexes (CTC). As the average per capita investment costs for CTCs turn out to be far too low compared to the conventional sewerage based sanitation system, they tended to be called as 'low-cost' sanitation option. In addition, in some towns depending on the situation and requirements of the community, a limited number of individual household latrines (IHL) were also constructed. Moreover, during the later part of YAP a new concept of micro STPs was introduced at selected locations which involved treating the wastewater from CTCs.

3.3 Over the years, it has been found that the benefits from low cost sanitation component have not been as per the initial estimates, particularly from the CTCs. Their utilisation levels have been low due to a combination of social, behavioural, institutional and technical factors. It must be noted that technical factors constitute only a limited part of the causes for under utilisation while the other three factors play a dominant role in determining the success of a sanitation programme. However, this chapter covers only the technical aspects of the three types of engineering structures which are described in the sections that follow.

COMMUNITY TOILET COMPLEXES

3.4 CTCs typically have two sections - one for men and one for women and each section have 10 or 20 latrine seats. The latrines are 'pour flush' type which have a ceramic pan and a water seal. Each section of the CTC has a separate area for bathing. A bore well, an electric connection and a diesel generator set have been provided to meet the water requirement on a regular basis. Capital cost per seat for a CTC is around Rs. 55,000 with septic tank and Rs. 50,000 without septic tank.

3.5 The CTCs are designed for a capacity of 50 users per seat per day. Considering expected large user base, water based systems were selected under the project. Some of the issues pertaining to the operation of CTCs are discussed in the paragraphs that follow.

Availability of water

3.6 For an off-site sanitation system based community toilet complex having pour flush water seal type of technology, availability of water is the most critical aspect for its use, operation and maintenance. In addition, a large quantity of water is required for bathing area as well as in keeping the place clean. In view of this, an energised bore well (with electric connection or diesel generator) has been provided at each CTC which ensures adequate supply of water. Running of the water pump involves energy cost which very often is the major expense and determines the financial sustainability of running a CTC.

3.7 In order to minimise consumption of water and thereby the operating costs, the latrine rooms are not provided with a water tap. Experience with taps showed that they are often tampered or damaged which leads to wastage of water. Instead the users are expected to use a container and for which a water storage tank is provided outside.

Use of latrine in a CTC

3.8 In absence of taps in the cubicles, the 'pour flush' system is adopted wherein the users throws water from a container and attempts to flush faeces down the water seal. However, very often it is seen that this quantity of water in not sufficient and the faeces are left in the pan. Generally the next person in the queue does the flushing and then uses the latrine. At times under water scarcity situation, the frequency of flushing goes down which creates unhygienic and unaesthetic conditions.

Operation and maintenance of CTCs

3.9 Operation and maintenance of CTCs involves flushing, washing the floor, running the pumps, running of diesel generator sets and safety of the facilities against any vandalism etc. The cleaning activity requires chemicals e.g., cleaning acid, bleaching powder, and phenyl which are used intermittently for cleaning of pans and disinfection of the platform and floors. Clearly this is among the most important aspects in maintaining hygiene and cleanliness and determines the functional sustainability of a CTC. In view of this the CTCs could not be left on their own and the projects have tried out different models to appoint a service provider or a care taker. Under these institutional models the responsibility of O&M rests either with the urban local body or it is given to a local NGO, or to the contractor who built the CTC. The operating agency has to depute a team of one supervisor and two or three sweepers who carry out all the above mentioned activities and also collect user fee to sustain their operations. (These aspects are further discussed under the chapter 4 on institutional arrangement).

Wastewater disposal at CTCs

3.10 Under the current arrangement, separate collection of wastewater from bathing area is not done. As a result, the possibility of reusing sullage subsequently as flushing water has not been explored.

3.11 Current arrangement for discharge of the combined wastewater from a CTC is in one of the following three manners:

- The water seals connected to septic tanks which in turn are connected to sewer lines
- The water seals directly connected to sewer lines
- The outlets of septic tanks draining into open surface drains (which are eventually intercepted and diverted to the centralised STPs)

3.12 This form of waste disposal is classified as off-site sanitation where the waste matter is conveyed though the water medium to an STP or to the river system. As against this, the on-site sanitation technology alternatives for community toilets e.g., septic tanks with drainage fields, and alternating multiple composting pit system were not tried out.

3.13 At those locations where land availability is a constraint and where sever line is not available, typically septic tanks with soak pits have been provided. However, in view of the small size of the plot, large volume of wastewater and limited capacity of soak pits, stagnation of effluent is observed. Alternatives such as drainage fields or micro-wetlands are not found which offer higher capacity for wastewater dissipation.

Location of toilets

3.14 CTCs have been constructed in low income communities, and near public places e.g., bus and railway station, etc. While those located near public places have recorded higher number of average users per day, there have been some concerns with regard to the CTCs in residential areas. This has to do with the nature of the target population where a majority of the floating population using the CTCs at busy junctions may be used to fixed point defecation as against the population residing in the low income community which is used to open defecation.

3.15 In a typical large slum locality in Delhi a number of CTCs have been provided which take into account the average distance one has to walk, number of potential users per CTC, space for septic tank, distance from open defecation ground, distance from any other existing toilet complexes etc. The last aspect is relevant as it has been reported that in one instance where the CTC was located close to an existing toilet complex of a hospital, the level of utilisation in new CTC was low. Apparently the user fee levied in the new CTC was a disincentive in comparison to the hospital toilet complex which was offering free services.

Cost of running a CTC

3.16 The cost of running a CTC involves expenses for electricity, cleaning chemicals and salary and wages for the supervisors, attendants and sweepers and repairs, if any. Among all the cost heads, the main component are found to be wages, chemicals and electricity/diesel expenses for running of the pumps. A typical calculation for one such facility operated by Sulabh International is presented in Table 3.1.

3.17 Indirectly, the financial sustainability of a CTC can be linked to the type of technology as it is the cost of water (or energy cost) in a pour flush type of latrine which is found to be the quite high.

3.18 In order to sustain the operations, the O&M agency collects certain user fee (@ Rs. 2/use) from all adult users. As there is no support from either the urban local body or from the project, the O&M agency has to completely depend on the revenue generated from the user fee. Typical calculation at a CTC of 10+10 capacity is shown in Exhibit 3.2 where it turns out that the bottom line will be positive only when there are at least 500 users per day at that CTC However, there are children (may be 20%) which are allowed free use and then there is pilferage by the caretaker which could be about 25-30%. Considering these aspects it would require around 1000 users per CTC to be in the profitable territory.

3.19 In this scenario, only the CTCs located at busy junctions, market places etc. have been able to generate higher revenue and are able to offer better services. On the other hand, most of the CTCs located in residential localities have seen less number of users per day and they are unable to meet the recurring costs. Recognising this aspect, under YAP the CTCs with high and low revenue potential were clubbed together and were offered to a particular agency. Nonetheless, O&M agencies are still finding hard to sustain the operations.

Table 3.1 COST OF RUNNING A COMMUNITY TOILET COMPLEX

(Rupees pa)

Manpower	2 supervisor @ 3000 pm, 4 safai karamchari @ 2000 pm	168,000
Cleaning chemicals	@ Rs. 10/seat/day	73,000
Electricity	5 HP motor running 8 hrours/day, electricity cost @ rs. 5/unit	54,458
Septic tank emptying	Three emptying/year @ Rs. 6000/emptiyng	18,000
Repairs	@ 2% of civil costs	22,000
Total		335,458
Per seat O&M cost		16,773

Note : CTC capacity : 10 seats for men and 10 seats for women

Table 3.2 REVENUE AT A CTC FROM USER CHARGES

No of users/day	Revenue pa	Fixed cost	Profit/loss
100	73,000	335,458	-262,458
200	146,000	335,458	-189,458
300	219,000	335,458	-116,458
400	292,000	335,458	-43,458
500	365,000	335,458	29,542
600	438,000	335,458	102,542
700	511,000	335,458	175,542
800	584,000	335,458	248,542
900	657,000	335,458	321,542
1000	730,000	335,458	394,542

INDIVIDUAL HOUSEHOLD LATRINES

3.20 Individual household latrines were constructed on a limited scale under the two river action plans. Under GAP, IHLs were constructed mostly in the towns of UP and West Bengal. Under YAP, the IHL component was limited mostly to Agra where about 3000 pit privy latrines were converted into pour flush latrines.

3.21 The IHLs again comprised pour flush type latrines with a pan and a water seal. In some cases particularly under GAP, the pans were made of PVC while under YAP they were of ceramics. Under GAP the project provided platform, pan and the substructure, if any and the beneficiaries were expected to construct the superstructure from their own resources. The funding structure adopted under YAP is not known, however it is expected to have been on the same lines.

Wastewater disposal at IHLs

3.22 Wastewater disposal arrangement in IHL comprised mostly a single technology option i.e., septic tank attached to a sewer line or a drain. Other technology options such as ventilated improved pit latrines (VIP), single pit pour flush latrines, two pit pour flush latrines, pour flush latrines connected to a small bore sewerage network were not tried out. There could be several reasons for this e.g., lack of space in individual plots for two pit construction, doubts and discomfort in usage of VIP latrines, lack of arrangements or service providers for emptying of single pits and public health concerns on transport of unstabilised waste etc.

Usage depending on construction quality

3.23 A field review carried out in 1995 found that about 50% of the surveyed IHLs under GAP were being utilised properly. Especially in West Bengal the usage was found to be as high as 90%. However, rest of the IHLs were found to have been abandoned or dismantled. In general the usage varied across communities and towns depending on their level of education, motivation, awareness, and socio-economic profile. Typically low usage in some communities was attributed to, among others, a combination of following reasons e.g.:

- Low availability of water for flushing
- Lack of the superstructure
- Low acceptance of PVC pans

3.24 The usage was found to have increased where the beneficiaries had replaced PVC pans with ceramic pans and where some kind of a temporary or permanent shelter was created (MOEF, 1995).

MICRO SEWAGE TREATMENT PLANTS

3.25 In order to control the discharge of wastewater from a typical CTC, ten number of 'micro STPs' were constructed on a pilot basis in different parts of Delhi. The objective of this pilot intervention was to assess suitability and performance of treatment systems based on a Japanese concept of 'Johkasou' under Indian conditions. Each of these STPs has a treatment capacity of 15 cum/day.

3.26 The Johkasou system of domestic wastewater treatment has evolved during last 80 years in Japan in response to pollution of inland surface water bodies from domestic wastewater in small towns and rural communities, specifically from individual households and cooperatives. Johkasou is a concept or an approach and involves a combination of unit operations and processes (physical, biological and chemical) on a micro scale for removal of suspended solids, dissolved organics (BOD) and faecal micro organisms. Depending on the number of users, situation and effluent requirements, the treatment scheme is customised which could comprise compact units for primary sedimentation, aeration for attached growth system and disinfection. Other process options comprise anaerobic filter tank, rotating biological contactor, contact aeration tank, secondary settling tank, sludge thickening, recirculation, sludge storage etc. In principal, as its name says, it represents a typical STP of varied configuration at a micro level. In other words, Johkasou system represents an advanced form of on-site sanitation where the wastewater is given elaborate treatment at the site of its generation before letting it out into the drainage system.

Institutional support mechanism

3.27 The concept and treatment approach has been widely applied in the rural areas of Japan and is backed up by a full fledged institutional mechanism stipulated under a special law called Johkasou Law of 1985. This Law lays down requirements for :

- Installation of the system
- Maintenance and desludging of reactors
- Type approval of a particular installation
- Registration for construction agencies
- Authorisation for desludging agencies
- Qualified installation technicians
- Qualified operators
- Registration system for maintenance vendors
- Miscellaneous aspects, and

- Penal provisions

3.28 In view of this elaborate institutional mechanism, apparently the system has been very popular and successful in Japan. Understandably, for it to succeed in another country under different socio-economic setting, a similar or perhaps stringent legal system would be required. In other words, in absence of such a legal provision, the system may not succeed. Moreover in a setting where there are no regulations for as simple a system as septic tank, the chances of success of an elaborate Johkasou system are very low.

Pilots in Delhi

3.29 The plants installed in Delhi under the pilot comprise three chambers for sedimentation, attached growth aeration and disinfection respectively. They have arrangement for aeration through a blower and sludge removal from the first two chambers with the help of sludge pumps. The total electric load is 1.6 kW and the average energy consumption is of the order of 20-25 kWh/day (equivalent to 1670 kWh/mld). Typically the land requirement for a 15 cum/day plant is 15 m x 15 m (equivalent to 1.5 ha/mld) .

3.30 All the ten plants were constructed locally under a special technology transfer agreement. These micro STPs were commissioned in later part of 2001. Out of these about 6 are reported to be functioning while the rest 4 are not operated. Apparently the costs of operation (energy, chemicals and manpower) are high and the running is not being sustained. Out of the 6 operational plants, at none of the installations sludge removal has been carried out as yet, however the effluent BOD is reported to be close to 50 mg/l. It is understood that due to external aeration in general the performance of a well functioning micro STP is better than a typical septic tank (however, MCD has also tried out an anaerobic filter attached to a septic tank and achieved outlet BOD of 60 mg/l).

Life cycle costs of pilot micro STPs

3.31 Average cost of a 15 cum/day capacity plant came to be about Rs. 1.13 million each (2001) and the average annual O&M cost is found to be Rs. 0.14 million. If the same life cycle cost calculation approach as adopted in the chapter on assessment of STP technologies is applied, the life cycle cost for the 15 cum/day plant over a period of 35 years, as shown in Table 3.3 comes to about Rs. 6.6 million. This is equivalent to about Rs. 440 million/mld, and is astronomical in comparison to the centralised STPs of any type of technology.

Table 3.3 LIFE CYCLE COST CALCULATION FOR A MICRO STP

Particulars	Unit	Value
Initial investment cost	Rs. Million	1.13
Recurring cost	Rs. Million pa	0.14
Civil works	%	30
E&M works	%	70
Civil cost	Rs. Million	0.34
E&M costs	Rs. Million	0.79
Uniform present worth factor (35 years, 5%)		16.37
Life cycle cost	Rs. Million	6.59
Capacity of the plant	m^3	15
Unit life cycle cost	Rs. Million/mld	439

Note: Four replacements of E&M components are considered over the life of the plant

3.32 In view of the prohibitive unit life cycle costs absence of supporting institutional mechanism, and difficulties in O&M it is suggested that such type of systems are not considered in the ongoing Ganga River Water Quality Management Plan. Instead the effluent should be conveyed to a centralised

STP and treated there which will be more economical. The argument that such systems will lead to reduced sewerage costs does not hold as the pipe network will required any way for carrying sewage from adjacent areas as well as the treated wastewater from the Johkasau (if it is not utilised on site for gardening etc.).

STRATEGIC CONSIDERATIONS FOR SANITATION

3.33 Under both the GAP and YAP the low-cost sanitation component was characterised by the supply driven approach of constructing community toilet complexes irrespective of the level of demand from the community. This aspect is exhibited in the form of low utilisation level of the common facilities and continued practice of open defecation by a large fraction of the target population in low income communities. In spite of channelling large resources in this component, the objectives of prevention of open defecation, improved public health and reduction of waste loads on the river system could not be achieved to the desired degree. Besides the behavioural and hygiene education aspects, it is found that from technical point of view, sustainability of the created facilities is dependent on the key inputs of water, electricity and manpower for operation, maintenance and keeping the place clean. Very often the facilities are abandoned due to lack of cleanliness which is dependent on the three above mentioned inputs.

CTCs versus IHLs

3.34 Connected to the behavioural aspect is the general preference for an individual or personal toilet rather than having to share the facility with a large number of users and among them some strangers. Undoubtedly, the level of hygiene and cleanliness maintained in an IHL is much higher than what is typically seen in a CTC. This has to do with the level of responsibility and sense of ownership towards an IHL and lack of it towards a CTC. The ease of having an IHL is far greater than having to go to a CTC which may not be convenient in night hours or during rains, and during other inclement weather conditions. Particularly for women and children and if the CTC is located much farther from the household these factors become discouraging for continued usage of the facility.

Off-site versus on-site sanitation

3.35 As against the current focus on off-site sanitation system where the waste is taken away from its place of generation, from the point of view of a river action plan it would be more effective and economical to focus on-site sanitation systems. The latter type of systems such as a two pit pour flush latrine or a composting latrine enable retention of the waste at the place of generation and its complete treatment over a certain period. As a result, generation of effluent and thereby organic load on the receiving aquatic environment is reduced.

IHLs with small bore sewerage system

3.36 In view of the above discussion, there is a need to evolve a new paradigm on low cost sanitation which could consider among other sustainable options, provision of individual household latrines connected to small bore sewerage system. As the name suggests, the latter is a simplified network of small diameter sewer pipes. It is considered to be one of the most important advances made in sanitation and has been found to be 'the only technically feasible, economically appropriate and financially affordable sanitation option for high-density, low-income areas' (Mara, 1996). (This option is covered in further detail in later part of this chapter).

The paradigm shift for sanitation

3.37 In this backdrop of not so encouraging experience with community toilets, there is a need to adopt a paradigm shift in promotion of the conventional 'low-cost' sanitation solutions. By taking lessons from the past interventions, the new approach needs to go beyond the convention and offer

more than what has been already tried out. The new approach needs to integrate following aspects :

- Sanitation to be considered as a process rather than mere construction of latrines
- Focus on behaviour change : move from open defecation to fixed point defecation
- Generation of demand for sanitation in the community through awareness and education
- The need for privacy, convenience and personal preferences for IHLs
- Community's capacity and willingness to share the construction costs
- CTCs to serve as transition solution
- Building of institutional capacity (e.g., CBOs) at the community level for operation and maintenance (This aspects is further discussed in Chapter 4)

3.38 Based on the experience from urban slum improvement projects in other parts of the country as well as in other countries in the region, promotion of IHLs under a community led demand driven programme turns out to be more successful strategy than working on the supply side by constructing community latrines. The strategy under GAP and YAP stopped with interventions at the CTC level and did not attempt to build up on limited success. The new strategy could look at CTCs as transition solutions and gradually move toward provision of IHLs. Once the people have got used to the habit of fixed point defecation, it is easier to move to IHL model, the next higher level of sanitation which is more sustainable. Therefore any programme on sanitation in low income communities needs to offer a combination of IHLs and CTCs and it needs to be adequately supplemented with extended software inputs for demand generation.

TECHNOLOGY OPTIONS FOR INDIVIDUAL HOUSEHOLD LATRINES

3.39 This section describes options which take the sanitation programme beyond the CTC model and offers alternatives to pour flush off-site sanitation type of latrines. Depending on the situation of the location, receptivity of the community, strength of the local bodies and community based institutions, available resources and time horizon, suitable options or combination there of should be selected. The following sections provide technology options for individual household latrines covering their key features, advantages, disadvantages and applicability. For detailed description of the technology and design aspects, reference is made to the WHO guidebook on on-site sanitation (Franceys, et.al., 1992). In all the options design corrections are required for safeguarding against collapse of pit, groundwater pollution, etc.

Ventilated improved pit (VIP) latrine

3.40 A VIP latrine comprises a squat platform and a vent pipe placed on a pit. Both the odorous gases and fly are controlled by the action of a screened vent pipe. It is a low end entry level option for IHL and can serve as a permanent solution when two alternating pits are provided for excreta digestion.

3.41 The VIP latrines are easy to construct, maintain, and are an affordable entry level option. They require no water for flushing and therefore do not lead to generation of wastewater. As a result, they are in line with the objective of wastewater control under a typical river cleaning project.

3.42 VIP latrines can be constructed on small plots where there is no on-site water supply and on any type of soil strata as the quantity of water for seepage is limited. In shallow water table situations, a sand envelope of 0.5 m provides adequate protection against ground water pollution.

3.43 Initial costs of a VIP latrine depend on size of the pit, platform, pit lining, sand envelope around lining, construction specifications, screened vent pipe, and shelter. A very approximate cost for this type of latrine for a family of 5-8 persons is Rs. 4500-5000.

Single pit pour flush latrine

3.44 This is a pour flush water seal type of latrine which is an improvement over a VIP latrine. The water seal prevents possibility of any odour, flies or mosquito nuisance. The platform can be direct on the pit or off set. This is one of the most feasible options for IHLs under congested low income communities where space for larger pits may be a constraint and preference for an odourless system is high.

3.45 The pit can be designed for a life of 1 to 2 years. Where water table permits, deeper pits could be constructed to give longer periods between emptying. Openings are provided in pit lining to allow liquid to infiltrate in to the soil and as a result this is also a zero discharge sanitation option. As in case of a VIP latrine, a sand envelope of 0.5 m can give adequate protection against ground water contamination. As there is only one pit, it needs to be emptied when full and for this, mechanical / vacuum emptying devices are essential in urban areas.

3.46 Advantages of a single pit latrine are its low cost and limited area requirement, free from the problems of smell, flies and mosquitoes, and ease in siting inside a house. Offset pit arrangement offers additional advantage of ease in emptying and upgrading to two pit system in future.

3.47 On the other hand, some of the disadvantages of a single pit latrine are listed as follows:

- Pit emptying requires trained operatives and equipment and could expose workers to risk of faecal infection
- Emptying of direct pit latrines is difficult
- Wet contents of the pit, if not disposed off properly, can lead to contamination of water courses, local groundwater table or general environment and still spread diseases.
- At least 5 litres of water per person per day is required for flushing and in localities facing water scarcity this is not a feasible solution
- In areas with deep black cotton soil or hard rock wastewater percolation is difficult
- Risk of groundwater pollution and contamination of water sources if not designed properly or if the hydraulic loading is more than 50 mm/day
- Water seal blockage and the risk of breakage if cleaning attempted carelessly

3.48 Single pit pour flush latrine is suitable for areas having round the year availability of adequate quantity of water, and where soil strata is pervious. However, it is not suitable in areas having impervious black cotton soil or expansive soils and impervious rock strata in the top layer.

3.49 Initial costs depend on size of the pit, pit lining, platform, ceramic pan, water seal, connecting pipe, pit cover slab, sand envelope around lining, construction specifications, and type of shelter. A very approximate estimate of cost of a single pit latrine including substructure and super structure for a family of 5-8 persons is between Rs. 8,500-10,000. Cost of incorporating situational relevant corrections e.g., sand envelope, impervious base, mound etc. is additional and could be approximately 30% of the above estimate.

Twin pit pour flush latrine

3.50 A twin pit pour flush latrine is a further developed version of single pit pour flush latrine. As the name says, it has two pits which are used alternately in a cycle of 2 years. The two pit latrine can be constructed where sufficient land is available in a residential plot and it serves as a stand alone or complete solution for the sanitation needs of a family.

3.51 Key features of a twin pit latrine are same as that of a single pit latrine with the advantage that it does not involve emptying of unstabilised waste and it yields innocuous compost. The cycle of two years in which the pits are used alternately provides enough time for stabilisation of the waste and

elimination / killing of pathogenic bacteria as well as helminth eggs.

3.52 Recurrent cost pertains to emptying of the compost once in two years. Initial cost is in the range of Rs. 8,000-10,000. This type of latrine has been widely promoted by Sulabh International in both urban and rural areas and it has yielded good results.

Small bore sewerage system : an alternative for low income communities

3.53 Small bore sewerage system comprises a network of small diameter sewer lines which are laid at shallow gradients and almost parallel to the existing ground profile without the expensive and large manholes but only simple inspection chambers.

3.54 Depending on the construction components and application, they are called settled or interceptor sewerage system, condominium sewerage system, simplified sewerage system and small bore sewerage system. Salient features of the technology are listed below.

Key features of the technology

3.55 Key features of small bore sewerage system are:

- Small diameter sewer pipes operating in open channel and pressure flow conditions
- Shallow excavation
- Low cost compared to conventional sewers
- Preferably laid on both sides of a lane rather than in the centre

Performance

3.56 A well engineered system is effective in providing good off-site sanitation in urban low income communities. This system has been successfully implemented under DFID supported Cuttack Urban Services Improvement Programme for low income communities, where the wastewater is finally discharged into a common septic tank. It has been found to be functioning satisfactorily.

3.57 One of the first large scale small bore sewerage system was installed under a community driven programme in Orangi low income community in Pakistan. The following box provides a brief profile of Orangi Project which was implemented about 15-20 years back and which can serve as a model for most Indian low income communities.

Box 3.1 : Experience from Orangi Project on small bore sewerage

The Orangi project in Karachi, Pakistan (OPP) provides an example of participatory sanitation programme in low income communities. Covering an area with about 50,000 houses and 3,400 lanes, the project was able to connect all lanes to sewer lines of small bore system. The OPP trained street managers organized the household toilet construction and sewer lines in their streets. The community itself organized training of the representatives in sanitation technology, arranged finance and participated in construction. The research and extensive support, skill support, survey & mapping and loan of equipment was provided by OPP. The OPP was able to keep costs at 20-25% of conventional sewerage by eliminating contractors, developing appropriate and low cost technology by research and involving the community totally in the project. The project has had a clear demonstration effect and is being replicated at many other slum localities in Karachi and other cities. As a model demonstration project the performance of OPP project has been outstanding. (International workshop on wastewater treatment: decentralised technologies for effective management, January 2003, New Delhi).

3.58 Simplified sewerage system is also widely used in Latin American countries especially in Brazil where it has evolved over last 20 years. Over the years its coverage has expanded as it has proved to be the only technically feasible, economically appropriate and financially affordable

sanitation option for high density, low income areas. Some of the other features of small bore sewerage system are listed below.

Specific requirements

- High level of community participation and commitment for upkeep of the system
- Individual household latrines – pour flush latrines or aqua privies
- High initial rate of household connection and water supply
- Lift station, and non-return valves where necessary
- Desludging machines in case of interceptor system from sewage authority

Options

- System with or without interceptor / septic tank connected to small bore
- System connected to a decentralised sewage treatment facility e.g., septic tank, anaerobic filter, micro-wet land etc. or to main sewer network of the city.

Dos and don'ts

- Ensure proper gradients to prevent backflows
- Keep minimum sewer diameter of 75 mm
- Avoid manholes as far as possible
- Provide for ventilation at high points where pressure flow conditions develop
- Lift station for group or individual houses where interceptor outlet is below sewer
- In case of interceptor sewers do not allow direct connection of latrines to the pipeline
- Create capacity within the community for simple O&M

Capital costs

- Figures for Indian conditions are not available, however overall costs can be lower than on-site sanitation

Operation and maintenance

- Regular inspection of connection chambers by the sewerage maintenance agency
- Running of lift station where necessary
- Desludging in case of interceptor sewerage system

O&M costs

- Information not available

Advantages

- Small bore sewerage system offers the facility of individual household latrines based on pour flush system to a larger percentage of population
- In totality, significantly less expensive option than conventional sewerage offering same technical feasibility

Disadvantages

- Improper design or maintenance may lead to operation and maintenance problems e.g., blockages or backflow, etc.

Applicability

- Simple sewerage : high density, low income housing areas
- Interceptor sewerage : areas already having septic tanks but with soil of low permeability
- Areas with assured water supply

TECHNOLOGY OPTIONS FOR COMMUNITY LATRINES

3.59 Based on the situation analysis on CTCs, broadly the following points emerge about their technical features:

- Quantity of water required for operation depends on how the excreta is transferred to the substructure, and
- Level of water pollution depends on how the wastewater is discharged from the substructure into the drainage system or the environment.

3.60 In order to reduce the water requirement, and thereby reduce the operating costs, low water consuming on-site sanitation technologies need to be considered for isolated locations. Low water consuming ceramic pan with smaller water seal may be one option for the commonly used pour flush latrines. However, this has already been adopted and there is limit to which it can help in reducing the consumption of water.

3.61 Exploring options beyond 'pour flush' technology for situations where a large number people are expected to use the facility (> 200/day), it is very difficult to experiment with alternative technologies which offer the benefits of low water consumption, without compromising on other aspects e.g., odour control, flies and insect control, aesthetics, and ease in use and cleaning. Moreover, under social conditions where water is used for anal cleaning, it would not be feasible to adopt dry sanitation options e.g., VIP latrines or composting latrines.

3.62 As described earlier, VIP latrine could be an option for IHLs, but its typical form with two year retention capacity may not be feasible for CTCs. Even with a backup support system in the form of vacuum emptying machines, this option is difficult to implement since this would involve emptying of latrines on a weekly or fortnightly basis and transporting the waste to a composting plant or to an STP.

3.63 On the other hand, a composting latrine requires high level of O&M control, discipline for separation of urine and faeces and balancing of carbon to nitrogen ratio by addition of dry carbonaceous matter. A simpler version such as double vault latrine has limitations of poor aesthetics, and besides the above separation practices it requires alternating usage of vaults. When inculcating the habit of fixed point defecation and general O&M of a latrine are found to be difficult, then further complicated composting solutions will be all the more difficult in a typical urban slum locality. As a result this option is also ruled out.

Aqua privy

3.64 Thus for a CTC under the Indian urban context the only possible low water consuming option that appears feasible and offers the advantage of a water seal type of system is aqua privy.

3.65 Aqua privy is a variation of 'pour flush-water seal' latrines constructed right above a septic tank. In this technology option the pans do not have a P-trap water seal and instead they are provided with a long chute, the other end of which is always submerged in water in the receiving septic tank

underneath. The faeces fall into the tank and settle down under gravity. The water seal effect is provided by the chute dipping in the wastewater, thereby preventing odour and flies nuisance. The wastewater undergoes sedimentation and partial decomposition in the tank and is allowed to flow out as in case of a septic tank. The effluent still requires careful handling i.e., either it needs to be dispersed into the soil medium through a drainage field or connected to a sewer line leading to an STP.

3.66 In comparison to the conventional 'pour flush-water seal' type latrines, in this case the water requirements are much less. This feature is of relevance in view of the fact that viability of 'pour flush-water seal' type community latrines is determined by the cost of energy for pumping adequate quantity of water from bore well.

3.67 Capital costs of the two types of systems would be comparable; however, the O&M costs will be lower in this case due to lesser requirement of water. Rest of the construction and O&M aspects are similar to a septic tank based system.

Wastewater disposal from CTC

3.68 This is the next stage and is of major concern from the point of view of a river water quality management project. The possible options are.

- Direct connection to a sewer line where ever feasible
- Septic tank with outlet to a sewer line
- Septic tank followed by an anaerobic filter with outlet to a sewer line
- Septic tank followed by a drainage field
- Biogas plant with outlet to a sewer line or a drainage field, and
- Evapotranspiration (ET) system based on a micro-wetland

3.69 The first three options are found to be commonly adopted for CTCs. Moreover, the option of biogas plant has also been implemented with limited success at various places. However, the other two options of drainage field and micro-wetland which are low in operating costs and offer sustainable solution for safe disposal of wastewater are typically not seen. Salient aspects of these systems are described in the paragraphs that follow.

Drainage fields

3.70 A drainage field is an absorptions system for settled wastewater coming out of a septic tank. It comprises of series of long and shallow trenches filled with brick bats, stones and an open jointed distribution pipe. The hydraulic loading is determined by the nature of the soil and depth of the ground water table. Loss of moisture from the entire system can be enhanced by planting suitable rapidly growing vegetation species on the sides of the trenches.

3.71 Although a drainage field is recommended on the downstream of a large septic tank, it is seldom found to be installed with community latrines. The reason for exclusion is found to be limited land availability in congested low income communities or on busy public places and need for infrequent maintenance care.

Biogas plants

3.72 On the other hand, biogas plants have been tried out as a partial treatment option for CTCs in different parts of the country (not necessarily under any river action plans) with variable success rate. Some of the relevant technical issues which affect its performance and lead to high rate of failure are discussed below.

3.73 CTC connected biogas plants are designed as typical anaerobic digesters for low solids

concentration and a long detention time of over 25-30 days. However, it is found that biogas yield from these plants is not consistent and the plants become dysfunctional in very early stage of their life. Some of the major reasons for this situation are:

- Anaerobic digestion process is quite sensitive to variations in temperature, pH, hydraulic loading, organic loading, carbon to nitrogen ratio, etc. However, the design does not enable control of these operating parameters within optimal range. For instance, in winter season the gas yield is almost negligible because of disruption in microbial culture.
- Effective operation of an anaerobic digester requires insulation and continuous mixing which are not provided in a biogas plant.
- The gases formed during anaerobic digestion process are corrosive. Special polymer lining is required to prevent damage to concrete and steel surfaces. Because of this reason most biogas plants suffer from the typical problem of leakage of gas.
- From biogas utilisation point of view, often either the quantity is not enough for the intended purpose or the utilisation may not be fully possible at a particular location. In such situations, biogas production does not bring any measurable benefits.
- The effluent contains high concentration of faecal coliforms and needs to be disposed off safely e.g., in a drainage field.

3.74 A typical 'low cost' type biogas plant cannot satisfy all the above process requirements and construction specifications, and invariably stops functioning within a short period after commissioning. If it were to be designed as a robust reactor for consistent delivery of biogas, it would no longer fit into a 'low cost' bracket. In view of these limitations, it is suggested that this option is not included under the proposed master planning activity.

Evapotranspiration through micro-wetland

3.75 Evapotranspiration (ET) through micro-wetland is an emerging alternative (which has not been tried out in Indian context or under the ongoing river action plans) for treatment of the septic tank overflows of small scale toilet facilities.

3.76 The system comprises a pre-treatment unit (usually a septic tank or an aerobic unit) for removal of settleable and floatable solids and an evapotranspiration sand bed with wastewater distribution piping, a bed liner, fill material, monitoring wells, overflow protection, and a surface cover. Suitable species of vegetation are planted on the surface of the bed to enhance the transpiration process (EPA, 2000).

3.77 Onsite systems with ET disposal are appropriate in locations with a shallow soil mantle, high groundwater, relatively impermeable soils, absence of fractured bedrock, or other conditions that put the groundwater at risk. This system can offer flexibility by combining seepage with evaporation when absolute protection of the groundwater or surface water is not required. However, an impermeable liner is recommended in case groundwater protection is required.

3.78 An ET system is a feasible option in semi-arid climates where the annual evaporation rate exceeds the annual rate of precipitation. In principle, it can remove large quantities of water during most parts of the year under Indian climatic conditions. Other climatic factors which affect its performance are level of precipitation, wind speed, humidity, solar radiation, and temperature. In view of this, information on micro-climatic data is important before deciding on an ET system.

Performance

3.79 Performance of an ET system can get adversely affected under hydraulic overloading conditions if more precipitation water enters than what could be evaporated. Thus, the evaporation rate

at the location must exceed the precipitation rate. This makes an ET system suitable for areas with relatively low rainfall. Properly designed and under normal hydraulic loading conditions an ET system can produce very low effluent volumes thereby making a toilet complex zero discharge system.

Operation and maintenance

3.80 Regular operation and maintenance of ET systems is usually minimal, involving typical yard maintenance such as trimming the vegetation. If a septic tank is used for pre-treatment, it should be checked for sludge and scum build-up and periodically pumped to avoid carryover of solids into the bed. Recommended maintenance practices include:

- Ensuring that all storm water drainage paths/pipes from the ET system are not blocked and that storm water drains away from the system.
- Using high transpiration plant species suitable for the wetness at ground level.
- If there is more than one bed, alternating the bed loading as necessary.
- Installing additional beds as required.
- Lastly, maintenance of a micro-wetland requires at least a gardener who could remove the excess vegetation growth from time to time and keep the soil-sand matrix in healthy condition.

3.81 However, if an ET system is properly installed on a suitable site, maintenance is rarely needed. O&M costs are minimal and would comprise pumping of settled wastewater if any, and wages for the maintenance staff.

Costs

3.82 Overall cost of an ET system depends on:

- Type of design, site, and wastewater characteristics
- Construction cost which is determined by surface area, a function of the design loading rate. (For non-discharging, permanent ET units located in suitable areas, the loading rate ranges from approximately 1.0 mm per day to 3.0 mm per day).
- Availability of suitable sand, type and thickness of the liner, use of a retaining wall (if needed), and vegetation (usually native to the area) (EPA, 2000).

3.83 Cost references under Indian context are not available and thus can not be provided. However, unlike the life cycle costs of Johkasou type micro STPs, here they are expected to be low as O&M costs are minimal. Nevertheless, site specific decisions have to be taken with regard to the need and advantage for decentralized treatment versus treatment in a centralised STP.

Advantages

3.84 Advantages of an ET system downstream of a CTC are listed below:

- ET systems may overcome site, soil, and geological limitations or physical constraints of land that prevent the use of subsurface wastewater disposal methods.
- ET systems can be used to supplement soil absorption for sites with slowly permeable shallow soils and high water tables.
- ET systems can be used for seasonal application, especially for summer homes or recreational parks in areas with high evaporation and transpiration rates
- Landscaping enhances the aesthetics of an ET system as well as beautifies the area.

Limitations / Disadvantages

3.85 Some of the limitation and disadvantages of ET systems are listed below:

- ET systems are strongly governed by climatic conditions such as precipitation, wind speed, humidity, solar radiation, and temperature.
- ET systems are not suitable in areas where the land is limited or where the surface is irregular.
- ET systems have a limited storage capacity and thus cannot store much wastewater in winter.
- There is a potential for overloading from infiltration or precipitation.
- Unless a watertight bed liner is provided, there is a risk of groundwater contamination.
- ET systems are generally limited to sites where evaporation exceeds annual rainfall by at least 60 cm (i.e., arid zones).
- Transpiration and evaporation can be reduced when the vegetation is dormant (i.e., winter months).
- Salt accumulation and other elements may eventually eliminate vegetation and thus reduce transpiration.

CONCLUSION

3.86 Having described a variety of technology options for on-site and off-site sanitation, it must be emphasised that technology in itself is not a solution for improved sanitation and consequent control of water pollution particularly in a low income urban community. Technology can only serve as a means and other enabling factors play a far more critical role in usage of the technology.

3.87 Having said that, the key aspects for technology are user preferences and choices. The technologies need to respond to what the people want and are willing to pay for. From this point of view, no particular set of technologies can be prescribed but only the range of options can be expanded with experience and consumer preferences. This brings us to the demand led approach for increasing sanitation coverage as against the current practice of supply driven approach. In many cases, depending on affordability people may settle for lesser developed technology while in other cases people may want options which offer higher convenience and less odour or similar factors.

3.88 The technologies that will have higher acceptability should not only meet preferences of the people and be affordable but also have a higher mix of local inputs from the community. This will create local institutions and micro enterprises which can engage in promotion of the sanitation concept and thus make the entire process more sustainable. This means a greater degree of flexibility in terms of CTCs and IHLs, type of on-site and off-site treatment methods, type of construction, etc. Therefore any sanitation programme should focus more on promoting the means to establish and continually expand upon the range of preferred options. In this regard the following criteria may be considered for technology selection depending on the local situation:

- Technologies that are known and preferred
- Technologies that are environmentally safe (no or least impact on health and environment)
- Technologies that are financially sustainable
- Technologies that use locally available material for construction and maintenance
- Technologies that are easy to replicate
- Technologies that can be operated and maintained easily and locally
- Technologies that people want and are willing to pay for

3.89 In this context, the sanitation programme would require a paradigm shift to look beyond CTCs and consider individual preferences which may comprise a combination of CTCs and IHLs (both on-site and off-site sanitation models); supported by where feasible, a small bore sewerage

system which has higher involvement of the local community during planning, construction and operation phases (UNICEF-USAID, 1997). Although the revenue model of a CTC gets undermined by promotion of IHLs, in the long run a mix of the two types of facilities would only provide a lasting and effective solution.

CHAPTER 4 SITUATION ANALYSIS FOR YAP - LOW COST SANITATION

4.1 One of the nine schemes under YAP I includes construction of community toilet complexes (CTCs) in YAP towns. Under the original phase the component focused on UP and Haryana towns while under the extended phase, majority of the LCS component was focused on Delhi, with a large public participation and public awareness component. Few additional CTC installations were also made in some other towns of Haryana and UP. Town wise details of total numbers of CTCs installed under the original and extended phase of YAP I have been shown as Table 4.1.

Table 4.1 TOWNWISE TOTAL NO. OF CTCs COMPLETED UNDER YAP I

Towns	Original Phase (1995-2001)	Extended Phase (2001-2003)
	No. of units/ seats	No. of units/ seats
Yamunanagar	4 / 80	4 / 20
Karnal	4 / 80	4 / 20
Panipat	4 / 80	3 / 30
Sonepat	5 / 100	3 / 30
Gurgoan	6 / 60	5 / 100
Faridabad	8 / 160	25 / 360
Haryana (total)	**31/560**	**44/600**
Saharanpur	10 / 100	10 / 100
Muzaffarnagar	12 / 120	5 / 50
Ghaziabad	11 / 110	45 / 450
Noida	13 / 130	--
Vrindavan	10 / 100	15 / 150
Mathura	10 / 100 & 300/300	10 / 100
Agra	50/500	40 / 400
Etawah	20 / 200	--
Uttar Pradesh (Total)	**436 / 1660**	**125 / 1250**
Delhi (Total)		**956/27000**

(Source : TEC-DCL, 2002)

4.2 Based on the discussions with officials in PIAs, NGOs and some users, there are indications that, in general, in UP, Haryana and Delhi, the utilisation level of the CTCs is found to be lower than was envisaged under the project, which has translated in limited achievement of benefits of prevention of open defecation, improved health and reduction of waste loads on the river system. The problem seems to lie with both the approach to implementation as well as O&M aspects of the sanitation component.

4.3 In the above context, this chapter provides a brief situational analysis of institutional aspects of low cost sanitation component, which includes a review of current institutional arrangements for O&M of CTCs in the participating states.

KEY ISSUES IN APPROACH TO IMPLEMENTATION

4.4 A review of the project documents indicates that overall, a supply driven approach was adopted in provision of low cost sanitation schemes, where the focus appears to have been on achieving large scale physical targets within a set time frame, without a clearly defined strategy for evolving sustainable solutions, which address beneficiaries' needs. This lack of demand responsive approach implied:

- Construction of CTCs was carried out by PIAs who were not supposed to be eventual owners of these facilities. The PIAs did not completely involve ULBs (except in Delhi) in planning and implementation stages of CTCs. At the time of handing over to the ULBs, the latter expressed reservations with regard to scope, extent and quality of works implemented under the low cost sanitation component. Ideally such conventional civil engineering works could have been implemented by the ULBs themselves (as in case of Delhi) which would have given them a sense of participation in the project. Currently, the ULBs express their sense of exclusion from the process and this aspect has still not generated necessary level of commitment required for O&M of the assets.

- Little efforts were made to involve the community (individuals/ formal or informal community based organizations) or seek their participation in design, planning and O&M of CTCs. The CTCs were designed and constructed by the PIAs, notably UPJN, PHED, and MCD based on locational priorities being accorded by the ULBs. The O&M contracts were also finalized either by the PIAs themselves, as by PHED in Haryana, or by the ULB without any community participation. As a result, CTCs are by and large being operated and maintained by agencies external to the community (either ULBs or NGOs/ contractors), who typically will have low motivation in providing a well run facility as per the needs of the community that it is intended to serve.

- Ineffective public awareness activities to induce sanitation and health related attitudinal and behavioural changes. This aspect is outside the scope of this study, however the above conclusion has been drawn from the report of JBIC sponsored study on Proceedings of Strategy Formulation Workshop on "Institutional Arrangements and Guidelines for effective collaboration between Government, NGOs and CBOs for conducive community participation", Development Alliance, New Delhi, 2003.

CURRENT INSTITUTIONAL ARRANGEMENT FOR O&M OF CTCS

4.5 O&M aspects and institutional arrangement of CTCs have been discussed below separately for Haryana, UP and Delhi.

Haryana

4.6 In Haryana, PHED entered into a contract with Sulabh for construction of CTCs and their O&M for next 30 years on pay and use basis in all participating towns, bypassing the long drawn out tendering process. Sulabh is an international NGO whose core area of competence is sanitation, especially in setting up and running public toilets. According to PHED, collaboration with Sulabh helped in bringing down the per-unit cost of the utilities. It is understood that the involvement of the ULBs was limited to an in principle agreement to the contract. However, in most YAP towns, location of CTCs was decided largely by ULBs.

4.7 Sulabh, Delhi division is the overall in charge for CTCs in Haryana. Discussions with Sulabh indicate that they have employed their own staff as caretakers and sweepers in CTCs, and no

community based organizations or individuals are involved. In their approach, particularly in problem slum areas, community is supposed to be motivated to use the CTC through public awareness activities such as dance and drama and personal interactions with community.

4.8 In all towns of Haryana, the CTCs have been handed over by PHED to the ULBs. However, it is found that, in some towns such as Yamuna Nagar and Karnal, this process has been only on paper. The actual job supervision (over O&M contractors) is being carried out by the JEs of PHED, who make weekly visits to the complexes to ascertain its quality of maintenance. For instance, officials in Municipal Committee of Gurgoan were not clear with respect to the ownership of the complexes.

4.9 Operation of the CTCs have received a mixed response i.e. usage of some CTCs is satisfactory (mostly in those located near markets/ with large floating population) while others are either in a state of disuse or low use. Some reasons for the latter include low patronage by community, high energy and water costs, availability of area for open defecation nearby etc.

UP

4.10 All CTCs were built by UPJN through private contractors. In the original phase of YAP I, UPJN contracted Sulabh for construction of CTCs with the understanding that the O&M contract for the same will be awarded to them for 30 years. In the extended phase, in order to discourage the monopoly of Sulabh International in the sector and encourage other smaller NGOs, UPJN decided to award the contracts for construction of CTCs to smaller NGOs other than Sulabh, with a similar understanding of O&M contract. However, it is understood that, in order to ensure a better quality of O&M and test the performance of these NGOs, UPJN recommended a shorter period of O&M contract of 5 years. But under pressure from the NGOs, in some towns including Gaziabad, the ULBs have extended the 5 year O&M contract to 30 years. This defeats the very purpose of moving away from Sulabh and lowers their motivation for providing high level of services. Participation of ULBs was limited to site identification, either in consultation with UPJN or independently as requested by UPJN.

4.11 Currently the institutional arrangements in the participating towns differ from town to town. While UPJN in some towns (includes Gaziabad, Agra, Muzzafarnagar) have handed over the CTCs to their respective ULBs, in others the former is operating and maintaining them on behalf of the ULBs through private contractors/ NGOs.

4.12 As in case of Haryana, some CTCs have a high utilization and are economically viable (mostly those located near markets/ with large floating population) and others are either in a state of disuse or have a very low utilization. Reasons for low utilization include low patronage by community, unavailability of finances etc.

4.13 It is found that in many places, NGOs that built the CTCs have abandoned the complexes due to lack of experience in operating them or economic non-viability. It also emerged that some of these NGOs were really independent private contractors who registered as NGOs for securing the contract.

Delhi

4.14 The project was entrusted to the Slum and JJ wing of MCD, whose mandate is to improve the quality of life of the deprived sections in slums, jhuggies etc. In Delhi, institutionally, two separate departments of MCD, viz., Conservation and Sanitation Engineering department (CSE) and Slums and JJ Department are engaged in providing CTCs. While CSE provides free service to users, Slum and JJ department provides “pay and use” Jan Suvidha complexes containing community toilets and baths, in addition to mobile toilet vans.

4.15 Some of existing CSE CTCs are being managed by MCD, most of others, including the ones

under Slum department are utilizing the services of NGOs and voluntary organizations.

Project implementation

4.16 Under the extended phase of YAP, in Delhi, 959 CTCs with 27500 WCs and 180 mobile vans were constructed by June 2002. Out of these, 741 were constructed by the General Wing of MCD based on the location and 218 were built by the Slum Department under the overall charge of Additional Commissioner, Slum Department (who was the project nodal officer). The construction of CTCs was in-house, by both General as well as Slum department. 4 mini STPs of 2 mld in addition to 10 micro STPs of 3 mld capacity were also installed under the project.

4.17 Out of the 959 CTCs, about 500 were built by demolishing existing dilapidated and non operational CTCs. The General wing was involved in liasoning and site identification in consultation with the CSE department of MCD and local councilors/ MLAs. Monitoring and management of the project was the responsibility of the Slum Department. A Project Monitoring Unit (PMU) was set up in July 2001under Slum department to supervise the activities of the project.

Operation and Maintenance

4.18 All the CTCs units were contracted out to registered NGOs (other than Sulabh) through an auctioning process in 2002. The entire selection and auctioning process was carried out through a Committee specially set up for this task. 959 CTCs were grouped in 100 odd groups and each NGO could apply for at the most 2 groups of CTCs. The terms of contract included payment of Rs. 50,000 as security deposit (refundable), quarterly payment of license fee at the auctioned rate per seat (minimum of Rs. 20 per seat per month) for 3 years, insurance premium plus electricity charges. No subsidy of any nature was inbuilt in the arrangement.

4.19 All CTCs are contracted on “pay and use” basis for a period of 3 years. Per use charge of Rs. 1 includes toilet and bath facilities for adults. Children below 12 years are allowed free access. Monthly family pass system at the rate of Rs. 30/ month was withdrawn due to its extremely low use. This system was also resisted by NGOs as it affected their remuneration adversely. No effort was made to involve/ form Community Based Organisations (CBOs) for O&M of CTCs.

4.20 It is understood that CTCs situated in market areas i.e. with high floating population such as Chandni Chowk and Subzi Mandi are earning large profits, however many CTCs mostly in slum areas are not doing well. Few reasons for low utilization have been brought out below.

<u>Reasons for low utilization</u>

- High perceived user charge and unwillingness to pay
- Low quality of maintenance of complexes
- Availability of open defecation land nearby
- Low public awareness of health benefits and poor understanding of the relationship/link between sanitation and health
- Unwillingness to use after dark by women
- Low participation by communities in construction/ O&M of CTCs
- Preference for a free of cost, other older complex nearby even if it is in very poor condition
- Low preference for bathing in public places
- Unavailability of water and electricity (in some CTCs process of installation of tubewells was delayed due to delay in sanction**;** in areas with electricity shortage, cost of running complexes on DG sets (diesel) is high)
- Under development of adjoining slum areas

4.21 As a result, a large number of NGOs are experiencing difficulties in operation and are now even surrendering the CTCs. It is also learnt that some NGOs having little prior experience in O&M, quoted low O&M rates at the auction. They are finding the complexes economically unviable and are defaulting in payment of license fee and electricity charges. Besides they lack capacity in creating awareness on hygiene and sanitation and thereby are unable to generate demand for use of CTCs in the target population.

Monitoring

4.22 A Project Monitoring Unit (PMU) was set up in July 2001 to collect and disseminate information on project progress and coordinate the NGO selection and supervision process. PMU will be disbanded by December 31, 2003. The organization structure of the PMU is shown in Figure 4.1.

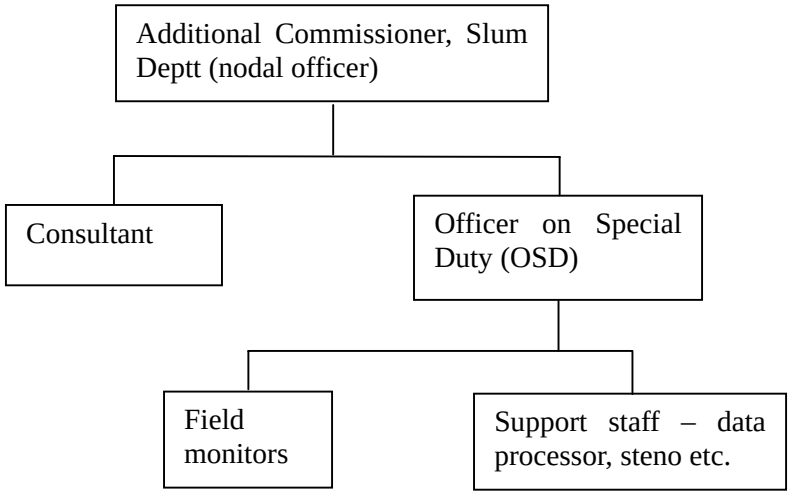

Figure 4.1 CURRENT ORGANISATION STRUCTURE OF PMU, SLUM DEPT., MCD

4.23 During the construction phase, fortnightly coordination meetings were organized between the PMU and the Commissioner to discuss the progress, cost etc. Currently, the General wing and the Slum wing are responsible for separately monitoring their own constructed CTCs for 5 years. Supervision of CTCs is carried out through field monitors whose job is to check whether the CTCs are being run properly or not, whether registers are being maintained or not or whether the CTC is facing any other problem. The future course of monitoring, once PMU is disbanded, is still in the process of being streamlined, however, it is expected that CSE department in the General wing would take up the task. For this purpose, no training in aspects such as NGO supervision has yet been conducted for the CSE department of General wing of MCD.

Experience of O & M through NGOs

4.24 Discussion with officials of MCD indicate that although O&M of CTCs by NGOs are in many ways better than that by MCD's own staff, several areas of concern relating to NGOs have emerged. These include:

- Quality of maintenance has not been as per contract such as lack of O&M staff as per contract, lack of repair.
- Unable to make many units economically viable, NGOs are observed to be cutting costs such as engaging only one sweeper who fulfils the role of a caretaker, delayed or avoiding of minor repairs in the complex etc. Overcharging outsiders is also being practiced in some places.
- The public awareness activities that were to be conducted in the communities including

meeting community leaders, spreading the message about health hazards of open defecation, have hardly been given any attention. At many CTCs, even display boards in front of the CTC have not been put up and record keeping in registers is not being carried out.

- As mentioned earlier, all NGOs are defaulting on payment of license fee and electricity charges. Being registered NGOs, it is difficult to take legal action against them, as compared to a private contractor whose registration can be cancelled in case of an irregularity.

4.25 In general, the commitment from most NGOs towards upkeep of the CTC has been found not up to the mark. Prime motivation of the NGOs is profitability; the significance of intangible benefits accruing to the community in the form of better health and convenience is not appreciated at the level of a beneficiary.

4.26 One of the main issues that have emerged in low utilization of CTCs is that of lack of acceptance of CTCs by the local communities. There was no consultation or need assessment of the community with respect to sanitation needs or CTCs. As a result, there is no sense of ownership of the local community with respect to the facilities, for whom they have been constructed. Even the public awareness activities that were carried out simultaneously under the project have achieved minimal impact.

CHAPTER 5 RECOMMENDATIONS FOR INSTITUTIONAL ARRANGEMENTS AND STRENGTHENING OF LOW COST SANITATION

5.1 The following chapter provides recommendations for institutional arrangements and strengthening of low cost sanitation component.

5.2 Key concerns that are responsible for limited impact of the low cost sanitation component in YAP I, as identified in the chapter 4, are supply driven approach to project implementation, low utilization of the CTCs by the community, limited impact of awareness creation activities on hygiene behaviour, and minimal consultation or participation of the users for demand assessment, construction/ O&M of the facilities.

5.3 Recommendations for approach to project implementation and options for institutional arrangements for O&M of CTCs have been discussed below.

APPROACH TO PROJECT IMPLEMENTATION

5.4 It is established that improved sanitation and hygiene behaviour involve change, which, to be meaningful, usually takes time. Improved sanitation is not simply about building latrines, nor is hygiene behavior programs solely about improving people's knowledge of hygiene and health. As more and more lessons are being learnt from implemented sanitation projects, the very term sanitation has come to be understood and defined (as under UNICEF programs) as a *process* whereby people demand, effect and sustain a hygienic and healthy environment for themselves by erecting barriers to prevent the transmission of disease agents. Over the years, acting as "providers" i.e. a supply driven approach has proven to be a poor strategy, rather creating the right environment and framework is critical, by which goals will emerge from within the local context through engaging key stakeholders.

5.5 Consultation with the communities, at the planning stage, is essential to establish exactly what they are willing and able to do and to define roles and responsibilities, both of user groups and the managing agency. It would also help in ascertaining whether community toilets are needed by the community or whether some other acceptable solutions, such as individual latrines, would work best. Ideally the project should be developed such that it is responsive to communities expressed desires/ needs and that test recipients' willingness to contribute for providing and maintaining those facilities. This is based on the premise that people pay for services and use them responsibly if they value what is provided to them. In this context, a participatory and collaborative demand driven strategy to identify needs has been demonstrated to be the most sustainable approach to provision of sanitation facilities. For this, health and hygiene awareness creation activities may need to precede the provision of toilets to stimulate demand.

5.6 Moreover, since ULBs are the institutions that are responsible for sanitation in and are already involved in provision and O&M of these services, it is recommended to implement this component through them, including their construction. This would provide them the acutely needed exposure to projects and may be even capacity building through the project, to fulfil their technical and managerial responsibilities that come with decentralization. Training component can help in enhancing their capability for effective monitoring and management of O&M contracts, in addition to planning, design, and construction etc. This arrangement would also retain the accountability for quality of design and construction with the institution responsible for O&M.

OPTIONS FOR INSTITUTIONAL ARRANGEMENT FOR O&M OF CTCS

5.7 As brought out in the situational analysis, current institutional arrangement for O&M of CTCs is through NGOs/ private contractors. Two options for institutional arrangements for CTCs have

been considered and their advantages and disadvantages have been discussed in the following paragraphs.

Option 1: O&M of CTCs by NGOs

Option 2: O&M by of CTCs through community management

Option 1: O&M of CTCs by NGOs

5.8 This option is built upon the current institutional arrangement in various YAP I towns where the construction and the O&M contract has been extended to NGOs. Lessons learnt from engaging NGOs on YAP indicate that many of the NGOs are actually private contractors who may have the construction capacity but little experience in O&M or conducting public awareness activities. As a result, unable to sustain the CTCs, many NGOs have abandoned the facilities. In this option, NGO is referred to an organisation which demonstrates adequate ability in O&M of sanitation facilities, community participation activities and has a social focus. Preferably they should have a proven track record. A careful assessment of NGOs needs to be done before handing over the CTCs. In this option it is further suggested that construction is carried out, if possible, through the ULBs themselves, for which they can engage private contractors.

5.9 In this process, it is important that communities are consulted with respect to their demand/ need and willingness to pay at the construction stage itself. This will ensure their participation and acceptability to the toilets being provided. This activity can be the responsibility of the same NGO contracted for O&M of the CTCs which has experience in community mobilisation/ participation activities. In the first phase, it can conduct community consultation component and in the second, take up O&M of CTC, in agreement and participation with the local people. They could do that by engaging sweepers and caretaker from the same community.

5.10 The merits of this arrangement are that it:

- Takes advantage of the NGO prior experience in O&M of sanitation facilities
- Helps in keeping the ULB lean by avoiding the need for inducting/ regularizing workers on payroll
- Prevents unionisation
- Decreases overhead establishment costs and achieves better work efficiency at lower costs
- Keeps the focus of ULBs on supervisory function

5.11 Demerits include the following:

- Being external (to the community) agencies, NGOs have a lower motivation to run these facilities well
- External NGOs tend to have low accountability with the local population and quality control may be difficult to ensure
- Taking legal action against an NGO is difficult as compared to a registered contractor
- Identification of competent NGO may be difficult since different NGOs have different capacities and areas of interest depending on their size and experience.
- There may be concerns relating with transparency in operation.

5.12 For improved performance by NGOs, it is suggested that:

- Rigorous and competitive selection of NGOs is undertaken to assess competency and track record

- Clear criteria for performance evaluation is evolved
- Ascertain capability in conducting public participation activities
- Legal penalties are included in the contract and imposed for non fulfilment of obligations
- Incentives/ awards in cash or kind for say "Best run CTC" are introduced.

Option 2: O&M of CTCs through community management

5.13 In this option, a community based organisation (CBO) is given the responsibility of O&M of CTCs, by issue of a contract directly to such a group of users. A CBO can be identified out of the existing groups such as women groups, self help groups, savings groups, youth groups etc. If suitable CBOs do not exist then efforts should be directed in forming such organisations or creating capacity of existing credible though weak structures. Ideally the group should have involvement of women as they are the key stakeholders/ beneficiaries.

5.14 In a community managed scheme, users may do the maintenance work themselves, or they could play a managerial role, raising funds for maintenance and paying the utility or a third party to do it for them. The group would be responsible for running the CTCs, raising enough revenue to cover the operating expenses. In the long run, the community based group would manage their revenue and operating surplus, maintain bank accounts, pay salaries and bills. Such community managed contracts have been successfully implemented for O&M of rural piped water supply schemes in UP and Orissa in India and primary collection of solid waste in urban areas. Similarly, water standpoints in urban areas are being managed by user committees in Dhaka and Swayambu in Nepal.

5.15 In India, examples of sustainable and efficient sanitation services being provided by CBOs are few, however they provide valuable insights in successful processes and innovative approaches. It is learnt that in Pune, such a practice has become popular and achieved a reasonable level of success. Similarly, in Kanpur a CBO called Kanpur Slum Dwellers Organisation (KSDF) has made efforts to build and operate community toilets, assisted by National Slum Dwellers Federation, Mumbai and an NGO, SPARC. KSDF is now active in 30 slums either directly or indirectly through government programs as well as small group initiatives. KSDF first mobilises the community, followed by assessment of users' needs. Based on the interest of the slum leaders, a door to door survey is conducted and the findings are then discussed in the community, with regard to problems, possible solutions and strategies. KSDF has played a facilitating role in community mobilization and encouraging the community to construct CTCs themselves and operate and maintain them on pay and use basis. In one such community, a part time caretaker and a sweeper was employed from the community. The caretaker is the cigarette shop owner next to the toilet, whose job is to collect money from users, supervise cleaner's work and maintain accounts. The toilet is running on a significant profit, due to its proximity to a commercial area. The community has, since then, reduced monthly charges for the residents, and used the monthly savings for replacing the toilet's roof and constructing a community centre.

5.16 As evident from the case studies, the success of community based approach depends on mobilising the community, encouraging them to plan and work together as a cohesive group and engineer a change in their behaviour. Effective community participation skills are required to facilitate this process, for which NGOs can be engaged. Possibly a part of a long process of community participation, a successful community managed contract for O&M of CTCs would involve (1) identification and selection of suitable communities that indicate willingness to participate in such an activity (2) facilitation in formation of suitable CBOs, or building on the ones that may already exist (3) capacity building of the CBO in various aspects of the project (4) taking over the contract and setting up mechanisms for O&M. This could be carried out in association with a partner NGO.

5.17 Community management has a number of benefits of:

- harnessing local knowledge and/or resources. In case of O&M of CTCs, people from within the community can be hired as caretakers or sweepers, who, apart from being more responsible towards the complexes, could be useful in motivating individuals or the community to use and pay for the toilets.
- putting resources back into the community. For example, it may generate employment or equipment for minor repair may be bought from the community shops. It also creates opportunities for profit/ income that can be plowed back into the project or used in a suitable manner for the community.
- improving quality control as users have a vested interest in the service.
- Reduced cost of works. In Kanpur, where the community built the structure, an investment saving of 40% was made due to absence of profits margin, overhead costs of contractor/ formal institution and some amount of free labour from the community.
- encouraging a more socially responsible standard of operation, without profitability being the criteria for operation
- being a more transparent system with a greater sense of control over matters
- realising social benefits by involving the community and helping promote the community management in the long term.

5.18 Disadvantages of such an arrangement could be the following:

- CBO may be a temporary management structure
- CBO may be prone to internal social conflicts or unable to agree on priorities and terms, may dissolve.
- CBO may be dominated by influential individuals, who may mislead or dictate terms.
- Community leaders who put in a lot of effort in promoting the project or instrumental in success of the group, may start to raise the question of payment for their efforts or members may turn dishonest and steal revenue.
- Local political leaders, under threat of erosion of their support base, may influence the community not to pay for the services ("government would provide free services") or channel services to influential sections of the community
- CBO may be weak and unable to take on all their responsibilities

5.19 For the above, an evaluation and monitoring criteria and mechanisms for assessing performance will have to be evolved. Moreover, suitable measures for integrating and coordinating the work of CBO with municipal organizations would have to be evolved.

5.20 This path breaking approach is new and involves a long and slow process. It is, therefore, recommended piloting this option in a selected number of communities to test its feasibility and develop the process. Once successful, it can be replicated on a larger scale in the second phase. It would be easier to implement first in small communities where cohesive and effective community organisations exist with broad community awareness. This entire process can be led by an experienced lead NGO, which based on the lessons learnt from the pilots, can replicate on a city wide basis.

5.21 In conclusion, it is prudent to mention that community initiatives can be a complicated and a slow process. Moreover, community management is clearly not an easy option and may be only one of a range of actions required. Generally, there is an emerging need for more flexible service arrangements and partnerships whereby all players make their contribution: service providers, users, NGOs, and private sector. One possible variation can be giving O&M of CTC to such a NGO which can, in the first phase, run the toilet, concurrently mobilise the community/ develop CBO capacity and subsequently hand over the toilet to the CBO. Specific solutions, that are viable and realistic, will, of course, vary from place to place.

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Appendix C

THE STUDY ON WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER IN THE REPUBLIC OF INDIA

CASE STUDY

ON

NON-SEWERAGE SCHEME

UNDER

RIVER ACTION PLANS

FEBRUARY, 2005

JICA STUDY TEAM

TOKYO ENGINEERING CONSULTANTS CO., LTD.

CTI ENGINEERING INTERNATIONAL CO., LTD.

PREFACE

Master Plan Study on Water Quality Management Plan of River Ganga in Republic of India that is being carried out by Japan International Cooperation Agency (JICA) focusing on four major towns of Ganga basin is an attempt to devise a feasible and need based plan for the Sewerage and Non-Sewerage Schemes to be implemented under GAP-II as a part of pollution Abetment Programme of River Ganga. The Study that was started on the request of Govt. of India from March 2003 addresses various issues that contribute to the pollution abatement of the River emphasizing greatly on point and non-point source of pollution.

The present Case Study was conducted as a part of JICA Study Team's endeavor to formulate a comprehensive Master Plan by addressing all related issues including the Non-sewerage that has a great significance in improvement of water quality of River and over all environmental conditions and hygiene standards of the town. The major objectives of the Study were to identify the best practices in Non-Sewerage activities that have been implemented under various River Action Plans in India and learn lessons from it that can be referred in the on going Master Plan for a successful implementation of the same. The subject experts and researchers conducted the Study mainly through documents review and on-site visits at selected locations.

The JICA Study Team sincerely acknowledge the contribution and assistance provided to the consultants of study Team by the concerned Implementing Agencies and others who gave valid information in order to conclude the study. In this regard, we express our thanks to officials of DUDA in Allahabad and Nagar Nigam who provided required information about bathing ghats, electric crematorium and Dhobighats and also facilitated the site visits. We extend our gratitude towards the officials of UP Jal Nigam and PHED Haryana, who were involved in the implementation of YAP-I for their support and cooperation in data collection and site visits in all YAP targeted towns of Haryana and Agra, Mathura and Vrindavan etc. in UP.

We also thank to all NGOs, Institutions and Community Based Organizations who led their support to the Study Team and guided with their inputs about the various focal issues such as Bathing Ghats, Electric Crematoria/ Improved Crematoria, Dhobighats, PP/PA and Cattle Wallowing etc. In this regard, we especially thank to Mr. Rakesh Jaiswal of Eco-Friends, Mr. Vinod Singh of Ganga Rakshat Andolan, Professor M.P Singh, Dean Faculty of Law Banaras Hindu University and Professor Sukhpal Singh.

We hope that the present Study will not be only useful in the ongoing Master Plan study, but it will also be purposeful for all those concerned in River Action Plans and related environmental projects showing them a road map for corrective actions.

APPENDIX C

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STRUCTURE OF THE REPORT

The entire report of the Case Study has been divided in to five chapters. Where as **Chapter 1** describes the Executive Summary, which briefly details out the entire study approach and major outcomes/ finding on the focal issues at a glance. **Chapter 2** presents an elaborate outline of background & Introduction, objectives and scope, study design and assumptions along with a details and backgrounds of different Non-sewerage schemes implemented under various River Action Plans i.e. Ganga Action Plan-I & II, Gomti Action Plan and Yamuna Action plan-I. The details of Non-sewerage Schemes implemented under these River Action Plans have been enumerated purposely to have concise outline of such schemes and their scale & size.

Chapter 3 of the report highlights the "**Qualitative Analysis"** of the schemes especially under **Yamuna Action Plan** (YAP) and **Ganga Action Plan** (GAP) based on the second hand source data mainly, i.e. information available in relevant reports / DPRs, and discussion with concerned agencies and PIAs. This part, thoroughly examines the approach of implementation, impacts and implications of such programmes / schemes and major recommendations (Dos & Don'ts) for the better implementation and sustainable impacts. This chapter thoroughly describes issues related to O&M, financial and institutional structures in implementation and maintenance of such schemes activity/scheme wise besides the physical locations and conditions of such scheme.

Chapter 4, outlines the findings of the study and key issues based on the field level observation, meeting with beneficiary and user groups and stakeholders regarding each and every scheme.

The conclusion and major recommendations / lessons learnt from the impacts of such schemes have been addressed in **Chapter 5**. This part also details out the various references of the study, sites visited, and people/ authorities contacted.

CHAPTER 1 EXECUTIVE SUMMARY

- Rivers in India are the lifelines for millions of people. They are regarded sacred and are used for bathing on account of not only religious reasons but also as a need as thousands of people do not have access to water supply system and they are depended on the river directly for the bathing and washing purposes. The important rivers like Ganga and Yamuna being the most important rivers of India from the religious points of view, have a unique water quality requirement in comparison to other rivers of India. It is estimated around lakhs of people take a holy dip in Ganga everyday across the country.

- Due to increasing population over the period of time and huge urban agglomeration and industrial developments along the Rivers, gradually led to extensive pollution load on these rivers mainly by domestic waste water discharge in to rivers through drains and sewers affecting the water quality and over all river's environment systems. Realising the menace, Govt. took initiatives and started various river's pollution abatement programme, the GAP being the first, which was started in year 1985 by the Govt. of India. Subsequent to GAP-I, which was accomplished in 1993, GAP-II was conceptualised and launched with enhanced scope to other rivers such as Yamuna, Gomti and Damodar.

- To achieve the objective of pollution abatement of river's water and environment, various core and non-core schemes were implemented across many towns under these action plans. The core sector schemes consist of interception & diversion schemes and STPs (Sewage Treatment Plants), designed to tackle 'point source of pollution', i.e. pollution that is from measurable sources such as drains, sewage pumping stations and sewerage systems. Non-core / non-sewerage schemes comprise Low Cost Sanitation (LCS) schemes, river front development schemes, electric and improved wood crematoria; and, tackle non-point, non-measurable pollution, such as dumping of solid waste and open defecation, dumping of un-burnt / half-burnt dead bodies etc.

- Non-Sewerage activities plays a significant role in reducing the pollution load on river besides contributing significantly to the improvement of river's environment and hygiene standards. However, the various non-sewerage schemes implemented under the River Action Plans including GAP and YAP, are not being utilized for the purpose they have been created due to various reasons, main important being the erroneous O&M conditions, lack of public awareness & participation and technical unsuitability in terms of the local needs etc.

- JICA Study Team which has undertaken to develop a Master Plan for the Water Quality Management Plan of River Ganga attempts to address all the issues related to river's pollution abatement including sewerage and non-sewerage. The present Case Study was undertaken with a view to understand the situations of non-sewerage schemes and identify the best practices/success stories of such schemes and the issues that determines the success or failures of such schemes. This was aimed to refer the factors, which made the schemes a success or failure taking lessons from them for an effective Master Plan of the same under the "Water Quality Management Plan Study of the JICA which is focusing on four cities i.e. Varanasi, Allahabad, Lucknow and Kanpur. The study items included, primarily, electric and improved wood based crematoria, bathing ghats, dhobighats, public participation & awareness and cattle wallowing, which are the major non-point source of river pollution.

- Since the area and scope of the focused issues was very large and it was difficult to make on site assessment of all focused schemes under the various River Action Plans, in the stipulated time, emphasis was on analysis of the secondary information available in reports/documents prepared by implementing and stakeholder agencies. However, it was realized at the same time that secondary data have limitations in reflecting the scenario and issues related to the focal issues of the case study, because most of the reports / documents available on such schemes were old (2-3 years back) and also in many cases did not focus many critical issues such as O&M, financial

aspect, thus, it did not clearly indicate the situation of these schemes in the present context. Therefore, in order to adequately comprehend the study within the given time frame, it was decided to analyse the situations through second hand source data and onsite visits at selected locations. Further, with this purpose, various relevant reports were mobilized from the implementing agencies, NGOs etc. and critically analysed in line with the objectives of the Study. This was followed up with the intensive field visits of the sites in four cities i.e. Allahabad, Varanasi, Lucknow and Kanpur and all major towns of YAP-I. Besides this, some facilities in Calcutta and its adjoining areas were also visited. The final conclusion and recommendations as laid down in the report have been derived from the comparative analysis of the secondary data review and first hand observation at the sites visited.

Major Observation &Recommendations

The Case study identified the various issues that are key to success and failure of such schemes besides a general assessment of the situations concerned with the sustainability of these schemes. Some major factors are outlined below:

- Majority of the facilities of YAP-I studied were found to be non-functional especially the improved wood based crematoria (IWC) in UP and Haryana except few exceptions like Mathura and couple of places in Karnal and Faridabad where the conditions of Operation & Maintenance (O&M) was comparatively better and facilities are partially utilised. However, the IWC in Mathura appeared to be good example of O&M and public participation.

- Strong community based institutional set up for O&M, and public participation are the important factors assessed to be essential for the success of such schemes in terms of utilisation and better O&M. This is supported with the experiences of some successful schemes that were studied under the GAP in four cities of UP and West Bengal. Almost all the schemes that were analysed in West Bengal are successful in terms of usage and maintenance, that's primarily because of community participation in the management and implementation of the schemes.

- Public Participation / Public Awareness (PP/PA) programme which is key element leading to success of schemes have not been site specific and issue oriented, they have been taken using uniform tools at all the places without any focus on target groups. Also, there hasn't been an emphasis on sustainability of such activities.

CHAPTER 2 INTRODUCTION

2.1 INTRODUCTION

Government of India has been implementing Various River Action Plans to curb the pollution load on rivers. Some of the important River Action Plans implemented or in place so far are Ganga Action Plan (GAP), Yamuna Action Plan (YAP) and Gomti Action Plan (GoAP) implemented targeting many towns across the country. Under these plans, several schemes were implemented to address the point and non-point sources of the pollution. Although, there have been greater emphasis on sewerage works, such as installation of sewage treatment plants, interception & diversion of nalas etc., which carries the domestic wastewater to the river and responsible for almost 80% of the pollution, gradually it was realized that non-point sources such as open defecation, solid waste, laundry activities, traditional cremation, bathing, and cattle wallowing are also a major sources of pollution and are significantly responsible for the pollution of river water quality and environmental conditions were also addressed in these River Action Plans, especially YAP-I, and with the results of this, a number of public toilets, electric crematoria (EC), bathing ghats were constructed in almost all the targeted towns and Public Participation and Public Awareness (PP/PA) programmes were carried out.

JICA study Team, working on the Master Plan Study for Water Quality Management Plan of River Ganga focusing on four major cities, Varanasi, Allahabad, Lucknow and Kanpur has also laid special emphasis on Non-Core activities besides the sewerage plans to tackle the pollution load and improve the water quality of the river. In this regard, it is proposed by JICA to study the scenario and implications of Non-Sewerage activities that have been initiated in the intervention areas and also formulating a need based and feasible plan for the implementation of non-sewerage schemes that includes primarily low cost sanitation (LCS), improved crematoria, bathing ghats, dhobighats and PP/PA. With this view, the Study Team carried out detailed survey on all the issues mentioned with a view to assess and understand the current scenario and identify factors that make the schemes a success or failure.

2.2 OBJECTIVES

The major objectives and purpose of the Case Study was to analyse the situation of Non-sewerage Activities carried out under River Action Plans and identify the best practices/success story if it exists and refer the factors that made the specific scheme successful or failure taking lessons for corrective actions. This Case Study focused intensively on institutional aspects, situation of Operation & Maintenance (O&M), financial aspects, public participation, awareness of the various user groups and stakeholders and also people's perception and willingness to participate in improving the conditions of the facilities. Though, the Study covered largely the YAP-I, and GAP-I, some related issues under GOAP and Damodar Action Plan were also referred through the documentary review methods.

The specific objectives are outlined as follows;

- To analyse the situation related to the Non-sewerage schemes implemented under various River Action Plans with emphasis on bathing ghats, dhobighats, electric/improved crematoria, public awareness and cattle wallowing.
- To analyse critically the issues related to the success or failure of non-sewerage schemes
- To specify the factors responsible for the success / failure of the schemes and conclude the recommendations based on the realistic findings and follow it in the ongoing Master plan Study of Water Quality Management Plan of River Ganga undertaken by JICA
- To learn lessons for the implementation of such schemes by the programme planners any where in India.

Apart from the above, the study also serves the purpose of critically evaluating the performance of these schemes, which has high cost implications involved and very significant from the point of view of pollution control.

2.3 APPROACH & METHODOLOGY AND SCOPE OF STUDY

The Study was carried out by a detailed analysis of such schemes implemented in various River Action Plans and under other schemes across the country. The review was done specially through documents review (reports, proposal etc), meeting with concerned implementing agencies and taking feed back from them, onsite visits of selected schemes / facilities across the intervention area and also by taking users / public opinion on this through qualitative group discussion.

In this Study, special emphasis was laid down on GAP and YAP. As mentioned earlier, issues like O&M, usage level, institutional arrangement, financial aspects etc of the various facilities were thoroughly analysed.

Though, the area of non-sewerage is much more than addressed in the present Case Study and also includes Solid Waste, LCS, River Front Development and beautification, this Study focused mainly the following issues;

- Dhobighats
- Bathing Ghats
- Electric &Improved Crematoria
- Public participation and Public Awareness (PP/PA)
- Cattle wallowing

As the study item and area being so wide and large, it was practically difficult and non-feasible to analyse each and every schemes of all the River Action Plans, in a constrains of time and resources. At the same time it was also equally important to comprehend the study objectively for the purpose it was conducted with a maximum coverage of intervention areas and schemes.

Keeping in to mind the above-mentioned scenario, it was decided to prepare a detailed inventory (ref. Table 2.2) of the schemes that were to be focused in the Study covering all the Non-Sewerage schemes of all major River Action plans that included GAP-I, YAP-I, GoAP and Damodar Action Plans. The inventory was prepared based on the secondary data available in the reports / DPRs. The MIS reports of the Ministry of Environment and Forests was the major source of data for the Inventory that includes all the information of sewerage and non-sewerage schemes implemented under various River Action Plans. The inventory gave clarity on the scale and size of the schemes and also helped to a great deal in selection of the schemes for on site visits.

The study area, so selected for the site visits included the 4 major towns of UP, all major towns of Haryana under YAP-I and also YAP towns of UP that includes, Agra, Mathura, Vrindaban Etawah and Ghaziabad, besides, visits to some facilities in Kolkata and adjoining areas such as Barrackpore and Budge-Budge.

2.4 DETAILS OF THE VARIOUS NON-SEWERAGE SCHEMES UNDER RIVER ACTION PLANS IN INDIA

2.4.1 *Ganga Action Plan Phase-I*

Table 2.1 Details of Non-Sewerage Schemes Completed by Type and State

Scheme	UP	Bihar	West Bengal	Total
Low Cost Sanitation	14	7	22	88
Crematoria	3	8	17	33
River Front facilities	8	3	24	35

Table 2.2 Town Wise Distribution of the Non-Sewerage Schemes

State	Town	LCS	Crematoria	River Front Development	Dhobi ghats
Uttar Pradesh	Allahabad	2	1	2	Nil
	Farukhabad & Fatehgarh	2	0	1	Nil
	Haridwar	2	1	0	Nil
	Kanpur	4	1	0	Nil
	Mirzapur	1	0	1	Nil
	Varanasi	3	0	4	3
Bihar	Bhagalpur	1	1	1	-
	Chapra	1	0	0	-
	Munger	1	1	1	-
	M-meh&B-uni	1	0	0	-
	Patna	3	5	1	-
West Bengal	Baharampore	1	1	3	-
	Cal corp Area	4	4	3	-
	East Bank	8	5	6	-
	Howrah	0	1	1	-
	Napadwip	1	1	1	-
	West Bank	8	5	10	-

Source: M.I.S. Report of Programmes under National River Conservation Plan, Vol-II, and December 2001.

2.4.2 *Ganga Action Plan Phase-II*

Table 2.3 Numbers of Sanctioned and Completed Non-Sewerage Schemes

(As on 31st January 2004)

Type of schemes	Uttar Pradesh	Uttaranchal	Bihar	West Bengal	Total
Low Cost Sanitation	3 (5)	0 (1)	0 (8)	0 (0)	3 (14)
Crematoria	0 (1)	0 (0)	0 (2)	0 (3)	0 (6)
River Front facilities	0 (0)	0 (0)	0 (11)	1 (6)	1 (17)

Note: The numbers in ( ) indicate of the schemes sanctioned till March 2003

2.4.3 *Gomti Action Plan Phase-I and Phase-II*

The Gomti Action Plan (GoAP) was launched in April 1993, which continued till March 1999 with part of the work completed in city Lucknow aided by DFID, UK, to control the pollution load from

cities of Lucknow, Sultanpur and Jaunpur. In Phase-I, 15 schemes out of total 27 sanctioned schemes were completed under different categories of the activities. Though, most of the schemes implemented under this phase were of sewerage nature, under Non-sewerage component, some LCS and improved crematoria were constructed in Sultanpur and Jaunpur apart from the PP/PA activities.

After the completion of GoAP-I, GoAP-II was launched from April 2003 which is proposed to be carried out till March 2007. This phase targets mainly the Lucknow city and emphasis mainly on sewerage works.

Table 2.4 Number of Non sewerage scheme completed under GoAP

Type of Scheme	Uttar Pradesh	Total
Low Cost Sanitation	2(2)	2 (2)
Crematoria	2(2)	2(2)
River Front facilities	0(0)	0(0)

Note: The numbers in ( ) indicate total number of schemes sanctioned till 31st March 2003

2.4.4 *Yamuna Action Plan*

Yamuna Action Plan phase-I was the part of Ganga Action Plan Phase-II, and was implemented with a view to improve the Water Quality and River's space environment of river Yamuna. The project was launched from April 1993 to February 2003 including the extended phase. The YAP-I targeted a total of 21 towns across three states, Uttar Pradesh, Haryana and Delhi. Out of these, 15 towns as 8 towns in UP, 6 towns of Haryana and Delhi were catered with financial assistance from JBIC amounting INR 7.3205 billion (INR 732.5 Crore). With a view to control the pollution load on river several sewerage and non-sewerage schemes were implemented. The sewerage schemes included Interception &Diversion works, construction of STPs, in this regard, total 34 STPs were constructed /installed with total sewage handling capacity of 743 MLD and around 180 Km of sewer was constructed.

Table 2.5 Yamuna Action Plan

S.No.	Town	LCS	IWC/EC	BGs	PP/PA
1.	Delhi	954	2	Nil	✓
2.	Yamuna Nagar	8	3	2	✓
3.	Panipat	7	3	Nil	✓
4.	Sonepat	8	4	Nil	✓
5.	Gurgaon	11	4	Nil	✓
6.	Faridabad	33	4	Nil	
7.	Karnal	8	6	Nil	✓
8.	Saharanpur	20	3	Nil	✓
9.	Muzzaffar Nagar	17	3	Nil	✓
10.	Gaziabad	56	12	Nil	✓
11	Noida	13	10	Nil	✓
12.	Vrindavan	25	4	Nil	✓
13.	Mathura	50	8	Nil	✓
14.	Agra	90	20	2	✓
15.	Etawah	20	10	5	✓

✓ *-Done*

Source: MIS Report YAP, NRCD & Pollution study Report on YAP, TEC-DCL 2002

Under this plan, Non-point sources of pollution were also addressed with great focus and a series of non-sewerage works were carried out in almost all the targeted towns. The major non-sewerage facilities that were created under YAP-I are Electric and Improved wood based Crematoria, LCS, bathing ghats and River front development works, a forestation and PP/PA programme. (Table 2.5)

Table 2.6 General Information about the Non-Sewerage Facilities constructed under YAP-I

S.No	Town	LCS		IC/EC		Bathing Ghats	
		Constructing agency	O&M agency	Constructing agency	O&M agency	Constructing agency	O&M agency
A: Haryana Towns							
1	Yamuna nagar	N	N	P	CBO	H	P
2.	Gurgaon	N	N	C	-do-	NIL	NIL
3.	Faridabad	N	N	C	-do-	NIL	NIL
4.	Panipat	N	N	C	-do-	NIL	NIL
5.	Sonepat	N	N	C	-do-	NIL	NIL
6.	Karnal	N	N	C	-do-	NIL	NIL
B: UP Towns							
1	Saharanpur	N	N	-	N	NIL	-
2.	Muzzafar Nagar	C (11) N (6)	C (11) N (6)	U	N	NIL	-
3.	Noida	N	**N**	C	N	NIL	-
4.	Ghaziabad	C (11) N (42) U(1)	C(11) N(42) U (1**)**	U	CBO/N	NIL	-
5.	Mathura	N	N	N	N/CBO	NIL	-
6.	Vrindavan	N	N	-	-	NIL	-
7.	Agra	NN	NN	N	CBO	C	NN
8.	Etawah	N (18)	N	C	NN	NIL	-
Delhi		C	N	NN	N	NIL	-

Note: N: NGO, C: Contractor, NN: Nagar Nigam, CBO: Community Based Organization, P: PHED, Haryana

Source: JICA study Team

CHAPTER 3 QUALITATIVE ANALYSIS OF NON-SEWERAGE SCHEMES BASED ON SECOND HAND SOURCE DATA

3.1 SCOPE

The qualitative analysis of the non-sewerage schemes which have been done on the basis of the second hand source data as per the various study and progress reports / documents aims to present a critical analysis of the issues related to the impacts and sustainability of such facilities.

The observations indicated in this part reflect the situations of such schemes as focused in the case study at the time of its implementation and its viability in terms of the area and target beneficiaries. As mentioned earlier, this also helps understand and assess the situation of the non-sewerage facilities activities in the present context by a comparative study of the same. Thus, it also gives a baseline background of the various issues that have been targeted under this Case Study.

The analysis largely covers the Yamuna Action Plan-I and also partly Ganga Action Plan-I.

Table 3.1 Details of the Schemes / Non-Core Facilities Town Wise

Type of Scheme	Towns & Location	Major Critical Issues	Project
1. EC, IC	Agra, Mathura, Vrindavan	- Needs & potentials, target groups - Usage, O&M status, institutional structure and capacity - Public opinion / awareness - Problem areas	YAP-I
2. IC, PP/PA	Faridabad	- Need & potentials, institutional structure and O&M - Target audience for PP/PA - Approach & impacts	YAP-I
3. Bathing Ghats	Yamuna Nagar, Etawah	- Usage, O&M	YAP-I
4. EC	Delhi		YAP-I
5. IC, PA	Yamuna Nagar, Gurgaon, Karnal, Panipat, Sonepat		YAP-I
6. EC	Allahabad, Kanpur	- Usage / O&M, - Financial Implications	YAP-I
7. Bathing Ghat	Varanasi	- O&M	GAP
8. PP	Kanpur, Mirzapur		GAP Indo-Dutch
9. PP / PA	Varanasi		

Major issues

The major issues that have been focused through the secondary source of information broadly cover bathing ghats/River front development, dhobighats and PP/PA. Though, LCS constructed to tackle the pollution load through open defecation is one main non-core facility, it has been analysed in Appendix B. Similarly, cattle wallowing also figure in the scope of the present study, there is no observation on this aspect in this part as it has not been addressed in either of the above mentioned River Action Plans and no information was available in any of the studies/reports referred for this purpose.

3.2 YAMUNA ACTION PLAN (YAP)

3.2.1 *Electric Crematoria / Improved Crematoria*

The performance of last rites is extremely important from the religious points of view for all segments of Hindu population. As per the tradition, it is preferred to be done on pyre along the bank of river, and for this purpose, there are specified place called "Samsan ghats". According to Hindu tradition, fire is considered to be the most pious and great purifier, so dead bodies are cremated on pyre of wood. After, the ashes collected are normally immerged in to holy rivers. The traditional cremation on wood requires huge quantity of wood resulting to failing to large no. of trees thus inflicting huge loss on ecology and environment besides contributing heavily to the pollution load.

As part of various endeavours to control this menace, Improved Wood Based crematoriums (IWC) were installed by NRCD under various River Action Plans. This was realised to be in consonance with socio-Religious and cultural pursuits of the people, who wants wood based cremation. A large Number of Electric Crematoria/ Improved Wood Based Crematoria were created under YAP-I in all the targeted towns.

The situation analysis of these structures generally examines the main critical issues concerning to these crematoria constructed under YAP and suggests its viability in context to the objectives it were created for.

A Case of Agra and Mathura

Table 3.2 Distribution of Improved Crematoria in Agra, Mathura and Vrindavan

S. No.	Town	Location s	Nos.	O&M
1.	Mathura	Dhruva Ghat	5	Agrawal sabha (CBO)
		Lakshmi Nagar	3	Not handed over to Municipality
2.	Vrindavan	Gyan Gudari	4	Not functional / no O&M
3.	Agra	Tajganj	10	Samsan Sudhar Samiti
		Balkeshwar	5	Balkeshwar Youth Association
		Malika Chabutara Sahganj	5	-

Source: JICA Study Team

SAPI (Special Assistance for Project Implementation) Team, which studied the approach and impacts of YAP-I in 2000, analysed the various factors related to the needs, usage and O&M of such IWC in Agra, Mathura and Vrindavan.

Improved Wood Crematoria

The Study focused the Knowledge &Attitude of the targeted population besides issues related to usage and O&M of the IWC in the aforesaid towns. As per the findings of SAPI Team, in Agra even less than 40% respondents knew about the IWC, where as interestingly in Mathura more than 80% of the people interviewed had knowledge about the same. The Study team in its observation not only justified the necessity and adequacy of IWC in these towns but even recommended 10 more crematorium platforms in Mathura, where the public awareness regarding the same was found to be considerably high[1]. The suggested figure for more nos. of IWC in Mathura was based on the PIA officials and stakeholders besides the users perspective and attitude were also taken in to account while suggesting the adequacy and requirements.

[1] The recommendation based on the demand by PIAs

User's Attitude regarding the usage of IWC was encouraging in Mathura as majority of them showed interest in future use of such facilities on account of their understanding that it takes less time / wood and reduce river's pollution. Where as in Agra respondents showed reluctance in the usage of such facilities.

The O&M of these structures are in the hand of Community Based Organisations (CBOs) under over all supervision of Nagar Nigam and Municipality. However, these agencies do not pay any exclusive attention to IWC and the O&M of these facilities is just done as a part of larger maintenance of the over all cremation ground, where the traditional cremation also takes place. This is to be noted that IWC in Agra and Mathura have also been constructed at the traditional cremation ground only like other towns and not separately. Thus, no specific maintenance efforts are put in to operate and maintain these structures.

Key Issues

SAPI team observed that some major constrains in usage of IWC were related to the religious issues. These are briefly outlined as follows;

- On account of religious beliefs of Hindus that cremation should take place on ground and body should touch the earth, so that users are discouraged to cremate their keen on IWC. Further, the belief that at least 400 kg of wood should be used to cremate the body also plays a key role in affecting the usage of IWC, which consumes less wood.
- The use of elevated platform and Iron material in IWC are not approved religiously as in Hindu rituals.
- The Knowledge, Attitude & Practices of the target groups is considerably low especially in Agra. Even if people know about IWC, their attitude towards its usage was negative.
- The target groups which knew about the IWC and acknowledge its advantages, showed willingness to propagate the usage of IWC than those who did not know it. It was indicative of the relevance of PP/PA in optimum utilisation of its usage.
- The Public Awareness tools used to disseminate the information regarding IWC in Agra and were "Signboard', Pamphlets and inter personal communication methods such as through community leaders and family members as indicated in the study report. Almost similar methods were used in Mathura also but here many mass awareness methods such as folk media and Audio-Visuals were taken up with comparatively greater intensity, which caters to the large number of audiences / beneficiaries, where as print materials and IPC have more limitations.

Recommendations for enhancing usage

The major recommendations as outlined by SAPI to improve the usage of IWC in Agra were concerned with Information Education & Communication (IEC) programmes targeting different segments of target population in a sustained manner.

The IEC Programme should emphasize regarding the followings;

- The cost, time and environmental effectiveness of IWC
- Location and access from the various localities
- The awareness programme should be target specific.

A Case of Haryana and Delhi

The observation outlined here are based on the review of progress reports, press clippings, information available on websites, figures related to usage collected by respective PIAs and also largely the "Evaluation Report of Centre for Social Research". However, the detailed site wise case analysis have been given in Chapter 4 of the report, which is based on the field visits and on site physical analysis.

Table 3.3 Distributions of IWCs and Electric Crematoria in Haryana &Delhi

Sl. No.	Towns	Location	No. of Units	O&M agency
A: Haryana Towns				
1	Yamuna nagar	City Center Jammu Colony Buria Gate, Jagadhari	1 1 1	-Shamshan Sudhar Sabha -Do- -Do-
2.	Gurgaon	Madanpuri Sikanderpur Silokhra Sirhole	1 1 1 1	-Shamshan Bhumi Sudhar Samiti - -
3.	Faridabad	Opposite Sector-18 (Near Agra Canal) Opposite Sector 15-A (Delhi Mathura Road) Sector –22, Faridabad Ballabgarh Tigaon Road	1 1 1 1	-Seva Samiti & NGOs -Do- -Do- -Do-
4.	Panipat	Krishna Pura Ward No.11	2 1	-CBO -Local Samiti
5.	Sonepat	Behind Hindu School Gohana Adda Near old water works Sector-15	1 1 1 1	-CBO -Local Sanstha -CBO -Local Sanstha
6.	Karnal	Model Town Dera Mastgir Balmiki Basti Kachhwa Road Hansi Road	1 1 1 1 2	-Shamshan Sudhar Sabha -Shri Sewak Sabha -Balmiki Sabha -Adrash Sabha -Shamshan Sudhar Sabha
7.	Delhi	Sarai Kale Khan Lodhi Road	1 1	-MCD -Arya Samaj NGOs

Source: Evaluation Report by PIA (PHED, Haryana)

General conditions & O&M arrangements

The improved Crematoria in all aforementioned towns have been constructed near or at the traditional Cremation grounds / places, where the dead bodies are burnt on traditional wood pyre. It has been observed that no IWC have been constructed at any exclusive place or separately.

These traditional cremation grounds / places in most of the places are maintained by locally based community organizations or groups comprising members from the local business groups, volunteers, social workers etc. At some places in Haryana, UP and Delhi they are formally registered under the Society Registration Act. These agencies take care of the general maintenance of the structures and cleanliness etc of the cremation ghats / places. At most of the cremation places, all basic amenities such as drinking water, waiting room/hall, toilets etc. have been provided. The general O&M of such structures is also taken care of by the O&M agency. The agencies / organizations have also deputed regular staff for the O&M of the ghats which include a supervisor cum accountant, sweeper/cleaner, and a gardener. At some places, as it was observed a full-scale accountant has been retained apart from the watchman. The general maintenance of most of the crematorium was satisfactory.

Since, the IWC or Electric Crematoria in Delhi have been built at the traditional cremation ghats as mentioned earlier no specific O&M arrangement is required or have been made for these facilities. The same staff and agency are supposed to take care of the Improved devices also, except at Sarai Kalekhan in Delhi, where the electric crematoria exists separately with no traditional cremation arrangements nearby, the special arrangement for O&M has been made.

Finance

The financial source for the upkeep and maintenance of these crematoria / places is based on the donations which the O&M agency / CBO receives voluntary from various quarters. The most of the funding is motivated by voluntary religious and charitable feelings, where in people/ associations donate. Apart from donations in cash people also sponsor the provision of facilities such as water tank, waiting hall, temple etc. Apart from, this, there were some institutions[2] who provide wood free of cost to the people who are very poor and unclaimed bodies.

The regular staffs are paid by the O&M agencies but besides this, there are some support staff like body attendant who sustain on tips they get from keens of deceased.

Issues pertaining to usage: A summary of the key observation in Haryana and Delhi[3]

The detailed analysis of the data from PIAs, situations indicated in the progress reports of implementing agencies (NGOs), recommendations suggested by the Evaluating Agency, CSR and also the on site visits by the investigators who worked on this case study suggested many key issues which is were observed to be directly and in directly associated with the usage of Improved Wood Based Crematoria & Electric Crematoria. Some of them are summarised as below;

- The main reasons for Non-usage of the improved crematoria / electric crematoria indicated by various agencies involved in O&M is concerned with religious and socio-cultural issues. Hindus don't cremate on any alternative system, which comes on the way of rituals and religious practices. Since, the improved crematoria and electric crematoria are not in line with it, people hesitate to use it as it is a one-time affair.

- However, religious factors being main but are not the sole reasons for less usage or no usage of IWC. Since, the advantages of IWCs were highlighted through the Public awareness campaign in YAP-I, its existence/inception was noticed in some pockets. But, when, it was tried occasionally especially by the economically unprivileged segments, the facts shared by them were astonishing. As the major advantages for which this device was developed, was consumption of less wood was strongly contradicted by the O&M agencies and users. They claimed that the metal platform, on which body is placed, has much wider gaps and after the wood are put to flame, the wood cracks in to peaces starts falling under the platform. This results to tremendous amount of gap in temperature required for the complete burning of body which is either met with the additional wood supplement in order to ensure that body is to completely decomposed in ashes. Besides wood consumption, other very significant problems/ demerits, which was brought to the notice were;
    - The body parts and bones that breaks after put to flames, also fall through the gaps in the ashtray, which is some times un burnt or half burnt.
    - The side plates are too high and when the pyre is arranged it becomes high, as it is around 2-3 ft. high from the ground, thus it becomes very difficult to keep the body over it. Often in this process the arranged pyre fall leading to arrange it again. According to care takers and other groups, with whom issue were discussed, it is very agonizing for the relatives who are already distressed and tired. People were really not

[2] like Krishna Janm bhoomi in Mathura
[3] Based on second hand source information and onsite field observation

found to be clear on how these IWCs are environment friendly on account of above factors.

- General awareness levels regarding IWCs were also not adequate as in many pockets, general public are not aware about this. It is interesting to note that at some places, people confused it with Electric Crematoria and on asking said it is the electric based arrangement[4].

- Other important reasons for the underutilisation of the facilities may be listed as below;
  i. Non-involvement of community during planning of the project.
  ii. Failure to obtain co-operation of religious organizations before constructing IC/EC
  iii. Inadequate supply of electricity for operation of electric crematoria. And huge O&M cost incurred on it.
  iv. Constructing the facilities without detailed feasibility analysis such as needs, locations, numbers, O&M plan. Etc. These facilities were installed simply either on demand of some NGOs or PIAs.

Outcome to be drawn from the Situation Analysis and its co-relation

The aforementioned observations on the conditions of IWC and Electric Crematoria are based on the In-depth study of the information from various sources as described in the scope. It is also supported with physical observations by visiting many Sites across three states. The results of the analysis which as stated is based on the factual data/information of Implementing Agencies and O&M agencies may be co-related with the objectives for which Case Study was undertaken. The measures if taken to mitigate the key highlighted issues such as technological corrections as indicated in case of IWC, public awareness and moreover a proper Feasibility Study before inception of such schemes will be useful in improving the existing conditions. The more detailed and site-specific observation has been specified in Chapter 4.

3.2.2 *Public Participation & Awareness: An Overview*

Needs and scope

PP/PA programmes were sanctioned for YAP towns in the original phase itself though it not taken up seriously and few awareness building type of programme were taken up in few towns with any specific focus or relationship to YAP. In most towns, the scheme lapsed and funds were reported to be unutilised. SAPI Team reviewed the PP/PA work done in YAP-I in 1999-2000, which recommended that PP/PA schemes, should be integrated in to YAP works especially non-sewerage schemes such as public toilets / LCS, electric and improved wood based crematoria, river front development activities etc. It also laid special emphasis on involvement of beneficiary groups for enhancing public acceptance in YAP works. It is therefore; PP/PA programmes were incorporated in to YAP-extended phase also. The PP/PA activities were undertaken in all 15 YAP targeted towns from October 2001 to March 2002.

As per the recommendations of SAPI study team, comprehensive DPRs for the PP/PA activities were prepared by the respective PIAs of each town, which was based on the guidelines that was formulated for this purpose by NRCD. The guidelines indicated the major activities to be taken up in each town, issues related to LCS, electric/ improved crematoria and other non-sewerage schemes, communication channel along with the activity wise cost break ups. The DPRs submitted to NRCD were appraised by consultants with justification of work and budget and finally sanction letters were issued to execution of work.

[4] It was observed during field visit in Gurgaon at two locations

As indicated below, the institutional set up for the implementation of any of YAP core and non-core scheme were the same. The same structure and institutional set up was responsible for the implementation and monitoring of PP/PA programme also in UP and Haryana. Only in Delhi it differs a bit where apart from MCD, Delhi Jal Board was responsible for the sewerage works implementation and monitoring.

However, the preparation of DPRs and execution was done at the division level offices under the supervision of respective project mangers in UP and executive engineers in Haryana involving local NGOs, the general managers UPJN and engineer –In chief, PHED, Haryana were responsible for over all supervision and monitoring. In Delhi, PP/PA programmes were carried out at a great scale by MCD. The Slum & JJ Department of MCD, was the nodal agency for implementation and monitoring of PP/PA activities and for this purpose, a PMU (Project Management Unit) was established under the Slum & JJ, for exclusive monitoring of PP/PA and LCS.

Further, in most of the targeted towns, NGOs were involved for the implementation of PP/PA activities, except Mathura, where it was done by the PIA (YPCU, Mathura) itself. The process of NGO selection was as per the guidelines of NRCD, given to PIAs, which was common in approach and criteria and was to be followed up by all PIAs. In each town, PP/PA scheme was advertised and NGOs with requisite experience were asked to apply. After this, short listed NGOs, who met the criteria, were contracted for the implementation of schemes according to their core expertise/ specialization.

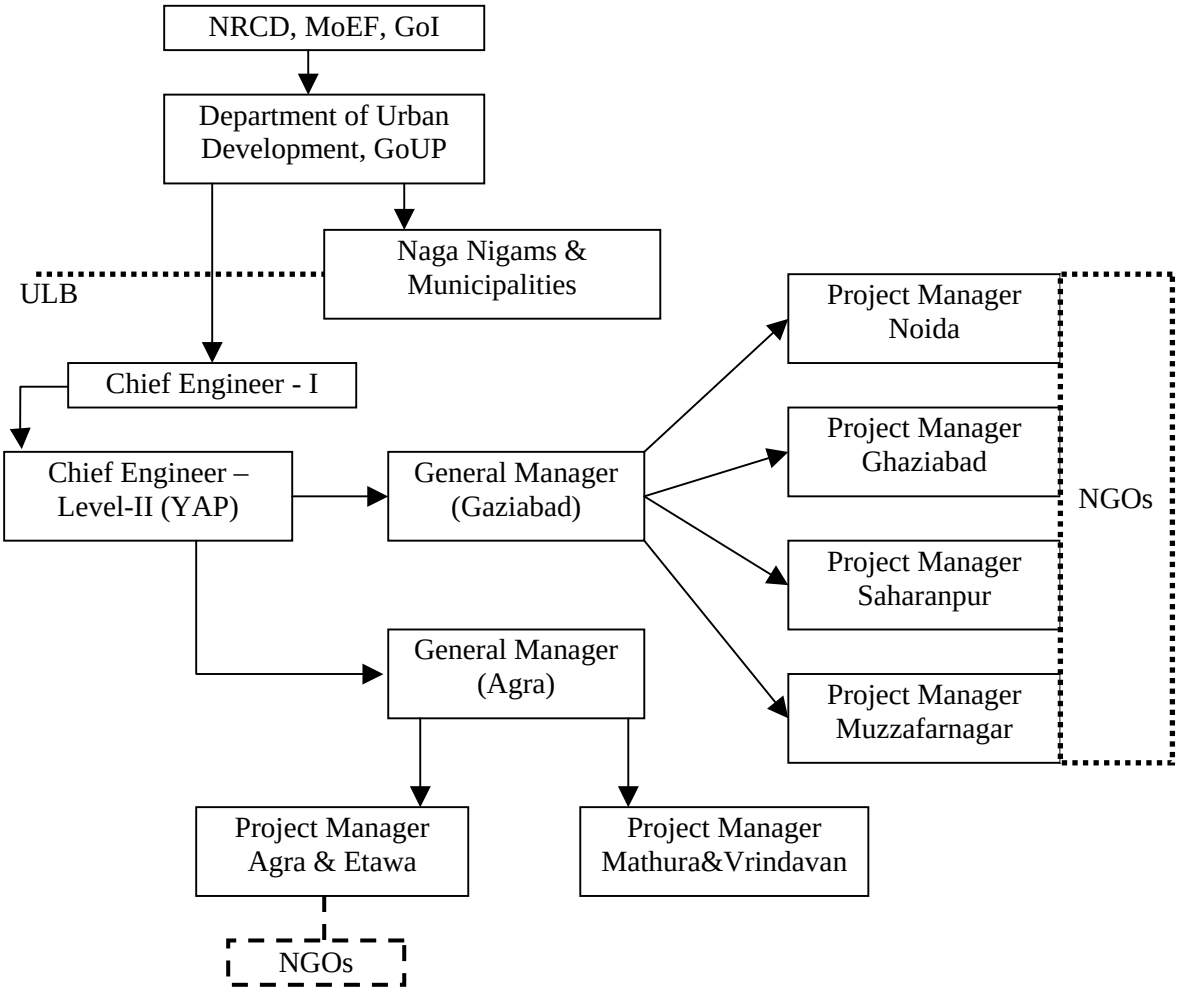

Figure 3.1 Organizational Structures for the implementation of the PP&A Programme

in UP

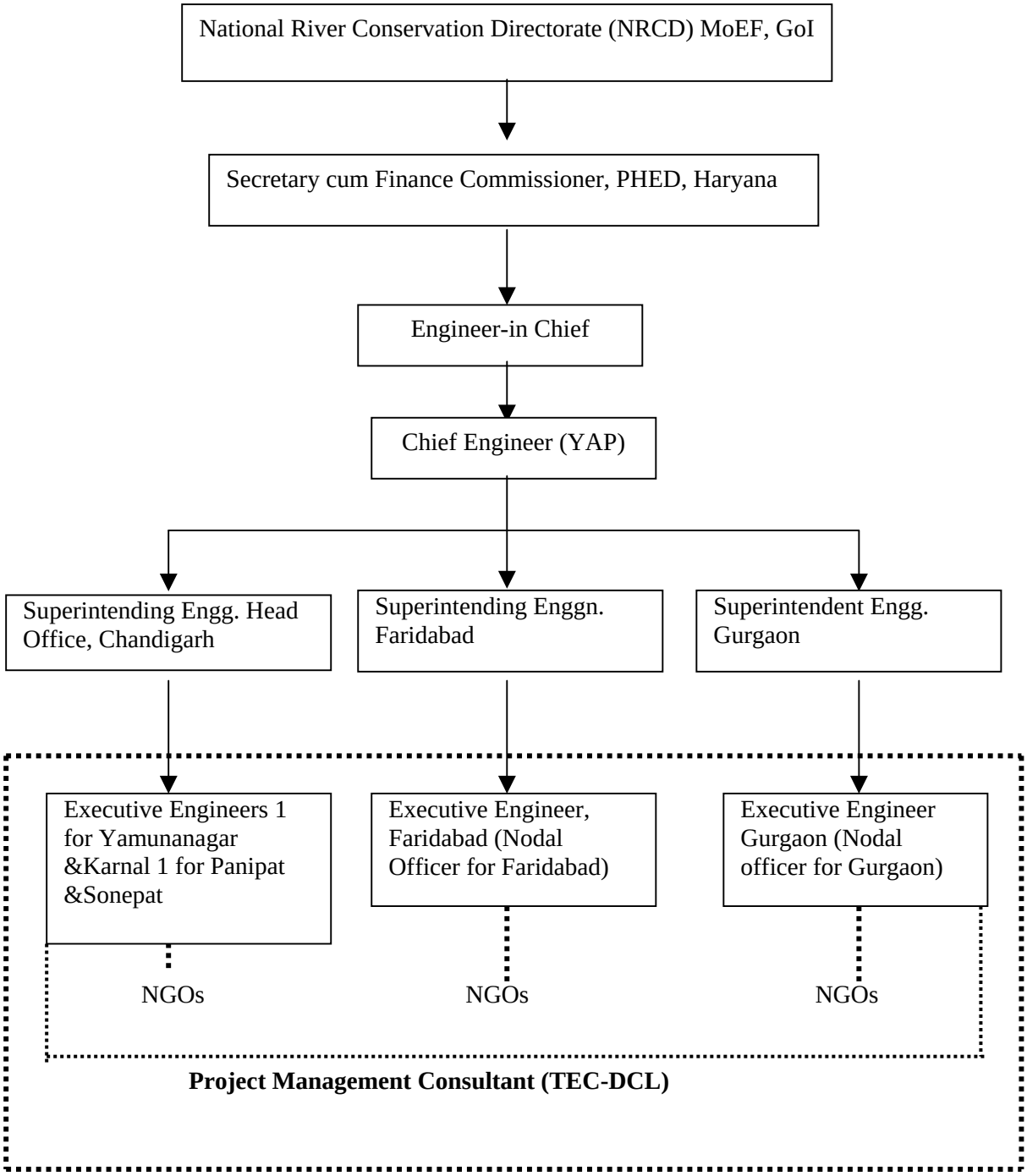

Figure 3.2 Organizational Structures for the implementation of the PP&A Programme in Haryana

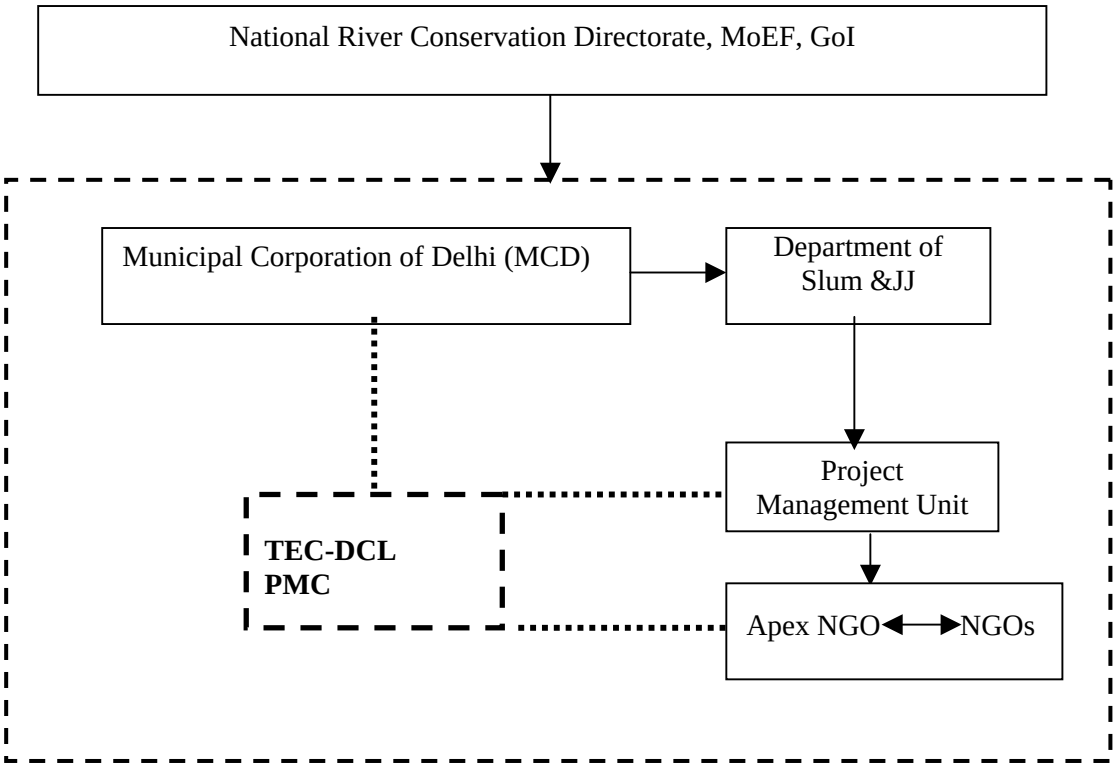

Figure 3.3 Organizational Structures for the implementation of the PP&A Programme in Delhi

Awareness Tools and Mediums

It was surprising to note that the major activities that were undertaken in YAP-I were common in nature and methodology for all the targeted towns. It formed the part of Guidelines supplemented to PIAs for the Proposal/ DPR formation. The size and frequency of such programmes were also fixed for each town. Thus, there was no scope for area specific awareness tools in the DPRs prepared by the PIAs.

The major activities that were undertaken under PP/PA programme were;

- Seminars/Workshop
- Rallies/Padyatra (Walkathon)
- Meetings &Exhibitions
- Print Materials (booklets, pamphlets, posters)
- Small media (hoardings, wall writing)
- School Programme (Quiz competitions, painting competitions)
- Awareness camps
- Shramdan (Voluntary labour)
- Folk Media (Folk dance and street theatres)
- Press meets
- Film shows & Audio-Visual
- Mobile Publicity Units (only in Delhi)

The aforesaid programmes were implemented for a period of 6-8 months in UP and Haryana, where as in Delhi it was carried out for around 12 months.

3.2.3 *Impact Analysis of PP/PA Activities in General*

The Public Awareness campaign undertaken in YAP-I was successful in mobilizing the general public and building a favourable environment towards the YAP works. The participation of children and women led to effectively communicate the issues related open defecation, laundry activity and solid waste[5] for some time. However, it could not lead to sustainable impacts due to many limitations and shortcomings in its approach of implementation. On the basis of detailed perusal and analysis of the various reports and DPRs of PIAs and NGOs regarding the PP/A impacts may be outlined as follows;

Positive Impacts

- The campaign covered thousand of people directly and indirectly and proved to be a good & effective platform of information regarding the river pollution, its causes and effects, advantages and disadvantages, prevention and role of community. Though, at most of the places, it was a first time exercise, it helped inform to large number of people, community regarding the facilities constructed under YAP and its advantages.

- A large numbers of CBOs and NGOs emerged in the process of awareness campaign. With the results of training and capacity building programme under the campaign, a potential group could be developed who could be further used as a change agent in mobilizing the community. Before, the campaign, by-and-large such institutions were non functional and not active.

- The campaign also had a positive impact on the utilisation of non-sewerage facilities especially LCS, though, yet very less than the expected optimum utilisation. Without the campaign the results would have been even worse.

Observed Shortcomings and Limitations in PP/PA Implementation Approach

- The concept of PP/PA was introduced for the first time as a scheme linked to YAP works, thus no prior experience of handling such programmes existed with PIAs and NGOs.
- The same PIAs (Staff) were responsible for the pollution control works (sewerage works &Construction works) as well as PP&A programme.
- Affected the monitoring of the Awareness programme as PIA's main emphasis was on sewerage activities.
- The NGOs selected for the purpose of PP/PA activities lacked experience in execution of such programmes, though they had claimed they have. Thus, it was a first time experience for the NGOs also.
- There was no specification in theme of campaign and target groups. At most of the places all themes were tried with all segments of target groups. It would have laid better impacts if theme categorization of the campaign had been done according to the target group's profile. For example, message regarding electric crematoria/ improved crematoria were carried out in the schools, where as it could have been more suitable and effective if disseminated to community leaders & religious leaders because they can directly influence the attitude of user groups.
- Similarly, the medium used for message dissemination on relevant issues were print medium (posters, pamphlets, booklets, hoardings etc.) in most of the towns, which have a limited potentials in terms of its outreach as majority of the target groups (particularly those living in slums and of low income pockets) lack education. Also, the print medium can inform but not motivate effectively, which is more important for influencing the attitude of targeted population.
- There was lack of participation of local population in designing, implementation and monitoring of PP/PA programme at almost all the locations except Mathura where community

[5] Progress reports of PIAs and NGOs in Haryana

participation in operation and management of PP/PA programme was facilitated through local youth clubs and CBOs. In most of the targeted towns the local public were just a casual audience and message dissemination was done through external facilitators belonging to NGOs and other professional groups. In most of cases their approach has been quantitative (Number and duration of programme/shows) and not qualitative, which is quite in effective in awareness building Programme.

- The PIAs who were responsible for supervision & Monitoring of PP/PA programme, lacked professional experience to monitor the effectiveness of PP/PA campaign/Programme, as they were engineers and had to coordinate the activities that did not fall in their competency. Thus, it also led to the quantitative monitoring and ignored the qualitative indicators.
- There was no involvement of Urban Local Bodies & Municipality since the beginning of programme. Also, the programme events were not adequately advertised in all the targeted towns leading to low response from audience.

3.2.4 *Impact of Public Awareness Programme: An Analysis of Faridabad*

Approach and Method

As mentioned earlier, the PHED, Haryana was the responsible agency for the implementation of any YAP related works in all six major YAP towns in Haryana state including PP/PA. The institutional structure for it was as same as outlined in Figure-2 of this report.

The PP/PA activities implemented in Faridabad, Haryana were the part of common DPR prepared by PHED Haryana for all major towns i.e. Yamuna Nagar, Karnal, Panipat, Sonepat, Gurgaon and Faridabad. The activities proposed in the DPR were almost common in approach & methodology for all towns except difference in financial implications, which varied from town to town depending on the scale and size of the proposed activities. It was interesting to observe that the approach suggested by PHED Haryana sounded to be area specific and target wise specific unlike the approach of other PIAs. Though, the activities proposed and implemented in Haryana were similar and as per the guidelines of NRCD, the through perusal of the DPR suggested a localized and need based approach of implementation of such activities. The activities/events proposed for PP/PA activities, were clearly demarcated issue wise and medium of communication /information dissemination were in line with the profile and acceptability level of target audience. It was envisaged in the proposal/DPR for using the communication medium, which are locally popular, and effective, emphasis was on using local language and dialects, which are very important characteristics of awareness campaign.

The similar approach was suggested for Faridabad also and the issues, which were addressed through the different activities, were as follows;

LCS

- Awareness about the existence of the LCS in the area/locality
- Advantages of using LCS (convenience, hygiene, privacy and dignity, health, positive environmental impacts on river, etc.)
- Creating demand and enhancing the usage
- Effective maintenance including light, and cleaning etc.
- Create demand for more number of LCS

Improved Crematoria

- Awareness about the existence of improved crematoria
- Advantages of using improved crematoria (less wood, lower expenses on rites, quicker burning, environment friendly, reduce the pollution load on river)

- Increasing the usage by enhanced religious acceptability.
- Effective monitoring and O&M of facilities
- Investigate the possibility of facilitating the transportation system (Hearse vehicle) or providing information to access the IWC.

Others

- Discourage laundry activity in river
- Cattle wallowing
- Awareness regarding effective solid waste management.

Table 3.4 Target group segmentation –An issue wise approach[6]

Issues/Facilities	Target groups
LCS	Women, children, people in slum areas, vendors, residents without toilets in houses, floating population, in the public places, pavement dwellers, small traders, Cleaners association (sweepers)
Improved Crematoria	Women, people in slum areas, Hindus and Sikhs, educated families, Low Income Groups, people looking after unclaimed dead bodies, religious leaders and priests (*pundit*s) involved in cremation rites.
Solid waste &Others	Sweepers groups, General Public, slum dwellers, children and women.

Table 3.5 Details of Programme of Activities in Faridabad

S. No.	Type of activity	Quantity	Amount (Lakhs)
1.	Seminar/Workshop	15 Nos.	0.25
2.	Publication of brochures and posters	11,000 Nos.	0.22
3.	Organising quiz and other competitions	6 Nos.	0.18
4.	Training camps	2 Nos.	0.18
5.	Awareness camps	2 Nos.	0.40
6.	Voluntary works (shramdan)	5Nos.	0.25
7.	Motivational/Promotional activities to involve community leaders	2 Nos.	0.12
		Total	1.62

Impacts Analysis & Major Critical Issues

The Implementation of PP/PA activities in Faridabad was carried out through a Delhi based NGO, "Sulabh International", which has also been entrusted with the responsibility for O&M of the LCS facilities in Faridabad.

The impacts of PP/PA campaign undertaken in Faridabad may be evaluated on the following indicators, which were in consonance with the objectives of the campaign;

- Awareness regarding the existence of the facilities i.e. LCS & crematoria
- Usage level and O&M status (cleanliness and safety etc.)
- Improved conditions of the solid waste in the town and reduction in open defecation
- Visible initiatives at community level in participation of Pollution abatement programme.

Comparison of Results of Evaluation Study and Data Collected by PIAs

[6] Detailed Project Report for PP/PA in Haryana by PHED , Haryana

After the accomplishment of the awareness campaign and construction of facilities in Haryana, Public Health Engineering Department (PIA) instituted an evaluation study focusing all six targeted towns of Harayana. The study was conducted by a Delhi based research agency 'Centre for Social Research". Though, study focused primarily the conditions of LCS and crematoria it also assessed the public awareness regarding the non-sewerage facilities.

The study targeted the Faridabad also and the major observation regarding the LCS and crematoria in Faridabad are summarised as follows;

LCS

- Awareness regarding the existence of the LCS facilities was observed to be fairly good as around 87 % of the target groups interviewed acknowledged its availability. However, the usage level is very less corresponding to the knowledge, the main reason identified for low usage in Faridabad was having alternative facility/own facility at home.
- As far knowledge on various other issues related to the LCS was concerned such as family pass system, individual pass system, facility available in side LCS like bathing room etc. was reported to be high
- As far demand assessment, majority of public desired that more number of such facilities should be created.
- The advantages of using Public toilets were also widely realised as "Privacy" and "Environment friendly" reducing the pollution load.
- O&M of most of the LCS units were said to be satisfactory and the staff 's behaviours and attitude towards users were cooperative.

Crematoria

Contrary to this, knowledge and awareness about IWC was observed to be missing in almost all localities. Though, people knew about the "Shamshan Ghat" (Cremation Ground) in general, target groups, surveyed, lacked specific Information on IWC. The usage is also almost negligible as no normal bodies were cremated on this.

As per the statement of Acharya[7] of sector 18 crematoria, only unclaimed bodies are used on these Crematoria, as there is no acceptability for this new improved devices.
The main reasons attributed to this were;

- Religious issues as cremation on metal plate form and which is also elevated does not have acceptability according to the Hindu's religion.
- The concept that it consumes less wood is also not approved by the O&M staff, they suggested that as it has been experienced many time wood consumption in this device is comparatively more, as due to the wide gaps between the horizontal bars on which body is placed is too high, the woods starts falling inside while burning. It was also pointed out that along with the burning wood peace, unburned bodies also fell in side the ass tray.
- Majority of people still do not know about the implications of such IWC, thus there is lack of public awareness also.

Major Critical issues in PP/PA Programme

The detailed analysis of PP/PA programme in Faridabad during YAP-I, where as approach and methodology as indicated in the DPR reflects a fairly good understanding of the issues related with public awareness in Faridabad and whole of Haryana. However, the Faridabad case was suggestive of the major gap in planning and delivery. Some of the critical issues related to campaign administration and monitoring as observed through analysis of situation are as follows;

[7] Person who perform the religious rights for the cremation

- The awareness campaign did not focus appropriately on IC and its advantages and appears to be centred around more on LCS and general themes.
- The awareness tools used in campaign were targeted the generic themes more such as cleaning of lanes/ streets etc, (which is more of general cleanliness drive than River's pollution specific activity) rather than an issue specific theme.
- The number and duration of the campaign activities were very short, keeping in view the area and population of the town. Only few events of folk media, group meeting etc was carried out at some locations, which failed to cover the entire area and population.
- There was lack of community participation in planning and execution of the activities. Monitoring was also done by PIA and Community had a very little role in monitoring.
- There were no follow-ups, which is very necessary for sustainable impacts of public awareness.
- The outreach of the message disseminated through any activity/event were not evaluated at the time of message dissemination, which is a very important to ascertain the effectiveness of activity.

Lessons to be learnt

The above scenario suggests that in order to ensure the sustainability of the PP/PA, especially in context to environment and river pollution abatement followings are the key factors that can make it a success.

1. The communication tools and activities should be need oriented and area specific and according to the acceptability potentials of targeted audience / population. A uniform approach may not be effective and sustainable for all the area/locations.
2. The campaign approach should be community based, i.e. programme should be carried out with active participation / involvement of the local community. They should be involved in planning, implementation, monitoring and evaluation of awareness activity.
3. The campaign "Theme" should be clear and short. There shouldn't be integration of too many message at a time, especially when it is targeted on illiterate and less educated groups. For examples, when the objective of campaign is to address the laundry activity, and target groups/ area are predominately watermen groups, the message related to Improved Crematoria should be avoided.
4. The implementation of programme should be subjected to regular review, feedback and effective monitoring. The monitoring should be qualitative and not only in terms of quantitative progress. Also, the subject experts should be involved in monitoring.
5. There should be greater emphasis on creating and capacity building of existing NGOs/CBOs and efforts of the awareness campaign should be directed on encouraging such institutions / groups to take the campaign process forward even after the completion of campaign schedule.
6. The sensitive issues such as improved crematoria / electric crematoria should address in a very gradual and sustained manner. Some 1-2 event/ activity may not be meaningful and effective in changing the deep-rooted religious beliefs, even if they are harmful.
7. The pre-programme publicity should be taken up very effectively ensuring the participation of maximum number of beneficiary groups.

3.2.5 *Impact of Public Awareness Programme: An Analysis of Mathura*

The PP/PA activities in Mathura were taken up under YAP-I by the PIA it self without involving NGO. The main activities undertaken were same as in other towns of YAP. However, it may be categorised in two broad categories; one the active participatory programs such as folk music &dance, street theatre, painting competitions and human chains. These programme require certain number of motivated participants/audience.

Other category was passive programs such as hoarding, posters, banners, pamphlets, newspapers and brochures etc. Though, no specific evaluation, was carried out of the PP/PA activities in Mathura, on perusal of various publications and news reports it suggests that PP/PA campaign in Mathura was very successful in mobilizing different segments of target population and building an environment for acceptability and participation of YAP works.

The following incidents compliment to the general observation and analysis of impacts of PPPA in Mathura.

Amar Ujala (Hindi daily), 20th Feb.2002
Today, in Mathura, few people immerged a dead cow in River Yamuna from the "*Chakra Tirth Ghat'* due to the negligence of the River Police. But due to the activeness of the local people, they failed to succeed in their objectives. People caught hold of these culprits and forced them to take out the Animal Body from the river and got it buried.
Three persons who brought the dead Cow in a rickshaw tried to throw it in River Yamuna from Chakra Tirth Ghat. At this point of time, 2-3 saints tried to stop them but they were neglected by these people. But as mentioned due to strong resistance from people, they could not be successful.

Dainik Jagran (Hindi daily)
In Mathura, strong public consciousness was noticed yesterday regarding the cleanliness of ghats along the River Yamuna. One person who had come to take holy bath in Mathura, spat beetle pick near the ghat. The shopkeepers and other persons who noticed him doing so immediately objected and then forced him to clean the pick he spat there.
Initially, he was not ready to go ignored public objections but when people threatened him to hand over to police, he complied and cleaned.

However, the as public awareness is a slow process, and requires a continuous and sustained efforts, the incidents like above which are only complimentary to PP/PA efforts and reflects the significance of PP/PA in the sustenance of such development programmes.

The major positive elements that were observed in the campaign approach of Mathura, on the basis of analysis of progress reports and IEC tools, are out lined here for reference;

1. There was greater emphasis on the active people's participation programme. The most of the programme were target group specific and Theme oriented.
2. There was more involvement of local community in the programme implementation. The folk performers and other message disseminators were from within the community, who understood the local target audience better than external people. Also, because of better rapport with the target community, it was easier to communicate the ideas and message effectively.
3. The community leaders / and other user groups (shop keepers, boat men etc.) were directly targeted through the campaign.
4. The printed medium of message dissemination was clear and easy to understand.

3.2.6 *Some Recommendations*

Although, the above mentioned points highlights the strengths of the PP/PA campaign approach in Mathura, it could have been more effective by paying attentions on following issues;

1. Networking

There were almost no efforts on networking. The govt. agencies like Primary Health Centres, Municipality, are very useful plat form having great potential to influence the public attitude and

behaviours. Also, they carry out awareness campaign &programme on health and sanitation issues such as Immunization, family planning, water and sanitation etc. The PP/PA campaign of YAP if could have been linked with such programme may have yielded the better results.

2. NGO/CBO Involvement

The NGO involvement in the Campaign was not observed in Mathura. NGOs, because of their close association with community could have better change agents for information dissemination.

3. Operation &Maintenance issues

The awareness programme largely focused the usage and availability of the Non-Sewerage facilities constructed under YAP-I. There was less or no emphasis on O&M issues like creation and sensitisation of CBOs for the maintenance and cleanliness of facilities like LCS, IC etc. This could have been more effective for the optimum utilisation of this structure.

The analysis of the PP/PA campaign in YAP-I in general and in Faridabad and Mathura highlights the approach of campaign, the various objectives it were carried for and its significance in the YAP-I works. As the PP/PA campaign were undertaken in YAP on the recommendations of SAPI Study Team, which has strongly recommended it for the success of YAP works and optimum utilisation and maintenance of the different assets created under the project.
The observation regarding the PP/PA made through the Case Study analysis, critically analyse the campaign merits and demerits which suggests various '**Does' & 'Don'ts'** for the effective and successful implementation of PP/PA campaign in similar Action Plans in the focused intervention areas or else where in India.
The Observation though, focus the PP/PA in details, the related issues such as utilisation of assets like IWC and issues related with it like O&M etc. is also reflected.

3.3 GANGA ACTION PLAN (GAP)

3.3.1 *Background & Scope*

The non-sewerage schemes formed an important and integral part of the Ganga Action Plan-I similar to the YAP. It implemented many schemes across 25 towns spread over UP, Uttaranchal, Bihar and West Bengal. As shown in table 1.1-1.2 schemes included LCS, bathing ghat and river front development programme, electric / improved crematoria and others. There was no specific attention on PP/PA program/activities under the GAP-I

The present section of the report, briefly analyse the status of such non-core schemes in terms of its utilisation, O&M and its co-relation with the utilisation, financial implications (revenue and O&M cost) and also public awareness about the advantages and its impacts on the cleanliness of surroundings and River Ganga. The emphasis of Case Study on non-sewerage schemes under GAP-I centres around the four major Towns of UP which have been focused under the Master Plan Study of the Water Quality Management Plan of river Ganga undertaken by JICA (Japan International Cooperation Agency). The major source of information/data on the basis of which, the analysis has been concluded are based on interactive meetings with stakeholders and PIAs, summary of Controller and Auditor General of India's report, and also reports of seminars/ workshops, journal etc published from various sources. Moreover, the specific source of data information has been detailed out in list of references attached.

3.3.2 *A Case of Varanasi:*

The important non-sewerage schemes that were implemented under the GAP in Varanasi included the electric crematoria at Harischandra Ghat and community toilets at all major bathing ghats. Besides, construction and development of several bathing ghats and relocation of dhobighats were also undertaken. Construction and development of Dr. Rajendra Prasad ghat and Raj Ghat are another important activities undertaken as a non-sewerage scheme in GAP.

The schemes were aimed for pollution abetment from non-point sources as areas infested with open defecation, disposal of half-burnt or un-burnt bodies and control of run-off from solid waste and laundry activities.

The main cause for the success / failure of such schemes identified was concerned with O&M and lack of community participation initiatives. The Nagar Nigam, which has the responsibility of the facilities constructed under GAP-I has not given attention in order to sustain it. Moreover, the NN has also the limitations of resources and besides the lack of commitment.

The bathing ghats which are very significant from the cultural point of view in Varanasi, which also helps to maintain the hygiene status of the riverbed area, are not in satisfactory conditions and a number of them are in pretty bad conditions as situation becoming worse by solid waste and other garbage, rampant open defecation near and at ghats, cattle wallowing and laundry activity that severally damage the environmental conditions near the ghat.

However, wherever, there are little intervention or effort from the community level, the situations are better.

Conclusion & Recommendation

- The facilities like bathing ghats, dhobighats and other initiatives like solid waste management etc. needs a sustainable O&M mechanism to sustain and remain operational in terms of usage.
- The O&M will be more effective if it is community based i.e. by involving the local resident groups, boatmen, shopkeepers and users. Since, community have many constrains of resources and skills, the community –govt./ULB partnership was assessed to be the best mechanism. Where as community can take responsibility of management at local /ground level, ULB needs to promptly address the issues related to finance and material support.
- There are several community based organizations in the form of association, youth club and religious groups in Varanasi, there is need to activate such institutions facilitate their partnership in the O&M of such facilities. However, it has been initiated by some voluntary groups like Save Ganga Movement but it does not establish the institutional set up for O&M and focus on public awareness.

BOX 1 An unique voluntary efforts for Public Participation in River Pollution Abatement Programme

Rakshat Gangam Andolan (Save Ganga Movement) :

Rakshat Gangam Movement is one voluntary group working on the strategy of using the cultural practices and methods to create public consciousness and facilitate their partnership in River Pollution abatement programme. As it was observed and assessed, the group is working continuously for generating a cultural movement to achieve the objective.

It works by organizing public/citizens vigilance and public pressure for effective implementation by the implementing agencies involved in GAP or any other project for clean Ganga.

The RGA organize the following on regular basis;

- Save Ganga awareness generation through walkathon along the ghats
- Save Ganga awareness programme
- Photo exhibitions showing the especially the various non-point source of pollution i.e. open defecation, dumping of un-burnt/half burnt bodies in the river, materials emerging out from temples and religious rites that are flown to river, solid waste, cattle wallowing and also laundry activities.
- Save Ganga musical evening and festival
- Save Ganga poster competition
- Publications and production of audio-visuals
- Special public awareness program on the auspicious occasions associated with Ganga.
- Debate/quiz etc on the theme of Ganga pollution abatement measures.

The cultural events and other awareness initiatives of the Save Ganga Movement attract sizeable public participation involving more to intellectuals & decision makers. The RGA being an informal group, the initiatives mostly flow from its founder convener. The funding sources are donations and contribution from the supporter and other members from the groups.

Since, Save Ganga Movement is an Informal Action Group and sustains on small donations, it also lack the strong in-house institutional set up to mobilize the public participation at such a large scale[8] However, the approach to forge public partnership and disseminate a sense of responsibility among people towards the cause by using the cultural resources.

Some important features identified in the organizing and management approach used by SGA are outlined as follows;

- It facilitates networking with different institutions like schools, religious organizations and youth groups
- Uses mostly the active community participation approach by rallies, walkathons and voluntary cleanliness programme, Human chain etc.
- Practice media advocacy by rising issues through news papers and photo exhibitions bringing the realistic stories to the people
- Highlights and seek public participation in curbing non-point source of pollution mainly, which is within the capacity of general public rather than going much in to sewerage schemes and technology. The issues like open defecation, maintenance of ghats and riverbed side, solid waste issues and complex religious practices are targeted mainly.

However, it is difficult to analyse the impacts of such initiatives addressed by SGA both quantitatively and qualitatively in Varanasi, there are certain limitations to its approach.

- Due to lack of resources, there are no regular follow-ups of the programme it initiates.
- The "Theme" of campaign are generic as it emphasize on river pollution in general and are not issue specific, which do not lead to the desired impact on the usage and maintenance of the facilities that have been created to curb the pollution load such as LCS, Crematoria etc.

[8] SGA organized a seminar and public march to mobilize public towards Ganga cleaning on December 11, 2003 at Varanasi, which was also attended by the members of this study team. It was observed that more than 5 thousand people participated in different activities of the program.

3.3.3 *Scenario in Kanpur*

The status of various schemes implemented to tackle the non-point source of pollution in Kanpur emerging out of bathing and washing, solid waste, dumping of dead bodies (un-burnt/half-burnt bodies in the river) along with the open defecation and cattle wallowing was analysed and summarized on the basis of monitoring reports and on site visit to the facility areas.

The major parts of information in this regard were collected from the ECO-Friends a Kanpur based NGO, working on various pollution abatement measures in Kanpur with specific focus on Non-Point source of pollution. The NGO has been taking several important measures to aware public about the causes of river pollution in Kanpur and its impacts on Ganga's Water Quality and environment. Besides, this NGO has also been actively pressurizing the Implementing Agencies and other stakeholders for quick and effective implementation of any schemes related to Ganga Pollution abatement through media advocacy and public mobilization.

The quarterly reports of the NGO (Eco-Friends) and a detailed one-to one discussion with its secretary and founder Mr. Rakesh Jaiswal helped significantly to understand the issues and scenario of non-sewerage schemes in Kanpur besides the on site observation.

The major outcome of the situational analysis of these schemes/activities is briefly summarized with emphasis on utility, O&M, public participation and people's perception.

Electric Crematoria: Status and significance

The three electric crematoria installed in Kanpur stretch of the river, one each at Bharon ghat and Bhagwandas Ghat and one at Mishra Colony Unnao, have been non-functional for a long time since its very commissioning on account of minor technical faults and electricity dues. This frequent breakdown have created notion among the people that crematoria are never functioning having a high adverse impacts its usage.

The Bhagwandas Crematorium which has double furnace, was repaired with electricity connection and supply in April 2003 after remaining dysfunctional for a long time did not received even a single body till July 2003 reflects the sate of utilization and its popularity among the people and user groups. However, as pert the reports of staff that around 10-15 bodies have started coming to these crematoria in month as a result of some initiatives/ efforts to create favourable public consciousness against the dumping of un-burnt bodies in to river, most significantly by Eco-Friends. The public hearing involving the people of ghat community such as cremators, boat men, Mahapatras (person who perform religious rites at the time of cremation), fishermen proved helpful at least to make people realize the ill effects of throwing dead bodies in to river.

Bhairon Ghat Crematoria was repaired and Nagar Nigam maintains made function in June 2003 with the help of five employees including supervisor, body attendants and electricians. It cost around 35000-40000 on salary and general maintenance of the crematoria besides high electricity cost every month. The crematoria have started receiving 20-30 bodies a month since last few months only mostly being the unclaimed one. High-perceived user charge, and lack of awareness apart from the religious taboos and perceptions. The crematorium, which is located at Mishra Colony, is not functional since last three years.

Major critical issues as observed and perceived

- The poor performance of electric crematoria in terms of O&M, and its acceptability that is also primarily influenced due to O&M, reflects that crematoria are not success in its objectives in Kanpur.

- There have been no efforts to popularise the crematoria and its implication on river pollution and other advantages in terms of cost effectiveness, user friendliness etc. among the public.
- There are little or almost no efforts on public participation and general awareness especially from the implementing and O&M agencies. It is done to some extent by NGOs and Volunteers but due to lack of resources it also fails to continue the process in long run and the initiatives undertaken by NGOs/Volunteers does not sustain.

Public Awareness Activities: Some Initiatives

The PP/PA activities have been taken up by Eco-Friends in Kanpur, which has tried to mobilise public especially to reduce the non-point source of pollution. The Ganga cleaning programme initiated by it, which focuses on removal of solid waste, dead bodies and other waste materials manually and burring it under the ground. Apart from this, it also has been taking mass awareness programme to educate and aware the public for discouraging open defecation, solid waste management and throwing dead bodies and animal carcases in the river.

Towards this end, it has been taking up several activities which include targeting the primary target groups such as cremators, washer men, boat men etc and also the secondary target groups which has the potential to influence the public opinion such as community leaders and local residents. The public hearing programme, which was carried out involving key stakeholders and user/beneficiary groups at the ghats, enjoyed good response from the audience groups and general public. It was also a good effort to mobilise the ghat community specifically who can play a significant role in the improving the general cleanliness of ghats and surrounding besides enhancing the usage of facilities.

However, the response of PP/PA in terms of its success could not be translated in to success keeping in view the scenario of usage and conditions of facilities such as LCS, electric crematoria and over all cleanliness etc. especially on river pollution. The main bottleneck in the implementation of PP/PA programme in Kanpur, which was carried out with focus on river pollution, as assessed in the process of situational analysis may be out lined as follows;

- The PP/PA programme though a good effort by NGO, could not deliver the desired impacts due to lack of consistency and sustainable efforts. The most of the programme were voluntary initiatives without the financial support/backing from the PIAs and other responsible govt. agencies and were short-term activities and there was no regular follow-ups.
- The theme of the campaign which were targeted in the PP/PA programme were mostly generic i.e. it highlighted the issues of River Pollution in general and not the scheme specific. Also, it did not emphasize the most specific issues like O&M of facilities, Usage etc.

CHAPTER 4 NON-SEWERAGE SCHEMES: THE FIELD EXPERIENCES

4.1 SCOPE & OBJECTIVES:

As stated earlier, the Case study Report is based on the critical analysis of the second hand source information/data and further substantiated with on –site filed visits at select locations of the target area that have been focused in the Study i.e**. Yamuna Action Plan** & **Ganga Action Plan** with focus on four major targeted towns of UP.

The main objectives with which the field visits were undertaken were;

1. To have a close assessment of the conditions related to various schemes/facilities through physical observation and analysis of related issues at ground level.
2. To compare the issues/ factors assessed through primary experience with the scenario outlined through second hand source information/ data i.e. documents review etc.
3. To assess the conditions concerning the focal issues in the present context i.e. success/failure, and learn lessons for future implementation/actions.

Keeping in view the scenario mentioned above, a number of non-sewerage facility sites were visited in around 12 towns of YAP-I and also in Allahabad, Lucknow, Kanpur and Varanasi in first phase of the site visit.

All important schemes such as dhobighats, bathing ghats, PP/PA, improved wood based and electric crematoria and cattle wallowing were intensively studied across the locations mentioned below (ref. table 4.1)

This Chapter presents the Scheme wise Situation Analysis of the sites studied along with the measures required for improvement and lessons to learn.

4.2 PLANNING THE SITES SELECTION FOR THE FIELD VISITS

The efforts were made to cover the maximum number of non-core schemes for onsite observation and analysis in the filed visits. The area/towns for the Site visits were identified primarily keeping in view the significance of schemes and data available on usage of such schemes in the reports from PIAs. It was attempted to cover almost all-important towns where the Schemes like IWC and PP/A programme were implemented. Since, the GAP covered large number of towns only the four major towns of UP, which are the target towns of Water Quality Management Plan of River Ganga, undertaken by JICA were given due emphasis.

Table 4.1 List of the Sites covered / visited for the Situation Analysis

S. No.	Towns visited	Issues to be addressed	Main issues studied
1.	Delhi	- Electric Crematoria - PP/PA	- Usage - O&M - Institutional Arrangements - Problem areas
2.	Faridabad	- Improved Crematoria - Cattle Wallowing - PP/PA	- Usage and O&M of the facilities - Extents of Cattle wallowing and initiatives for its prevention - Public Awareness: Impacts of public awareness
3.	Gurgaon	- Improved Crematoria - PP/PA	- Usage level - Institutional arrangement of O&M - Public Participation in O&M
4.	Panipat/ Sonipat	- Improved Crematoria - Cattle wallowing - PP/PA	- Public Awareness about the facilities - O&M mechanism - Public Awareness and initiatives taken for prevention of cattle wallowing
5.	Yamuna Nagar	- Bathing Ghats - Improved Crematoria	- O&M of facilities - Public participation &Awareness
6.	Mathura &Vrindavan	- Crematoria - PP/PA	- O&M - Public Awareness - Institutional Set up
7.	Agra	- Crematoria - Bathing Ghats - Cattle Wallowing	- Institutional set up of O&M - General condition - Suitable interventions
8.	Varanasi	- Cattle wallowing, - Bathing Ghats - Public Awareness Initiatives	- O&M-Institutional Set up - Situation of Cattle Wallowing &Solutions - PP/A-initiatives
9.	Allahabad	- Cattle Wallowing - Bathing Ghats - Electric Crematoria - Dhobi ghats	- Problem of Cattle wallowing and public perception about this. - Conditions of EC and its usage, O&M etc.- Issues related with Dhobighat and success story if any
10.	Lucknow	- Dhobighats - Crematoria - Cattle Wallowing &Public Awareness	- Issues and perceptions - Success story if any
11.	Kanpur	- Electric Crematoria - Dhobi ghats &PP/A	- General scenario &Success Story if any
12.	Etawah	- Bathing Ghats &IWC	- Usage/O&M

4.3 TOWN WISE ANALYSIS UNDER YAP-I

4.3.1 *Delhi*

(1) Scope

As indicated in table 4.1, the main emphasis of case study in Delhi was on electric crematoria (EC) only as LCS does not come under the context of study and other facilities like bathing ghats and dhobi ghats have not been undertaken. However, besides EC, general approach to PP/PA was also assessed by comparing its impacts in usage and maintenance of assets. Along with this, an overview of PP/PA activities, its Theme and implementation approach have also been analysed and focused in this part.

As mentioned earlier, two ECs were constructed under YAP-I. One at Sarai Kalekhan and another at the traditional cremation ground at Lodhi Road.

(2) Electric Crematoria: Sarai Kalekhan

The EC at Sarai Kalekhan, which was made operational in year 2001, is a double furnace crematoria built with a cost of around 4.14 Crore with 100% funding from National River Conservation Directorate (NRCD), Ministry of Environment &Forests, Government of India. The two electric furnace are constructed, while one furnace is made functioning and other remains stand by. The furnace, which is kept round the clock functional, takes approximately 64 KW to maintain the required temperature of around 600° Celsius. It become even more and goes approximately 900-950° Celsius once the body is placed inside for cremation. The schedule time of cremation is from 6 AM to 10 PM every day.

Operation &Maintenance and Institutional Structure

The Crematoria has been provided with all necessary amenities for the users such as toilets, rest room / waiting room etc. the surrounding is very clean having a beautifully maintained lawn. The O&M of the crematoria is done by Municipal Corporation of Delhi (MCD. While over all supervision of the crematoria is under the MCD, it is managed by some core staff which includes 2 supervisors, 4 attendants (cremation), and 4 sweepers along with a security guard. The maintenance of furnace and operation of other electrical system such as temperature maintenance, maintaining logbook etc. is being done through private contactor, who is engaged through tendering by the executive engineer, Electrical MCD. The entire cost of O&M is borne by MCD, which includes the salary of its staff and a contractual agreement of Rs. 5 lakh with contractor.

Usage

As per the latest record, which is maintained at crematoria, nearly 3-4 bodies are received every day for cremation, most of them being the unclaimed one around 70%. The unclaimed bodies are brought by Police and Hospitals to crematoria. However, the claimed bodies are from the economically higher class and educated community mostly very few bodies are from the under privileged class also who find difficult to cremate on traditional wood based pyre due to the high cost even if there preference was traditional cremation.

Financial Implications

The O&M of these crematoria is extremely high due to the higher number of staff, maintenance of equipments and also the support facilities like toilets and moreover the high electricity cost which exceeds 1.25-1.5 lakhs per month. Where as the revenue generated out of it is even not sufficient to take care of salaries of one staff. The charges fixed by MCD for the claimed body is Rs. 300 where as it is free in case of unclaimed body.

Key issues with regard to its usage and sustainability

The above scenario reflected following major issues that concerns to the usage and sustainability

- The usage by high income groups indicates that usage is related with the awareness and need to be given greater and sustained emphasis/efforts.
- The high O&M cost as perceived in case of this crematoria is due to over staffing and high electricity charges. The possibility should be explored to integrate the entire O&M system, i.e. instead of having two set of O&M staff, one for general maintenance and another for electrical operation and maintenance through contractor, it could be managed by the core staff of MCD by training and skill up gradation in operation & maintenance of electrical parts also.
- Though, its been around three years since the crematoria became functional it is not yet very popular among many segments of population, and need to be popularise through public relation activities.

(3) Electric Crematoria: Lodhi Road

The Lodhi Road electric crematoria has been constructed at the site of traditional wood based pyre crematoria which was constructed around 55 years back by Arya Samaj, a Non-Profit trust for social service. It was constructed on request of the trust, which has been very efficiently maintaining the traditional crematorium place. The O&M of electric crematoria is also the responsibility of Arya Samaj only.

The double furnace Crematoria was built by demolishing 4 conventional furnaces. The Crematoria besides other accessories like transformers, Control panels etc. has also the provision of diesel Generator set for combating any critical power situation. The room for generator and meter room for Delhi Vidyut Board has also been provided along with provision of fire fighting system and pollution control unit for furnace. The total cost of the construction is around Rs. 145 lakhs. It was constructed by Ronsan International, a Delhi based agency under the over all supervision & Monitoring of Construction &Design Services Department (C&DS) of UP Jal Nigam.

Operation & Maintenance in Present Context and Financial Implications

The O&M is being done by Arya Samaj with the help of its two staff; 1 technician and 1 attendant who are taking care of the whole crematorium place in general and exclusively devoted to electric crematoria only.

According to the Acharaya (incharge) of the crematoria, the staff at this cremation ground or any other cremation place, which is maintained by Arya Samaj, are highly motivated and skilled. They have been handling many cremations every day and there was no need for additional staff for the electric crematoria as very few bodies come to this, which is easily manageable with the existing staff. He maintained that since one furnace is kept operational round the clock, one skilled staff can very well handle the technical operations. The organization does not get any financial support from MCD or any Govt. agencies and sustains entirely on its own resources, which it generates through donations and grants.

The cremation charge at this crematorium is Rs. 1,200, which is approximately 4 times higher than Sarai Kalekhan crematoria. According to the O&M agency the charge has been fixed at this rate in order to compensate the huge O&M cost which incurs on the electricity consumption and maintenance of equipments, as the organization (trust) runs on donations, it is extremely difficult to mobilize the resources to meet the expenses of O&M without considerable revenue from its usage. Also, it was said that users of electric crematoria mostly comes from the higher income groups, the amount of Rs. 1200

is very much within their capacity to pay and not a burden at all. The monthly electricity cost of the crematoria is almost same as of Sarai Kalekhan i.e. approximately 1.5 lakh.

The Arya Samaj (O&M) agency has started a system of coupons for the fund mobilization and the keens of deceased /visitors buy the coupons of different value/cost voluntarily as per their capacity and wishes. The amount generated through this system is utilized for the operation and upkeep of electric crematoria.

Usage

The average usage of the crematoria is approximately 50-60 bodies per month, and interestingly most of them are claimed one that too from higher income groups. The average time that takes place in cremation is around 1.5 to 2 hours. The most pre-dominant issues that concerns the usage is religious beliefs only as it was in case of other IWC/ Improved crematoria.

(4) PP/PA: An Analysis of Key Approach to Implementation & Impacts

The PP/PA programme in Delhi were taken mainly with an objectives to create awareness and educate citizens of Delhi on the significance of preventing pollution in Yamuna and its source of pollution and also influence public perception, attitude and practices with respect to Yamuna cleaning.

The PP/PA activities were mainly carried out through NGOs and for this purpose, a Delhi based NGO, ACORD, which was engaged as an Apex NGO along with three other NGOs working under the supervision and control of ACORD, however the larger objectives being the same, the "Theme" and "approach" of the campaign for all 4 NGOs varied. Where as ACORD focused the wider range of Community Toilets Complexes (CTCs), through community mobilisation programme, street plays & community meetings, developing and distributing the communication materials, film shows on mobile exhibit unit and a weekly radio programme. The major activities of other 3 partner NGOs may be described as follows;

- AICURD's (All India Centre for Urban &Rural Development): Its role in YAP was to develop a pilot scale model on participatory waste management in "BALASWA Resettlement Colony, which could be replicated in other parts of the city. The over all objective of this initiative was to set up a community based non-municipal mode of waste management.
- TERI (Tata Energy Research Institute): Formation of ECO-Clubs in school covering all 12 MCD Zones, exposure visits to the bank of Yamuna where as another NGO, JAC (Joint Assistant Centre) conducted Health Mela and rallies around CTC sites focusing on communities around the CTC with the aim to popularise them.

Intervention Area

The project covered all over Delhi including 12 Zones of MCD apart from the NDMC and Delhi cantonment area.

Major Emphasis of PP/PA in YAP

As the main emphasis of Public Awareness was on usage and effective maintenance of CTCs (Community Toilet Complexes) and a pilot scheme was undertaken on solid waste management through community participation in Balsawa which is a slum resettlement colony having around 3500-4000 households and a population of around 20000. There was no focus on electric crematoria in the scope of PP/A programme initiated through NGOs.

The major activities that were undertaken under the Balaswa Waste management pilot Project were;

- Initial Ice breaking and rapport building with the Community.

- Impart awareness / message dissemination among community towards waste management through street plays, film shows, community meetings, rallies, and exposure visits.
- Identification and orientation of community waste collectors from within the community. They were trained in effective waste collection with safety and safe disposal.
- Site was selected for garbage disposal with the help of community people.
- Construction of garbage station &compost pit.
- Door to door waste collection started in the community
- Segregation of waste collected done at garbage station

Public Awareness: Correlation between Objectives and Impacts

On in-depth analysis of the Public awareness programme in Delhi conducted under the Yamuna Action Plan with the aforesaid objectives though a good efforts in terms of approach and implementation could succeed only little in meeting the various deliverables it was initiated for. Firstly, as it aimed to enhance usage and improve O&M of CTCs built to tackle the pollution by open defecation, could not be optimised due to non-provision of basic support facilities like, water supply, electricity and mechanism of cleaning etc. timely. Which had a negative impact.
The focus of Public Awareness programme was more on quantitative targets. i.e. nos of meeting, street plays, film shows to be completed as per the contractual provisions rather than the qualitative impacts. There was little efforts on pre-program publicity in the target area, community based approach and need driven programs.

However, the Balsawa Experience was successful in mobilizing and sensitising community
About the solid waste issues but could not deliver the desired results due to lack of follow up activities. The limitation such as short time frame of the intervention and lack of a follow up system also proved vital in minimizing / affecting the impacts of campaign.

4.3.2 *Agra*

(1) Scope

In Agra, the main Non-Core schemes implemented under YAP-I, were IWC, PP/PA programme and renovation of two bathing ghats. In the present case study efforts were on analysing the situations of IWC and also largely PP/PA issues, its objectives and impacts. Since, in case IWC and bathing ghats, it was easier to make assessment of issues based on the physical observation and discussion with PIAs, CBOs (O&M organization for IWC) and users/beneficiary groups, it was difficult to analyse the impacts of public awareness specifically in terms of River pollution i.e. YAP. However, a general over view of PP/PA was done with some specific observations on the condition of solid waste, cattle wallowing and also usage of assets. Here, the major issues as observed about IWC and PP/PA are described precisely.

(2) Improve Wood Based Crematoria in Agra: A Total Fiasco

In Agra, total 20 Improved Wood based crematoria have been installed across three places, 10 at Taj Ganj, and 5 units at Balkeshwar and Malika Chabutara Sahganj respectively. All the Crematoria have simple Iron platform with two side elevated plates covered with a metal shades; there is no chimney in any crematoria to tackle the problem of smoke/flame and odour.

All the IWCs in Agra have also been installed at the traditional cremation ground like other places at all above-mentioned 3 sites/locations. It is maintained by the locally based community organization (table. 3.2), which is responsible for maintenance of over all cremation ground and has been doing it since many years even before the IWCs were installed there. Though, in principle, the O&M of any of the assets created under the YAP is supposed to be the responsibility of Nagar Nigam, it has simply

handed over to these CBOs, who even don't appear to be well acquainted with the advantages and purpose of these IWCs.

Some major observations regarding these IW crematoria in Agra is summarized below which gives an understanding of the situations of crematoria

A) Tajganj Crematoria

- In Tajganj, which is the famous cremation ground of the Agra, situated at the bank of River Yamuna, total 10 Units of Improved Crematoria were installed by YPCU Unit of UPJN. Now, 7 units out of the total 10 units installed have been dismantled and totally taken out of the place. The dismantled parts were found to be dumped in a shed at the cremation ground only. This was done by the functionaries of CBO, maintaining the ground as they felt it was of no use to have them here. According to them, it only occupied the space, which is already congested making people to cremate out side the crematorium complex, in open most of the time. They said many units which have been up rooted were never used since the time of its installation and were totally non-functional. Interestingly, UPJN and Nagar Nigam had no information about the crematoria being dismantled. The existing three units at Taj ganj are also not in use as only unclaimed bodies some times are brought and cremated here. There is no specific attention on the maintenance of these crematoria units and CBO (Samsan Sudhar Samiti) takes care of its safety only. There is no any contractual agreement between the *Samiti* and NN or UPJN regarding O&M of IWCs and CBO undertake to do it voluntarily.

- A focused group discussion with the functionaries / members of the CBO and people/ user groups revealed following major issues with regard to usage of the facility
  - The space of the cremation platform is very less so that body does not fit on it properly when placed with required amount wood
  - It has been experienced many times that wood consumption is no less than that required in traditional cremation.
  - People are yet not aware about the environmental advantages of these crematoria. Mr. Pradeep Kumar who had come with the body of his keen for cremation said, he has visited this place many times and enquired keenly about this facility, but no body could tell him the advantages of this crematoria, other than consumption of less wood. He asked in turn, "why will one compromise with the rituals just for saving few KG of wood? Unless there is some other advantages like user friendly, eco-friendly etc". He also contradicted that it saves almost 50% wood of the traditional cremation out of his own experience which he observed himself while an unclaimed body was being cremated in front of him. Thus, crematoria is yet not popular among people especially people are not sure of the advantages which is propagated about this.

B) Balkeshwar Improved Crematoria

The Five Units of IWC at this cremation ghat, which is also near riverside, is not in use since last one year. A local youth club maintains the cremation ground. Which takes care of cleanliness and maintenance of plat forms (traditional) and the boundary wall, temple and other structures by voluntary contribution system. There are two staff deputed at the cremation place, one body attendant who assists in cremation to the users and another is security guard cum sweeper. They do not get any remuneration from the *Samiti/*club and sustains on the tips they get from the keen of deceased, which is between 20-60 per cremation. Like Taj ganj, there is no formal undertaking between NN and the Club.

The main reasons of poor usage is concerned with religious factors such as iron platform, and height from the ground being the main. Also, some technological demerits like falling of un-burnt body parts along with ashes in the tray down the platform was said to have discouraged the usage. Lack of awareness also emerged as an issue that can be associated with low/non usage of these crematoria.

According to the staff at crematoria people come here from many parts of the towns and adjoining places including the rural areas for the cremation, and majority of them come to know about this facility at the cremation ground for the first time and had no prior knowledge about this. In this condition, they do not want to experiment with new and strange for them. Also, there is no appropriate motivational initiatives at the ghat (site of cremation) to influence the users regarding IWC.

C) Mallika Chabutara Improved Crematoria

This crematoria ground is situated in the city and in very dilapidated conditions. There is no maintenance and it exists on open ground without even a boundary wall. The surrounding is very dirty as there is open defecation, lot of garbage dumping etc. Even the ashes are not cleaned regularly. Due to open field, dog etc. find easy way to the cremation ground and are seen often near the pyre.

As informed by local residents, this cremation ground is used by the economically & socially under privileged such as schedule caste only. The Improved Wood based crematoria were not found to be in satisfactory conditions as two of them (total 5 nos. installed) have been dismantled. Regarding usage, as on visual observation, it appeared that it has not been used since long, how ever, the local residents informed some time very poor family do use it. The detailed information on factors /issues could not be available as no responsible person/agency exists to give accurate information.

(3) Public Awareness &Participation about River Pollution

The situational analysis of Public participation &awareness in Agra in context to river pollution has been derived on the basis of analysis of some relevant indicators that were focused in YAP-I under the PP/PA programme, such as utilization level of facilities like LCS, bathing Ghats and IWC, O&M conditions of these facilities, conditions of solid waste management and public attitude and behaviours regarding river pollution.

The selection of above indicators to have an in sight on the situation of public awareness in Agra, specifically in terms of the “focused theme” (river pollution) was justified by co -relating the larger objectives of the Public Awareness programme undertaken during YAP-I in Agra, with the current prevailing scenario.

As per the assessment of current prevailing situation with regard to various non-core facilities and people’s perspectives about the same, following are the major observations that reflect the scenario of Public Awareness in Agra. This may be briefly summarized as;

- On discussion with the members of O&M agencies, user groups and residents it was confirmed that IWCs are still not known among large segment of population. It is not popular in many pockets of the town and adjoining areas/villages. Also, there are negative impressions about these crematoria like it is not user friendly, in effective to ensure complete burning of the body, and other technological anomalies, instead of positive impression regarding its advantages. This is suggestive of in efficient communication programme both in size/ scale and techniques that were attempted to popularise this aspect in YAP.

- Lack of community oriented initiatives to improve the conditions of solid waste and maintenance of bathing ghats and cattle wallowing in River do not reflect well on the impacts of PP/A programme, which were carried out in Agra with focus to improve the above. Leaving a side the poor conditions of solid waste littered around the lanes, residential surroundings and streets in Agra, the conditions of cleanliness near the facilities like LCS, Ghats, River bed area and IWCs was found to be even worse, reflecting limitations of PP/PA campaign carried out under YAP with emphasis to above.

- The poor usage of crematorium and LCS units across the town is also concerned significantly with Public Awareness, attitude and behaviours of users/beneficiary groups and indicates the need to take up the public awareness activities in much sustained manner with people oriented actions. Though, poor / underutilisation is not the sole results of poor public awareness, and concerned with other key factors also such as maintenance, cost and convenience, habits and rituals, it is definitely an important determinant for the success of such facilities. In case of Agra, where the various non-core facilities created are very poorly utilized, gives a conclusion of un satisfactory public participation and awareness interventions.

The, above-mentioned scenario on general PP/A status in Agra on River Pollution issues are based on field level observations, meeting with beneficiary groups and analysis of various related factors.

4.3.3 *Mathura & Vrindavan*

(1) Scope and General Observation

Mathura was one very important town where many Sewerage and Non-Sewerage works were carried out under Yamuna Action Plan. The Non-Sewerage schemes included construction of Low Cost Sanitation units, Improved Crematoria and public participation &awareness activities. The bathing ghats and River Front Development activities were proposed but dropped later due to some constrains at implementation level. Similarly, almost similar activities were implemented in Vrindavan also. The Yamuna Pollution Control Unit (YPCU) of UP Jal Nigam was the PIA for all the schemes.

The situational analysis of the non-sewerage schemes in Mathura was done through the analysis of secondary data and information and also by first hand experience at sites. The onsite observation largely emphasized on IWC and public awareness, attitudes and practices by discussion with stakeholders, users and residents.

(2) Improved Wood Base Crematoria: An Exception in Mathura

The 5 Units of Improved Crematoria at Dhruva ghat in Mathura were reported to be 100% utilised. The Ghat (cremation place) is situated on the bank of River is basically the traditional cremation ghat being maintained by 'Dhruva ghat Samsan Sthal" (a local community based organization) and Rotary Club jointly, was experienced to be a good example of community based maintenance. The crematorium place has all the basic ambience for the users/people who come from different corners of Mathura, Vrindavan including the rural areas, which includes sitting arrangements, prayer room, hall for relaxation, drinking water, shower, and water pump to clean the ashes after the cremation. The entire area is very well maintained and clean. 3 regular staffs manage it. The fund mobilization is through voluntary contribution of the members and donation by general public and keen of the deceased who come to attend the funeral.

Regarding usage of IWC, people prefer to use this, in spite of the fact that it consumes the equal amount of wood or some times even more. Mr. Krishan Chand, an advocate, who has come to attend the funeral of his friends wife, who was being cremated on the IWC said that people use it more by being motivated with its popularity. Another, advantage of using it as he cited that it takes less time to burn the body than traditional cremation. Mostly used by educated class, the technological demerits as it was observed in other areas resulting to fall of bone etc. was said to be insignificant in comparison of the time it saves! Maintains Sri Ram Lal another user of the facility.

However, there was demand to improve the design of the platform making it to mach the religious aspects like it some how should touch the ground which is very significant from the Hindu religion's point of view.

Major issues observed to be the key elements for success

- Effective maintenance of the cremation place and popularity of IWCs among various segments of population
- Higher consciousness for environment and pollution especially among the educated class.
- The special interests and efforts by O&M agency. The staff and attendants communicate to users about the improved crematoria and the its realistic advantages like time save and their perception on being environment friendly

Apart from above, the 3 units of improved crematoria which has been installed on other side of Yamuna the place called "Lakshmi Nagar" is not functional yet due to administrative and fund problem as stated by Project Manager YPCU, Mathura. According to him, crematoria has not be taken over by Municipality yet because it requires some necessary staffing and provision of basic support facility like electricity, water etc. to run it for which there is no fund with Municipality. Similarly, in Vrindavan where 4 Units of IWC have been installed but not functioning due to court stay on its usage as a result of petition filed by a Religious Organization (Ashram) located near the crematoria.

(3) LCS

Apart from Improved Crematoria, general perception of public with focus on other facilities like LCS was also assessed. In this regard, around 6-7 LCS were randomly selected for on site assessment/ visit, based on the criteria of its usage and performance, which was collected from UPJN and O&M agencies (NGOs).

It was interesting to observe that the locations/site of LCS, which were reported to have very low usage due to lack of public cooperation, non-willingness to pay and other reasons, people showed tremendous interest in it. Though, managed by NGOs, people expressed that facilities provided by Govt. is very much beneficial for them and majority of people want to use it. They asserted that poor maintenance and cleanliness affects the usage more than cost. At almost all the sites which were visited in Mathura, local residents and community leaders said they will be even ready to contribute in maintenance cost if required to run the LCS and 30 Rs. Is not a problem for most of the people. They said cleanliness and maintenance is very important for users especially in case of LCS.

4.3.4 *Etawah*

Etawah is situated on the left bank of River Yamuna, which flows in the southern part of the town. The City is situated at 27 ° North latitude and 75° East longitudes. The approximate population of the town is around 0.20 million.

The various activities that were undertaken in YAP-I of non-sewerage nature included LCS, improved crematoria, bathing ghats improvement works and PP/PA activities.

Crematoria

The field visit to Etawah under this Case Study was especially motivated by the information received from UPJN, YPCU Unit regarding the success of Crematoria during field visit at Agra. This was informed to the study Team by one official of UPJN while discussing informally the conditions of non-sewerage schemes in UP, that IWC are doing very well in Etawah in comparison to any other towns.

But, the on site visit/ assessment of the facility presented altogether a different scenario of the same. The 10 numbers of IWC created at "Shamsan Ghat" near the Riverside were not used since a long time. And only traditional cremation was found to be predominantly in practice. There was one cremation found to be around 20 days old, which was an unclaimed body according to the guard of crematoria place "Mr. Baccha". The over all responsibility of maintaining the crematoria is of Municipality but it

appeared to be totally ignored. The general cleanliness of the crematorium ground was very unsatisfactory as there was no arrangement for its regular cleaning.

Interestingly, the Cremation Ghat has been occupied by commercial laundry men (Dhobis) and it is virtually being used as dhobighats. The shades of the crematoria are used by dhobis to keep their donkeys, which they use to carry the clothes and other washing materials. On the other side of this ghat, there lies plan area, which is used for conventional cremation.

Key concerns

- The facilities were created without any need assessment just to achieve the physical targets of construction and no efforts were made to popularise it.
- Lack of Community participation and consciousness towards the schemes/facilities. By and large, it is perceived to be government's responsibility to ensure the sustainability of such schemes. Even the bathing ghats near by are not maintained. There were bushes/ filth and garbage everywhere near the ghat. It is not being used.
- No emphasis on community involvement ever since it was constructed. In the name of public awareness/publicity, a board has been placed giving details of scheme such as Project under which it has been constructed, Name of the constructing agency, along with a notice board on advantages of Improved Crematoria.
- It may be concluded that in Etawah experience was a disappointment because it was visited to identify the issues that makes the facility sustain based on information from reliable source!

4.3.5 *Haryana*

(1) Experience and Key Issues

The onsite visits to YAP targeted towns in Haryana, were carried out with a view to have assessment of the physical conditions of the Non-Core facilities/ activities in the present context, apart from the impacts on environmental and river pollution for which it were implemented.

The broad scope of study through on site assessment included IWCs in all major YAP towns, i.e. Faridabad, Gurgaon, Panipat, Sonepat, Karnal and Yamuna Nagar, public perception and awareness about the non-core facilities, advantages of its usage, situation of cattle wallowing and bathing ghats in Yamuna Nagar.

On in depth analysis, of the scenario pertaining to above schemes in case of Haryana Towns, it was observed that broadly the situations concerning the schemes/activities are similar in nature and extent. The issues related to usage & status of utilization level, O&M mechanism, Financial implications and others are by-and large same in respect of all the towns except one or two cases, which were observed to be slightly better from the usage point of view.

Keeping above in view, a general perspective of the situation & key issues are summarized and outlined here, instead of a detailed town wise description of each scheme/facility in order to avoid the duplications of key observation, which as stated above was similar in all six towns that were visited.

- The IWC have been installed at the traditional cremation ground at all the locations/place visited. They are maintained by the local community based organizations and grass root NGOs. The maintenance is broadly in terms of its safety and not any financial expenditure for repair/modification of structure, parts of the crematoria. They have been handed over to the respective local level Samitis (committee) who were already maintaining the traditional crematorium place and platforms without any contractual undertaking with them.

- The usage of IWCs were reported to be very low at almost all the places and used mostly for unclaimed cremation by police. Except at one location in Faridabad (Sec-22). Gohna Road crematoria in Sonepat where even the claimed bodies are cremated but mostly by poor community, who on knowing that it consumes less wood, go for it. It was reported that around 15-20 bodies are burnt on average on this Improved device at both places.

- The main problem concerning to usage of these crematoria were religious factors, and technological demerits. However, the lack of awareness and knowledge regarding this were also a major cause for the low utilization. When asked to "*Mr. Ram Lal solanki*" who had come with a dead body for cremation at Madanpuri cremation ghat/ground, in Gurgaon, about the Improved Wood Based Crematoria, his response for non functioning of the IWC was that, "It consumes very high voltage of electricity leading to exhaust the transformer of the area due to high load" interestingly, the same idea/thought was share by many people on the site! This incident is quoted specifically to highlight the popularity of an IWC in main city of Gurgaon, and that is so close to PHED office. Similar kind of experience was realized at some more locations in Karnal and Yamuna Nagar. The above scenarios are suggestive of the extent of public awareness and popularity of the scheme/facilities.

- Besides, above, two nos. of bathing ghats that have been constructed under YAP-I in Yamuna Nagar by the PHED with a cost of approximately 73 Lakhs. One Ghat is located at City Centre, which is near to the Crematoria ground. The ghat is small in size and provision for changing Room for both male and female has been arranged. The ghat is maintained by Irrigation department but hardly any visible efforts were observed for the maintenance. Some major observation regarding the ghat of City Centre area, are specified as follows for better clarity of situations &issue concerned with this.
    - The cleanliness of the ghat 's surrounding was in adequate as there was lot of garbage and solid waste materials littered at and around the Ghat vicinity.
    - The usage of the facility is low as it is not suitable located. The PIAs (PHED) officials admits that there was no significance of bathing Ghats at Yamuna Nagar because this place does not have any religious significance, thus no much attractions for bathing in River Yamuna, and is used by labourers, and people working infield casually.
    - The general conditions of O&M may be assessed by the fact that Changing room constructed at the ghat was occupied by an unknown person (he said on enquiring, that he is watch man of the area/ward) and all his belonging including bedding and a suitcase was found locked inside. This also highlights the utilization level and status of O&M of the bathing Ghat

- The prevalence of cattle wallowing in river Yamuna and issues pertaining to this, were also studied in the present Case Study across all focused towns in Haryana. It was observed that Cattle wallowing is not a very frequent practice in Haryana especially in City/Municipality area and do take place in rural stretch of Faridabad at some places and Panipat. There were no cattle wallowing observed physically in either of the towns in all six targeted towns. The PIA's officials and general public also seconded the findings of no cattle wallowing in River Yamuna. On the basis of discussion with PHED officials, and some milk men/ cattle owners, the following main reasons/factors were outlined for not taking the cattle in River;

    - The strong perception that River's water is polluted and may be grossly harmful for the cattle health among owners.
    - Majority of owners have own arrangements of drinking water and bathing at their doorstep.
    - The absence of ghats and riverbed area along the riverbank and also high water level in most of the towns.
    - Absence of elements like tradition, practices etc. It has not been a very popular practice in the YAP targeted towns of Haryana.

(2) Conclusion and Suggestions

On the basis of scenario described as above, the situation & issues related to O&M, usage, PP/PA and financial implication, that are key to sustainability of the programme/scheme may be concluded as follow briefly;

- The poor utilization of IWCs in all YAP Towns in Haryana, the main reasons attributed to this are socio-religious, and lack of awareness among different segments of population.

- There is almost on specific efforts on O&M of these crematoria. This need to be made more formalize i.e. Municipalities need to fix responsibility on CBOs maintaining regarding its being functional and just handing over without any onus will not be effective.

- CBOs responsible for maintenance of crematoria should be sensitised regarding the advantages of IWCs and should be involved in the publicity &awareness programme.

4.4 TOWN WISE ANALYSIS UNDER GAP-I

4.4.1 Scope and Coverage area

As the detailed account of GAP and the kinds of non-sewerage schemes has been described in Chapter 2 and 3 of the report, the present findings, which are based on field experiences, are specifically in respect of the 4-targeted towns that were focused in the present Case Study i.e. Varanasi Allahabad, Lucknow and Kanpur. It outlines the general prevailing conditions of various schemes in the present context in all four cities besides the analysis of specific schemes/activities that were considered/found to be success in terms of utilization, O&M, Public participation and public acceptance to this.

4.4.2 Varanasi

In Varanasi, the main emphasis of field visits was on situational analysis of bathing ghats, dhobighats, and Cattle wallowing only since, electric crematoria, which has been constructed at Harischandra Ghat, was closed and non-functional for a long time and LCS was not in scope of study.

(1) Bathing Ghats

In this city of pilgrimage, bathing Ghats are the main attractions. People flock in large numbers every day to take bath and worship in the temple built along the River bank. There are around 80 Ghats in Varanasi that line the Western Bank of River Ganga. Most of the Ghats in Varanasi are ancient and have been built by *Maharajas (Kingdoms)* from different princely states of India.

Under the GAP-I, construction and renovation of some bathing ghats were undertaken by Irrigation Department, which may be listed out as follows;

1. Ghat Constructed
   a. Assi Ghat
   b. Rajendra Prasad Ghat
   c. Raj Ghat

2. Protection & Slop work
   a. Harishchandra Ghat
   b. Chauki Ghat
   c. Kshemeswar Ghat
   d. Boondi Parkota Ghat
   e. Hanuman Garhi Ghat

f. Badri Narain Ghat

Out of the above, Assi Ghat, Rajendra Prasad Ghat and Raj Ghat were the full-scale construction and development works, renovation of steps and construction of platform were completed at many Ghats as above mentioned under headline 2, 3 & 4.

The present Case Study examined the major problem areas concerning to the ghats of Varanasi, the issues related to Operation &Maintenance in general and role of private agencies such as NGOs, CBOs, Volunteers in its maintenance with specific reference to some ghats (Assi, Raj Ghat, Rajendra Prasad Ghat, Dasashwamedh Ghat and Prayag Ghat)

Problem Areas

The main problem areas, which were identified as a result of onsite physical observations, discussion with the representatives of community, user/beneficiary groups and residents, may be categorized in to two major categories. I) Natural problems, which are naturally evitable and II) usage related, which are behaviour concerned.

I) Natural

- Heavy siltation due to flood/ High water level due to rains every year.
- High load of visitors/ users every day due to high religious and cultural significance.
- Breaking of stairs during rainy seasons/flood

II) Others

- High pollution loads due to bathing, and throwing of offerings (flowers and other puja materials)
- Unhygienic conditions emerging out due to open defecation and urination, cattle wallowing and laundry activities
- Dumping of solid and liquid wastes generated out of the various commercial activities along the ghats and near by residential buildings/houses.
- Poor initiatives from the Nagar Nigam and Govt. agencies for handling the waste management and cleanliness

Operation &Maintenance of Ghats in general

Generally all the ghats are to be maintained by Nagar Nigam. The core issues that Nagar Nigam is supposed to address with regards to maintenance of ghats are; provision of drinking water and toilet facilities, cleanliness of the ghats and its surroundings by effective solid waste disposal system, preventing cattle wallowing and movement of stray animals besides desilting.

The maintenance of Ghats that were constructed under Ganga Action Plan is also the part of usual process and no specific mechanism has been established for this. While, construction/ renovation works are to be taken up by irrigation department, cleanliness and maintenance of hygiene of ghats is the responsibility of Nagar Nigam.

Key issues

- At most of the ghats, including those constructed / renovated under GAP, are grossly affected with solid waste. Open defecation, and urination is also rampant on and around many ghats.
- There is no specific arrangement for the cleaning and disposal of waste materials at the ghats and the ward sweeper of the area/locality is supposed to clean the ghats also besides the residential areas and streets of that vicinity. Also, there is no active monitoring of the same. Some times, sweepers dump the garbage they collect not only from the ghat but also from the nearby locality at some place or corner of the ghat for many days.
- There is no private partnership initiatives started by Nagar Nigam and govt. agencies. Although, there are some voluntary efforts from NGOs/ social workers and CBOs etc. at some Ghats, which are motivated by their own conscious.
- However, Nagar Nigam does cleans some important ghats at the occasions of festivals and also carry out desilting works after rainy seasons, it is not sufficient to ensure the proper O&M of the ghats and are only symbolic.

Box 2. Private Partnership in O&M of some Ghats in Varanasi: Some Good Experiences

The initiatives to involve NGOs and other Community Based Organizations in to maintenance of some famous Ghats like Dashaswmedh Ghat, Rajendra Prasad Ghat, Prayag Ghat and some other ghats adopted by Social Workers on their own, voluntarily has proved the significance of public participation for the effective O&M of the Ghats also like any other structure.

The Cleaning of Dasashwamedh, and two other adjoining ghats by "Ganga Sewa Nidhi" a local NGO, as its part of "Ganga Arti" (worshiping Ganga) Programme, which is supported primarily by Hotel Taj, is a good example of private partnership. The NGO, which promotes and highlights the cultural and religious significance of River Ganga is involved in regular washing of the Ghat's stairs, collection of waste and its effective disposal, supply of safe drinking water and is going on successfully since many years.

Apart from the above, the voluntary ghat cleaning and de-silting works undertaken by some social workers like "Shanti Lal Jain" has helped associate a large number of the active persons and youth with the ghats cleaning activities, though it is not yet in sustainable stage due to constrains of resources, it can be made sustainable if synergies with govt-private partnership.

(2) Dhobi Ghat

In Varanasi, three dhobi ghats constructed under Ganga Action Plan, Phase-I at Konia, Nadesar and Baulia Pokhari by Varanasi Development Authority during 1988-89, were handed over to Nagar Nigam for Operation &Maintenance. These dhobi gahts were constructed to stop the laundry activity in the river by rehabilitating washer men and shifting them to the constructed dhobi ghats.

The purpose of very its construction is not met as very few people are using these dhobi ghats that too occasionally and still a large number of users prefer to go to river side only. On discussion with some users it was observed that these dhobi ghats are only an alternative facility for the hundred of washer men during rainy seasons, when there is flood in the river and difficult to wash at ghat side along the riverbank, and not the main facility.

The Ghats are to be maintained by the users only i.e. Dhobi association, which hardly has any orientation on this aspects. The general condition of cleanliness around the vicinity is not satisfactory as it is full with garbage around and some times pigs roaming nearby. However, Mr. Bhaiya lal of Dhobi Association, maintains that Associations occasionally undertakes the cleaning of tanks, units and ghat area apart from taking care of lights, and other necessary things. The water supply is from Jal Sansthan which charges Rs. 800 per month towards the cost of Water supply and it is paid by contribution by Dhobis.

(3) Cattle Wallowing: Problems and Analysis of People's Perception

The cattle wallowing is a most prevalent practice in Varanasi, as it may be seen many ghats across the riverbank from Raj Ghat to Assi/Nagwa.

Thousands of buffalos from many parts of town come to river every day. Its effects on water quality and hygiene of ghat are well known, yet it was attempted to understand the public perception and their attitude on the same with respect to river pollution, through an informal focused group discussions. The FGD was carried out on beneficiary groups, cattle owners, shopkeepers, boatmen and community

leaders of the area. In this regard, total of 4 FGDs were planned and carried out at 4 different locations, following the participatory discussion methods and techniques. Though, objectives of the case study in general, were to analyse the scenario and impacts of Non-Core schemes carried out the River Action Plans, it is to say that there have been no interventions on cattle wallowing any where, the study of this aspect has been willingly taken up to know the facts and issue related with this.

The main focal issues on cattle wallowing are as follow:

1. Time at which cattle are taken to the river.
2. Main reasons for taking cattle to river
3. Advantages as felt by the cattle owners / users
4. Their perception regarding the pollution caused by their cattle.
5. Do they feel responsible that any way it affects the river water quality or pollutes the surroundings near ghats?
6. What solution they suggest to overcome this problems
7. Is their any provision / rule by Nagar Nigam to prevent cattle wallowing in the river?
8. Any other issues that emerges in course of discussion.
9. General public opinion about the same.

The major outcomes of the FGDs are summarized as follows;

At Chowka Ghat, around 450-500 buffalos start arriving from nearby and other different locations from 9.AM to 10 AM every day. They remain in river till 4 PM during winter and till 5 PM during the summer time.

Cattle owners at Chauka Ghat

i) Reasons for taking cattle in to river

- Mr. Ram Singh Yadav, who has 15 buffalos and is in milk business, said, though, cattle wallowing has been prevalent in River Ganga, since long time, the extent was less in comparison to the present scale. The main reasons for this he said, was exhausting/closing of old ponds in the town and also scarcity of water at personal level.
- According to Sri Deen Dayal Yadav, also a cattle owner and milk trader, the major cause of cattle wallowing are lack of alternative facilities for cattle bathing and drinking water in town, besides this, it also very convenient for the owners to handle large number of cattle as once they enter in to water, they remain there almost the whole day and we find time to concentrate on other works like selling milk, arranging fodders, and other domestic works. Thus, by bringing cattle in to river it saves time, and labour. It was pointed out by some participants that cattle have adopted themselves with the river's environment and feel healthy and happy which leads to enhance milk productivity also.
- Once, cattle are taken out of the yard (place where cattle are kept), it paves space clean the same in more proper way.
- The another advantages of cattle wallowing as cited by the participants was that it helps in smooth traffic on the road, other wise, if they are kept open are taken on road, causes heavy traffic problem leading to inconvenience to public and also cattle owners are penalized by police quite often.

ii) Perception regarding River Water Pollution and Ghat Environment due to cattle wallowing

Nagwa Ghat to Assi Ghat

Teliyanala Ghat

The cattle wallowing do not affect the water quality of river at all as felt and perceived by majority of the participants. Mr. Deen Dayal and Mr. Prakash said that River Water is being affected/polluted due to the drains carrying waste water meet to River and cattle wallowing is quite insignificant in terms of realizing as a source of pollution. Although, it was realized by Mr. Manuj, a priest and Mr. Suresh a student that due to cattle dung, of course, ghat's area/environment is affected little bit but it picked up to make dung-cake which is used as fuel after some time.

However, the only problems which appears predominant due to cattle wallowing, as perceived by almost every participants that it causes hindrance for people who come for bathing and also to tourists who come for boating. It was suggested that if the old ponds/*Kunds* (kind of ponds) are rehabilitated properly the cattle wallowing will be minimized to a great extent. Some of the *Kunds* (ponds), which participants suggested for urgent intervention to clean/ rehabilitate are *Pitrakund, Pichasmochan Kund, Suraj Kund etc.*

iii) Initiatives/Rule to prevent cattle wallowing

According to Dr. A.P. Singh, veterinary health officer, Varanasi Nagar Nigam there is rule to prevent cattle wallowing which is within the scope of "Cattle pass Act 1871". This act has been applied in Varanasi, which prohibits any cattle to walk freely on the road. If it is found so and on complain by any person the owner may have to pay the penalty up to Rs. 1000. In respect to specific provision to prevent cattle wallowing in River Ganga specially, he said, the rule applies everywhere in town and no specific provision exists in case of river exclusively. On enquiring about measures/initiatives by Nagar Nigam to prevent cattle wallowing in River, Dr. Singh informed that since cattle owners remain with their cattle/buffaloes, and do not leave it un attended, it can not be stopped a per the provisions of present Rule. Although, members who participated in the discussions had no clue/ idea of any such rule that can be exercised by Nagar Nigam to prevent taking cattle to river and also they maintain that it has never been applied so far.

iv) Key issues emerged from the Discussion

The FGDs which were carried out to understand the problem areas and public perception on cattle wallowing, suggested following main issues related to this;

- Cattle wallowing, though accepted as source of pollution of ghats and river's environment by most of the participants, but not a major problem in comparison to other sources/ activities like sewers/ nalas etc.
- It can be minimized by providing alternative facilities / option to the users as suggested by the users/ cattle owners. The most viable options in respect of Varanasi, as identified by the participants groups are various Kunds and ponds that were located in the many area. Some

important of them are Pishach Mochan Kund, Suraj Kund, Pitarkunda besides other small ponds.

- Participants however outlined some solutions to cattle wallowing in River Ganga, and suggested rehabilitation/ cleaning of existing ponds, they even suggested that most viable options to relocate the cattle bathing in river should be identified/studied preferably along the river bank also as majority of dairy farm owners remains/exist near the Ghat/river vicinity, it will be difficult for them to move to town areas.
- At present, there is no any organized system/ association to control the /manage the cattle wallowing even at the community level.

4.4.3 *Allahabad*

(1) Electric Crematoria

In Allahabad, the main schemes, which were examined, were Electric Crematoria, Bathing ghats of Rasoolabad, Dhobighats and also scenario of cattle wallowing.

While, Electric crematoria which has been constructed at Sankar Ghat, Teliar Ganj, is being maintained by Nagar Nigam. The usage is very less as only 15-20 bodies are cremated in a month. The ANN has employed 4 staff for the maintenance, including one technician, two body attendants and 1 sweeper. Also, there is a separate unit in the Nagar Nigam especially to look after the functions of crematoria, which is under the supervision of a Junior Engineer level officer. In case of any technical break down, this cell takes corrective measures.

The fee charged by Nagar Nigam in case of claimed body is Rs. 350 but in case of unclaimed it is free like other places. The reasons for low usage are due to lack of public awareness and consciousness. The person in charge of crematoria said that on opposite side (place to be determined), lot of claimed/ unclaimed bodies are flown in to river without burning and there has been no efforts to control this. He said, if measures are taken to ensure that unburned bodies are not thrown in to river directly, it will definitely come to Electric Crematoria, which will enhance the usage and also have great impacts on controlling the river pollution. It runs from 10 AM to 10 PM every day.

(2) Bathing Ghat

Rassolabad Ghat was constructed under the GAP Project and has plate form and stairs. But only few stairs could be visible due to heavy siltation. Rest of area was not visible. Also, since the river keep on changing it course (direction), there was no water near the ghat at the time of visit. According to the local residents, few years back it was being used. There is no maintenance of this ghat at all by any agency, and there was lot of garbage/ solid waste littered across the ghat area.

(3) Dhobi Ghat

Although, there are total 5 constructed Dhobighats in Allahabad by District Urban Development Agency (DUDA) under the National Slum Improvement Programme *(Rastriya Malin Basti Sudhar Yojna),* all are functional and maintained by the Dhobi Associations of respective areas. Though, all

the dhobi ghats are being used, but not to the optimum level because of poor maintenance and facilities.

A Unique Example of Public Participation in the O&M of the Dhobi Ghat

Out of the above, Dhobi Ghat of Mamphord Ganj sets out to be a unique example of community based/ self-sustainable O&M system. Constructed by DUDA, it is entirely managed by the user groups through a committee formed with the members from within the group. The physical conditions of the Ghat as observed were very well maintained with a clean surrounding. It has in built water supply system, through a tube well which is also maintained by the users them self including the cost of operation and technical break down when ever it occurs.

Some salient features, which were observed regarding the O&M of this facility and makes it to run success fully, may be outlined as;

- There was high degree of motivation observed among the users, they understand the importance of this facility for them as it was constructed on their demand and after a great efforts. Users even provided voluntary labour contribution in its construction and were fully involved in the process of planning, and construction.
- The Committee formed for its maintenance looks after the cleanliness and repair works, but also allocate time schedule for each person/users, collects funds as per the needs as and when arise for any maintenance work etc. In case of any problem related to time slot, the users amicably resolve it by discussing it within the group.
- The usage is very high as all the units are utilized. People work in shift according to the time slot allotted to them and once one-person leave it is occupied and used by another person. The washing at this place start from early morning 4.30-5 AM and continues till late evening even by 9 –10 PM some times.
- The group understands the impacts of washing in River and the level of pollution it fetches. But, according to them more than concern for river pollution, it is more users friendly and convenient to operate here.
- The committee informed that we ensure instant cleaning of the wastes generated in process of washing emerged out of detergent/soap or other materials. After one group/batch complete the washing, they clean their unit and surrounding adequately before they leave and another batch joins it.

(4) Cattle Wallowing

Magnitude of problem

Cattle wallowing in Allahabad was observed to be at much high level than Varanasi which is spread over 7-8 main ghats along the river side in Yamuna and Ganga. Its numbers ranges from 500-2000 cattle at one ghat which even increases during summer time. The number is higher between 11 AM to 1PM.

The reason to take cattle at the ghat

According to Mr. Roshan Lal, cattle owner, the main reason of brining the cattle at ghat is no other facility in the city. Also the water supplied by Municipality is not enough for the cattle. The Municipality provides the water two times – in morning and in evening. Due to this reason they have to take their cattle at ghat. Here the cattle get enough water for drinking and bathing purpose. All other participants have the same view who come at this ghat at some far distance while the nearby cattle owner have no option except to leave their cattle at ghat.

On enquiring about the advantages of cattle wallowing as realized by the users, no one had clear view about the advantage only that the cattle get enough water for bathing and get relaxed here as these cattle requires much water and they like to sit longer into the water.

Perception of Participants on pollution at river through cattle wallowing

- According to Mr. Dashrath, Boatman at the ghat, due to the cattle riverbank is too dirty and their Dung is spread over at the ghat and at the riverbank. Here the number of cattle is too much and they were made to come from very far places also. Approximately 2000 cattle come here daily. So people also hesitate to take bath and they search the place where the cattle remain less. He told that the main problem is the number of cattle presence at the ghat and their dung by which the platform and riverbank get dirty.
- According to Mr. Jamuna, Boatman, many Dairy-farmers bring their cattle to wash at the ghat and due to their cattle dung the place becomes very dirty and bad smelling. Due to this bad smell viruses and germs growth, which cause the human diseases.
- Mr. Roshan Lal told that the river water is affected a little due to cattle bathing but they have no other option for this reason. Also if they use the municipal water that is supplied for drinking purposes and also it is not sufficient for cattle. If government provides some other facility then they can move there.
- Some other participants of cattle owners were have no comments on this and they told that they have only this option for their cattle. While the participants from boatmen were totally on the opinion that the cattle wallowing are also one of the reasons of affecting water quality and making dirty the ghat. Before some years they have strongly tried to stop the cattle wallowing at this ghat but slowly they get down as Nagar Nigam does not help and it never tried for the solution. It only restrict at the time of Kartic Function for one month.

Perception for the Solution of the problem

- Mr. Dashrath Lal told that the separate ghat should be provided to cattle owners and it should be far from the main ghat which are used for pilgrimage and bathing purposes. They should be provided the place in downstream of the river.

- The other participants like Nanku, Mohan and Bulaki Lal who are living at Balua Ghat were not agreed on the matter to sending them at the end of the city for cattle bathing. They told that if they would be provided any other nearby ghat only for cattle, they can move there.

Any Provision/ Rule to prevent Cattle wallowing at the ghat

- Participants told that only for one month in Kartik month of bathing festival, Nagar Nigam Strictly stop the cattle wallowing at this Ghat and also the nearby ghat. As this time many pilgrims and priest come here for taking bath so Nagar Nigam make also cleaning of all nearby Ghats along with this. All participants were agreed on this point and all knows, also they have not take their cattle at the Ghat. Only some take their cattle very far from the place where the people generally not go for bathing.
- It was also informed that Nagar Nigam, after this festival never checks the ghat and its condition. There is no rule or provision to prevent cattle wallowing at the ghat. Only due to the resistance from the residents and boatmen the cattle are not send on some ghat.

However, almost all participants were of the view that the reason of river water pollution is basically from Domestic wastewater and Industrial wastewater. Apart from this, solid waste further aggravates the condition. They further expressed that the people/pilgrims, who come to take bath from outside, should also be restricted for throwing poly-bags and poly-bottles at the riverside.

4.4.4 *Lucknow*

(1) Scope of Study

The main emphasis of field level analysis of the situations pertaining to the Non-Core Schemes, in Lucknow, under this Case Study included Operation &Maintenance of Dhobi Ghats and usage, Bathing Ghats and attitude and perceptions regarding cattle wallowing in the river.

It may be said that situations on above mentioned issues, remains the similar and no much significance could be identified in Lucknow with regard to operation, usage and sustainability of facilities/ schemes that were created with a view to tackle the non-point source of pollution, and only one dhobighat which was visited demonstrated meaningful significance. As the open defecation is also a major source of non-point pollution, and a number of LCS/ community toilets have been constructed in Lucknow also, its conditions and impacts were not studies as it was out of scope of study.

(2) Dhobi Ghat at Viloch Pura: A Success Story

This Ghat was constructed by DUDA, Lucknow with a view to rehabilitate Dhobis (laundry men) who have been washing the chicken embroidered clothes along the river bank since age long period. The chicken embroidery works is a very famous textile trade in Lucknow and a source of livelihood for thousands of people.

This Ghat is situated in the residential area of old Lucknow and has total 110 units and 220 washing plate forms (at one unit, two washing platforms exists, one each side). The total area is spread over approximately 1000 sq meter. This ghat is also managed by Local Dhobi Samiti, which is a registered Committee having a formal structure of its functioning having a President, General Secretary and Treasurer who are the main functionaries of the governing body. According to the president of Samiti, this Ghat was constructed after hard and continuous efforts and follow up with govt. departments. This

Dhobi ghat caters to an area of around 10 Km benefiting to more than 300 users/ beneficiaries every day.

The water supply is through a tube well which was originally provided by DUDA, it was expanded by installing one additional number in order to adequately meet the demand of water supply, keeping in view the large number of users. The additional tube well cost Rs. 45,000 approximately, which was mobilized by the committee through contributions from within the groups, as informed by users and functionaries (managing committee) at the site. The general O&M cost includes, expenditures on electricity, water supply, cleanliness of the repairing of pipes, platforms etc., that all are borne by the users groups only and there is hardly any external funding source.

Some Significant Issues

On the basis of scenario described above which is based on the first hand assessment at site and discussion with the beneficiary groups, the scheme/facility is to be considered a success in terms of meeting the objectives it was established for. The usage patterns of this facility present a good example of O&M system, which is key for the sustainability of such schemes.

Some major significant points that were observed as key elements leading to the success of scheme are outlined as follows;

- The scheme/facility was planned and finalized in consultation with the community and users/ beneficiaries specifically. It was proposed by community on the basis of felt needs.
- The system of O&M was pre planned. As it was decided before hand that it will be maintained by the users only, there was no confusion with regard to O&M after the construction, and the Samiti (Committee) took over the O&M immediately after the construction was accomplished.
- There was community involvement/ participation right from the planning of the scheme.
- There is no dependency on govt. or other external agencies for the funds/financial requirements for the maintenance of structure as it is done immediately as and required by mobilizing it internally.
- People are motivated and handle it as their "baby". Thus, there is a sense of ownership among the users/beneficiaries, which is very important for the sustainability of any such scheme.
- It is managed by a Core group of members from within the user committee, who are active having entrepreneurial bent of mind, and capable of influencing public perception.

(3) Cattle wallowing: Attitude and public perception in Lucknow

Cattle Wallowing in Lucknow is less in comparison of other three cities. However, it was attempted to analyse the situation with regard to people's understanding, perception and solution through a Focused Group Discussion on the target groups (cattle owners, boat men and others).

The main out come of the FGD carried out in above respect, may be outlined as below

- Cattle wallowing has no significance on River's Water Pollution or the riverbed area as said the participants of FGD at Raj Ghat. They were of the view that major causes of pollution should like interception of Nallas and treatment of sewage should be given attention. On being more specific on Non-point source of pollution, they stressed that solid waste and open defecation are the major problem, that pollutes the River's environment area and cattle wallowing is insignificant.

- Lack of space and alternative facility were cited to be the reason s behind taking the cattle to the Riverside.

- On asking about the solution and providing the alternative facilities for cattle bathing that can reduce/stop cattle wallowing in River, it was asserted by the participants that such an intervention is not required in Lucknow as it (cattle wallowing) has no co-relation with River pollution. "Why is there attention / efforts to look at the pollution source which is quite visible, and wasting time on such petty issue?" asked Maiku and Bhola, the participants of the FGD. Almost all the participants agreed that cattle Wallowing is not the problem in Lucknow.

4.4.5 *West Bengal*

Non-Sewerage Schemes that have been implemented in West Bengal under the Ganga Action Plan includes the Low Cost Sanitation, Electric Crematoria, and River Front Development (RFD) Works. On perusal of the secondary data and reports related to the activities implemented in West Bengal, it was found to be reported that schemes such as electric crematoria, LCS and RFD are running well from the point of view of operation &maintenance (O&M) &usage.

An onsite visits to the facilities in Calcutta and adjoining Municipalities that includes Maheshtala, Budge-Budge and Barrackpore Municipalities also supports the facts derived from the second hand sources. The Study Team visited following facilities with a view to analyze the prevailing situation of the schemes across the three Municipalities, besides taking feedback from the implementing and O&M agencies such as KMDA and local municipal authorities.

Location	Facilities	Number	Municipality
Nungi Kalibari Ghat	LCS	1	Mahestala
	Electric Crematoria	1	
	River Front Development (RFD)	2	
Chitragaungue Kalaibari Ghat	Electric Crematoria	1	Budge-Budge
	River Front (Construction of the steps and	1	
Kesto Mukharjee Cremation Ghat	Electric Crematoria	1	Barracpore
	LCS (Maintained by army through Sulabh)	1	

A site wise description of the O&M conditions and analysis of the issues are presented herein for each facilities visited.

(1) Electric Crematoria - Mahestala

The Mahestala is one of the 30 Municipalities of the greater Kolkata territory in West Bengal having a population of around 4 lakhs and spread across the area of 11.6 sq Km. The Chairman who is an elected person and head of a governing council comprising of 7 core members heads the Municipality. The Chairman is the supreme authority and the governing council takes all decisions unanimously.

A single furnace crematoria was constructed by the KMDA under Ganga Action Plan Phase –II with a view to discourage the use of traditional wood based crematoria which has a great implications on the environment and also contributes to the River's pollution load.

The analysis of the crematorium conditions presents a very good example of a successful Operation &Maintenance, public awareness about the advantages of such facilities that leads to the high usage.

Some key observations regarding the crematoria are outlined as follows;

- The crematoria is situated along the river side area is equipped with all basic amenities such as waiting room, toilets, drinking water facilities, besides beautifully maintained lawn, an office room, store room etc. besides the main furnace area. It is being maintained by the Municipality through a private contractor Ms. J.K. enterprise, who has responsibility of over all Operation and Maintenance that includes the electrical operation and the cleanliness of the facilities.
- The annual cost of the O&M includes Rs. 120,000 towards the contracting cost besides Rs. 5,000 monthly towards the maintenance of furnace and other electrical items that is directly borne by the Municipality. The contractor is managing the facility by employing 4 staff that includes 2 persons for electrical operation and one sweeper and 1 security guard. The contractor collects the user fee, which has been fixed at Rs. 450 per cremation towards the burning and Rs. 50 towards the general maintenance of the premises area such as cleanliness etc. Besides above, the monthly electricity cost for running the crematoria comes to around Rs. 60-70 thousand, which is borne by the Municipality.
- The average 110-120 body are brought for cremation here which most interestingly are claimed ones coming from all segments of the population i.e. educated &rich, middle income groups, poor and uneducated sections. The number of unclaimed body is only 3-4 every month.

Points of significance

The most significant points which were observed regarding the O&M and usage are specified as follows;

- The private contractor under the strict supervision of municipal organization does the maintenance, which monitor the maintenance activity on almost daily basis. Thus, a very active participation and commitment of the municipal organization in terms of monitoring of the O&M process.

- Municipal Organization not only monitors the physical operation of the -facilities but also takes strong initiatives for public participation and awareness. The local municipality disseminates the messages regarding the availability and advantages of electric crematoria among the people through its representatives such as ward inspectors, councilors at regular intervals.

- This was interesting to note that direct involvement of municipal body is more in public awareness than the participation of external agencies like NGOs or others. This forms the important part of the agendas of public meetings, which the councilors and authorities of Municipality hold in their wards/ areas at fortnightly and monthly basis, to address the general issues like health, sanitation, drinking water, construction of lanes and roads, sewer systems etc. Mr. Kali Bhandari, The Chairman of the Mahestala municipality informed that “every times, when there is a public meeting to resolve the core issues of the public needs in any area, it is ensured that the performance of existing facilities including the crematoria and other facilities are reviewed with the beneficiary groups and responsibility is fixed at certain responsible and active members of the community to diffuse the problem areas in case it is found so. The responsibility of public awareness is also shared by the user groups regarding usage, maintenance etc. under the supervision of municipal authorities.

Key Factors Observed to be the Main Catalyst of Success

- Well-controlled and accountable system of operation &maintenance. The cost factors which is comparatively very less for the general maintenance like cleanliness, staff salary and others, also provides stimulus to the Municipal Organization for an effective monitoring and prompt maintenance.

- Active and continuous initiatives and participation of the Municipality leads to a very significant impacts on the user groups and general public, making the facility very popular.

- There is involvement of community-based organizations in the publicity of the facility and also public education, which is more close to the community and capable of influencing the public behaviour and practices.

(2) River Front Development / Bathing Ghat of Nungi Kalibari Ghat

The Nungi Kalibarighat was constructed under Ganga Action Plan Phase-I and the construction includes construction of steps in small area, waiting room for the commuters who come to take boat/steamer[10] at this ghat, toilet facilities for ladies and gents and a shed with platform for performing the religious rites by the pilgrims. The Ghat, is being managed by the "Kalibari Temple Committee" including the LCS and other facilities under the overall supervision and monitoring of Mahestala Municipality. The construction was carried out by KMDA with a total cost of Rs. 15.45 lakhs.

Some Salient Features of O&M

The general observation of cleanliness at the ghat was observed to be impressive despite the fact that the vicinity is inhabited by the population of low-income groups who are the daily wageworkers, vendors and sweepers etc. who are considered to be having low awareness and education level. The temple committee has employed total 3 staff for cleaning and management of the facilities, who work in two shifts. The LCS is on pay and use system and for water closet, it is charged 1 rupee, and for urinals 25 paise, it was encouraging to observe that people even pay for the urinal services and instead of going for open urination around the River Front areas.

The usage of LCS is more during some special religious event, wherein large number of devotees comes for religious bathing that leads an implication on the revenue of the facility. Besides this, the shed, that has been constructed and used for performing religious rites by the pilgrims for their ancestors salvation is also a source of revenue generation as the users pay Rs. 20 including the fee of priest and the part of it is deposited for the maintenance of the facility area.

Advantages of community based management as observed

- Regular and close watch on the problems issues and functioning of staff.
- Good rapport with the community because of close association in the area. Temple Committee
- Localised approach and system of revenue collection and management.

[10] : Boat/ steamer is a popular transport medium for commutation to across river side in Kolkata

- The O&M staffs are from within the community area, which has also control over the user groups.
- The active participation of people from the local area in the maintenance and cleanliness also had a noticeable effect on the motivation of residents and other user groups leading to better participation and cooperation in the management of cleanliness of facility and area.

(3) Bathing Ghat and River Front Development in Budge-Budge Municipality

The River Front Development &Bathing Ghats development works undertaken at the "Chitragaunge Kalibari Ghat" in Budge-Budge Municipality is another example of a successful O&M and public participation in the management and maintenance of the facilities. The RFD works at this ghat included the construction and repair of the bathing steps, development of River Front station, construction of women changing room and public toilets, stone pitching on the floors of temple area, and same beautification like railings etc.

The ghat is close to the electric crematorium and basically serves the purpose of bathing for the family members who come with dead body for the cremation, besides the usual users like temple priests and staff, visitors etc.

The O&M of the RFD area as well as the crematorium has a centralized management under the overall control of Municipality. Where as the crematoria are maintained through private contractor exclusively, the ghat area is managed in collaborative efforts of the contractor engaged for crematorium maintenance and the temple management committee. The contracting staff takes care of sweeping and cleaning of the area on daily basis; the temple committee works as a watchdog and also facilitates the public awareness and education to the user groups and local residents.

Salient Features

- The synergy of private –govt. partnership in the management of O&M activities was observed to be the most significant factor for the cleanliness of the area. A sense of individual responsibility towards maintaining the cleanliness of the area was noticed among the user groups rather than fixing the responsibility only on government always which generally is a common practice.
- The better cleaning of the facility leads to the better usage; this was noticed at this facility area. Also, due to better maintenance there was a good demand for the facilities and it is optimum utilized.
- Electric Crematoria, which is adjacent to this Ghat, also has the similar arrangement for the monitoring of O&M, but, since it involves the electrical operation also besides the routine cleanliness, the electrical operation is being done through a specialized contract agency. However, the temple committee, through its group of volunteers is complementing the activities of contractor by extending support in public education.
- The optimum utilization of the electric crematoria as it was found, is linked not only with public awareness but also with the adequate and prompt operation & maintenance. As it has been experienced in this case study that poor utilization of electric crematoria and IWCs in other towns of UP and Haryana was due to the technical anomalies, frequent failures of equipments, power breakdown, which sends a wrong notion among the people and beneficiary groups about the capacity and performance of these facilities, thus discouraging the usage. Therefore, the adequate O&M and the quick intervention from the O&M agencies in case of any problem which affects the function of facility and ensuring that is functional in all the circumstances, has a significant role in the higher usage of the facilities.

(4) Low Cost Sanitation

Low Cost Sanitation (LCS) scheme has been implemented in West Bengal under the Ganga Action Plan as a part of major schemes of the Non-Core activities. Besides this, several schemes of LCS have

been implemented under the various schemes of State Govt., according to the Kolka Metropolitan Development Authority (KMDA). The LCS scheme included the Individual House Latrines (IHL) as well as the CTCs.

Under this case study, it was attempted to assess the performance of such LCS in West Bengal, and with this view certain community toilets (4 Nos.) were visited at different locations randomly and besides this, the public toilets at the other facilities like bathing ghats and crematoriums were also assessed.

The situation of such LCS facilities can be described briefly according to the parameters of the evaluation, which broadly focused the utilization level, maintenance and people's perception regarding this as follows;

- The LCS are very well maintained not only from the point of view of cleanliness but even the structural and support services like electricity, water supply, washing material etc. which are considered essential from the point of view to usage.
- The most of the LCS though directly maintained by Municipality but there was involvement of locally based institutions like youth clubs and religious institutions who were found to have rapport and support base among the user groups.
- The LCS (Community Toilets) are on use and pay basis at almost everywhere and even the urination is charged to inculcate the sense of ownership. Also, it was observed that there is willingness to pay for the promptly maintained facilities instead of using it free of cost.
- The community awareness was noticeably higher as far as importance and advantages of LCS was concerned. The awareness on the issues of sanitation such demerits of open defecation, cleanliness and environment were noticeably greater than other towns, which were covered in the study. It was due to the sustained efforts of Municipality as well as the voluntary agencies.

Conclusions

- Almost all the Non-Core schemes such as River Front Development, LCS and Crematoria are largely a success in terms of the usage and maintenance.
- The main O&M agency, which is the Local Municipality of the area were found to be very active in the implementation of O&M measures and in this regard, Municipality has taken initiatives for community participation in O&M and also taken measures for its sustainability through a sustained monitoring.
- Public Awareness on the issues of environment and related issues were noticeably higher which has implications on the attitude and behavioural practices of the beneficiary groups, leading to an impact on the usage and maintenance of these facilities.
- As the cost also plays a significant role in the O&M of any facility, it was observed in Calcutta that the higher usage provides a good option for the cost recovery of O&M and helps reduce financial pressure on the Municipality.

CHAPTER 5 SUMMARY AND LESSONS

5.1 SUMMARY AND CONCLUSIONS

The outcome of this comprehensive Case Study of the Non-Sewerage Schemes may be summarized and concluded as follows;

- The facilities that have been created under the various River Action Plans are not effective in tackling the issues they were created for in most of the cases except very few exceptions. The major reasons attributed to this have been identified as non-utilization or very poor utilization, motivated with the factors like poor O&M, inappropriateness in feasibility (needs, locations, numbers, management etc.) lack of community participation initiatives & public awareness (social &religious acceptability) and sustained efforts from PIAs and Operating agencies.
- On scheme wise detailed analysis, it was observed that though, Improved Wood Based crematoria are not success at many places or very less utilized on account of not only the socio-religious factors but also due to technical anomalies as observed and indicated by users/beneficiary groups. Some of inadequacies identified with this having impact on usage are, falling of wood from the metal platform, which as claimed leads to consume more amount of wood than it is said. Also, it is not user friendly in many terms as people find it difficult to place the body over the pyre because of excess height.
- There was lack of community participation in the institutional arrangement of Operation &Maintenance as observed in most of cases seen/studied. It is done through contactors / agencies or the Govt. bodies on its own, without any focus on community involvement. At some places, where it is done through grass root NGOs/CBOs, it is comparatively in better physical shape*. That emphasizes the significance of public participation and involvement in formulation, implementation, monitoring and O&M of such schemes for a better utilization and sustainability of the same.
- The most of the schemes created though very important from the point of view of planning have been installed without giving care to its feasibility in terms of the area of its installation, and any focus on pre-installation sustainability arrangements.
- Public Awareness programme have not been given due importance which are key to success foe the schemes of such kind. Though, realized in YAP and executed but with a very generic in nature/approach and were not the target group specific.
- Cattle wallowing is considered as one of the non-point source of river pollution and pollution of river bed area/ghats, but so far no initiatives have been taken up to address this aspect either in YAP or Ganga Action Plan, except raising this issues in Public awareness programme, that too, very superficially. However, Focused Group Discussions, carried out at this issue in four cities of UP revealed, it is not recognized significantly a source of pollution and hardly have any implications on the Rivers Water Quality.
- The main reasons for cattle wallowing as attributed by users and public, are lack of alternative facilities in the town, scarcity of water at home, age long practice of taking them to river side, saving of time and man power etc.

5.2 LESSONS TO LEARN

The countermeasures on the major outlined issues for the sustainability of Non-Core schemes are the key points to learn from the experience of Case Study. However, some main critical points may be specified as below;

- Feasibility assessment is very important before inception of such projects. The demand /need assessment, its suitability in terms of demand in the area, users profile, O&M etc. must be assessed prior to construction.
- The facilities like electric crematoria/IWC are the good technology options to tackle the cremation related pollution source, which is a major non-point source of pollution, but it important to create social acceptability through a sustained social/public mobilization programme, which should be specifically directed to attitudinal change and not just awareness (knowledge dissemination). It requires a long-term approach and initiatives. One must not expect an immediate benefit out of it. However, while propagating such socially sensitive concept, it is extremely important to rule out all the technical inappropriateness associated with it.
- The Community oriented initiatives for creation/construction of the facilities like Dhobighat &Bathing Ghat are more effective mechanism to ensure its maintenance and better usage. The "Dhobighat" at Mamphord Ganj in Allahabad and "Villoch Pura in Lucknow" being the most suitable examples of this. The IWC of Dhruvaghat in Mathura is another successful example of community-oriented initiatives of running the community assets.
- Public Awareness/Participation programme is the key approach to ensure the sustainability of the facilities like IWC/EC, Bathing Ghats and LCS etc. but more importantly, methodology / techniques of the awareness programme/campaign must be directed and controlled by people & target groups. Meaning thereby, that campaign needs to be taken up in accordance to the target groups and should be subject specific.
- The O&M is directly linked with the utility of facilities like LCS, Bathing Ghat and Crematoria.

ANNEXURE-I

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ANNEXURE-II

PEOPLE/ AUTHORITIES CONTACTED /MET

S.No	Name	Designation &Organisation
1.	Mr. Dilbagh Singh,	Executive Engineer, PHED Faridabad
2.	Mr. H.K. Goel	Asst. Engineer, PHED, Faridabad
3.	Mr. J. B. Verma	Execitive Engineer, PHED, Yamuna Nagar,
4.	Mr. A.K. Jain	Asst. Engineer, PHED, Karnal
5.	Mr. Anil Kumar	Junior Engineer, PHED, Karnal
6.	Mr. Gupta	Executive Engineer PHED, Panipat
7.	Mr. Josi	Asst. Engineer, PHED, Sonepat
8.	Mr. Sanjay Sharma	Coordinator, Sewa Samiti, Faridabad
9.	Mr. B.K. NIM	Project Manager, YPCU, UPJN Mathura& Vrindavan
10.	Mr. A.K. Garg	Project Manager, YPCU, UPJN, Agra & Etawah
11.	Mr. Agrawal	Project Engineer, Agra
12.	Mr. Narayanswami	Consultant, PMU, YAP, Delhi
11.	Mr. Rakesh Jaiswal,	Secretary, Eco-Friends, Kanpur
12.	Mr. Rehman,	Team Leader, IPCU, Kanpur
13.	Ms. Babita Sriwastwa	Project Director, DUDA, Allahabad
14.	Mr. M.P. Singh	Dean, Faculty of Law, BHU, Varanasi
15.	Mr. Sukhpal Singh,	Professor, Faculty of law, BHU, Varanasi
16.	Mr. Ramashakar Singh	Save Ganga Movement, Varanasi
17.	Mr. Badal Chatterjee	Municipal Commissioner, Allahabad
18.	Araya Samaj,	NGO, O&M agency, Lodhi Road Crematoria
19.	Mr. K.K. Choudhary	Dy. Health officer, MCD

Appendix D

APPENDIX D

Economic and Financial Evaluation for CTC in Low Cost Sanitation Program

1. Objectives

The Low Cost Sanitation (LCS) Program to construct Community Toilet Complex (CTC) was proposed in this Study. This Program will be carried out at two steps; Pilot Project and Full Scale Project, if the Pilot Project succeeds. The objective of this evaluation is to analyse economic and financial viability of the Pilot Project but not Full Scale Project.

2. Economic Evaluation

2.1 Assumptions

(1) Economic Benefits of CTC

Contingent Valuation Method (CVM) is applied to evaluate the benefits for providing a new CTC, in which economic benefits can be measured by willingness of people to pay (WTP). In this analysis, the following two values of WTPs are available in the existing report and through the WTP survey conducted by JICA Study Team. Based on these WTPs, economic benefits are estimated.

1) WTP for improvement of water quality of the river Ganga
   - Same WTP as the Sewage Scheme is assumed; i.e. Rs.326/annum per household for the targeted cities (See Volume III-6 for details).
2) WTP for using a CTC to be newly constructed.
   - WTP of each city is assumed as follows, which is a result of the Public Awareness Survey by JICA Study Team in 2003.

Table 1 Willingness to Pay for use of CTC

(Unit: Rs./visit per person)

City/Income Group	WTP
Allahabad	
Low Income Group	0.53
Medium Income Group	0.40
High Income Group	0.52
Total/Weighted Average	0.47
Kanpur	
Low Income Group	0.68
Medium Income Group	0.72
High Income Group	2.11
Total/Overall Average	0.81
Lucknow	
Low Income Group	0.62
Medium Income Group	0.67
High Income Group	1.66
Total/Overall Average	0.78
Varanasi	
Low Income Group	0.72
Medium Income Group	0.53
High Income Group	2.13
Total/Overall Average	0.74

(2) Financial Costs of CTC

The followings are assumed for the estimation of costs of construction and operation and maintenance (O&M).

1) One unit of CTC consists of 10 seats for men and 10 seats for women.

2) Usage capacity of a seat is 50 person-visits per day in maximum, i.e. the usage capacity of one unit of CTC is 1,000 person-visits per day in maximum.
3) 2 types of CTC was consider in evaluation
   - Disposal by Septic Tank & Soak Pits (Type A),
   - Disposal with Sewer Connection (Type B)

The detailed costs estimation of construction and O&M by type are given in the Chapter 2 of Volume IV. Following table shows a summary of financial costs of construction and O&M per CTC.

Table 2 Financial Cost

Financial Cost

Type	Construct-ion Cost (Rs.)	OM Cost* (Rs./annum)
Type A	1,300,000	151,200
Type B	1,100,000	177,075

(Remarks) *:
1. Type A includes a cost for the cost of sludge disposal at amount of Rs.600/month.
2. Type B includes the cost for sewerage treatment services. In this case, one tenth of average charge level of Rs.2,173/ annum and average family size of 6.57 persons per HH for domestic cost resulted from the Survey on Public Awareness is applied as a basic unit instead of the cost for de-sludge. Resulted basic unit: Rs.33,075 = (2,173/6.57*1000) /10

In addition, the costs for detailed design and physical contingency are assumed at rates of 15 % and 10 % of the construction cost.

(3) Economic Costs

To evaluate economic costs using financial costs, a conversion factor is assumed at the same rate that applied in the Sewage Scheme, i.e. 0.65 in overall average for both the construction and O&M costs (See Volume III-6 for details). Following table shows a summary of the estimated economic costs.

Table 3 Economic Costs

Economic Cost (Unit: Rs.1,000)

Type	Construct-ion Cost	OM Cost per Annum
Type A	1,053	98
Type B	891	115

(4) Family size

Average family sizes in Lucknow, Kanpur, Allahabad and Varanasi are 6.15 persons per household (HH), 6.40 persons/HH, 6.32 persons/HH and 7.40 persons/HH respectively according to the Public Awareness Survey.

(5) Other Assumptions

- Discount rates

A discount rate of 10 %, which is same as the Sewage Scheme, is applied to calculate Net Present Value (NPV) and Benefit Cost ratio (B/C).

- Project cycle

A life cycle of CTC is assumed to be 30 years and thus thirty years' project cycle is assumed for the evaluation.

2.2 Economic Evaluation

Based on the above assumptions, a yearly cash stream of the economic costs and benefits are worked out for each city as shown in Annex 1 and 2 together with the evaluation process and economic evaluation for the provision and O&M of a 20-seat CTC is made. In the evaluation, the number of users per day for a 20-seat CTC is calculated to gain 10 % of Economic Internal Rate of Return (EIRR).

Table 4 Summary Result on Economic Evaluation

In Case of Type A

Lucknow		**Kanpur**		**Allahabad**		**Varanasi**	
Number of Users at Least: 575 person.visits		Number of Users at Least: 558 person.visits		Number of Users at Least: 868 person.visits		Number of Users at Least: 622 person.visits	
NPV (Rs.1,000)	2	NPV (Rs.1,000)	1	NPV (Rs.1,000)	1	NPV (Rs.1,000)	1
EIRR	10.03%	EIRR	10.01%	EIRR	10.02%	EIRR	10.01%
B/C	1.00	B/C	1.00	B/C	1.00	B/C	1.00

In Case of Type B

Lucknow		**Kanpur**		**Allahabad**		**Varanasi**	
Number of Users at Least: 574 person.visits		Number of Users at Least: 557 person.visits		Number of Users at Least: 866 person.visits		Number of Users at Least: 621 person.visits	
NPV (Rs.1,000)	2	NPV (Rs.1,000)	1	NPV (Rs.1,000)	1	NPV (Rs.1,000)	2
EIRR	10.04%	EIRR	10.02%	EIRR	10.01%	EIRR	10.03%
B/C	1.00	B/C	1.00	B/C	1.00	B/C	1.00

The result of economic evaluation in case of type A for Lucknow indicates that 575 person-visits are required to obtain 10 % of EIRR. This means the provision of a 20-seat CTC is economically feasible if 575 persons use the CTC per day. For Lucknow, Kanpur and Varanasi, the CTC will be economically feasible with around 600 person-visits but for Allahabad it needs 870 person-visits to ensure economic feasibility. The result of the type B is almost same as the type A.

3. Financial Evaluation

3.1 Existing Charging System

For financial evaluation, fist of all, existing user charging system in the 4 cities was studied. Following table shows a result of existing charge for CTCs based on a sampling survey by JICA Study Team 2003. The existing charges of CTCs range from free charge to Rs.2 per visit.

Table 5 Summary Result on Existing Situation on Community Toilets

(Unit: numbers)

Type of Charge		Lucknow	Kanpur	Allahabad	Varanasi
Type 1	Male: 1 Rs., Female: 0 Rs., Child: 0 Rs.	24	16	0	0
Type 2	Male: 1 Rs., Female: 1 Rs., Child: 0 Rs.	3	10	27	5
Type 3	Male: 1 Rs., Female: 2 Rs., Child: 0 Rs.	0	2	0	0
Type 4	Male: 2 Rs., Female: 0 Rs., Child: 0 Rs.	2	2	0	0
Type 5	Male: 2 Rs., Female: 1 Rs., Child: 0 Rs.	3	3	1	0
Type 6	Male: 2 Rs., Female: 2 Rs., Child: 0 Rs.	0	3	2	14
Type 7	Free Charge	2	0	3	0
Type 8	Family Pass	0	7	1	0
Type 9	Others	1	0	0	2
Total		35	43	34	21

Based on the figures in the above table, average charge level can be calculated as shown in the following table. In calculation, family pass and other charging system are excluded. As shown in the table below, application of family-pass is few. However, according to the workshop involving the people living in slum, the family-pass type charge is preferable for them.

Table 6 Existing Charge Level on Community Toilets

(Unit: Rs./person-visit)

	Lucknow	Kanpur	Allahabad	Varanasi
Male	1.09	1.22	1.00	1.74
Female	0.18	0.64	0.97	1.74
child	0.00	0.00	0.00	0.00

(1) Financial Benefits

The financial benefit of CTC is equivalent to revenue from user charge. The existing charges of CTCs range from free to Rs.2 per visit. The average charges for male are 1.09 Rs./ visit in Lucknow, 1.22 Rs./ visit in Kanpur, 1.00 Rs./ visit in Allahabad and 1.74 Rs./ visit in Varanasi.

The followings case studies by charging system are evaluated to estimate the financial benefits of CTC.

1) Person-visit charging: fixed charge per visit or use

Rs. 2/ visit are assumed for the CTC that is maintained well and keep clean and is located to convenient places. This assumption may be justified by the fact that the people currently use and pay for the CTC that is even ill-maintained and unhygienic.

2) Family Pass: fixed charge per family and month

Family pass is the system that households pay for their use per month per family. As mentioned in the previous section, the community people prefer family pass because the pass is more convenient. In this case, financial feasibility of family pass is evaluated.

(2) Financial Costs

The financial costs include actual construction cost, engineering cost and contingency as mentioned in the previous section.

1.1 Financial Evaluation

(1) Person Visit Charging (Base Case)

Assuming Rs.2 per visit, the number of use per day for a 20-seat CTC is calculated to gain 10 % of Financial Internal Rate of Return (FIRR). The result of the financial evaluation is shown in table below and Annex 3 and 4 for details. 10 % of FIRR is gained if 514 persons use the CTC of type A per day.

Table 7 Summary of Financial Evaluation in Base Case

Type A		**Type B**	
Number of Users at Least: 514 person.visits		Number of Users at Least: 512 person.visits	
NPV (Rs.1,000)	1	NPV (Rs.1,000)	0
FIRR	10.01%	FIRR	10.00%
B/C	1.00	B/C	1.00

(2) Sensitivity Analysis of Base Case

The assumed charge of Rs.2/ visit seems to be high. The following table shows the result of sensitivity analysis by changing the charge level from Rs. 2.0 to 1.3. If the charge is Rs. 1.3 per use, the financially feasible number of use is 790.

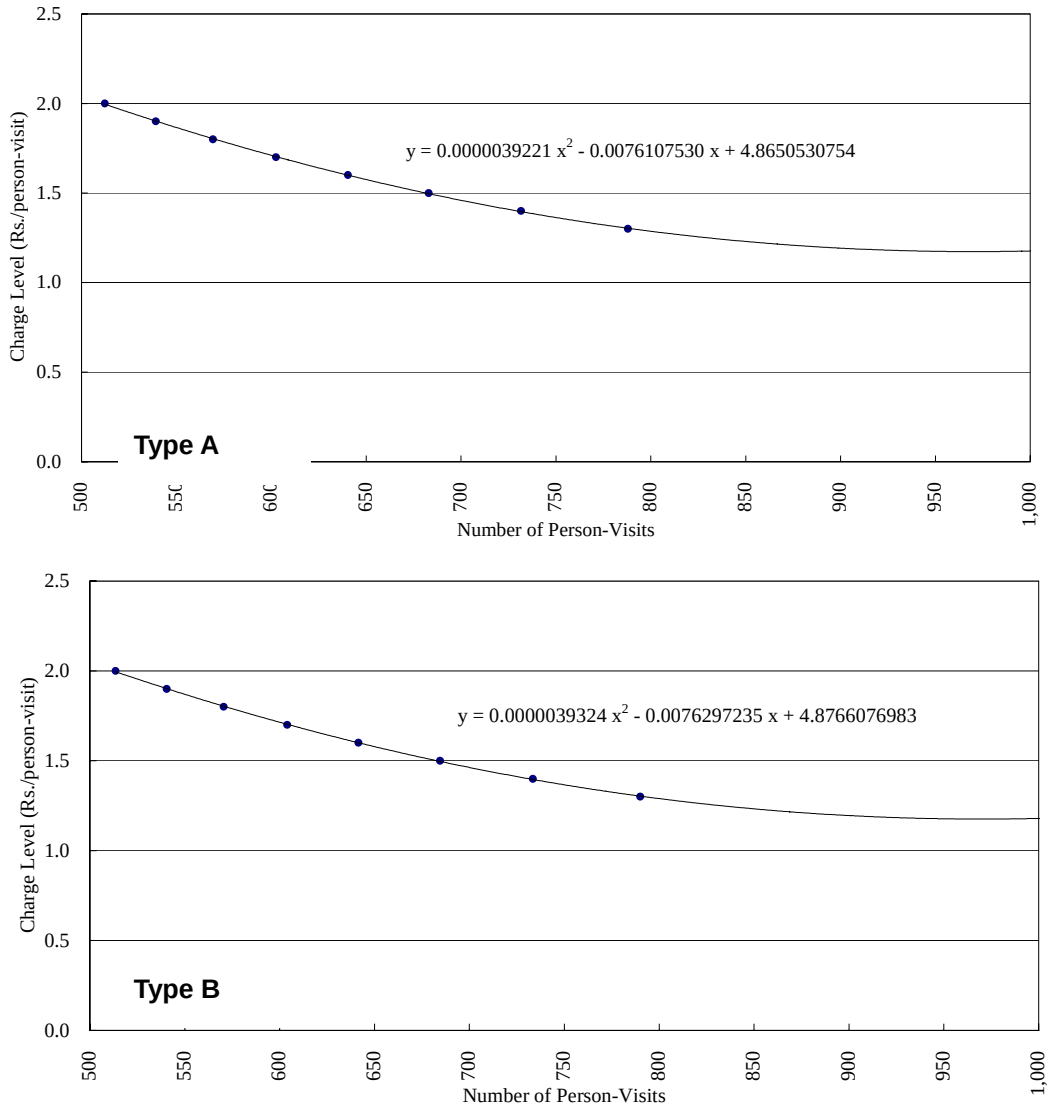


Figure. 1 Relationship between Feasible Charge Level and the Number of Person-Visits

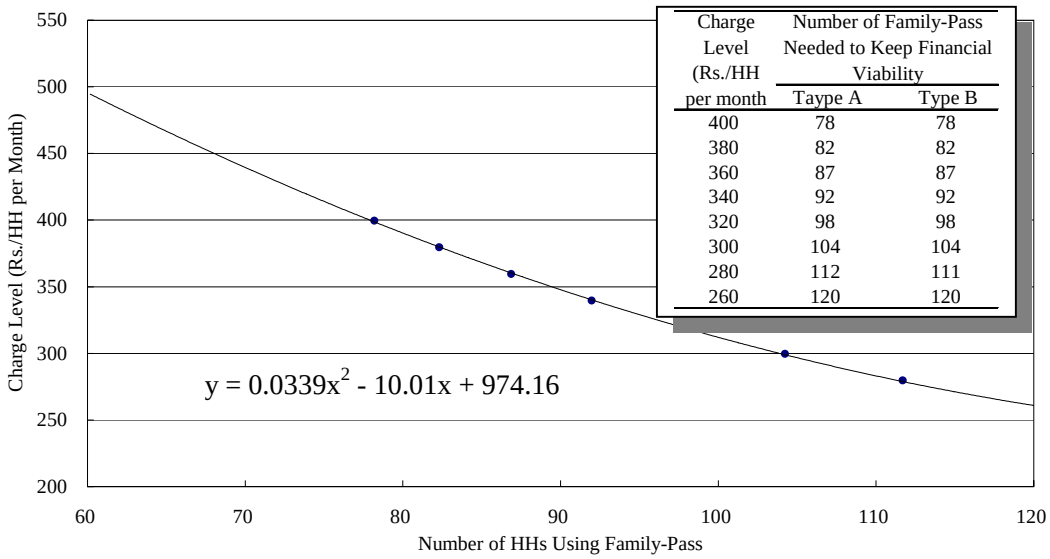
Table 8 Relationships between Charge Level and the Number of Person-Visits

Charge Level (Rs./p-v)	Number of Person-Visits Needed to Balance	
	Taype A	Type B
2.0	514	512
1.9	541	539
1.8	571	569
1.7	604	603
1.6	642	640
1.5	685	683
1.4	734	732
1.3	790	788

(3) Application of Family Pass

1) Charge level to recover all the costs

The relation between the number of HHs that use family pass to use the CTC and the level of its financially feasible charge to recover both the initial and O&M costs is estimated as below.



Charge Level (Rs./HH per month	Number of Family-Pass Needed to Keep Financial Viability	
	Taype A	Type B
400	78	78
380	82	82
360	87	87
340	92	92
320	98	98
300	104	104
280	112	111
260	120	120

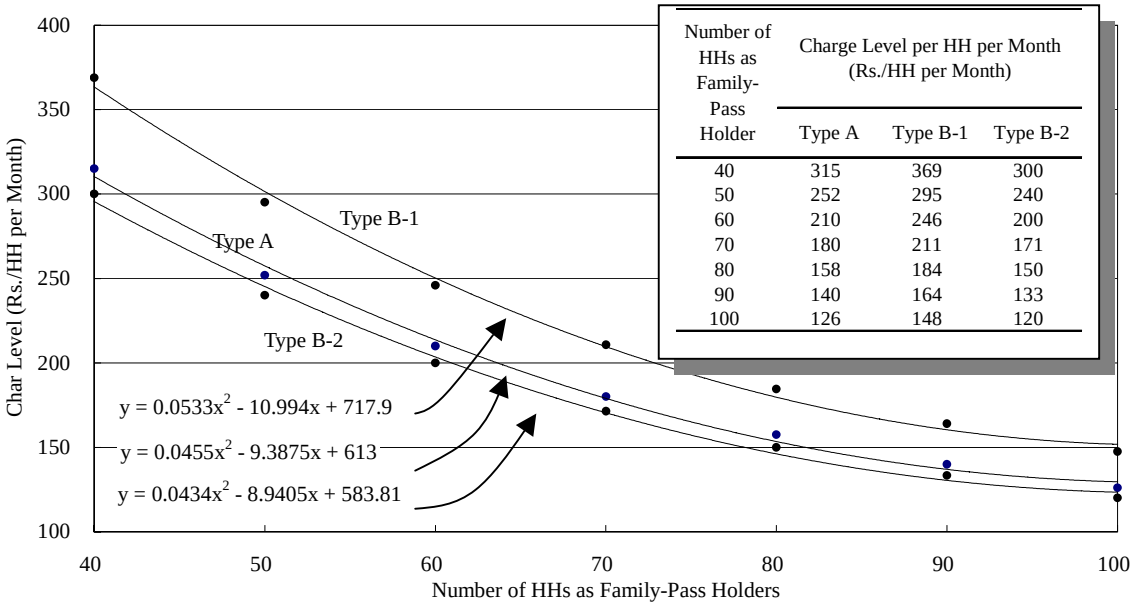
Figure. 2 Relationships between Feasible Charge Level and the Number of Number of HHs having Family-Pass to Recover All Costs

If 78 HHs use family-pass they should pay Rs. 400 per month per HH. If 120 HHs use family-pass they should pay Rs.260 per month per HH. These charges seems rather expensive and may not affordable for slum dwellers since most of them fall in the low income group and under poverty line in income level. Assuming 7 persons of average HH size and one person use the CTC one time per day, 120 HHs is equivalent to 840 person-visits per day.

2) Charge level to recover O&M costs only

It may be difficult to recover both the initial investment and O&M costs. Usually, this kind of public facility is constructed by grant aid of central and local governments and users pay only O&M costs only. The case of recovering only O&M costs is analysed below for family pass system by type of wastewater disposal system.

- Type A: Septic tank
- Type B-1: Sewer connection and to pay for sewer tax
- Type B-1: Sewer connection but not to pay for sewer tax



Number of HHs as Family-Pass Holder	Charge Level per HH per Month (Rs./HH per Month)		
	Type A	Type B-1	Type B-2
40	315	369	300
50	252	295	240
60	210	246	200
70	180	211	171
80	158	184	150
90	140	164	133
100	126	148	120

Figure. 3 Relationship between Feasible Charge Level and the Number of HHs having Family-Passes to Recover Only O&M Costs

If 100 HHs use family-pass they should pay Rs. 126 per month per HH for type A. The other cases resulted in almost the same number as type A. Assuming 7 persons of average HH size and one person use the CTC one time per day, 100 HHs is equivalent to 700 person-visits per day.

1.2 Affordability

According to the Household Survey by JICA Study Team, the average monthly household income for the low income group in the four cities are as follows:

City	Household Income in Rs.		
	Average	Max.	Min.
Lucknow	3,382	25,000	500
Kanpur	3,047	14,000	1,000
Allahabad	2,660	8,000	500
Varanasi	3,017	18,000	600

Source: Sample Household Survey by JICA Study Team, 2003

Assuming Rs.3,000 of the average income for the low income group, Rs.126 of a family pass is equivalent to 4.2 % of the total income. The surveyed low income group has diversity in household income consisting of higher income to much lower income. This charging level may be affordable for the higher income households in low income group but not the average to lower income households. Most of the much lower income households may not have any toilet in their household. To provide these households with a toilet, some measures including the followings should be taken. However, to keep self-sustainability, subsidy from local governments shall be avoided.

- Reduction of O&M costs, especially for care takers, by using community human resources
- Increase the number of users
- Charging system preferable for lower income households
- Subsidy from local governments

4. Conclusion and Recommendation

(1) Economic Feasibility

The provision of a 20-seat CTC will be economically feasible if around 600 persons use it for Lucknow, Kanpur and Varanasi but 800 to 900 persons for Allahabad assuming the target Economic Internal Rate of Return (EIRR) of 10 %.

(2) Financial Feasibility

1) Person-visit charging system

Assuming the user charge of Rs.2 per visit, the number of users per day for a 20-seat CTC is calculated to gain 10 % of FIRR. If around 500 to 600 persons per day pay and use the CTC, it becomes financially feasible.

2) Family pass system

Monthly family pass may be a preferable option for payment to use CTC. The users should pay Rs.260 per month per household for a family pass to recover both the initial and O&M costs assuming 120 pass holders, equivalent to about 840 person-visits per day. The users should pay around Rs.130 per month per household for family-pass to recover the O&M costs only, assuming 100 pass holders, equivalent to about 700 person-visits per day.

3) Affordability

To provide these HHs with a toilet, some measures should be taken as follows:

- Reduction of O&M costs, especially of care takers cost, by using community human resources
- Increase the number of users
- Grant from local governments

Annex 1 Economic Internal Rate of Return in Case of Type A CTC

Lucknow (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	1,053		1,053	23	123	146	-907
1		98	98	30	164	194	96
2		98	98	30	164	194	96
3		98	98	30	164	194	96
4		98	98	30	164	194	96
5		98	98	30	164	194	96
6		98	98	30	164	194	96
7		98	98	30	164	194	96
8		98	98	30	164	194	96
9		98	98	30	164	194	96
10		98	98	30	164	194	96
11		98	98	30	164	194	96
12		98	98	30	164	194	96
13		98	98	30	164	194	96
14		98	98	30	164	194	96
15		98	98	30	164	194	96
16		98	98	30	164	194	96
17		98	98	30	164	194	96
18		98	98	30	164	194	96
19		98	98	30	164	194	96
20		98	98	30	164	194	96
21		98	98	30	164	194	96
22		98	98	30	164	194	96
23		98	98	30	164	194	96
24		98	98	30	164	194	96
25		98	98	30	164	194	96
26		98	98	30	164	194	96
27		98	98	30	164	194	96
28		98	98	30	164	194	96
29		98	98	30	164	194	96
30		98	98	30	164	194	96
Total	1,053	2,940	3,993	937	5,043	5,980	1,987
NPV			1,797			1,799	2
EIRR							10.03%
B/C							1.00

(Note)
- Number of Users: 575 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 6.15
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Kanpur (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	1,053		1,053	21	124	146	-908
1		98	98	28	166	194	96
2		98	98	28	166	194	96
3		98	98	28	166	194	96
4		98	98	28	166	194	96
5		98	98	28	166	194	96
6		98	98	28	166	194	96
7		98	98	28	166	194	96
8		98	98	28	166	194	96
9		98	98	28	166	194	96
10		98	98	28	166	194	96
11		98	98	28	166	194	96
12		98	98	28	166	194	96
13		98	98	28	166	194	96
14		98	98	28	166	194	96
15		98	98	28	166	194	96
16		98	98	28	166	194	96
17		98	98	28	166	194	96
18		98	98	28	166	194	96
19		98	98	28	166	194	96
20		98	98	28	166	194	96
21		98	98	28	166	194	96
22		98	98	28	166	194	96
23		98	98	28	166	194	96
24		98	98	28	166	194	96
25		98	98	28	166	194	96
26		98	98	28	166	194	96
27		98	98	28	166	194	96
28		98	98	28	166	194	96
29		98	98	28	166	194	96
30		98	98	28	166	194	96
Total	1,053	2,940	3,993	874	5,104	5,978	1,984
NPV			1,797			1,798	1
EIRR							10.01%
B/C							1.00

(Note)
- Number of Users: 558 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 6.40
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Allahabad (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	1,053		1,053	34	112	146	-907
1		98	98	45	150	194	96
2		98	98	45	150	194	96
3		98	98	45	150	194	96
4		98	98	45	150	194	96
5		98	98	45	150	194	96
6		98	98	45	150	194	96
7		98	98	45	150	194	96
8		98	98	45	150	194	96
9		98	98	45	150	194	96
10		98	98	45	150	194	96
11		98	98	45	150	194	96
12		98	98	45	150	194	96
13		98	98	45	150	194	96
14		98	98	45	150	194	96
15		98	98	45	150	194	96
16		98	98	45	150	194	96
17		98	98	45	150	194	96
18		98	98	45	150	194	96
19		98	98	45	150	194	96
20		98	98	45	150	194	96
21		98	98	45	150	194	96
22		98	98	45	150	194	96
23		98	98	45	150	194	96
24		98	98	45	150	194	96
25		98	98	45	150	194	96
26		98	98	45	150	194	96
27		98	98	45	150	194	96
28		98	98	45	150	194	96
29		98	98	45	150	194	96
30		98	98	45	150	194	96
Total	1,053	2,940	3,993	1,377	4,601	5,978	1,984
NPV			1,797			1,799	1
EIRR							10.02%
B/C							1.00

(Note)
- Number of Users: 868 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 6.32
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Varanasi (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	1,053		1,053	21	125	146	-908
1		98	98	27	167	194	96
2		98	98	27	167	194	96
3		98	98	27	167	194	96
4		98	98	27	167	194	96
5		98	98	27	167	194	96
6		98	98	27	167	194	96
7		98	98	27	167	194	96
8		98	98	27	167	194	96
9		98	98	27	167	194	96
10		98	98	27	167	194	96
11		98	98	27	167	194	96
12		98	98	27	167	194	96
13		98	98	27	167	194	96
14		98	98	27	167	194	96
15		98	98	27	167	194	96
16		98	98	27	167	194	96
17		98	98	27	167	194	96
18		98	98	27	167	194	96
19		98	98	27	167	194	96
20		98	98	27	167	194	96
21		98	98	27	167	194	96
22		98	98	27	167	194	96
23		98	98	27	167	194	96
24		98	98	27	167	194	96
25		98	98	27	167	194	96
26		98	98	27	167	194	96
27		98	98	27	167	194	96
28		98	98	27	167	194	96
29		98	98	27	167	194	96
30		98	98	27	167	194	96
Total	1,053	2,940	3,993	843	5,135	5,977	1,984
NPV			1,797			1,798	1
EIRR							10.01%
B/C							1.00

(Note)
- Number of Users: 622 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 7.40
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Annex 2 Economic Internal Rate of Return in Case of Type B CTC

Lucknow (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	891		891	23	123	146	-746
1		115	115	30	164	194	79
2		115	115	30	164	194	79
3		115	115	30	164	194	79
4		115	115	30	164	194	79
5		115	115	30	164	194	79
6		115	115	30	164	194	79
7		115	115	30	164	194	79
8		115	115	30	164	194	79
9		115	115	30	164	194	79
10		115	115	30	164	194	79
11		115	115	30	164	194	79
12		115	115	30	164	194	79
13		115	115	30	164	194	79
14		115	115	30	164	194	79
15		115	115	30	164	194	79
16		115	115	30	164	194	79
17		115	115	30	164	194	79
18		115	115	30	164	194	79
19		115	115	30	164	194	79
20		115	115	30	164	194	79
21		115	115	30	164	194	79
22		115	115	30	164	194	79
23		115	115	30	164	194	79
24		115	115	30	164	194	79
25		115	115	30	164	194	79
26		115	115	30	164	194	79
27		115	115	30	164	194	79
28		115	115	30	164	194	79
29		115	115	30	164	194	79
30		115	115	30	164	194	79
Total	891	3,443	4,335	936	5,034	5,970	1,635
NPV			1,794			1,796	2
EIRR							10.04%
B/C							1.00

(Note)
- Number of Users: 574 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 6.15
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Kanpur (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	891		891	21	124	146	-746
1		115	115	28	166	194	79
2		115	115	28	166	194	79
3		115	115	28	166	194	79
4		115	115	28	166	194	79
5		115	115	28	166	194	79
6		115	115	28	166	194	79
7		115	115	28	166	194	79
8		115	115	28	166	194	79
9		115	115	28	166	194	79
10		115	115	28	166	194	79
11		115	115	28	166	194	79
12		115	115	28	166	194	79
13		115	115	28	166	194	79
14		115	115	28	166	194	79
15		115	115	28	166	194	79
16		115	115	28	166	194	79
17		115	115	28	166	194	79
18		115	115	28	166	194	79
19		115	115	28	166	194	79
20		115	115	28	166	194	79
21		115	115	28	166	194	79
22		115	115	28	166	194	79
23		115	115	28	166	194	79
24		115	115	28	166	194	79
25		115	115	28	166	194	79
26		115	115	28	166	194	79
27		115	115	28	166	194	79
28		115	115	28	166	194	79
29		115	115	28	166	194	79
30		115	115	28	166	194	79
Total	891	3,443	4,335	872	5,094	5,967	1,632
NPV			1,794			1,795	1
EIRR							10.02%
B/C							1.00

(Note)
- Number of Users: 557 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 6.40
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Allahabad (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	891		891	34	112	145	-746
1		115	115	45	149	194	79
2		115	115	45	149	194	79
3		115	115	45	149	194	79
4		115	115	45	149	194	79
5		115	115	45	149	194	79
6		115	115	45	149	194	79
7		115	115	45	149	194	79
8		115	115	45	149	194	79
9		115	115	45	149	194	79
10		115	115	45	149	194	79
11		115	115	45	149	194	79
12		115	115	45	149	194	79
13		115	115	45	149	194	79
14		115	115	45	149	194	79
15		115	115	45	149	194	79
16		115	115	45	149	194	79
17		115	115	45	149	194	79
18		115	115	45	149	194	79
19		115	115	45	149	194	79
20		115	115	45	149	194	79
21		115	115	45	149	194	79
22		115	115	45	149	194	79
23		115	115	45	149	194	79
24		115	115	45	149	194	79
25		115	115	45	149	194	79
26		115	115	45	149	194	79
27		115	115	45	149	194	79
28		115	115	45	149	194	79
29		115	115	45	149	194	79
30		115	115	45	149	194	79
Total	891	3,443	4,335	1,374	4,591	5,964	1,630
NPV			1,794			1,794	1
EIRR							10.01%
B/C							1.00

(Note)
- Number of Users: 866 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 6.32
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Varanasi (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: WTP for: Water Quality	Benefit: WTP for: CTC	Benefit: Total	Cash Balance
0	891		891	21	125	146	-746
1		115	115	27	167	194	79
2		115	115	27	167	194	79
3		115	115	27	167	194	79
4		115	115	27	167	194	79
5		115	115	27	167	194	79
6		115	115	27	167	194	79
7		115	115	27	167	194	79
8		115	115	27	167	194	79
9		115	115	27	167	194	79
10		115	115	27	167	194	79
11		115	115	27	167	194	79
12		115	115	27	167	194	79
13		115	115	27	167	194	79
14		115	115	27	167	194	79
15		115	115	27	167	194	79
16		115	115	27	167	194	79
17		115	115	27	167	194	79
18		115	115	27	167	194	79
19		115	115	27	167	194	79
20		115	115	27	167	194	79
21		115	115	27	167	194	79
22		115	115	27	167	194	79
23		115	115	27	167	194	79
24		115	115	27	167	194	79
25		115	115	27	167	194	79
26		115	115	27	167	194	79
27		115	115	27	167	194	79
28		115	115	27	167	194	79
29		115	115	27	167	194	79
30		115	115	27	167	194	79
Total	891	3,443	4,335	841	5,126	5,968	1,633
NPV			1,794			1,795	2
EIRR							10.03%
B/C							1.00

(Note)
- Number of Users: 621 /day
- WTP for Improvement of Water Quality: 326 /annum per HH
- Family Size: 7.40
- Conversion Factor: 0.65 (From Financial Cost to Economic Cost)
- D/D 15% of Civil Works
- Physical Cont. 10% of Civil Works

Annex 3 Financial Internal Rate of Return in Case of Type A

In Case of Charge Level of Rs.2/person-visit (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: Revenue Due to Charge Collection	Cash Balance
0	1,625		1,625	225	-1,400
1		151	151	300	149
2		151	151	300	149
3		151	151	300	149
4		151	151	300	149
5		151	151	300	149
6		151	151	300	149
7		151	151	300	149
8		151	151	300	149
9		151	151	300	149
10		151	151	300	149
11		151	151	300	149
12		151	151	300	149
13		151	151	300	149
14		151	151	300	149
15		151	151	300	149
16		151	151	300	149
17		151	151	300	149
18		151	151	300	149
19		151	151	300	149
20		151	151	300	149
21		151	151	300	149
22		151	151	300	149
23		151	151	300	149
24		151	151	300	149
25		151	151	300	149
26		151	151	300	149
27		151	151	300	149
28		151	151	300	149
29		151	151	300	149
30		151	151	300	149
Total	1,625	4,536	6,161	9,221	3,060
NPV			2,773	2,774	1
EIRR					10.01%
B/C					1.00

(Note) Number of Users: 514 /day
D/D 15% of Civil Works
Physical Cont. 10% of Civil Works
Unit Charge: 2 Rs./time
Conversion Factor: 0.8
Among the visits, 20 % are the free charge for children.

Annex 4 Financial Internal Rate of Return in Case of Type B

In Case of Charge Level of Rs.2/person-visit (Unit: 1,000 Rs.)

Year in Order	Economic Cost: Const-ruction Cost	Economic Cost: Running Cost (OM Cost)	Economic Cost: Total	Benefit: Revenue Due to Charge Collection	Cash Balance
0	1,375		1,375	224	-1,151
1		177	177	299	122
2		177	177	299	122
3		177	177	299	122
4		177	177	299	122
5		177	177	299	122
6		177	177	299	122
7		177	177	299	122
8		177	177	299	122
9		177	177	299	122
10		177	177	299	122
11		177	177	299	122
12		177	177	299	122
13		177	177	299	122
14		177	177	299	122
15		177	177	299	122
16		177	177	299	122
17		177	177	299	122
18		177	177	299	122
19		177	177	299	122
20		177	177	299	122
21		177	177	299	122
22		177	177	299	122
23		177	177	299	122
24		177	177	299	122
25		177	177	299	122
26		177	177	299	122
27		177	177	299	122
28		177	177	299	122
29		177	177	299	122
30		177	177	299	122
Total	1,375	5,312	6,687	9,199	2,512
NPV			2,768	2,768	0
EIRR					10.00%
B/C					1.00

(Note) Number of Users: 512 /day
D/D 15% of Civil Works
Physical Cont. 10% of Civil Works
Unit Charge: 2 Rs./time
Conversion Factor: 0.8
Among the visits, 20 % are the free charge for children.