_VOIS PLANET

Climate conundrum: impact on urban India

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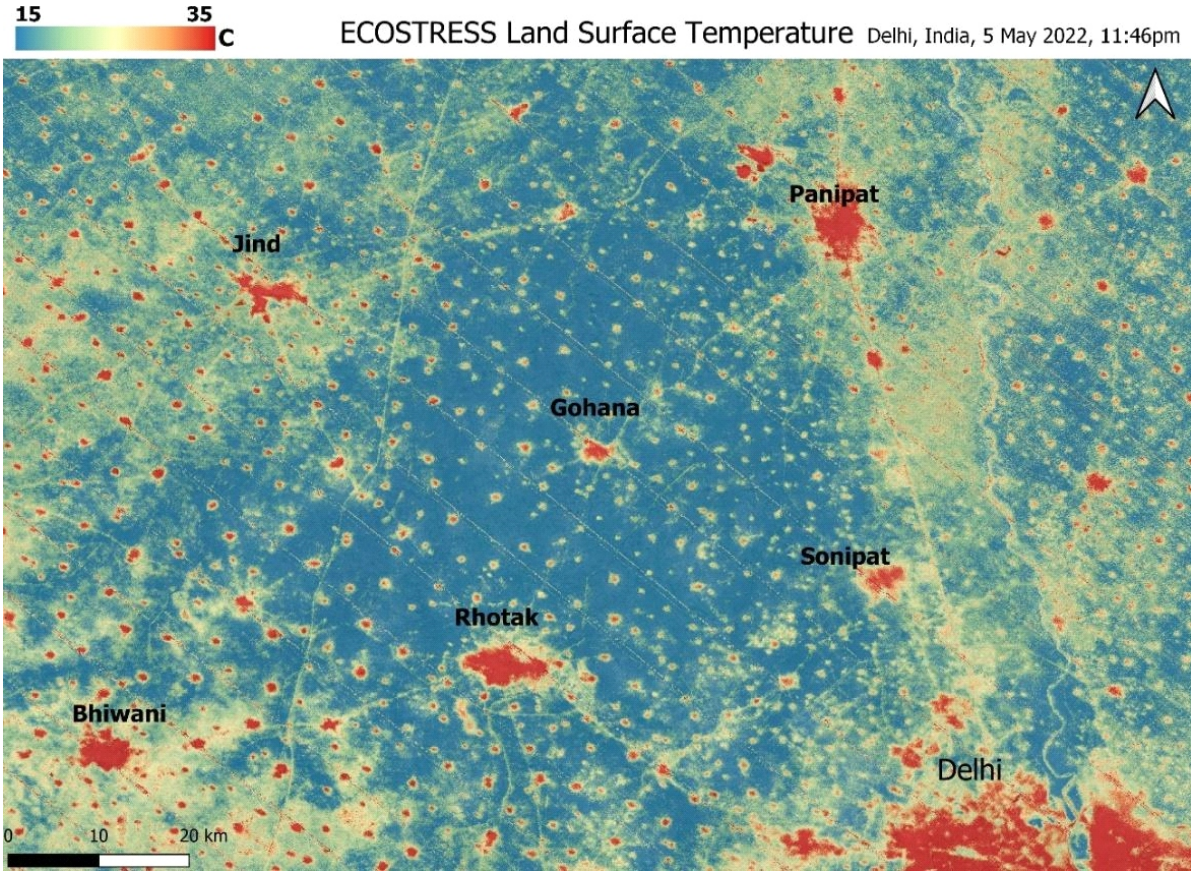
1. Introduction

Climate outlook for India has never been more alarming as it is now. Incidents of untimely rain, prolonged drought, flashfloods, more intense and frequent cyclones—all point to the erratic climate pattern. Media reports on rural distress and layered impact of extreme weather events on lives and livelihood seem to suggest that migrating to urban centres is one of the adaptation strategies that people are adopting.

If different projections are to be believed, about 400 million more people will live in urban centres of India by 2050. However, status quo in mega cities and small cities is not encouraging when we think of quality of life. On one hand, cities are facing multiple climate risks and higher incidence of diseases, and on the other hand, population growth is acting as a stressor. Hence, it is important to take stock of the situation in the urban centres and have a detailed look at the effectiveness and sustainability of such a strategy.

2. How does climate distress play out in urban India?

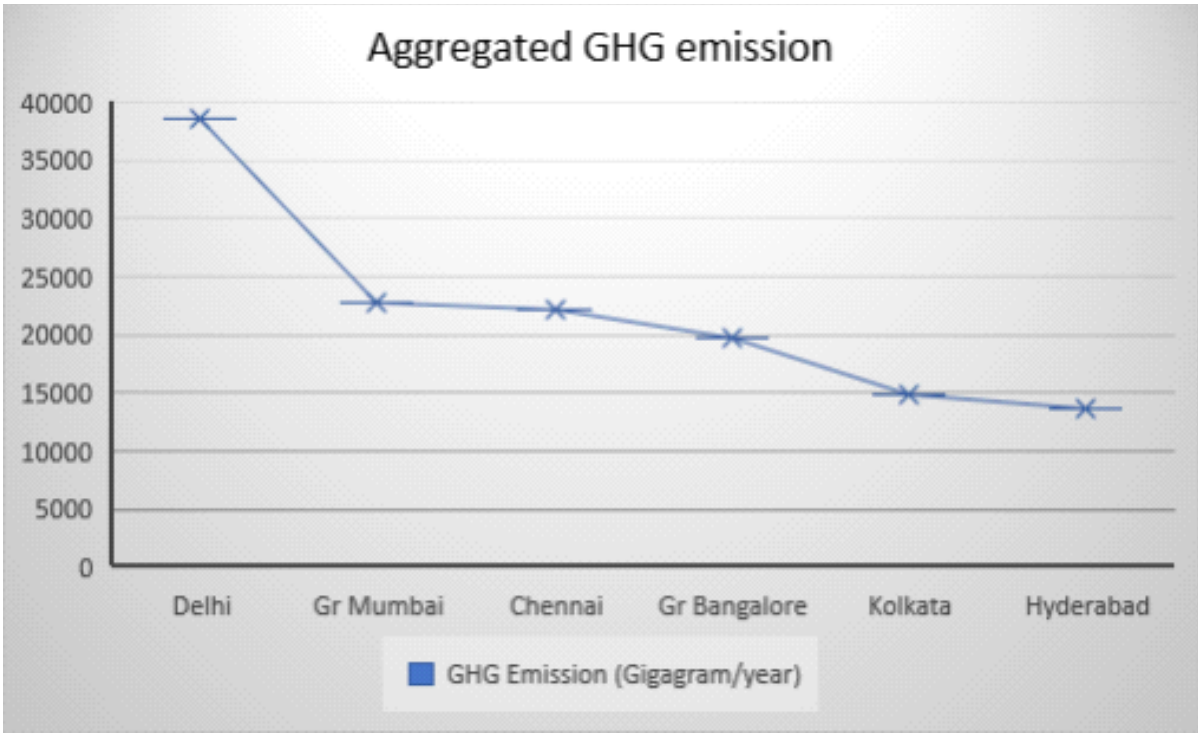
In 2022, Delhi recorded the hottest May since 2018, with mercury touching 49 degrees Celsius, in the first half of the month. It was during one of those days that NASA's satellite captured an interesting phenomenon. NASA's Jet Propulsion Laboratory released images showing "heat islands" in and around the national capital of Delhi. Claiming that the images were taken just before midnight on May 5, NASA's press note said that the temperature in Delhi's urban "heat islands" and neighbouring villages reached 39 degrees Celsius, while surrounding areas were about 5 degrees Celsius colder.



The "heat islands" are visible in the image as red spots.

3. Double whammy of increasing GHG emission and 'waste heat'

The cities are trapping lot of heat because of its steady increase in greenhouse gas emissions. According to a study released in 2015,[1] which assessed greenhouse emissions of cities based on 2009-10 data, Chennai emits 4.79 tonnes of CO2 equivalent emissions per capita—the highest among all cities. The city is followed by Kolkata (3.29 tonnes of CO2 equivalent emissions). Chennai also reportedly emits the highest CO2 equivalent emissions per GDP (2.55 tonnes CO2 equivalent per INR 1 Lakh) followed by Greater Bangalore (2.18 tonnes CO2 equivalent per INR 1 Lakh). If we look at aggregated GHG emissions from all sectors, Delhi leads the cities with 38633.20 Gg/year[1].



1Gg/year = 1000 tonnes/year

Secondly, the cities are also trapping heat through concrete buildings and asphalt roads that have replaced plants and soil. Tall buildings and narrow streets further trap hot air between them and reduce airflow. As a corollary effect, the cities have become energy-guzzling spaces with more air conditioners running for long hours. These ACs emit heat and end up heating the entire neighbourhood. Not just ACs, waste heat from vehicles and factories also add to the ambient heat, further exacerbating heat island effect. Further, increased overall energy consumption for cooling (refrigeration and air-conditioning) puts pressure on power plants to produce more energy, which leads to higher emissions of heat-trapping greenhouse gases. This cycle is insidious.

The urban heat islands have a searing effect on health of residents, especially those in poor neighborhoods. They suffer from heat strokes, heat exhaustion, and even death. Data from the National Crime Records Bureau (NCRB) revealed that between 2015 and 2020, 2,137 people reportedly died due to heat stroke in the northwestern states. The southern peninsula reported 2,444 deaths due to excess environmental heat, with Andhra Pradesh leading the list. Men of working age (30-60 years) have been the biggest casualty.

4. Sea level rise

The coastal cities in India are already witnessing the impact of climate change in the form of storm surges and urban floods. According to reports,[2] Over the last two decades, the quantum of loss of life and property is increasing. When floods hit the streets of Chennai in 2015, it led to financial losses to the tune of INR 22,000 crore. The Kerala floods in 2018 led to financial losses worth INR 27,000 crore.

More recently, in 2020, Hyderabad faced unprecedented rainfall in October leading to deaths of about 50 people and destruction of property worth more than Rs 5000 crore. That same year, Mumbai received 82 per cent of its average July rain in just 8 days. This year, Bengaluru set a record for the highest annual rainfall (1,700 mm till October 18), surpassing the previous high of 1,696 mm in 2017.

What the cities across India are witnessing is the signs of the days that are predicted by experts. Warming of polar caps and ensuing rise in water level have been a constant threat to India, which has a long coastline of 5,700 km. In fact, global literature on sea level rise is full of caveats on the pace at which the Indian Ocean region is experiencing sea-level rise. According to the World Meteorological Organization's (WMO) State of the Global Climate in 2021 report, globally, the rate of sea-level rise was 4.5 mm per year between 2013 and 2021, but in Indian Ocean region, average sea-level rise each year was 2.5 mm more than the global average.

Three major coastal cities—Mumbai, Kolkata, and Chennai—have an average elevation of 2-10 meters. They come under LECZ—Low Elevation Coastal Zones—which have costal elevation of less than 10 meters. Approximately 81,000 square km of land fall under LECZ in India, which is home to over 60 million. Interestingly, 50 per cent of them live in cities. With cyclones and heavy rains estimated to intensify further, the coastal cities are likely to suffer from flooding of lands, particularly during high tide.

To quantify possible consequences for millions of people living along Indian coastline, RMSI, a global GIS consulting company, did a study. It came out with specific numbers in terms of roads and properties that are at risk of getting affected by 2050. According to an article in Water Science Policy portal,[3] such water-related disasters feature prominently in global risk assessment of the World Economic Forum. I

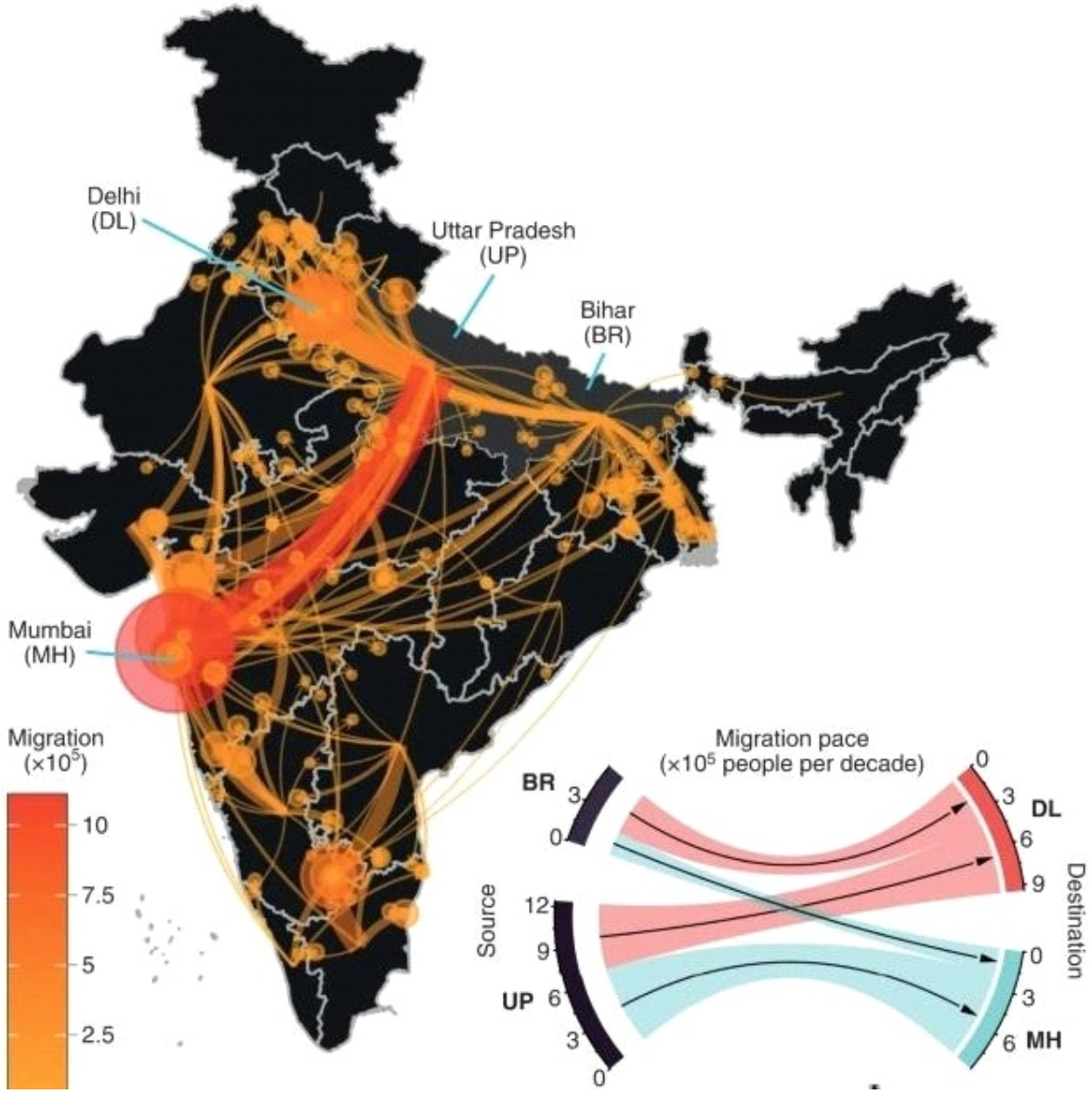
Cities	Length of roads that can get affected	Buildings to get affected
Mumbai	24 km (126 km during high tide)	998 (2,490 during high tide)
Chennai	5 km	55
Kochi	NA	464 (1,502 during high tide)
Thiruvananthapuram	NA	349
Visakhapatnam	9 km	206

5. Migration and lingering threats for migrants

Climate change-induced extreme weather events are already compelling rural population to desert their homes and fields and flee towards towns and cities. While India does not officially capture data on climate-induced internal migration, according to a report by the Internal Displacement Monitoring Centre, about 3.6 million people were internally displaced each year between 2008 and 2019. This is largely attributed to sudden disasters—Cyclone Amphan displaced 2.4 million people mostly from West Bengal and Odisha—and slow-onset climate crises like drought, sea-level rise, water stress, decline in crop yield, and more intense heat waves.

Frequently hit by drought, Andhra Pradesh and Maharashtra are witnessing a wave of migration as crops fail. Low yield from agriculture and failure of existing livelihoods are driving people away from Uttar Pradesh, Madhya Pradesh, and Rajasthan to major cities in Maharashtra or Gujarat, or to Delhi where they reportedly work in brick kilns and construction sites.

This migration is putting a severe strain on urban population and on precious resources like water and land. Major cities in India are experiencing population growth due to migration and it is causing changes in land use pattern and leading to unplanned urbanisation. Urban centres are getting congested, putting pressure on waterbodies, and affecting recharge capacity of natural aquifers.



Pattern of flow of inter-state migration based on the 2011 India Census. Source

More importantly, it is further marginalising the already vulnerable groups of migrants in cities. People turn into slum dwellers and squatters living in informal settlements generally located in vulnerable areas (low lying areas, including flood plains, etc.) with minimum or no access to basic amenities. According to the 2011 Census of India, one in six urban residents live in officially designated slums. Source About 28 per cent of urban residents do not have access to toilets and adequate drainage. source Extreme weather events further expose these social vulnerabilities.

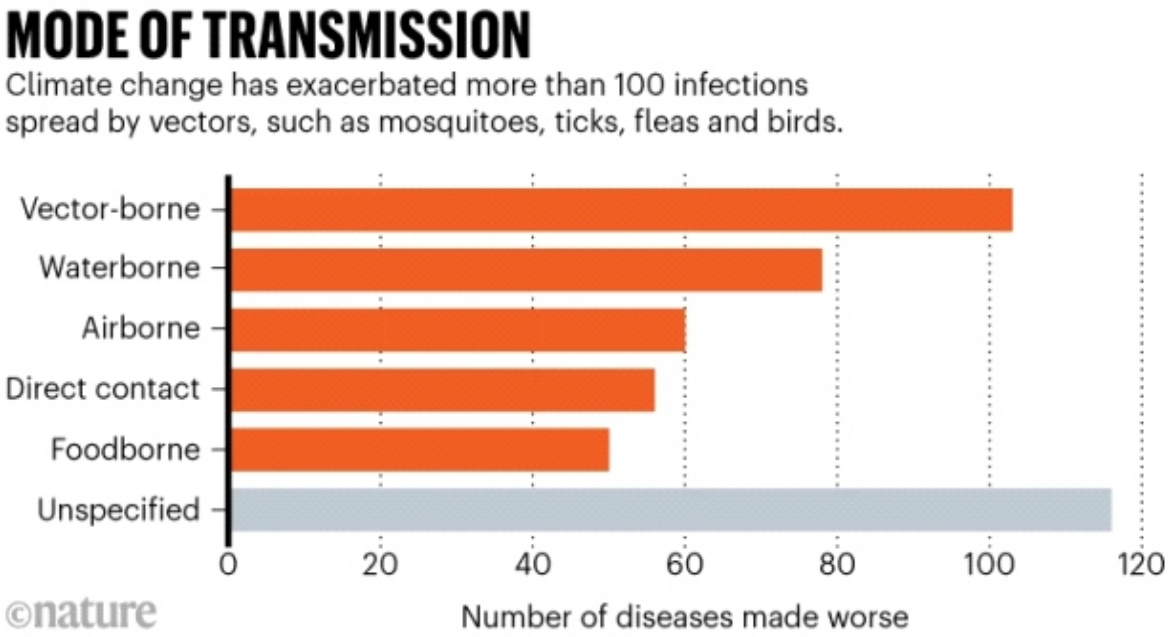
There is no dearth of evidence of these vulnerabilities. In 2013, Odisha witnessed a large-scale migration, especially of fishing communities, when cyclone Phailin hit the state. In the same year, notorious floods induced by cloudbursts forced mass migration from Uttarakhand. However, when they moved to different cities, they often settled in densely packed dwellings and in low-elevation areas, which are prone to get flooded.

On August 29, 2017, Mumbai received 331.4 mm rainfall, which was the highest in a decade. The migrant workers, who work as daily wage earners, live in squatter communities. They were one of the worst affected as wall collapse and drowning were the common reasons for injury and death. In absence of decent and tenured housing conditions and inadequate resource supplies, people became vulnerable to nature's fury in the city. Isn't it an irony that the same set of people, who flee their homes and leave their villages behind in search of better living conditions and livelihoods, are the ones who are the most affected by extreme weather events in cities? Indeed.

A makeshift shelter for migrant labourers from Muzaffarpur (Bihar) was ravaged by Cyclone Amphan in Kolkata.

6. Health

Climate scientists and epidemiologists argue that climatic hazards have led to increase in disease prevalence, especially in urban clusters. Shrinking gap between people and pathogens and increasing range and virulence of pathogens is attributed to extreme weather events. Increase in temperature and rainfall, for example, have expanded the range of mosquitoes, leading to dengue, malaria, and chikungunya outbreaks. Similarly, storms, sea level rise and floods force people to move, often leading to outbreaks of cholera and typhoid fever.



"In India, there has been an accelerated spread of dengue and chikungunya, both transmitted by the Aedes mosquito, which is particularly well adapted to urban areas. The annual number of new dengue cases is estimated at more than 30 million, while chikungunya cases is believed to have increased by 390% over the last three years (2015-17). Recent estimates indicate that India is the country with the highest prevalence of these two diseases," says Olivier Telle, a Research Scientist.[4]

Delhi is a classic example. It is experiencing hotter climate year on year, resulting in higher temperatures and untimely rainfall. These factors are promoting breeding of mosquitoes and increased transmission of dengue. It is a trend that emerged decades back. "Since 1990s, dengue has become more frequent in India, especially in urban zones, and they also spread to new geographic regions. This geographic expansion is due to changes in eco-climatic factors, climate change, rapid urbanisation, population growth and population movement," says a report.

Impact of extreme weather on urban health

Extreme weather event	Health impacts
Heat wave	✓ An increase in the number of people dying from heat stroke. ✓ Increases in cardiovascular and respiratory mortality in the short term
Flood	✓ Floods, landslides and windstorms have both direct and indirect impacts (deaths and injuries) (infectious disease, loss of food supplies, long-term psychological morbidity) ✓ Water and sanitation systems are disrupted. ✓ Providing mosquito vectors with nesting grounds, leading in disease outbreaks ✓ Post-traumatic stress disorder (PTSD) is a condition that occurs after a severe flood
Drought	✓ Reduction in availability of water for hygiene, which can lead to diarrheal and respiratory diseases ✓ Increase in drought conditions may affect water availability and water quality (chemical and microbiological load) due to extreme low flow
Higher temperatures	✓ Diseases transmitted by mosquitoes and ticks (e.g., malaria, dengue) ✓ Temperature affects the survival of major bacterial infections.

Furthermore, these hazards weaken people's ability to cope with infections. The climate-vulnerable migrants live in constant fear of contracting diseases as they have poor sanitation facility, erratic water supply, and little or no waste disposal facility. The UNFPA had pointed out a sinister combination of poor access to health services, crowded living conditions, poor water supply and inadequate sanitation, which is ideal for spreading respiratory and intestinal conditions, and vector-borne tropical diseases like malaria, dengue, typhoid, and yellow fever.

"To control these diseases in a more sustainable manner, the health of the inhabitants must become a key factor of urban development. This involves reforming the management of diseases, and hence of urban centres, developing more equitable urban infrastructures, and most of all, developing inclusive cities," suggests Telle.

7. Adaptation and Mitigation

With distress-driven rural-urban migration expected to increase in future as agriculture-dependent livelihoods come under increasing climatic stress, the need to prepare for climate migration is perhaps more significant for India than any other country. According to Chetan Choithani, a postdoctoral research associate at the Urban Studies Institute, Georgia State University, "The sheer size of the country and levels of poverty provide a compelling enough reason. India has 270 million people who live below the poverty line of $1.90/day. A large majority of the country's poor people live in rural areas who are most prone to climate-driven shocks due to their low adaptive capacity."

Two broad points emerge when it comes to preparing Indian cities for climate migration-

1. Addressing issues at the source of migration to reduce outflow of people
2. Making migration safe and viable for people

Experts are of the opinion that there is need for preemptive action before a climate disaster strikes. This preemptive action must be taken in rural areas, which has the potential to become 'outmigration hotspots.' "At the source of migration, there is a need to build climate-resilient infrastructure and livelihood models. Farmers in flood-prone Bihar, for instance, are encouraged to cultivate water-intensive rice, which effectively utilises the floodwater available. Therefore, based on local demographics, geography and socio-economic factors, each plan needs to be localised so that communities have incentive, support, and resilient infrastructure in the region where they reside," argues Surbhi Arul, a public policy professional.[5]

One of the gaps that several reports highlight is the absence of adequate records of migrants across states. There is widespread consensus about the fact that adequate and correct data on occupation, income level, basic service provision, etc. of migrants can inform and guide state, district, and sub-district governments to develop suitable policies and mechanisms around urban livelihoods, low-cost accommodation, and skill development.

India's social security programmes, including ICDS, MGNREGS, and PDS, feature prominently in this discourse around climate migration. However, questions are being raised on their effectiveness in helping rural poor to cope with climate shocks. According to the International Institute for Environment and Development, "India's social protection programmes do not consider extreme weather and were not designed to build climate resilience." It proposes "anticipatory wage employment and portability of social protection entitlements" to ensure that access to benefits is not affected when one moves from one location to another.

Based on an analysis of how Rajkot, a city in Gujarat, is mainstreaming climate action,[6] researchers at the Centre for Policy Research argue that cities in India need to prioritise the implementation of central and state government schemes and policies that have explicit climate objectives. For example, Rajkot Municipal Corporation, while developing proposal for the 2015 Smart Cities Mission, highlighted climate-friendly features such as solar installations, green buildings, and non-motorised transport, by incorporating suggestions from different national guidelines. Similarly, the researchers alluded to the fact how Rajkot is "using locally specific urban objectives as an entry point for climate action". According to them, "political feasibility of climate actions is higher when they are linked with more familiar, and often more immediate, urban priorities". For example, in case of management of streetlights, the municipal corporation identified high costs of powering 54,000 bulbs and decided to replace conventional street bulbs with LEDs. This will not only lead to financial savings, but also carbon savings to the tune of 7 MT CO2 per year. This is what is required in the long term: a creative adaptation of urban development directives to accommodate climate actions.

References

1 T.V. Ramachandra, Bharath H. Aithal, et al. 'GHG footprint of Major cities in India', Indian Institute of Science, Bangalore, https://wgbis.ces.iisc.ernet.in/energy/paper/GHG_footprint/discussion.html

2 Jainer S, and Anand A, 'Code Red for Humanity': Sinking Indian cities, World Resources Institute, Aug 27, 2021 https://wri-india.org/blog/%E2%80%98code-red-humanity%E2%80%99-sinking-indian-cities

3 Ram, A., 'Making Indian cities climate and water resilient', Water Science Policy, February 07, 2022, https://watersciencepolicy.com/article/making-indian-cities-climate-and-water-resilient-d22349e15819?language=English

4 Telle O., 'Emerging infectious diseases in India: the scourge that could boost urban development', The Conversation, April 17, 2018 https://theconversation.com/emerging-infectious-diseases-in-india-the-scourge-that-could-boost-urban-development-95076

5 Arul S., 'India needs to recognise the rights of climate refugees', IDR Online, June 3, 2022, https://idronline.org/article/climate-emergency/india-needs-to-recognise-the-rights-of-climate-refugees/

6 Khosla R, and Bhardwaj A., 'MAINSTREAMING CLIMATE ACTIONS IN INDIAN CITIES: CASE STUDY OF RAJKOT', Centre for Policy Research, Sep, 2017, https://cprindia.org/wp-content/uploads/2021/12/Mainstreaming-Climate-Actions-in-Indian-Cities.pdf

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