



Water logging and its Implications in Patna Municipal Corporation

• Daisy Singh • Sanjana • Ruchi Rani
• Bhawana Nigam

Received : November 2013

Accepted : March 2014

Corresponding Author : Bhawana Nigam

Abstract : *Water logging is the accumulation of rainwater due to lack of a proper drainage system. Patna's saucer-like topography and very old sewerage system has led to acute water logging causing great inconvenience to people of Patna. 'The situation is worse in the eastern part of Patna, which is greatly affected by water logging during the monsoonal period' (Siddhartha, 2009). In India trash mainly hazardous plastics, metals and packaging are growing exponentially. In the last decade, garbage has increased at nearly twice the rate of population growth leading to water logging during rainy season. (Siddhartha, 2009). It has been found in the survey*

that 73% of the respondents face problem of water logging and 17% of the household lies in the area where water takes more than 5 days to recede out of the houses. The survey shows that 63% of the respondents face this hellish condition due to throwing of garbage on roads and drains. This is mainly due to improper garbage disposal facility in the city. 'The people who live amidst this rotting garbage and untreated sewage, fall easy victims to dysentery, malaria, dengue, diarrhoea and a host of other diseases. More than 3 lakh children alone die of dysentery in Indian cities each year according to Health Ministry (Siddhartha, 2009). The reason for old Indian cities like Patna being so dirty is that the city is a combination of careless municipal authorities who refused to change outdated waste disposal practices that can no longer cope up with population growth and new trash like plastics and other non-degradable waste (Siddhartha, 2009). On the other hand 'the wards of Kadam Kuan and West Lohanipur have been re-built and the drainage system has been improved, but what is more important is a change in people's attitude. People often praise cities like Bangalore and Mumbai, but they do not realize the reason behind it. People must change their mentality and understand the importance of civic sense' (Mandal, 2011). 'The first solution to our urban progress is the systematic development of the fast growing urban centers' (Siddhartha, 2009).

Daisy Singh

B.A. III year, Geography (Hons.), Session: 2011-2014,
Patna Women's College, Patna University, Patna,
Bihar, India

Sanjana

B.A. III year, Geography (Hons.), Session: 2011-2014,
Patna Women's College, Patna University, Patna,
Bihar, India

Ruchi Rani

B.A. III year, Geography (Hons.), Session: 2011-2014,
Patna Women's College, Patna University, Patna,
Bihar, India

Bhawana Nigam

Lecturer, Department of Geography,
Patna Women's College, Bailey Road,
Patna – 800 001, Bihar, India
E-mail :

Key words: *Water Logging, Encroachment, Health hazards, Municipal Corporation.*

Introduction :

Water logging is the accumulation of rainwater on roads after rains due to lack of a proper drainage system. It is the most common problem plaguing several parts of the state capital during rainy season. After heavy rains Patna becomes a floating city. The saucer shaped topography; faulty drainage system, natural siltation, encroachment, illegal constructions, absence of inlets and outlets, improper maintenance of existing drainage system etc. are the main reasons for water logging in Patna. The improper and unscientific functioning of Municipal Corporation, is also one of the major reasons.

Water logging creates adverse social, physical, economic, health related and environmental impacts. Disruptions in traffic movement, damage to structures and infrastructure, loss of income potentials, disruption in electricity supply, foul smell, etc. are the effects of water logging in the Urban Agglomeration (city life). It also increases the risk of water borne diseases like malaria, dengue, jaundice, gastrointestinal infections such as typhoid and cholera. According to a study, water borne diseases spread in monsoons (July to September) showing a percentage of 44.67% and 39.33% respectively.

Every year in Patna Urban Agglomeration, water logging throws normal life out of gear in different areas including Lohanipur, Patliputra Colony, Kadamkuan, Srikrishnapuri, Gardanibagh, Gandhi Maidan, S.P. Verma Road, Ashok Rajpath, Sabji Bagh, Kankarbagh, Rajendra Nagar, Hanuman Nagar, Kautilya Marg, Exhibition Road, Bahadurpur etc. According to Patna Municipal Corporation (PMC), there are 1200 kms of underground drains under the control of Patna Municipal Corporation but civic bodies do not have

required equipments to clean them. There are 122 pumping stations to drain out water, but 113 are operational and the remaining 9 would be made operational but sanitation workers have to face a tough time in cleaning such drains. (articles.timesofindia.indiatimes.com)

Objectives of the Study :

The main aim of this study is to: i) observe the general condition during water logging in Patna Urban Agglomeration area; ii) examine the social and economic inconvenience faced by the people during water logging; iii) review the health and hygiene related issues during water logging; iv) observe the development of drainage system in Patna Urban Agglomeration and v) examine the nature and type of assistance provided by Patna Municipal Corporation and the state government.

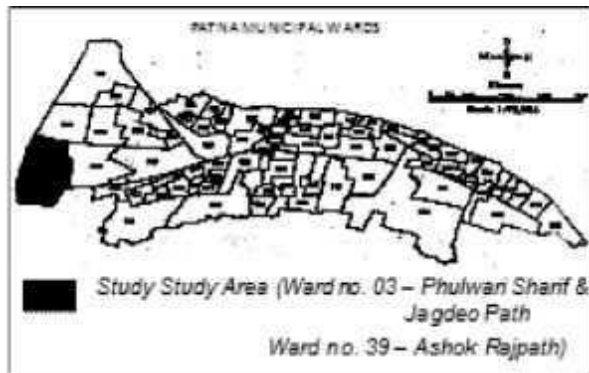
Study Area :

The present project work has been carried out in Patna Urban Agglomeration area. Patna is the capital city of Bihar and is situated on the crossing of 25° 37'N latitude and 82° 12'E longitude. Patna is located on the right bank of river Ganga. On the basis of physiography, the city of Patna lies within the South Bihar Plain (Sinha, 2013). Patna has saucer shaped topography, so water logging is common in central part of Patna (especially in Kankarbagh and Rajendra Nagar area). The total span of Patna Municipal Corporation area is around 110 square kilometers having a population size of 1.8 million (Census 2011).

Patna Municipal Corporation area consists of 72 wards. These wards are distributed into 4 circles namely New Capital Circle, Bankipore Circle, Kankarbagh Circle and Patna City Circle. Field survey of the study includes the area around Ashok Rajpath (ward no. 39) of Bankipore Circle and the areas around Phulwari Sharif and Jagdeo Path (ward no. 3) of New Capital Circle.

Figure 1

Map showing Division of Patna into wards and selected study area



Database and Methodology :

The study is mainly based on the primary data collected through the questionnaire, for a sample size of 100 households in the three study areas of Patna Urban Agglomeration. Altogether, 34 households were randomly selected from Jagdeo Path, 33 households each from Phulwari Sharif and Ashok Rajpath for the survey purpose. However, to supplement the project, the relevant data and published literature have also been consulted. The data regarding garbage collection and the related workers were collected from the Patna Municipal Corporation Office.

This research project followed a distinct methodology mainly having three phases which were – (i) **Pre-Field Survey** (which included the review of relevant literatures, collection of published data, preparation of a base map and visit to the PMC office); (ii) **Field Survey** (which included preparation of questionnaire, sample survey of one hundred dwellers of the study area and generation of primary data); (iii) **Post-Field Survey** (which included the compilation of data, preparation of relevant tables and suitable diagrams and preparation of the project report). (Agrawal, 2012)

Analysis :

With this background, the present study has examined the problem of water logging in Patna Urban Agglomeration and how it is affecting the health, social well being and economic life of the city dwellers. The role of Patna Municipal Corporation, Government and related issues have also been taken into consideration. People's cooperation with the governmental work is also considered as it plays a very crucial role in the maintenance of urban city system such as Patna. Thus, this comprehensive study throws light on causes, impacts, role of PMC regarding water logging and suggested the remedial measures to alter the current scenario.

Causes of Water Logging :

In Patna, during monsoon season, even a small duration of rainfall creates water logging. Water logging is caused due to the sum total of various reasons, for e.g. natural topography of the low lying areas around Sabji Bagh and surrounding areas of Ashok Rajpath are responsible for such water logging while the mismanaged roads are a causative factor for water logging in the Jagdeo Path. The case is different with Phulwari Sharif area where the spread of garbage especially plastic wastes are responsible for a higher intensity of water logging.

Among the various causes of water logging the important ones can be categorized as-

1. **Natural causes** - It includes the saucer shaped topography of Patna sloping towards south and east. Thus, the shape and deficient system as well as a continuous rainfall causes mild to severe water logging in several localities of the city.

2. **Man-made causes** - It includes several reasons, like lack of effective drainage or inadequate capacity for drainage flow, choking of manholes due to improper garbage disposal, encroachment, unplanned constructions; irregular cleaning of manholes, catch pits, drains and sewer lines; unplanned extension of urban areas such as 'Jalla areas of south Patna' to blockage of natural drainage system; spread of slums and squatter settlements near/over nalas and drainage lines etc.

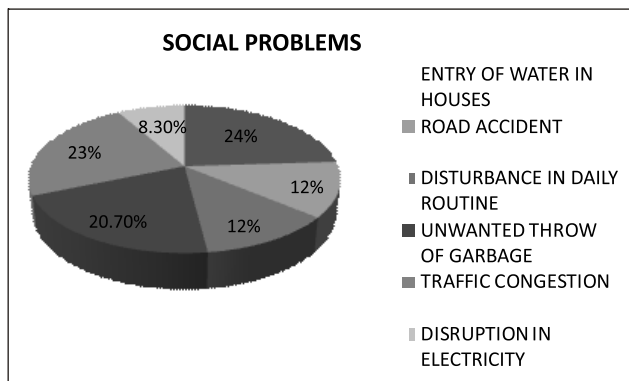
Impact of Water Logging :

Social Impact : Water logging creates many social problems like entry of water in houses during heavy rains, road accidents due to accumulation of water and the uncovered manholes and potholes, slippery surface and potholes on roads, disturbance in daily routine, unwanted spread of garbage, traffic congestion, disruption of electricity, etc.

Water logging affects the daily routine of students, working men and women while commuting. They with great difficulty attend schools and offices and are even unable to attend in case of severe water logging. Due to water logging, people are forced to use private vehicles instead of public vehicles adding to the problem of traffic congestion. People throw their domestic garbage in nalas and on roads which creates a hellish condition when it spreads out due to water logging. In the areas of kachcha road, mud is unable to hold the poles strongly which breaks the high voltage electric wire and disrupts electricity.

Figure – 2

Social Problems Caused Due To Water Logging



Source : Based on Sample Survey, 2013

Figure 2 shows the social problems faced by respondents of the study area. Water enters in the houses of 24% of the respondents causing great misery. It is followed by 23% respondents who face traffic congestion. 20.7% respondents face the problem of unwanted spread of garbage in their localities due to water logging. Road accidents and disturbance in daily routine are the problem of each 12% respondents. Very few people, that is, 8.30% people face disruption in electricity due to water logging.

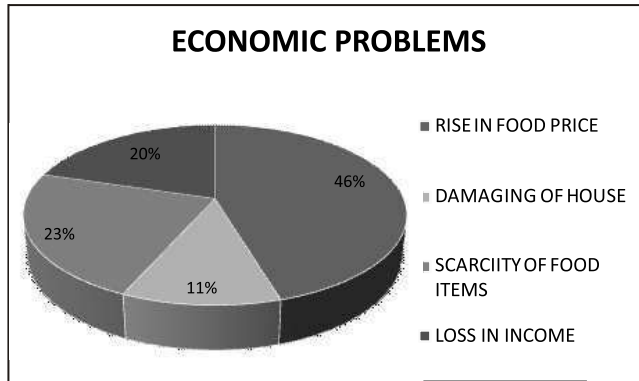
Economic Impact : Water logging around any house for a long duration weakens the base of the house and may result in the collapse of the house and may cause heavy loss of life and property. Wearing and tearing of outer paints and oxidation of iron grills, loss and scarcity of food items, rise in food price and loss of income are some other negative impacts of water logging.

Water logging for a long period causes heavy damage to crops. As a result there is temporary scarcity of fruits, vegetables and grains supplied to urban areas of Patna. Water logging disturbs transportation facility making it difficult to bring food items and thus, prices rise up. The income of unskilled workers is adversely affected. They work on daily wages and cannot go to their work place

due to water logging. People engaged in informal business and those who run shops are also not able to open their shops due to stagnant water on roads and in colonies. On the whole it can be said that water logging creates several inconveniences to people.

Figure 3

Economic Problems Due To Water Logging



Source : Based on Sample Survey, 2013

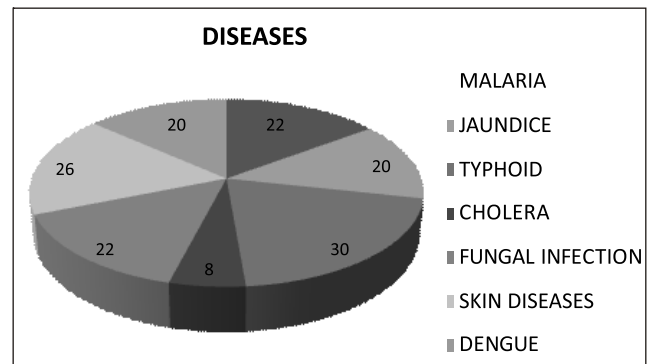
46% respondents complained about rise of food prices during water logging. This is followed by 23% respondents facing scarcity of food. Another 20% people face loss in income followed by 11% respondents whose house has been damaged due to water logging. Thus people face a lot of economic problems during water logging.

Health Hazards : During rains, water gets accumulated in low lying areas, in houses, streets and in unused containers. The stagnant water and the spread of garbage create mess and become breeding ground for bacteria, mosquitoes, viruses etc. which cause diseases like Malaria, Cholera, Typhoid, Fungal Infection, Gastro-intestinal diseases, Diarrhoea, Nausea and the dreaded Dengue. As a result people frequently fall ill and have to visit the doctor. According to the survey 33% respondents of the study area visit the doctor once a month due to water logging and related health hazards.

Dengue is a deadly disease and it is caused to all sections of people and especially in areas where the problem of water logging is acute and there is lack of proper sanitation, lack of proper sewerage system, lack of garbage disposal facility, lack of infrastructure etc. According to a study, over 110 Dengue cases of Patna UA have been already reported in PMCH this year and there are more than 450 cases of Dengue all over Bihar. Thus, water logging creates serious health hazards which cannot be ignored along with social and economic problems.

Figure- 4

Spread of Diseases in the study area



Source : Based on Sample Survey, 2013

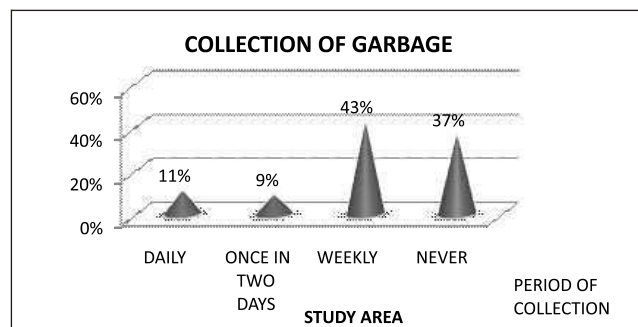
During water logging in the monsoon season, 30% people were affected by typhoid, 26% by skin diseases, 22% each by malaria and fungal infection and again 20% respondents each by jaundice and dengue. 8% respondents were affected by cholera.

Role of Patna Municipal Corporation Regarding Water Logging :

Water logging is a serious problem in Patna; its effect can be minimized to a great extent if checked timely and properly by Patna Municipal Corporation (PMC). It is the work of Municipal Corporation to look after proper drainage facility, proper garbage disposal facility, proper management and cleaning of water drainage before and after monsoon in the city.

The residents of Patna have several complaints against PMC. It is about frequency of garbage collection, pathetic condition of drains and manholes, lack of fogging and sanitation services provided by PMC, intolerable foul smell due to regular accumulation of sewerage water and the creation of breeding ground for mosquitoes and flies leading to health hazards. In the survey it was found that 87% of the respondents were highly dissatisfied with the work of PMC. From the responses given by the people, it can be concluded that PMC is not working properly as per the expectations of people. Regular collection of garbage, better garbage disposal facility, treatment of stagnant water, etcetra are expected from PMC.

Figure 5
Collection of Garbage in the study area



Source : Based on Sample Survey, 2013

Figure 5 shows the frequency of collection of garbage by PMC in the study area. Weekly collection of garbage is done in the colonies of 43% of the respondents of the study area. 37% of the respondents have never seen any garbage collection in their areas. Only 11% respondents responded about the daily collection of garbage in their areas followed by 9% where garbage collection is done once in two days.

Table - 1

Workers with PMC

| | Post | Population per worker | | Worker per kilometer | |
|--------------|---------------------|-----------------------|-------|----------------------|------|
| | | 1975 | 2012 | 1975 | 2012 |
| Demand force | Sanitary labor | 135 | 481 | 111 | 32 |
| | Sanitary supervisor | 2140 | 7616 | 7 | 2 |
| | Sanitary inspector | 22524 | 80152 | 0.67 | 0.19 |
| | Driver | 6757 | 24046 | 2.22 | 0.64 |
| Working | Sanitary labor | 135 | 481 | 111 | 32 |
| | Sanitary supervisor | 2140 | 7616 | 7 | 2 |
| | Sanitary inspector | 22524 | 80152 | 0.67 | 0.19 |
| | Driver | 6757 | 24046 | 2.22 | 0.64 |

Table 1 shows the comparison of workers available with PMC for different posts in the year 1975 and 2012.

Challenges Faced by PMC :

PMC also faces some problems like lack of employees, lack of machines and tools, no cooperation from other governmental and non-governmental organization and apathy of the government in cleaning the city during water logging.

Initiatives Taken by PMC and Government :

1. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) had allocated a fund of Rs. 33 Crore to PMC under '*Chaka Chak Patna*' scheme for solid waste management in the city. This was a *door-to-door garbage collection scheme*. (Data collected by the published diary of PMC, 2010).

2. A project of Rs. 2000-2500 Crore is being proposed by PMC from government for cleaning Patna and preparing a new drainage system. (Income-expenditure Budget, PMC, 2011-12).

3. Government has selected the detailed project report for the overhauling of drainage system to avoid water logging in low lying areas during rainy season.

4. The *concrete drains (pucca drains)* in several areas have been cleared before monsoon this year. But, the cleaning of the underground drains and inlet points are the biggest challenge for PMC sanitation workers.

5. The Patna High Court has directed the state government to *constitute a three member committee* to probe or check the expenses of Patna Municipal Corporation. The court has also asked the PMC to *submit a counter affidavit* regarding garbage and water logging problems. (High Court site, Judgment order, CWJC No. 9574 (2010))

Conclusion :

Old and poor drainage system, unwanted spread of garbage on roads and drains, encroachment, ignorance by PMC and non-cooperative common people are some of the major reasons for water logging in the city. Water logging has negative impact on socio-economic conditions like traffic congestion, damage to houses, scarcity of food, disturbance in transportation, loss in income of people etc. It has been deduced from the survey that 73% of the respondents faced water logging. The people who live amidst the rotting garbage and untreated sewage, fall easy victims to dysentery, malaria, dengue, diarrhoea and a host of other diseases. PMC lacks adequate number of staff and machinery. 82% of the respondents in the survey are not satisfied with the work of PMC.

Suggestions :

- There should be construction and maintenance of roads and streets with proper water flowing facility.
- Manholes should be made in between two inlet points.

- Slope of the road should be towards drain lines.
- Rain gardens or rain water harvesting system should be installed.
- Bio-drainage could be an intelligent step in reducing the stagnancy of water.
- Residential societies and NSS volunteer can be used as work force for cleanliness drive.
- There must be adequate numbers of PMC dustbins in all colonies.
- Private Companies can join too and help the government in picking up of garbage and convert it into rich, organic compost or items of some good use.
- Encroachment over drains should be removed at the earliest to maintain the normal flow of drain water.
- Government must take some initiatives and listen to the problems of PMC department which is suffering from lack of staff and machinery.
- Common people of Patna should take care of throwing garbage and contribute towards achieving a clean Patna.

But only framing of suggestions is not enough, its implementation is more important. All these steps, if implemented properly, will definitely improve the undesirable social, economic and health implications of water logging in Patna Urban Agglomeration area.

References :

Books

- Agrawal C., Sharma V. (2012). *Research Methodology in Geography*. New Delhi : Commonwealth Publishers.
- Mandal R.B. (2011). *Urban Geography*. New Delhi: Concept Publishing Company.
- Siddhartha K., Mukherjee K. (2009). *Cities Urbanization And Urban System*. New Delhi : Kisalaya Publications Pvt. Limited.
- Sinha V.N.P. (2013). *Bihar- Land, People and Economy*. New Delhi : Rajesh Publications.

Government Reports / Documents

- Census of India, 2011.
- Data collected by the published diary of PMC, 2010.
- High Court site, Judgment order, CWJC No. 9574 (2010).

- Income-expenditure Budget, PMC, 2011-12.
- Gazette of Bihar, 1975-76.
- Gazette of Bihar, 2011-12.

Web links

- www.patnamunicipalcorporation.com (Retrieved 25-09-2013)
- www.articles.timesofindia.indiatimes.com (Retrieved 13-08-2013)
- www.waterandmegacities.org (Retrieved 13-08-2013)
- <http://www.hdp.gov.in/waterlogging.html> (Retrieved 16-09-2013)