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Drainage system of Patna

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Abstract : *In this millennium where India and Indians are reaching new heights in every field, its drainage system has gone from bad to worse. The Drainage System in Patna was established in 1936 but today it has become a very big menace for the city dwellers. Considering the topography Patna is situated on a level strip of land along south bank of river Ganga between Danapur in the west and Fatuah in the east. The strip slopes towards south and also towards east. This sort of topography has given a saucer like shape to Patna. There are 3 sewage treatment plants, each located at Saidpur & Beur in South & South West and Pahari in North of the city respectively.*

The drainage system of Patna can be distinguished as consisting of two systems i.e, Underground drainage system and Storm water drainage system. The underground

sewerage system is one of the best methods of waste conveyance and disposal. But, due to high capital and operation cost and topography, urban areas depend on the other mode of waste disposal. Surprisingly, only 20% of the total households in urban areas of Patna are covered with underground sewerage system, increasing the dependencies on the septic tank and low cost sanitation systems in other 80% of areas in Patna. As far as Storm water drainage system is concerned it can be said that this type of system is responsible for removing the excess rainwater out of the city area.

Patna Municipal Corporation (PMC) spent a hefty amount in 2011-12 to upgrade the drainage system of the state capital. Sources in the civic body said PMC had earmarked Rs 18 crore for maintenance and upkeep of the drains for 2012-13. It spent around Rs 39 lakhs in 2013 for the purpose.

The drainage system of Patna has a very important role in the development of the city. It is responsible for maintaining sanitation facilities in different areas. Our project focuses on the types of drainage system existing in Patna, their problems and solutions , comparisons with other places, interviews, suggestions etc.

Key words : *Millennium, Dwellers, Menace, Topography, Underground drainage system, Storm water drainage system, Conveyance, Earmarked.*

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Introduction :

Patna is the capital of Bihar and the largest urban area. The town is located in Patna district that comprises of six sub divisions. It is located on a level strip of on the South Bank of the river Ganga that slopes to the South and East. The rising waters of the rivers Ganga, Punpun and Sone all impact the town and its drainage system. The storm water drainage of the town has been divided into four zones – Eastern, Southern, Central and Western. The city is comprised of narrow streets and lanes that hinder laying of drainage conduits. The town's proneness to water logging is mainly on account of its slope. Overall, the drainage system here is faulty. The overall system of drainage is not very efficient with intermixing of storm water and sewerage; drains are clogged with garbage and silt. Thus their carrying capacity is reduced; the drainage pumping plants are not working to designed capacity and the unplanned growth of the town is creating further pressure on the infrastructure.

In order to have a clean and healthy life, the municipal corporation has to take serious steps and this has to be supported by each and every citizen of Patna.

Objectives :

1. To highlight the drawbacks of drainage system of Patna.
2. To highlight the reasons for the increasing problems of the city dwellers.
3. To highlight the lack of infrastructure and implementation of programmes of the municipal corporation of Patna.

Techniques and Tools :

1. Information acquired from newspapers and magazine.
2. Internet.
3. Interviews of local people and city municipal officials.
4. Survey of area.

The City Patna :

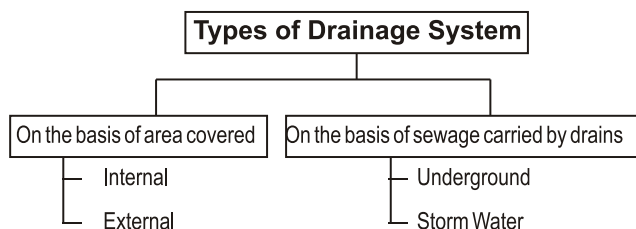
The modern city of Patna is situated on the southern bank of the Ganges. The city also straddles the rivers Sone, Gandak and Punpun. The city is approximately 35 km long and 16 km to 18 km wide. In June 2009, the World Bank ranked Patna second in India (after Delhi) for ease of starting a business. As of 2004-2005, Patna had the highest per capita gross district domestic product in Bihar, at INR31,441. Using figures for assumed average annual growth, Patna is the 21st fastest growing city in the world and 5th fastest growing city in India by the City Mayors' Foundation. Patna registered an average annual growth of 3.72% during 2006-2010.



Patna museum, Gol Ghar, Gurudwara at Patna Sahib

What is Drainage System ?

Drainage is a procedure by which the useless water and waste products are removed from the proper place of habitation to a place of flowing water like rivers, streams, seas, oceans etc. and the systematic arrangement of this process is termed as drainage system.



Drainage System of Patna :

The three pumping stations of Patna are:

- Saidpur
- Beur
- Pahari

Types of Drainage System in Patna :

- Underground drainage system
- Storm water drainage system

Underground Drainage System in Patna :

The underground drainage system is one of the best methods of waste conveyance and disposal. But, due to high capital & operation cost and topography, urban areas depend on other modes of waste disposal.

Table No. 1. Underground Sanitation Service Level Indicator in Patna

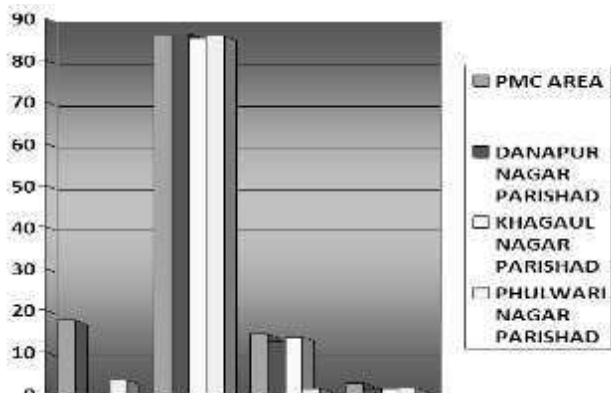
Components	PMC area	Danapur Nagar Parishad	Khagaul Nagar Parishad	Phulwari Nagar Parishad
Availability of UGD system	Yes	No	No	Yes
Quantity of Sewage in MLD	170	10	4	1
Treatment Capacity in MLD	109	NA	NA	NA
%age of Population with UGD	9.2	NA	NA	NA
Sewer Length in km	27.4	NA	NA	6.0
Number of Connections	21884	NA	NA	532
Number of Septic Tanks	58305	9566	2132	3686
Road Covered by UGD Network (%)	25	NA	NA	10
%age of Assessment with				
UGD Network	17.6	NA	NA	3.2
Individual Toilets	85.7	86.3	85.2	85.7
Public shared toilets	14.3	12.4	13.6	13.7
Open Defecation	2.5	1.3	1.2	1.4

Source : (i) Urban Local Body and Line Departments Survey Formats, Patna, Danapur, Khagaul and Phulwari Nagar Parishad. NA - Not Available

Table No. 2. Percentage of Assessment

SI No.	Components	PMC Area	Danapur Nagar Parishad	Khagaul Nagar Parishad	Phulwari Nagar Parishad
1.	Underground drain network	17.6	NA	NA	3.2
2.	Individual Toilets	85.7	86.3	85.2	85.7
3.	Public shared Toilets	14.3	12.4	13.6	13.7
4.	Open Defecation	2.5	1.3	1.2	1.4

Assessment of Sanitation

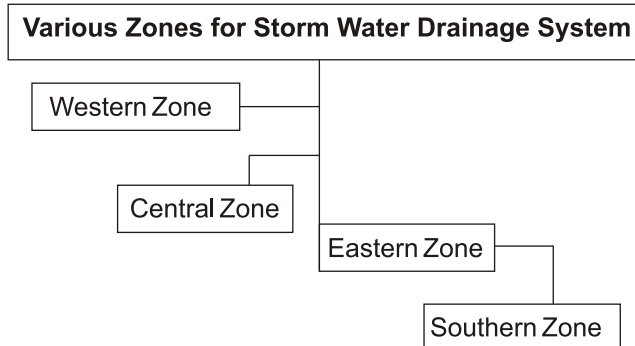


Source: (i) Urban Local Body and Line Departments Survey Formats, Patna, Danapur, Khagaul and Phulwari Nagar Parishad. NA-Not Available. UGD-underground drains, INT-Individual toilet, PT- public toilets, OD- open defecation.

Storm Water Drainage System in Patna :

Storm water drainage system is built to dispose the excessive rainwater out of the city area but sometimes storm water drains; open drains and storm outfall carry sullage, septic tank effluent and even untreated sewage.

Existing Storm Water Drainage System in Patna Urban Area



Western Zone

It extend from west Fraser road to Danapur Khagaul road

It extend from West Fraser Road to Danapur Khagaul Rd. Drainage Zone	Length in Km	Pumping Station	Water Discharge
Serpentine Channel	7	Mandiri	River Ganga
Boring Road	3	Rajapur	River Ganga
S.K. Puri Drain	4.6	Punaichak	Danapur Road
Kurjee	6.9	Kurjee	River Ganga

Central Zone

It extends from Patna Gaya road in the west to Nalanda Medical College in the east and from Ganga bridge in the north to Delhi Howrah railway line in the south.

Drainage Zone	Length in Km	Pumping Station	Water Discharge
Bakarganj Channel	15	Saidpur Pumping Plant	Not Functioning properly; water logging
Kadamkuan	18	Pahari	Punpun River

Eastern Zone

It extends from new Bye pass in the north to Nalanda Medical Hospital and College in the west.

Drainage Zone	Length in Km	Pumping Station	Water Discharge
Akamkuan Nala	18	Pahari	Punpun River

Southern Zone

It extends from old Bye pass road in the north to new Bye pass road in the south and from Patna Gaya railway line in the west to Agamkaun in the east.

Drainage Zone	Length in Km	Pumping Station	Water Discharge
Joginagar	–	670 Pumping Station	Punpun River

No Drainage System

Sl. No.	Area
1.	West of Chirayatar, Karbigahia, Some Parts of Kankarbagh, Bahadurpur, Hanuman Nagar
2.	South of Railway Line upto Phulwari Sharif.
3.	Near Patna Canal and Saguna Turning.
4.	From Kurjee to Polytechnic including Sadaquat Ashram, Brajkishore Memorial, Loyola School.

Issues Regarding Underground Drainage System in Patna :

- Only 20% houses are connected with underground drainage system.
- Rest 80-85% houses with septic tanks.
- No system of rainwater harvesting exists.
- Infiltration of rainwater into sewerage causes over flooding.
- Partially or fully untreated sewage flows into open drains.

Issues of Storm Water Drainage System :

- There are provisions for separate drains but in practical all wastes , untreated sewage , septic tanks and storm water flows in same drains.
- Incompetent pumping stations.
- Overpopulation and construction of unplanned colonies.
- Encroachments , solid waste dumping, silt deposition leads to water logging.
- Multilateral agencies lead to mismanagement.

A COMPARATIVE STUDY

1. Indus valley civilisation v/s Patna



Drainage System of Indus Valley Civilisation and Patna

Indus Valley Civilisation	Patna
<ul style="list-style-type: none"> • All houses had drainage facility. • Special facility of Vertical pottery drainage shafts was present. • Cleaning was done regularly. 	<ul style="list-style-type: none"> • All houses do not have drainage facility. • No such unique facility is available. • Cleaning is not done regularly.

2. London v/s Patna



London

Patna

London	Patna
<ul style="list-style-type: none"> • Length of drains-160km. • It has 6 interceptor sewers. • Controlled localized floodings observed. • Area is not divided into zones. 	<ul style="list-style-type: none"> • Length of drains-184km. • It has 11 pumping stations. • Floods out of control is observed in some areas. • Area is divided into 11 zones.

3. Tokyo v/s Patna



Tokyo

Patna

Tokyo	Patna
• Special feature named G-cans is present.	• No such feature is available.
• No flooding situations can be seen.	• Flooding situations are commonly seen.
• Resources are properly utilized.	• Resources are not properly utilized.

4. Dhaka v/s Patna



Dhaka

Patna

Dhaka	Patna
• No legal flood management policies available.	• Flood management is present.
• Flood risks are more.	• Flood risks are less.

4. Mumbai v/s Patna



Mumbai

Patna

Mumbai	Patna
• 53 pumping stations.	• 11 pumping stations.
• 1400km long network of drains.	• 184 km long network of drains.
• Open defecation is of about 17% of population.	• Open defecation is about 2-3% of total population.

ANALYSIS

Table No. 3.

Sl. No.	Items	Patna	Indus	London	Tokyo	Dhaka	Mumbai
1.	Country	India	–	England	Japan	Bangladesh	India
2.	Length of Drainage System	184 Kms. (Approx.)	–	1600 Kms.	–	–	1400 Kms.
3.	Special Facility	–	Vertical Pottery Drainage Shafts	–	G Cans	–	–
4.	Food Risks	50%	–	5-10 %	–	80%	30%
5.	Pumping Stations	11	–	6	–	–	53

Survey :

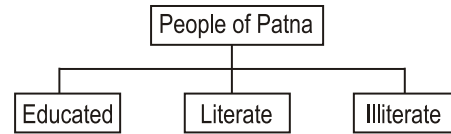


Chart Showing Satisfaction and Dissatisfaction of Educated People



Chart Showing Satisfaction and Dissatisfaction of Literate People

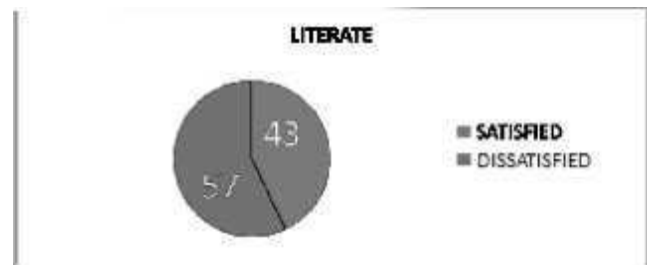
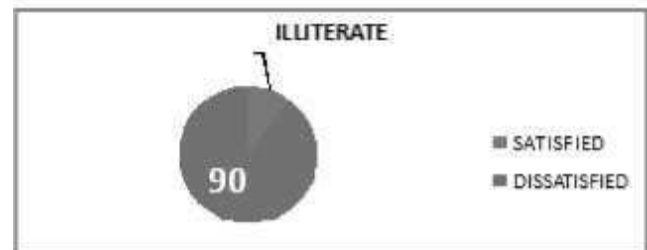


Chart Showing Satisfaction and Dissatisfaction of Illiterate People



Interview With Mr. R.K. Verma, Engineer, Nagar Nigam Patna

According to Mr. R K Verma, the Nagar Nigam engineer, the situation of drainage system of Patna is not at its best due to lack of funds and cooperation of people. But still the PMC is trying its best to eradicate all the problems existing in Patna relating to drainage .

Suggestions :

1. Suggestions – Experts

- S.SINHA OF PANI MORCHA – southward extension of current drainage system.
- SANTOSH KR OF NIT PATNA-ban on plastic items.
- SUJATA HINGORANI-use of bio drainage
- S. S. CHAKROBORTY, DELHI development of infrastructure
- DEEPAK BAXI,VIT, PATNA-watershed management programme
- A.K.GOSAIN, IIT DELHI-contribution of local people ,NSS etc.

2. Other Suggestions

- Use of geo textile filters, coco fibres or rag filters , smart ditch
- Drainage in natural flow of water
- Slot drainage
- Use of advanced technology like GPS and GIS

Conclusion :

Drainage system of Patna is very old , its situation is very pathetic and needs steps to be initiated for its improvement. In this project we have tried to highlight the major problems faced by the common people as well as the organisation PMC. Blaming each other is no solution . Now it is time to take initiative at the lower level where every individual needs to perform his civic duties by keeping his nearby place clean and neat. If every individual keeps his surroundings clean then one day we will be among the top cities with perfect drainage system.

Thus it is not only the duty of municipal corporation but also the duty of every individual to give their best efforts towards keeping their environment neat and clean.

“SOMETHING IS BEAUTIFUL ONLY TILL WE KEEP IT BEAUTIFUL”

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Dainik Jagaran - dated - 23/4/13, 25/4/13, 4/6/13, 4/6/13, 9/6/13etc.

Interviews

R. K. Verma, Engineer, Patna Nagar Nigam

Citizens of Patna – Kankarbagh, Patliputra Colony, Patel Nagar, Kurjee, Boring Road