

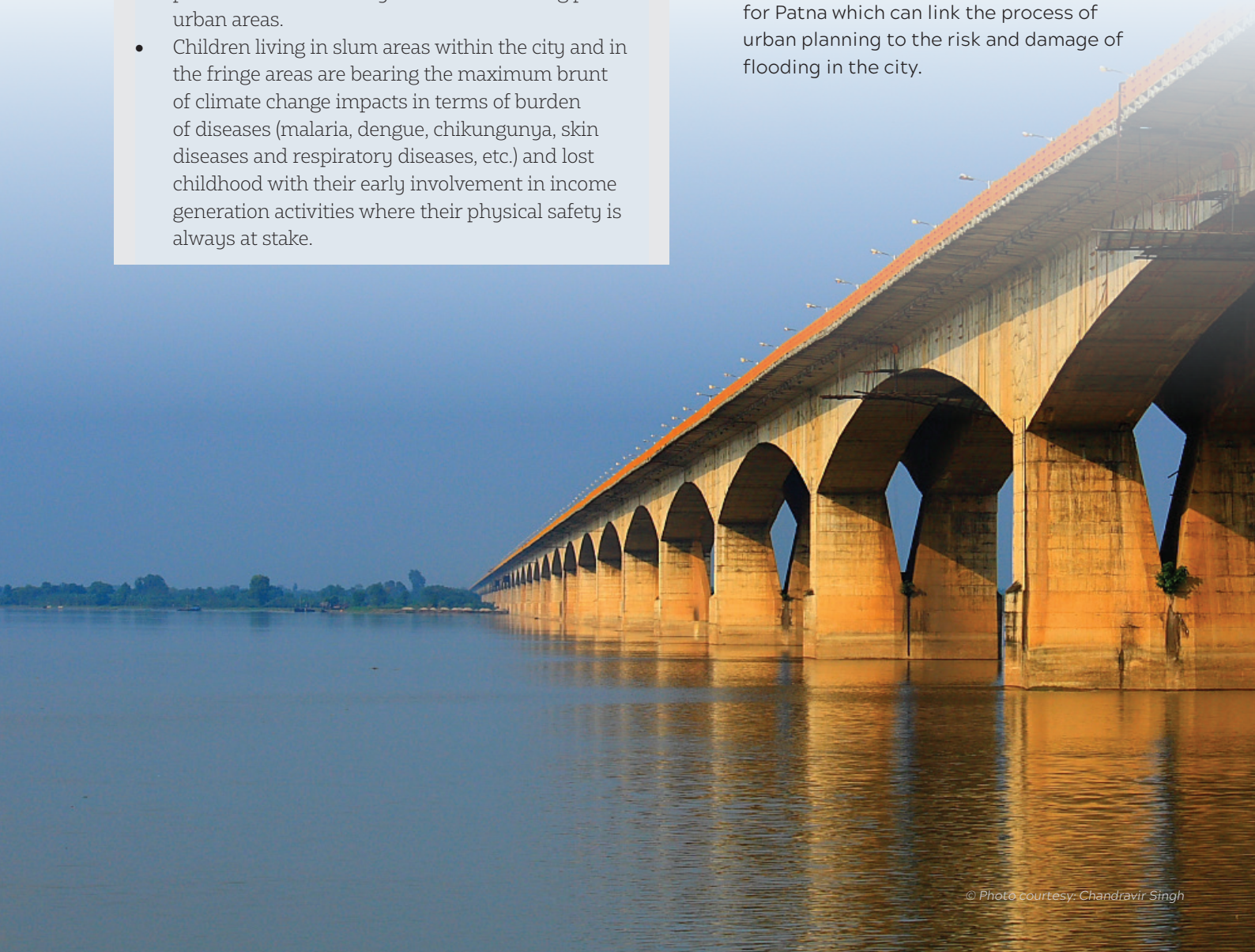
Patna

FACTSHEET

Key Findings

- The number of days with temperatures above 40 °C in the city are increasing, adversely affecting children's health and causing heat strokes in school going children as well as those children who are compelled to work in the open.
- Variations in temperature over the city is resulting in situations where the duration of temperature regime between 10-20 °C is increasing, creating a conducive environment for breeding of mosquitoes giving rise to vector-borne diseases.
- The city is expanding in an unplanned manner with unauthorized construction happening on the flood plains which will result in unavoidable conditions of waterlogging in near future aggravating the vulnerabilities of marginalised population, especially poor children in the city and in surrounding peri-urban areas.
- Children living in slum areas within the city and in the fringe areas are bearing the maximum brunt of climate change impacts in terms of burden of diseases (malaria, dengue, chikungunya, skin diseases and respiratory diseases, etc.) and lost childhood with their early involvement in income generation activities where their physical safety is always at stake.

Patna, the capital of Bihar, is the second largest city in eastern India after Kolkata. It is located on the southern bank of the river Ganga into which four other rivers Ghaghara, Gandak, Punpun and Sone drain. The Patna Municipal Corporation (PMC) area covers 107.62 sq. km and is comprised of 6 sub-divisions and 72 wards. The city receives rainfall from both, the southwest and northeast monsoons and has an annual average precipitation of 1,100 mm. Patna falls under Seismic Zone IV, which is a high-risk earthquake zone. It also falls in the risk zone of floods as well as of high wind damage. The impact of climate change is recognized as an important issue in the city, which is highly prone to hydro-meteorological hazards. The city has been facing the challenge of acute urban flooding in the past few years where several parts of the city stood inundated for several days and at times even months. Strategies need to be developed for Patna which can link the process of urban planning to the risk and damage of flooding in the city.



quick facts

Geography

Geographical Coordinates:

Latitude 25.6 °N
Longitude 85.1 °E

Height from mean sea level:

174 ft

Area of Municipal Corporation*:

107.62 sq. km

Wards:

72

Demography

Population*:

16,84,222
(Census,2011)

Decadal Population Growth Rate*:

17.66% (from 2001 to 2011)

Population Density:

15650 persons per
sq. km

Total Households*:

294,612

Average Household Size*:

6

Slum Population*:

77034

Slum Households*:

13696

Floating Population***:

2-2.5 lakh

Literacy Rate*:

83.37%

Sex Ratio*:

885

Climate

Climate

Humid subtropical climate

Annual Rainfall

1,100 mm

Major Disasters

Flood/Waterlogging, Fire,
Earthquake, Road accident,
Health epidemic

Children

Child Population*

0-4 years: 134519
5-9 years: 168112
10-14 years: 185260

Children currently attending school (Age 6-17 years, Patna-Urban)* **-

96.9

Children aged 5-14 years engaged in work % (Patna-Urban)**

1.1

School Dropout % (Patna-Urban, Age 6-17 years)**

2.4

Crude Birth Rate (Patna-Urban)**

16.9

Crude Death Rate (Patna-Urban)**

4.6

IMR (Patna-Urban)**

25

U5MR (Patna-Urban)**

29

Sex Ratio at Birth (Patna-Urban)**

936

MMR (Nalanda, Patna, Bhojpur, Buxar, Kaimur Bhabua, Rohtas)**

221

Children Suffering from Diarrhoea (%) Patna-Urban**

5.2

Children Suffering from Acute Respiratory Infection (%) Patna-Urban**

16.1

*Census 2011, Census of India

**Annual Health Survey 2012-13 Fact Sheet, Bihar

*** Master plan of Patna , 2031

Climate Scan of the City:

Observed Climate

- Humid subtropical climate with four main seasons: Winter, Summer, Monsoon and Post-monsoon.
- Extreme hot summer prevails from late March to early June.
- The monsoon season prevails from mid-June to late September (accounts for more than 80 per cent of its annual rainfall).
- Chilly winter nights and foggy/sunny days prevails from November to February.
- Annual mean temperature of Patna is 25°C.
- Annual mean maximum temperature of the city is 31.30°C.
- Annual mean minimum temperature is 19.80°C.
- The highest temperature during the last 115 years was recorded as 46.6°C on 9th June 1966, while the lowest ever was 1.1°C on 9th January 2013.

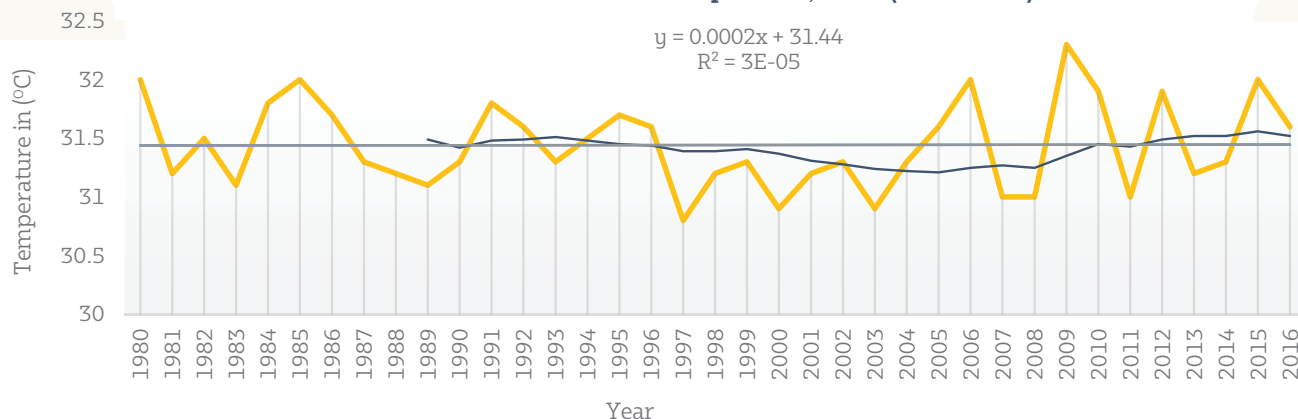
Annual Climate Change Trend

- The rainfall amount is decreasing at the rate of 3 mm over the last 30 years (1985-2015).
- Annual mean minimum temperature has significantly increased in last 37 years over Patna i.e. 0.021 °C/year.
- The highest increase in mean minimum temperature in winter and post monsoon season i.e. 0.022 °C/year was observed during 1980-2016.
- Patna has witnessed a significant increasing trend in temperature; at times it witnesses temperatures more than 45 °C.

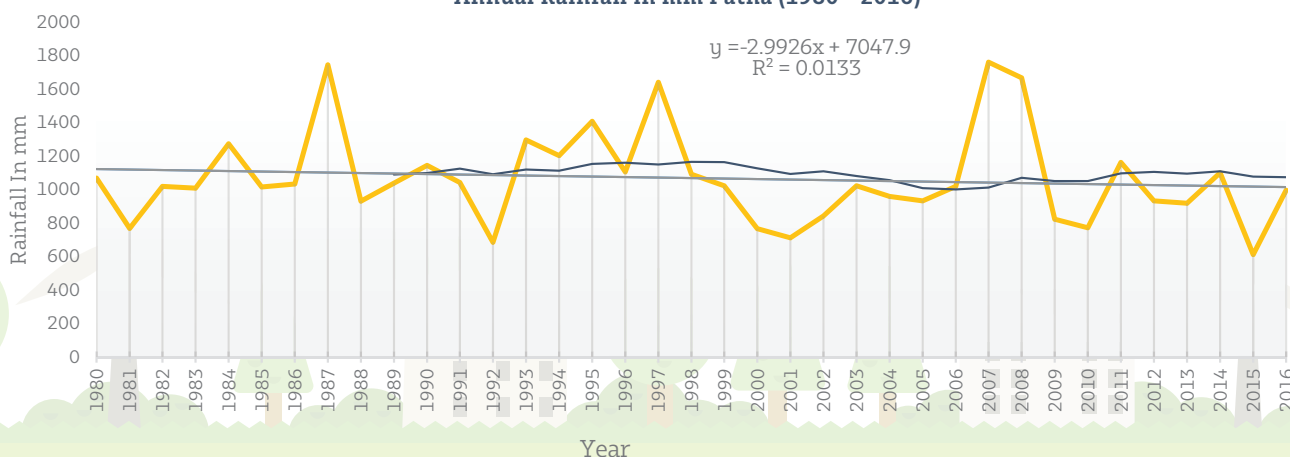
Future Climate Change Projections

- Annual maximum temperature is likely to increase by 1.82 °C by 2050.
- Annual minimum temperature is likely to increase by 1.95 °C by 2050.
- Annual mean maximum temperature is likely to rise by 1.75 °C by 2050 during post monsoon. Whereas in winter, this is likely to rise by 1.85 °C by 2050.
- Annual mean minimum temperature during post monsoon season is likely to increase by 2.85 °C by 2050.
- Hot days and warm night might increase.
- Mean annual rainfall is projected to increase by about 8-12 %.
- Mean monsoon rainfall is likely to increase by 70-90 mm by 2050.
- Most of the increases might occur in the monsoon period.
- Extreme rainfall events might increase by 10-25% by 2050.

Annual Mean Maximum Temperature, Patna (1980 - 2016)



Annual Rainfall in mm Patna (1980 - 2016)

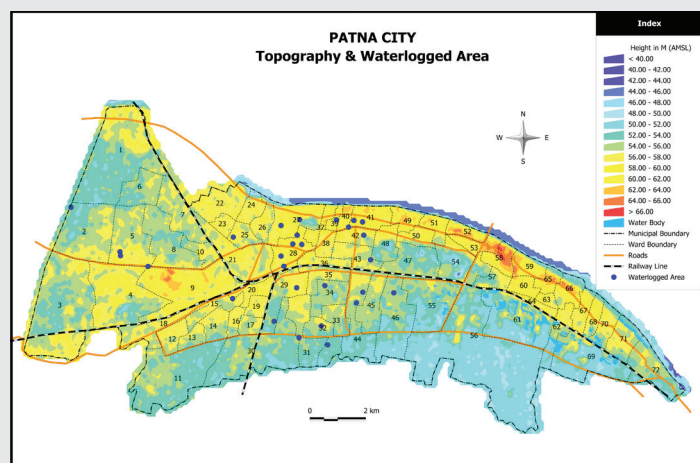


RISK FRAME OF PATNA



Tackling climate change impacts and achieving development amidst widespread poverty are the two major challenges faced by Patna City. Failure to tackle climate change impacts will further have disastrous effect on development of the city which is currently happening in an unplanned manner exposing the marginalised populations to different types of hazards. The impacts of such hazards also depend on natural systems of the city like vicinity to rivers, topography, low slope gradient and high groundwater table. The role of communities and their behavioral dimensions also have a key stake in determining the risk frame of the city. Lack of responsible behavior towards the maintenance of city's services, lack of ownership, lack of awareness, low level of civic discipline and social discrimination are some of the key factors which enhance the vulnerability of the city as well as its population. Lack of adequate planning and effective enforcement of rules and regulations further aggravates the existing vulnerabilities. Urban flooding, waterlogging in new areas due to extreme rainfall, sun strokes and sudden increase in diseases such as Dengue, Chikungunya are identified as major climate related shocks for the city. It has been found that the current

actions, existing plans, policies and procedures are not at par to tackle the impacts of climate change on the city. Ultimately, the combined effect of such natural, human and development factors are resulting into enhanced vulnerability of the city in the events of climate variability (current and projected future) leading to enhanced shocks and stresses of urban people and hence increased risks in the city. These shocks and stresses are further aggravating poor children's vulnerabilities, adversely impacting their health, education, water & sanitation aspects, nutrition and physical protection.



Climate change vulnerabilities of urban poor children

Key Issues	Responsible Factors	Special Categories of Affected Children
Health: <ul style="list-style-type: none"> • Infectious diseases such as malaria, dengue, chikungunya • Respiratory diseases such as asthma and allergies • Skin related diseases such as boils, warts and itching 	<ul style="list-style-type: none"> • Rapid increase in temperature • Lack of proper dumping site • Waterlogging • Vegetables cultivated by using wastewater especially in the outskirts • Lack of proper sewerage system, health and institutional facilities 	<ul style="list-style-type: none"> • Children living in the slums • Children living in fringe areas of the city • Children working in informal sector for their livelihoods. • Migrated or resettled children due to climate change impacts
Education: <ul style="list-style-type: none"> • Decreased school attendance due to illness • Climate induced disasters hit the poor communities who are then forced to discontinue their children's schooling • Displacement due to rural-urban migration, which leads to problem of identity, influencing education adversely • Schools located in the low lying areas are prone to waterlogging, which affects the building structure in several ways • Lack of infrastructure facilities such as drinking water and toilets in school premises leads to open defecation and infectious diseases 	<ul style="list-style-type: none"> • Floods and waterlogging • Location of schools in low land area • Shallow hand pumps, inadequate infrastructure such as drinking water, toilets, lack of safety, no open fields, high rural-urban migration 	
Nutrition: <ul style="list-style-type: none"> • Increasing malnutrition resulting in improper growth, manifesting in the form of low weight, stunted height, low IQ, under five mortality • Diminishing food security 	<ul style="list-style-type: none"> • Droughts leading to food shortage • Low incomes of informal vendors and wage workers directly impacting their children's nutrition • Urbanization reduces the scope of farm based activities thereby diminishing the availability of diverse food and adequate nutrition 	
WASH: <ul style="list-style-type: none"> • Lack of potable water • Water-borne diseases like diarrhoea, cholera, typhoid, and hepatitis. 	<ul style="list-style-type: none"> • Lack of proper dumping site • Waterlogging and floods • Lack of proper sanitation infrastructure, lack of health and hygiene awareness among parents and children • Open defecation 	

Key Issues	Responsible Factors	Special Categories of Affected Children
Child Protection: <ul style="list-style-type: none"> Lack of basic entitlements Drug and Substance abuse Sexual abuse Trafficking Gambling Child marriage 	<ul style="list-style-type: none"> Rural to urban migration Eviction drives in informal settlements Children get involved in informal sector activities for their livelihood Lack of education and awareness among parents about child safety issues. 	

Strategic directions to build climate resilient and child friendly Patna

Health	Education	WASH	Nutrition	Child Protection
<ul style="list-style-type: none"> As minimum temperature is increasing in the city, concentrated health related initiatives need to be strengthened in winter season also. Phase out current dumping grounds, particularly those in the low-lying areas of the city. Cool roof technology for resilience against heat strokes should be adopted. Near real-time diseases surveillance system should take place to monitor and reduce incidence of water and vector-borne disease outbreaks. Need assessment of human resources in hospitals and adequate deployment should happen. 	<ul style="list-style-type: none"> School safety plans should be implemented. Renovation of old school buildings and construction of new disaster resilient school buildings should happen in the city. Review school course curriculum (text books) through a climate change and disaster risk reduction lens and suggest supportive and innovative materials for awareness building among children. Initiate climate resilient activities through some pilot projects in schools, such as rainwater harvesting, solid waste management etc., and also develop Climate Resilience Plan for Schools. 	<ul style="list-style-type: none"> There is a need to establish local water quality testing labs/ facilities at PHCs and at schools/colleges. Conservation and restoration of natural water bodies and catchment areas. Renovation of broken pipelines. Aquifer mapping Conduct a feasibility analysis for a centralized dual system of sewage as per the natural gradient system (enforcing rainwater-harvesting rules). Develop scenario-based inundation maps for preparedness and response. Take strict action on encroachment of drains. Decentralised sewage treatment plants to be installed. Strict enforcement on ban of plastic waste, dumping in peri-urban areas. 	<ul style="list-style-type: none"> Establishment of kitchen gardens at school gardens with drought and water tolerant crop varieties and vegetables should be encouraged and consumption of same by the children in mid-day meals should be promoted. Promotion of climate resilient agriculture in peri-urban areas. Establishment of sewage treatment plants in peri-urban areas. Strict enforcement of city master plan 	<ul style="list-style-type: none"> Strict enforcement of laws relating to child safety and protection. Awareness among parents and children on child safety and protection issues. Link every child to AADHAR with their family to ensure protection against trafficking during distress periods.

Climate Change and Disaster Resilience for Urban Children:

An Initiative of UNICEF, India and Gorakhpur Environmental Action Group, Gorakhpur, Uttar Pradesh

For further information, please contact:

Gorakhpur Environmental Action Group (GEAG)



Delhi Office:

A-187, First Floor Shivalik, Malviya Nagar, New Delhi 110017,
Phone: +91 11-41667754,
Email: geagdelhi@geagindia.org

Gorakhpur Office:

HIG First Phase 1/4, Siddharthpuram, Tara Mandal, Gorakhpur, Uttar Pradesh 273001
Phone: +91 551 2230004
Fax: +91 551 2230005
Email: geagdelhi@geagindia.org