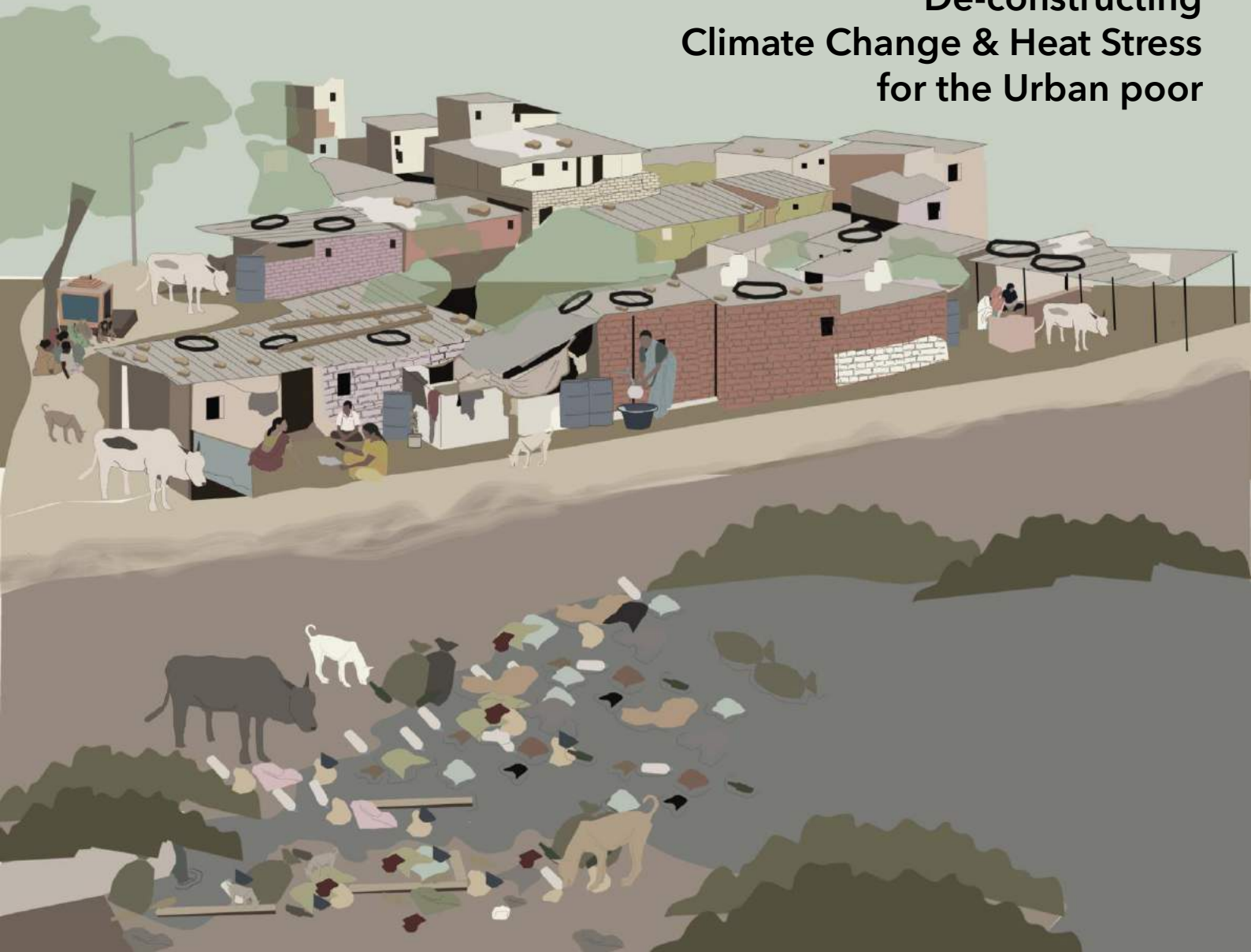


A Handbook on

Climate Change

De-constructing
Climate Change & Heat Stress
for the Urban poor





Humanitarian
innovation fund

elrha



This handbook was compiled by Integrated Design (INDÉ) as a part of the project titled 'Community-based Climate Action Plan in Urban Poor Settlements of Bhopal' funded by the Humanitarian Innovation Fund (HIF), Elrha. The field partner for the project was Gujarat Mahila Housing SEWA Trust (MHT). We acknowledge the support of Elrha and its partner organisation SEEDS, India (Sustainable Environment and Ecological Development Society) in carrying out the project.

The information presented in this handbook is based on secondary research as well as information and insights gathered from selected urban poor settlements in Bhopal as a part of the above-mentioned study. More details about the study are available in the 'Community-based Climate Action Plans (C-CAP)' developed for the three pilot settlements.

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A Handbook on

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Badhbadha Settlement, Bhopal

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Nehru Colony, Bhopal

The background image shows an informal settlement. In the foreground, there is a large, messy pile of trash and debris, including plastic bottles and other waste, next to a body of water. A person wearing a yellow dress and a pink headscarf is walking on a dirt path. In the background, there is a brick wall and a blue building. The sky is clear and blue, and there are some trees in the distance.

Introduction

The climate crisis is here; and its impacts are being felt across the globe- albeit in varying degrees and intensities. Climate science is increasingly able to show that much of these impacts gaining intensity due to anthropogenic activities.¹ Climate science is also making it strikingly clear that cities - socio-economic and cultural melting pots of human activity - are the main sources of climate forcers.² At the same time, cities are hotspots of socio-economic vulnerability and inequity, physical manifestations of which take the form of unplanned slums/informal settlements. Located on the most vulnerable landscapes in cities, the most rapid growth in climate vulnerability and exposure has been in these unplanned urban pockets.^{2,3,4}

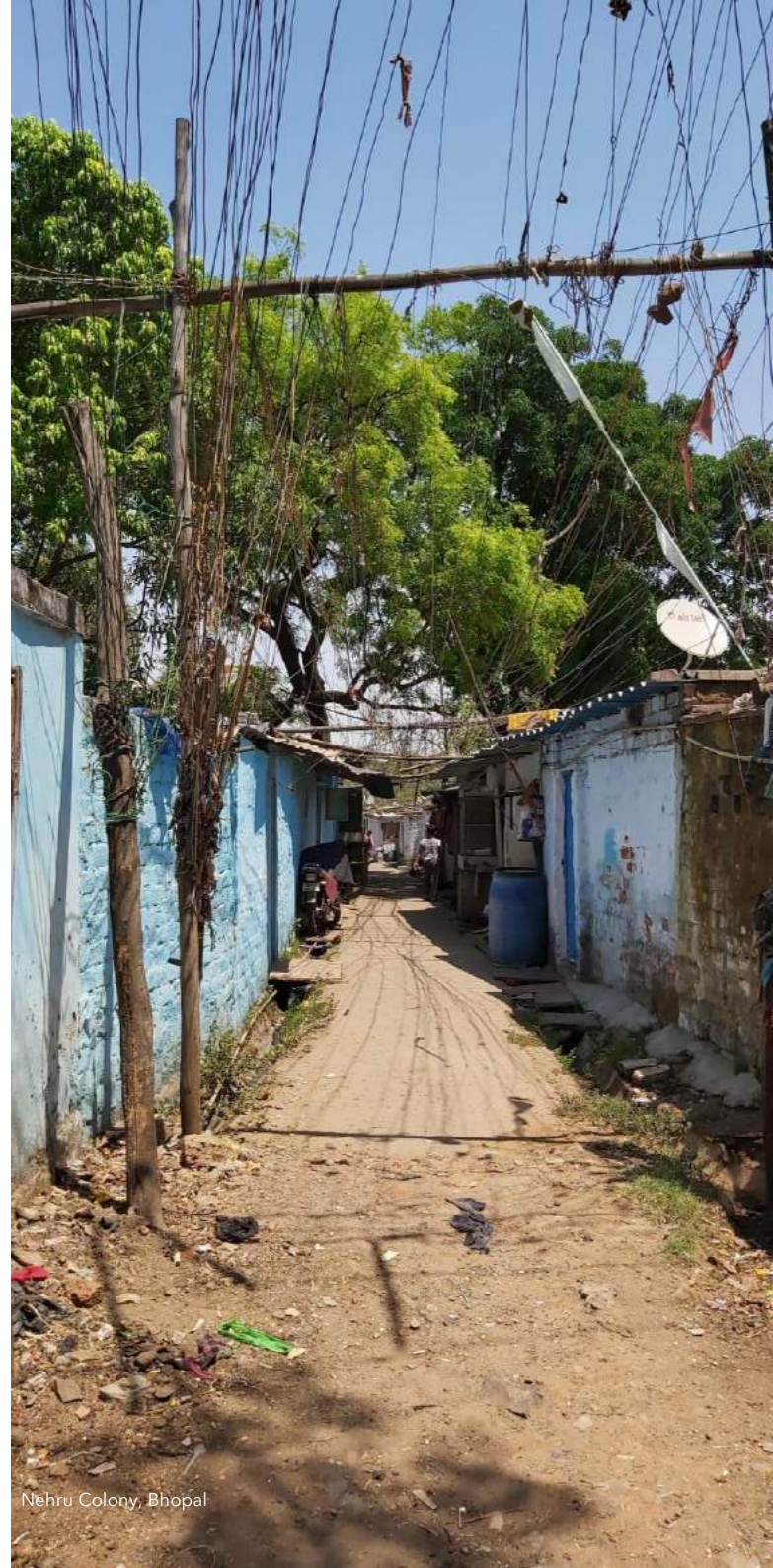
Global dialogues on climate change stress that the greatest gains in well-being in urban areas can be achieved by reducing climate risks for low-income and the marginalised through targeted interventions focusing on the informal settlements. Transformative climate actions, that anchor on intersectionality, gender responsiveness, and inclusion, can advance equity and environmental justice over the long term- not just for the urban poor, but for all urban residents.² There is thus an urgent need to support this vulnerable populace in responding to the increasingly intensifying effects of climate change.

Why this Handbook?

Years of socio-economic vulnerability has led the urban poor to employ a variety of coping and adaptation mechanisms at the time of climatic disasters. However, with increasing intensity and frequency of these events, the formerly successful coping and adaptation strategies of the urban poor are being challenged. How can we help them in adapting to climate change impacts better? As a first step in supporting them, the urban poor need to be empowered with information about climate change and the expected local effects of the same.⁵ **This is first and key objective of this Handbook- helping the urban poor understand climate change in simple and relatable ways.**

Climate change is leading to changes in landscapes as well as physiology. While the first is visible and relatable, the latter is rarely framed within and pinned to climate change. **The second objective of this Handbook is to highlight the intrinsic relationship between landscapes and people while seeking to assist the most vulnerable to articulate the everyday changes in their lives and living within the context of changing climate.** There are critical gaps in information about the nuances of climate change impacts on the urban poor and their settlements. The more we document and understand this information, the better we are positioned to design plan and policy responses that support the vulnerable groups and their habitats. **The third objective of the Handbook is to contribute to this critical need by providing a framework for collecting this valuable information from marginalised communities.**

Through the above objectives, the Handbook tries to integrate different streams of knowledge (qualitative or experiential, as well as quantitative or scientific) in better understanding and responding to vulnerable communities.



Nehru Colony, Bhopal

Who can use this Handbook?



Urban Poor Communities

The primary target audience of this Handbook is the poor living in informal settlements in urban areas.



Grassroots Organisations

The Handbook can be used by CBO/NGO/grass roots organisations to help communities frame their vulnerabilities in the context of climate change.



Scientists & Decision Makers

This Handbook is also designed in such a way that it acts as a tool to collect information/data from communities. This information can then be collated and shared with scientists and policy makers decision makers to reverse the flow of information

Structure of this Handbook

The Handbook begins by introducing the **various concepts associated with climate change** through simple definitions and graphics. A broad understanding of these concepts will help the reader in understanding the subsequent sections better. The second section explains the **what and why of climate change and its various interconnected impacts** and manifestations (on landscapes and people). The Handbook then delves deeper into the concept of **heat waves and its implications at various scales**- regional, city, settlement, and individual.

The impacts at the settlement and individual scales are illustrated through the everyday life of a family (including members of different age groups and gender) living in an urban poor settlement in a Central Indian city. While giving a broad list of impacts and manifestations, the Handbook provides the **opportunity/ space to add on information** (which may be contextualised information) about already listed impacts, or additional impacts.

General Concepts⁶

Global warming

An increase in temperature near the surface of the Earth. Global warming has occurred in the distant past as the result of natural causes. However, the recent and ongoing warming is caused by people's activities. Global warming leads to climate change.

Greenhouse effect

The way in which heat is trapped close to Earth's surface by "greenhouse gases" or heat trapping gases which acts as a blanket wrapped around Earth. Greenhouse gases include carbon dioxide, methane, nitrous oxides, and water vapor.



Climate

Patterns of weather over long periods of time. Climate is usually measured over a period of 30 years or more.



Weather

The condition of the atmosphere at a particular place and time. Some characteristics of the weather include wind, temperature, humidity, and precipitation. Weather can change from hour to hour, day to day, and season to season.



Climate change

The broader set of changes that go along with warmer temperatures, including changes in weather patterns, the oceans, ice and snow, and ecosystems around the world.



Sea level rise

Sea levels have risen because glaciers and ice sheets are melting, and seas are warming.



Ocean Acidification

Extra carbon dioxide in the atmosphere (from cars and factories) is absorbed by the oceans, making them more acidic. This can make it difficult for plants and animals in oceans to survive.



Biodiversity Loss

Warming temperatures, rising seas, melting ice, and other impacts of climate change can threaten the habitat of many plants and animals.

General Concepts⁶

Heat Waves

Long periods of time with temperatures that are hotter than normal, typically lasting for several days. As the Earth warms, more areas will be at risk for hotter and more common extreme heat waves.



Wildfires

Fires that burn large amounts of forests and brush. Warmer temperatures and drier conditions can help fires spread and make them harder to put out.



Urban Heat Island Effect

An urban heat island occurs when a city experiences much warmer temperatures than nearby rural areas. This is because urban surfaces, like roads and buildings, absorb and re-emit more heat than natural surfaces, like grass and trees. And as climate change increases the likelihood of heatwaves, the heat island effect is being worsened.



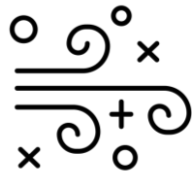
Heavy Precipitation

As the temperature increases the air's capacity for water vapor goes up. An atmosphere with more moisture can produce more intense precipitation events.



Droughts

A period with little rain and not enough water. Global warming will increase the risk of drought in some places.



Air Pollution

Air pollution is caused by solid and liquid particles and certain gases that are suspended in the air. These particles and gases can come from car and truck exhaust, factories, dust, pollen, mold spores, volcanoes and wildfires. The solid and liquid particles suspended in our air are called aerosols.

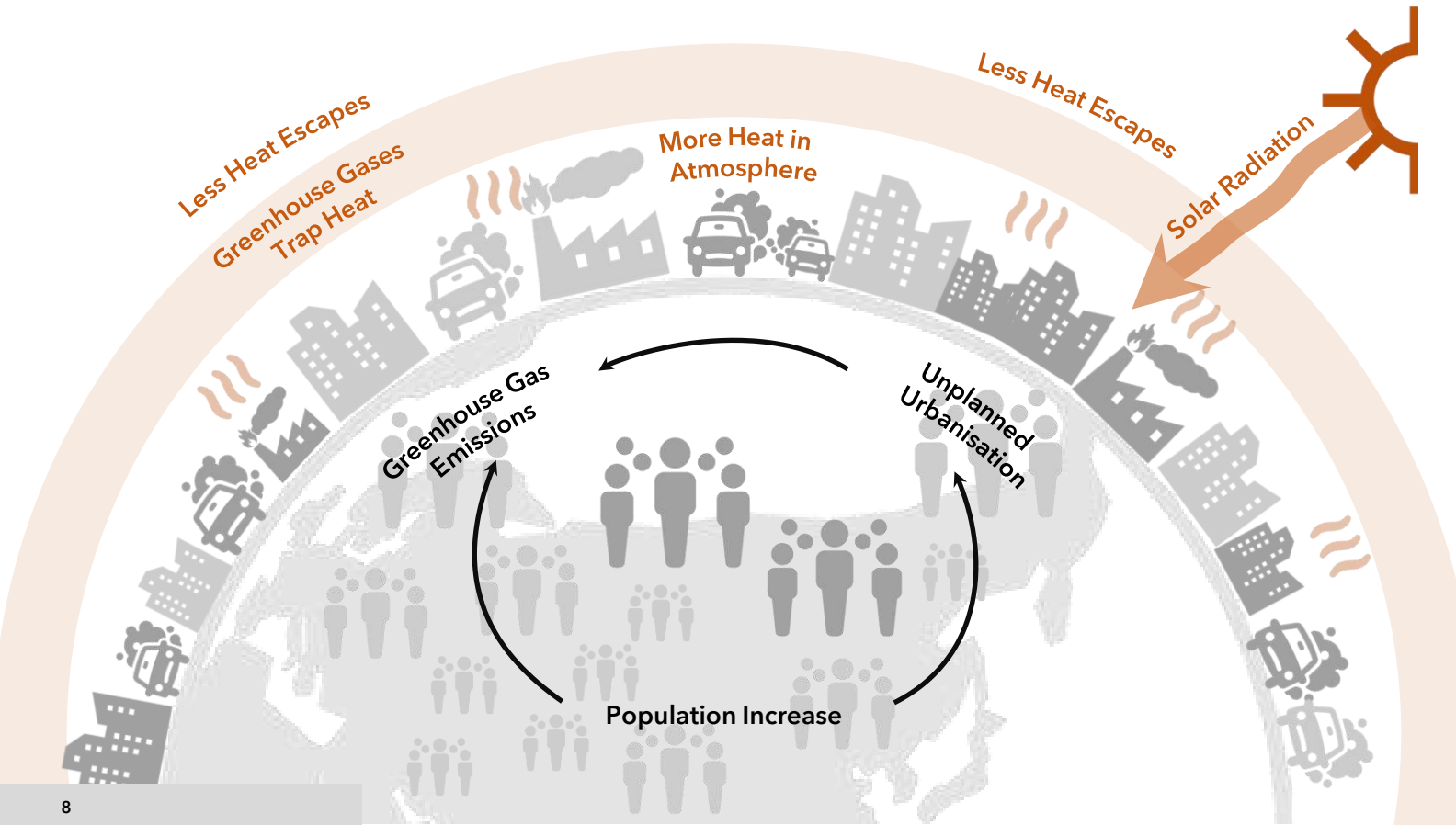
Let's understand Climate Change Better!

No matter where we live, we all experience **weather**: how the conditions of our atmosphere change over minutes, hours, days, weeks. We also experience **climate**: the weather of a place averaged over several decades.

Climate change is when these averaged conditions start to change and its causes can be either natural or caused by human activities. Rising temperatures, variations in rainfall, increased extreme weather events are all examples of climate changes, but there are many others. ⁷

Earth's climate has changed throughout history. So why should we be worried about Climate Change now??

Here's Why: The current warming trend is different because it is clearly the result of human activities since the mid-1800s. Human activities have produced the atmospheric gases that have trapped more of the Sun's energy in the Earth system. ⁷

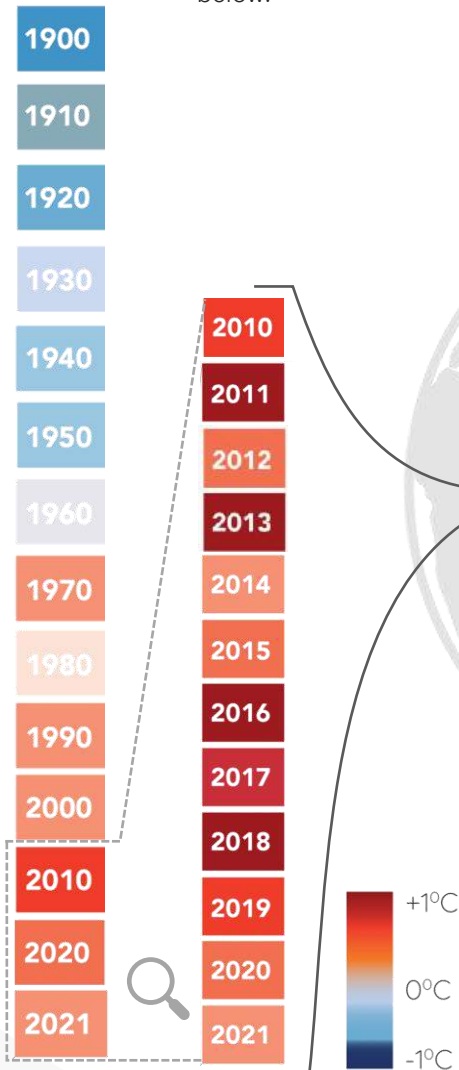


What are some of the evidences of human induced Climate Change?

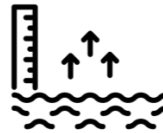
Global Temperature is Rising



The average temperature of the Earth's surface is warmer than at any time in the last 100,000 years!⁷ The increase/decrease in temperature from the normal is shown below.⁸



Oceans are getting warmer



The ocean has absorbed much of the increased heat and is now warming faster than at any time in at least 11,000 years.⁷

Glaciers are melting



Glaciers in the world are rapidly melting since 1950. This rate has not been seen in at least 2000 years.⁷

The average temperature of the Earth's surface between 2011 and 2020 was

1.1°C warmer

than the average temperature in the late 19th century.⁷

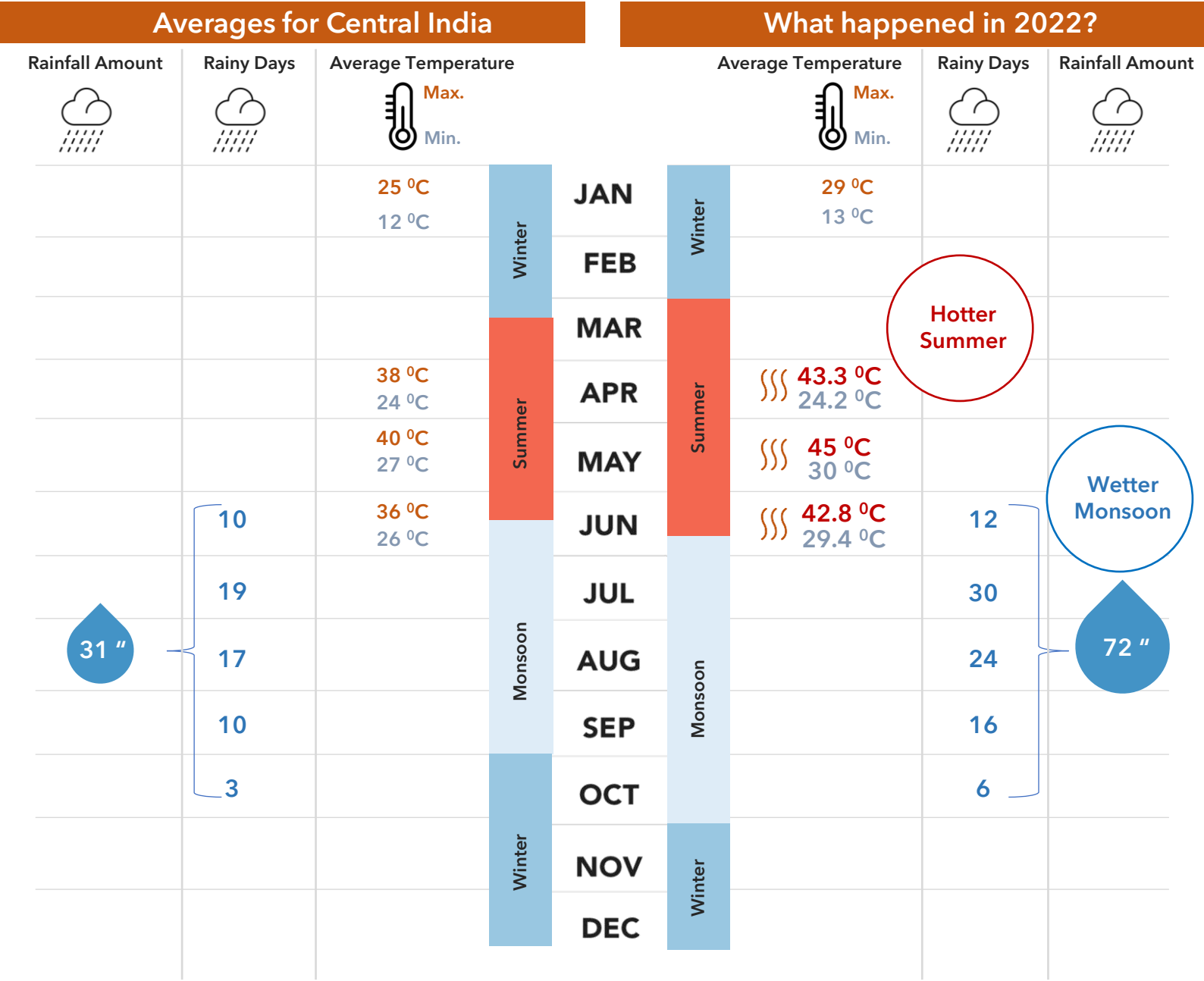
Extreme Events are Increasing



Since the 1950s, there has been more frequent and more intense heatwaves, heavier and more intense rainfall events, severe droughts, and stronger cyclones.⁷

Do you feel it is now hotter during summers and wetter during monsoons than before? This is because of Climate Change!

In the image below, a typical seasonal calendar for a city in Central India is compared with the recent changes that are observed.^{9, 10, 11, 12, 13}





The Ripple Effect



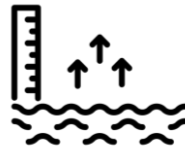
Global Warming



Melting Glaciers



Heavy Precipitation



Warmer Oceans



Droughts

Translation as Extreme Events



Wildfires

Impact on City and Region



Crop Loss



Heat Island Effect

Impact on City & Region

Impact on Landscape



Ocean Acidification



Sea Level Rise



Heatwaves



Economic Loss



Death



Livelihood Loss



Disruption of
Social Services



Vulnerability to Vector
Borne Diseases



Flooding



Water Scarcity



Vulnerability to Vector
Borne Diseases



Health Risk



Damage to shelter and
loss of assets



Disruption in Infrastructure
Services



Limited Access to
Healthcare

Impact on Urban Poor

?

What are the other
ways in which Climate
Change is impacting
you?

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Assessing Vulnerability & Adaptive Capacity

As illustrated in the previous pages, vulnerability to climate risks, especially in urban areas, results from a combination of physical, sociocultural, economic, and institutional conditions- which are often interrelated.²⁷ Conditions like poor governance, inequitable access to public services, and increased social inequality amongst others create vulnerable urban pockets often occupied by the poor.^{3,4}

This 'normal existence' of the urban poor in precarious social, spatial, economic, political, and environmental settings, increases their vulnerability to climate change impacts manifold.²⁸ For example, adverse economic conditions push the poor to locate in high-risk zones (like low-lying areas and derelict land) deemed undesirable for other development. Affordability, proximity to livelihood opportunities, and decreased eviction threats are some of the reasons the poor choose these locations.^{27,29} Political and social disenfranchisement makes these pockets invisible in the formal systems and processes- often depriving them of basic service provisions (water supply, drainage, solid waste management, sanitation, etc.) as well.

The Intergovernmental Panel on Climate Change defines vulnerability a function of the character, magnitude, and rate of climate variation to which a system **is exposed, its sensitivity, and its adaptive capacity**. That is, vulnerability constitutes the interaction between an external dimension, which is represented by the 'exposure' of a system to climate variations, as well as an internal dimension, which comprises its 'sensitivity' and its 'adaptive capacity'

Vulnerability

=

(Exposure X Sensitivity) - Adaptive Capacity

Risk: The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions. Elements essential in the formulation of risk include hazard and vulnerability.³⁰

Hazard: The probability of occurrence for a given threat.³⁰

Vulnerability: The propensity or predisposition to be adversely affected.³⁰

● Exposure

The presence of people, livelihoods, environmental services and resources, infrastructure, economic, social, or cultural assets in places that could be adversely affected.

Example: Location of house in areas without tree cover.

● Sensitivity

The degree to which a system is affected, either adversely or beneficially, by climate variability or climate change. **Example: Use of heat absorbing materials such as asbestos sheet roofing, or use of mud tiles that reduce heat absorption.**

● Adaptive Capacity

The combination of strengths and resources available to an individual, community, society, or organization that can be used to prepare for reducing adverse impacts or harm and leverage beneficial opportunities. **Example: Access to resources in times of stress.**



Criteria that Determine Vulnerability & Adaptive Capacity

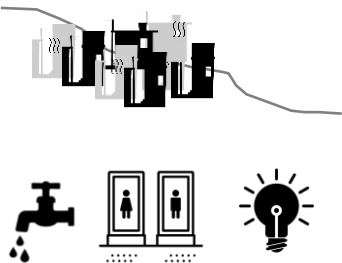
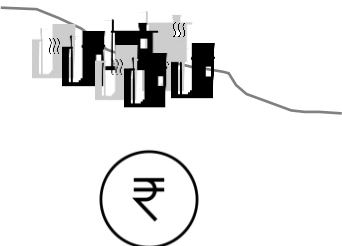
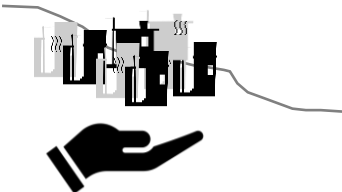
Given this understanding, a few criteria have been collated that can be considered to have a bearing on vulnerability, exposure, and adaptive capacity to climate change in urban poor settlements. However, each context may present additional criteria (or) sub-criteria that determine climate change susceptibility. This handbook encourages its users to add these to the list on the next page.



What are some of the other criteria that impact you & your settlement?

Add these to the list on the next page.

#	Criteria	Sub criteria	Why these criteria/sub-criteria?
1	Physical Characteristics	Built Fabric Density	Increased population density, congested spatial fabric, and use of heat-trapping materials like tin sheets, cement sheet (asbestos), plastic, and tarpaulin increase their vulnerability to increased heat stress.
		Ground / Tree cover	
		Building materials	
		Highway, Pakka/ Katcha Roads	
2	Topography and Proximity to Natural Features	Proximity to Waterbodies (lakes/streams/drains/rivers)	Location of slums in close proximity to water bodies like lakes, streams, and drains or nallahs increases their vulnerability to flooding. These water bodies often become dumping sites for the city and settlement thus exacerbating flooding risks and associated health and economic impacts.
		Topography (low lying area/valleys/slopes etc.)	
		Drainage lines	
		Pakka/ Katcha Roads	
		Permeable surfaces	
		Stagnant water Spots	
3	Proximal Land-Use	Industrial/Residential/ Commercial/Old City area	The land use in proximity to the slums (like industries, landfill sites, residential/commercial) areas determines the intensity of air, water, and land pollution.
		Specific features like landfill/garbage dumps/crematoriums, railways lines etc.	

#	Criteria	Sub criteria	Why these criteria/sub-criteria?
4	Access to Services and Public Amenities 	Water supply/ Sanitation/ SWM /Electricity/Roads	Research in the global South indicates that access to services/risk reducing infrastructure like paved roads, storm and surface drainage, piped water, etc. can play an important role in decreasing vulnerability to climate change induced impacts like floods, water scarcity, and heat stress.
		Access to public health	
		Access to public transport	
5	Socio-Economic Characteristics 	Genesis and Evolution	The genesis and evolution determine the types of embedded/evolved knowledge systems that can play a role in their adaptive capacity. Similarly factors like the types/location of livelihoods and land tenure status (linked to access to services) also determine their susceptibility to climate change impacts.
		Cultural/Behavioural aspects	
		Livelihoods	
		Land Tenure	
6	External Support 	CBO Intervention	Interventions (social and technological) initiated by community-based organisations (CBO) are also evidenced to improve the adaptive capacity of the urban poor.

#	Criteria	Sub criteria	Why these criteria/sub-criteria?



What is a Heat wave?

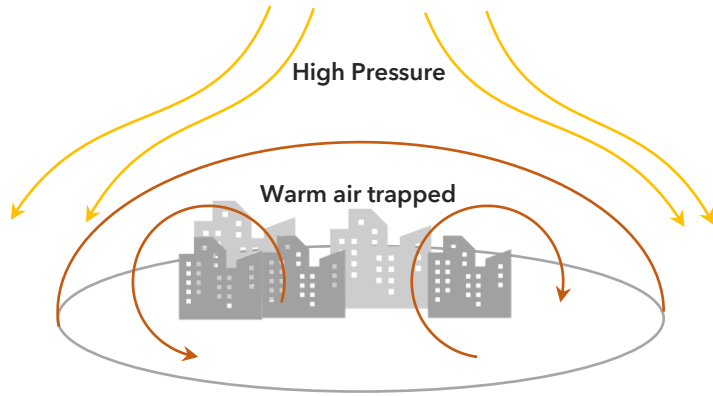
A period of abnormally hot weather. ¹⁴

Also called 'warm spells' or 'extreme heat event'. ¹⁴

Global climate change is likely to be accompanied by an increase in the frequency, intensity & duration of heat waves. ⁷

What causes a heat wave?

A heat wave occurs **anywhere** when a high-pressure system develops over a large area forcing air downwards and trapping warm air close to the ground. ¹⁵



A heat wave occurs can be accompanied by



High Humidity

or



Very Dry Conditions

Who is most impacted?



Outdoor Workers

Construction workers and others who are exposed to heat for longer durations



Old & Young

Because their bodies are unable to adjust to temperature changes easily

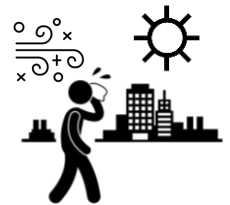


Poor

Lack of access to services like proper shelter, water supply, electricity, etc.

Urban Areas

Old, children, poor, and outdoor workers in urban areas are most impacted. Urban areas with high population density, lesser green cover, higher pollution increase the impact of heat waves.



Social Impacts

Heat-related illness and death

800 million people

globally, are more often exposed to environmental risks like heat, due to poor infrastructure, building design and disadvantaged locations. ¹⁶



Economic Impacts

Productivity Loss

Globally, **2%** of total working hours is projected to be lost every year, either because it is too hot to work or because workers have to work at a slower pace. ¹⁶

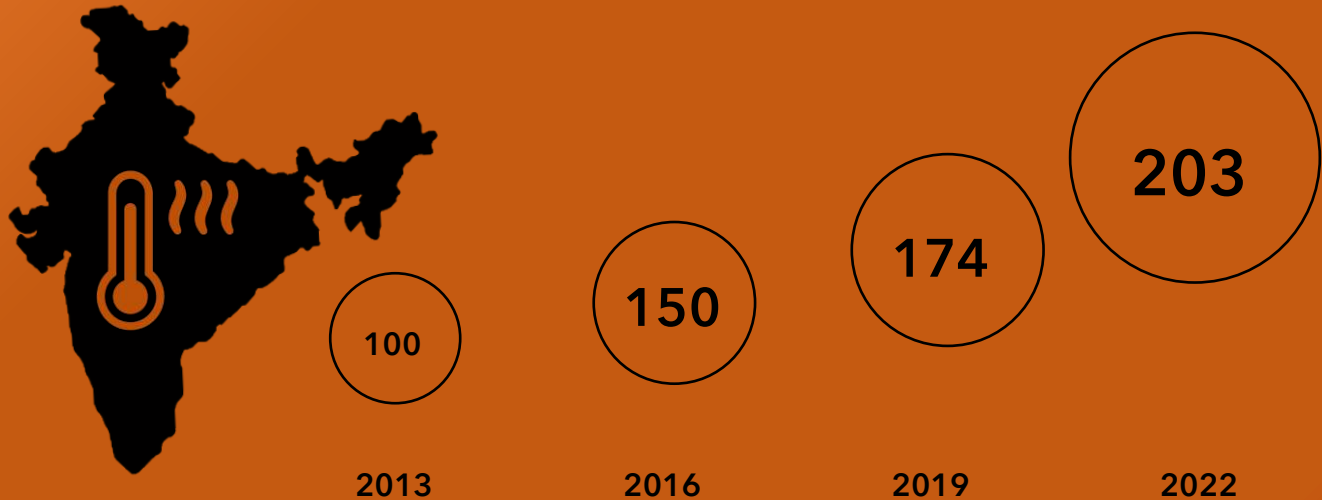


Ecological Impacts

Water Scarcity & Flooding

Heatwaves are leading to water shortages and increased stress in agriculture. Heatwaves are also causing glaciers across the globe to melt leading to flash floods downstream. ¹⁶

Heat wave days in India¹⁷



Crop Failure



6- 7 million Hectares
Affected in 2022¹⁸

Deaths & Health Risk



Atleast 39 deaths in
2022¹⁹

Disruption in Services



753 passenger train
services cancelled in
April 2022²⁰

to prioritise movement of coal rakes.
This was to address the rising electricity
demands.

Who declares a heat wave in India & when?

Temperature at which a heat wave is declared is dependent on the place.

The **Indian Meteorological Department (IMD)** declares a heat wave when the maximum temperature crosses the limits indicated in the table below. These limits vary across plains, hills, and coastal areas.

Heat wave (& warm night) is also declared based on 'departure from normal temperature' and 'maximum actual temperature'.

If the below criteria is met at least in 2 stations in a meteorological sub-division for at least two consecutive days, then heat wave is declared on the second day.

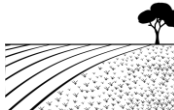


Warm Night

When maximum temperature at night is **40°C** or more

Warm night is declared if departure from minimum temperature at night is **4.5°C to 6.4°C**

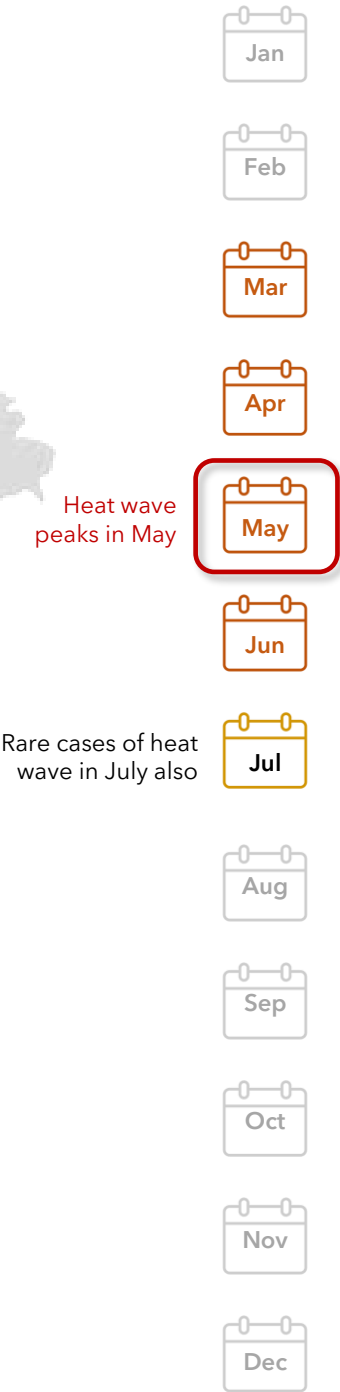
Very warm night is declared if departure from minimum temperature at night is more than **6.4°C**

Temperature Limits beyond which Heat wave is declared		Based on 'departure from normal'	Based on 'maximum actual temperature'	
	40°C or more in plains	For both plains & hills	Heat Wave if departure from normal is 4.5°C to 6.4°C	Heat Wave if maximum is 45°C or more
	30°C or more in hills		Severe Heat Wave if departure from normal is 6.4°C or more	Severe Heat Wave if maximum is 47°C or more
	37°C or more in coastal areas		Heat wave if departure from normal is 4.5°C or more	Heat wave if maximum is 37°C or more

Heat wave prone areas in India



Heat wave months in India



Source: IMD, https://internal.imd.gov.in/section/nhac/dynamic/FAQ_heat_wave.pdf

How does IMD monitor heat waves?

IMD has a **big network of surface observatories** covering the entire country.

These stations measure various things like



Humidity



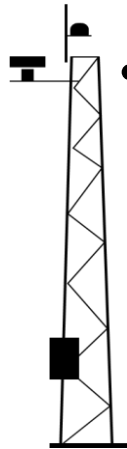
Temperature



Wind Speed & Direction



Pressure

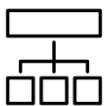


Based on daily maximum temperature station data over many decades, IMD finds out the normal maximum temperature of the day for particular station. IMD then declares heat wave over the region based on changes from this normal temperature. ¹⁹

How is information from IMD on heat waves shared?



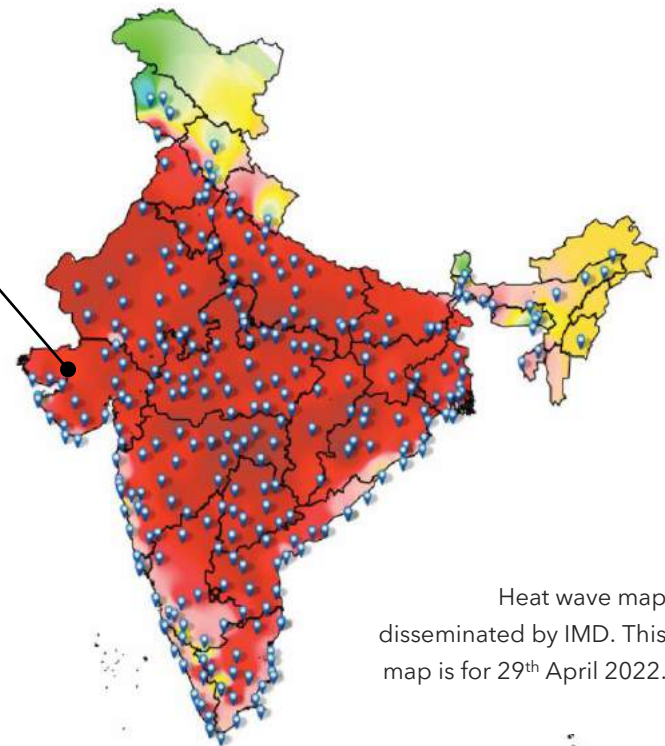
All India Weather Forecast Bulletin & Special Heat Wave Guidance Bulletins are released 4 times everyday during 1 April to 30 June in IMD website.



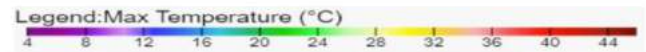
The heat wave information is shared with concerned State Government Authority, Media, Indian Railway, Health and Power departments etc. District wise heat wave warnings are issued by State Centres of IMD.



The general public is informed through Print & Electronics Media.



Heat wave map disseminated by IMD. This map is for 29th April 2022.



Heat wave alerts by IMD



**Normal Day
(No Action)**

Maximum temperatures are near normal



**Heat Alert
(Be Updated)**

Heat wave conditions at isolated pockets persists on 2 days



**Severe Heat
Alert for the day
(Be Prepared)**

(i) Severe heat wave conditions persists for 2 days (ii) Though not severe, but heat wave persists for 4 days or more



**Extreme Heat
Alert for the day
(Take Action)**

(i) Severe heat wave persists for more than 2 days (ii) Total number of heat/severe heat wave days exceeding 6.

Number of days experiencing extreme
heat conditions- above

43°C

has increased from
10 days in April 2021 to

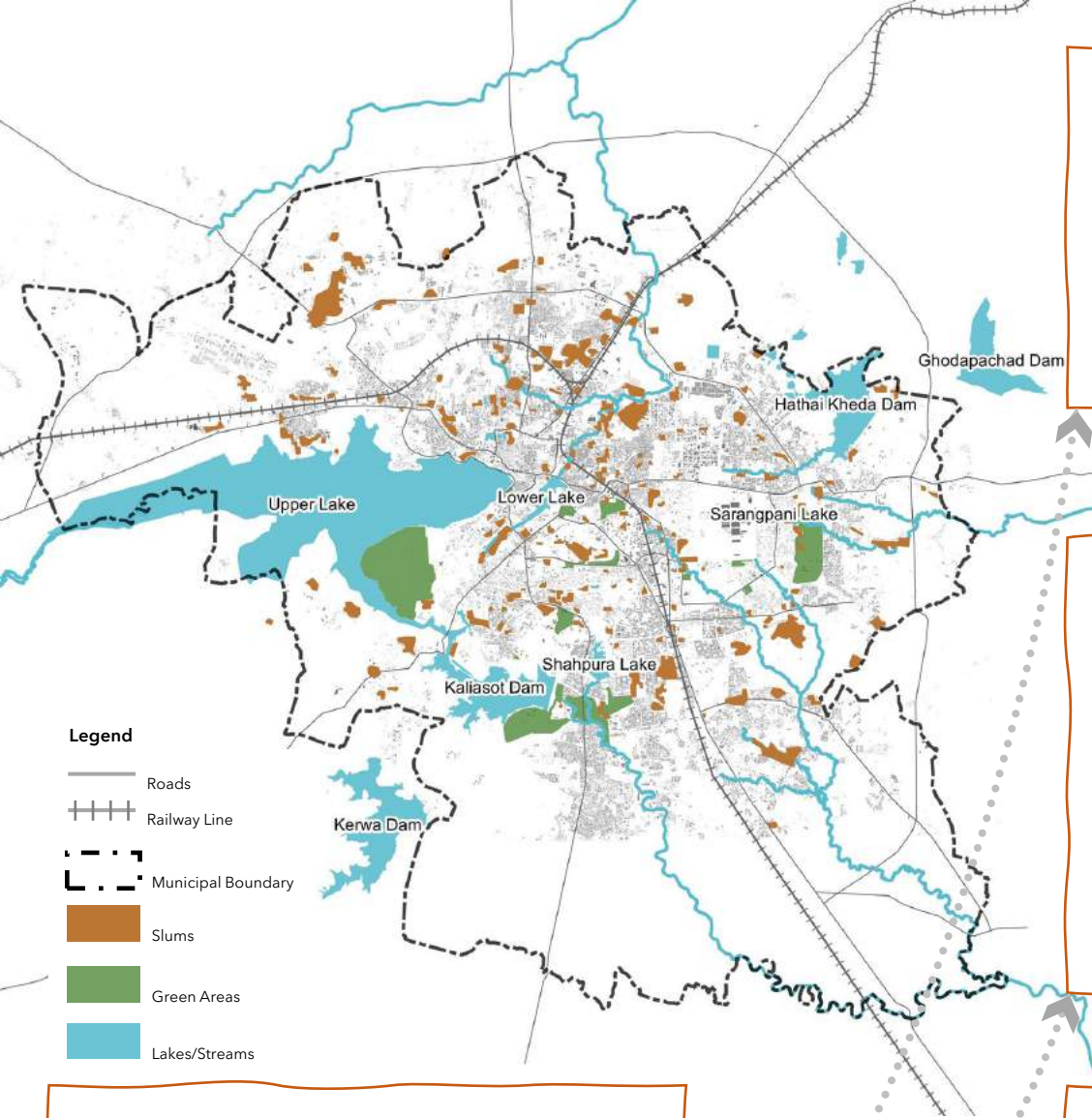
28 days

in April 2022
21, 22



Bhopal

Bhopal experienced heat waves in
April, May and June in 2022

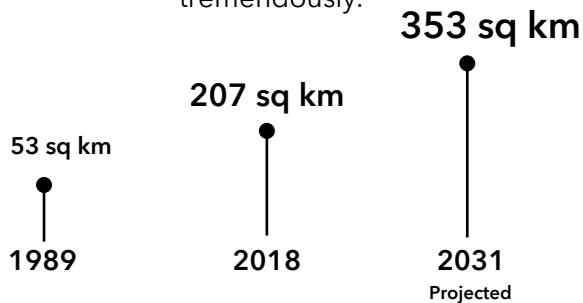


Green Cover in the City has reduced from **35% in 2009** to **9% in 2019**.²⁴



Informal settlements have grown exponentially across the city in the past 20 years. There are **388** informal settlements in the city, which are home to **36% of the city's households**.²⁵

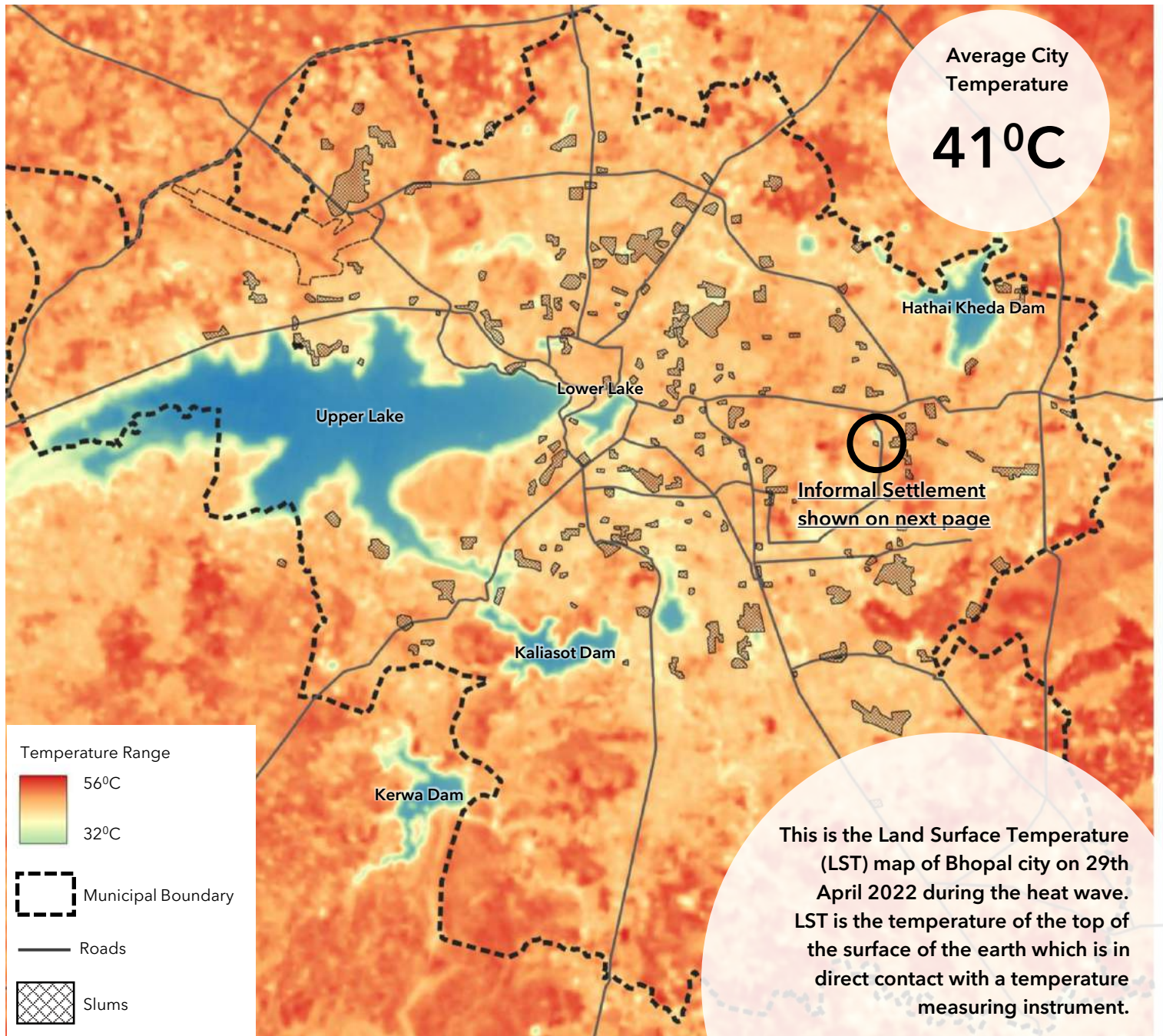
The **built area** in the city has grown tremendously.²³



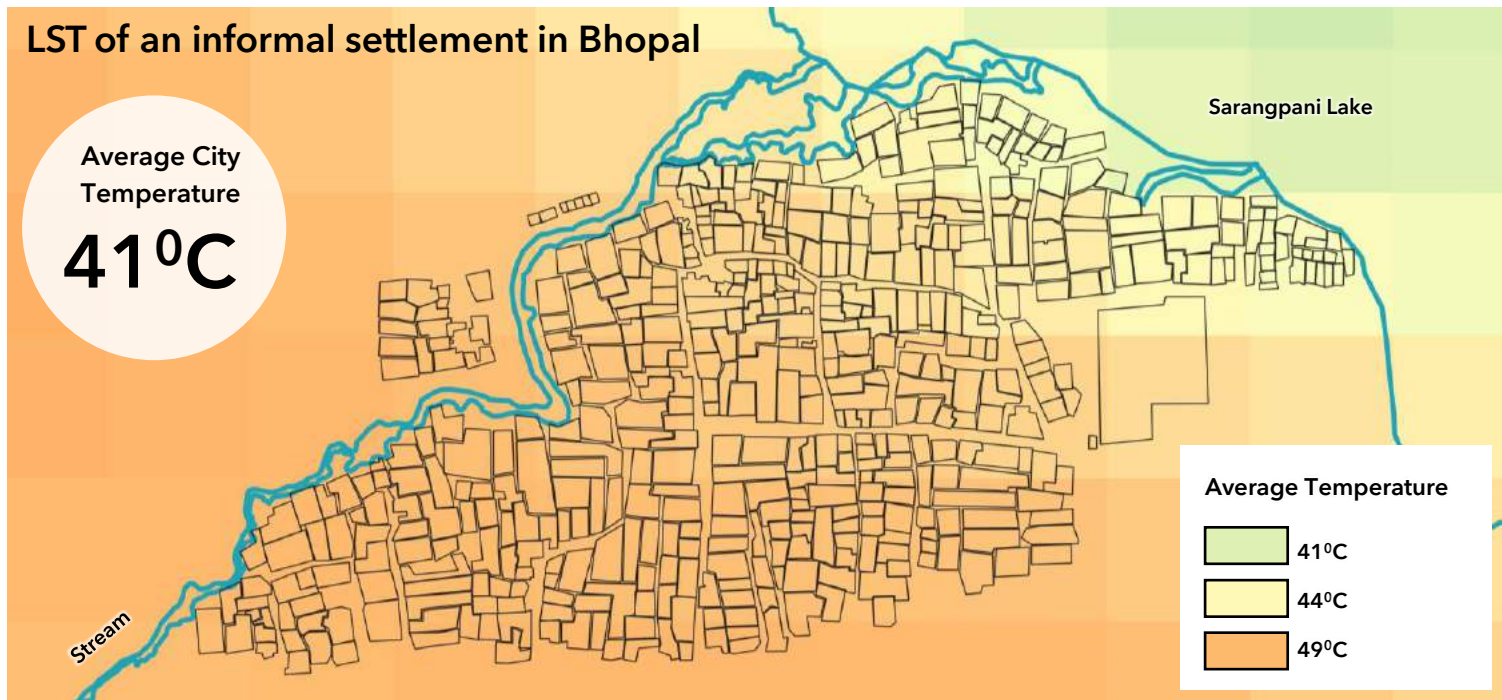
Water level in the Upper lake dipped to 1651.80 feet in 2019, which is below the minimum level of 1652 feet (needed to keep the lake alive).²⁶

Land Surface Temperature of Bhopal

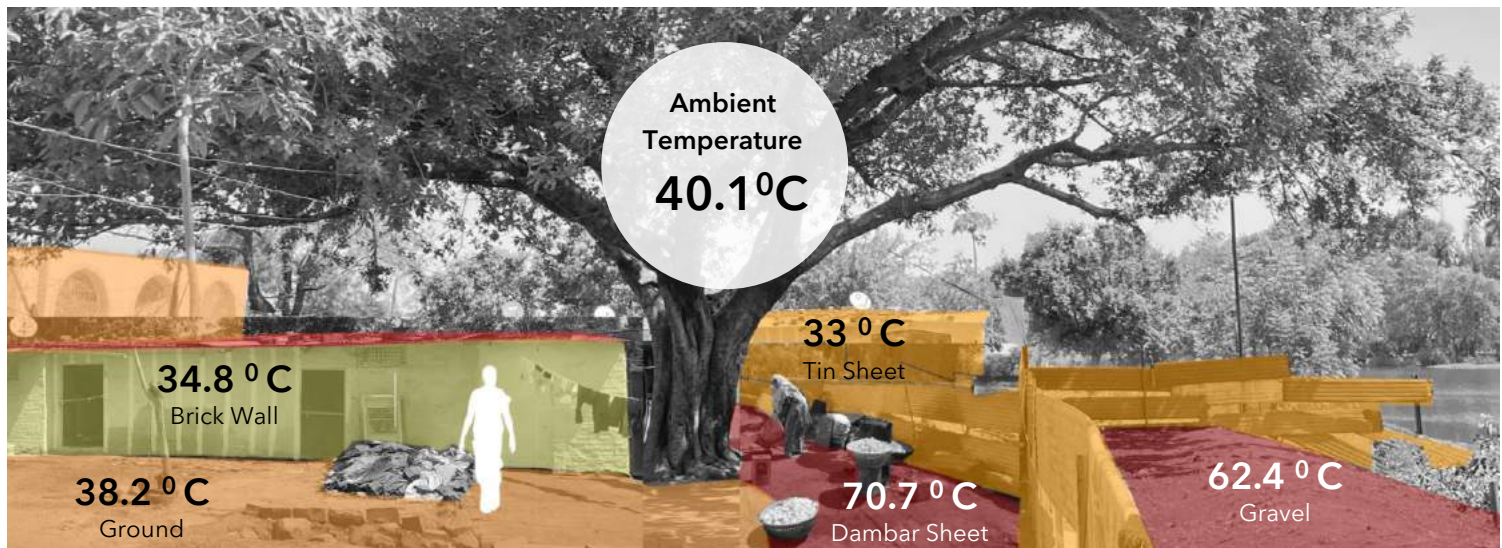
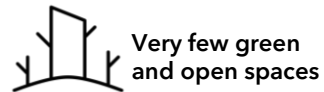
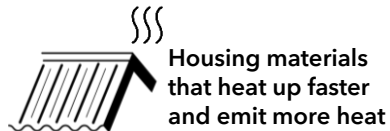
(on 29th April 2022)



LST of an informal settlement in Bhopal



While the average city temperature on 29th April 2022 was 41°C, the temperature within an informal settlement can go higher as shown in the above map. This could be because of multiple reasons like



Story of Shanti Nagar

This is Shanti Nagar, one of the oldest settlements in the city. It is located in a **low-lying area** along a small stream which has turned into a dirty nallah over time. The settlement has densified over the years and presently houses approximately **250-300 households**. The houses in Shanti Nagar are made of **brick walls and asbestos/tin sheet roofs**. The area has 20 community taps and receives **water only for 2 hours a day** and most of the houses have their **own toilets connected to soak pits**. Most men in the settlement are daily wage workers, and the women are engaged in domestic or home-based work.



Shanti Nagar does not receive solid waste management services from the municipality. As a result, residents end up **dumping their waste in the adjacent stream**. Earlier, residents used to sleep outside at night during summer. However, they do not do this anymore because **haphazard garbage dumping has led to an increase in mosquitoes and rodents**.

Building materials used in the settlement (asbestos and tin sheets which absorb and emit a lot of heat), increased density, lack of green spaces, and a dirty nallah is contributing to a **heat island effect within the settlement, even at night**.



Conversations from Shanti Nagar

During a heatwave

Expenses



Wages



"My husband and I are very worried about our expenses during this heat wave. We are rationing our household income for essential needs as we can't afford to spend it unwisely."

"Our locality was so much greener and cooler earlier! We had a lot of fruit trees like mango, amla, and jamun, and even big trees like Banyan and Peepal."



"The nallah was so beautiful and clean when I first came here 20 years ago. Now people dump so much garbage in it. Even sewage from the neighbouring areas flow into it. The water in the nallah has also decreased so much because of the heat"

"The heat is becoming unbearable by the day! I feel the pollution from the main road traffic and dust from the nearby construction site have worsened the heat in the area."

Conversations about the City

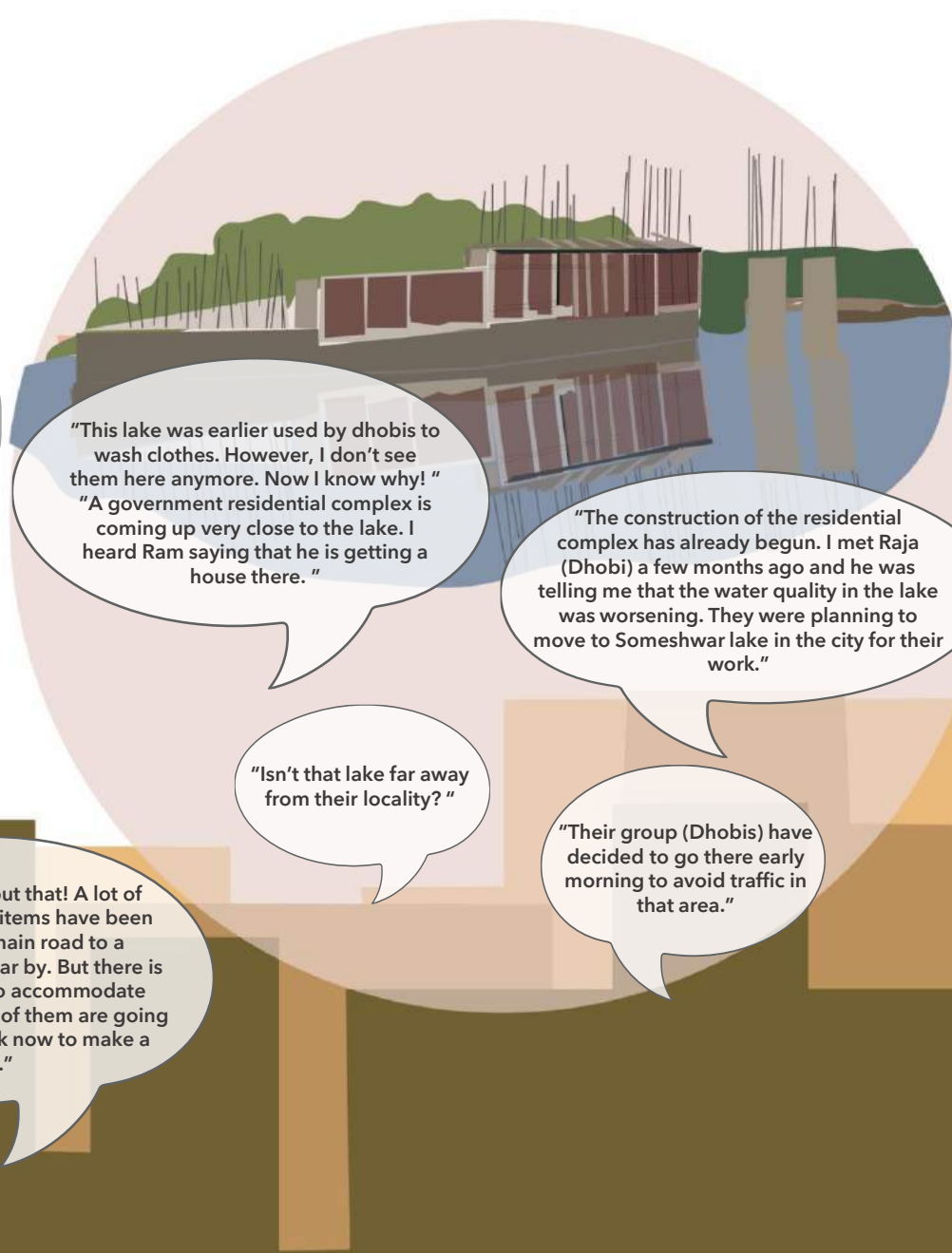


"Do you remember the time when we used to walk to the Upper lake through the forest area?"

"Yes, it was indeed a pleasant walk to the lake in the older days. Now a four-lane road has come there which provides good connectivity to the new city areas. However, there is so much traffic and pollution in that area now!"

"Now that you mention, yes, there is always a traffic jam on that road. I heard Raju saying that the road widening work will begin soon and he will be going there to work."





"It's Aruja's daughter's wedding. We are going to New Market for the wedding shopping".

"I have heard its quite big and has a variety of things. Your husband works there, right? Can you tell us which area within the market is best for wedding shopping?"

"This lake was earlier used by dhobis to wash clothes. However, I don't see them here anymore. Now I know why! "

"A government residential complex is coming up very close to the lake. I heard Ram saying that he is getting a house there. "

"The construction of the residential complex has already begun. I met Raja (Dhobi) a few months ago and he was telling me that the water quality in the lake was worsening. They were planning to move to Someshwar lake in the city for their work."

"My husband has a pushcart to sell small household items in the New Market. He and some of his acquaintances are sometimes asked to move away from the main road and foot path to free up space."

"Isn't that lake far away from their locality? "

"Yes, I did hear about that! A lot of people selling small items have been shifted from the main road to a government space near by. But there is not enough space to accommodate everyone there. Many of them are going for construction work now to make a living."

"There is a new vegetable market also near the new government space. Seema's husband was hired by the market association recently to clean the vegetable market area."

"Their group (Dhobis) have decided to go there early morning to avoid traffic in that area."

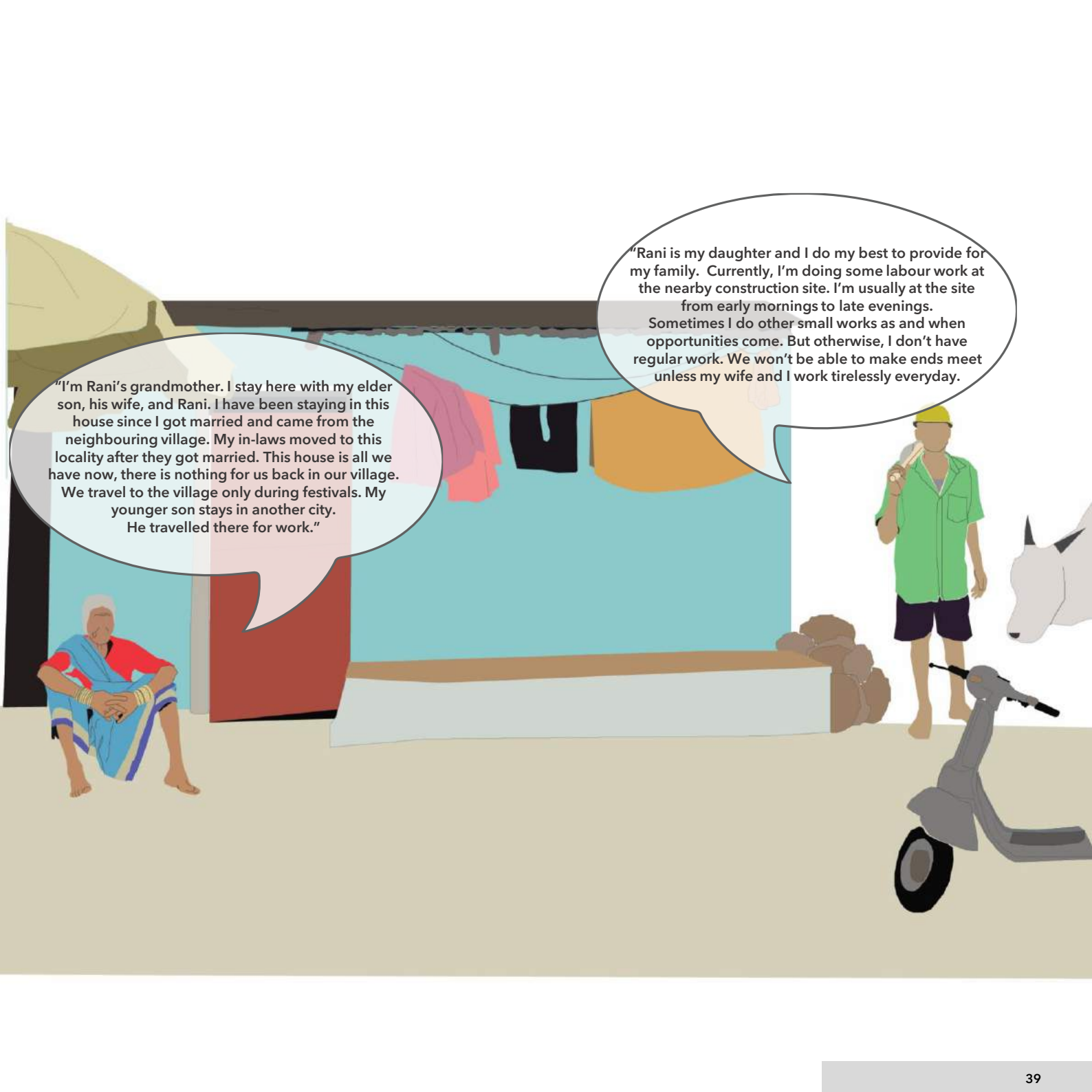
Story of a household at Shanti Nagar

Regular day for the family

"I'm Rani and this is my home in Shanti Nagar. I have a small family and a lot of friends who stay here. My school is only 2 km away from my home, so I walk to school. Today is a holiday but I'm already ready at 7 a.m. as my mother tells me to take bath when the water comes from the community tap near our house. My mother and father go to work by 10 a.m. You can see my mother making rotis for our lunch."

"I'm Rani's mother. I have already finished cleaning our house and will soon leave for domestic work in the neighbouring residential society. I'm cooking food for my husband who will also leave for his work in some time. We will be back home only late in the evening. Rani's grandmother will look after her during the day."





"I'm Rani's grandmother. I stay here with my elder son, his wife, and Rani. I have been staying in this house since I got married and came from the neighbouring village. My in-laws moved to this locality after they got married. This house is all we have now, there is nothing for us back in our village. We travel to the village only during festivals. My younger son stays in another city. He travelled there for work."

"Rani is my daughter and I do my best to provide for my family. Currently, I'm doing some labour work at the nearby construction site. I'm usually at the site from early mornings to late evenings. Sometimes I do other small works as and when opportunities come. But otherwise, I don't have regular work. We won't be able to make ends meet unless my wife and I work tirelessly everyday."

Story of a household at Shanti Nagar

During heatwave



"It's so hot today! My friends and I came back home early from school, but my mother says we can't go out to play."



"We have started using the cooler for the past one week, but today we have had it on since morning which is usually not the case. Our dog Raja is staying with us the whole day, usually, he only comes home during lunch and dinner time."



"Today, my mother today got up early to get water from the tanker. There is no water coming from the tap."

"Grandmother has been sleeping since I reached home from school. She took some medicine before resting."

"It's so hot today! I feel tired and dizzy even after taking my medicines and drinking water."

"Father has been coming back home early these days. He says he is very tired to play with me."



**What can we do as a
community?**

Steps proposed by the Community

Issue

! So many trees in the settlement have been cut over the last few years. It used to be so much cooler when there were more trees and plants.

Solution

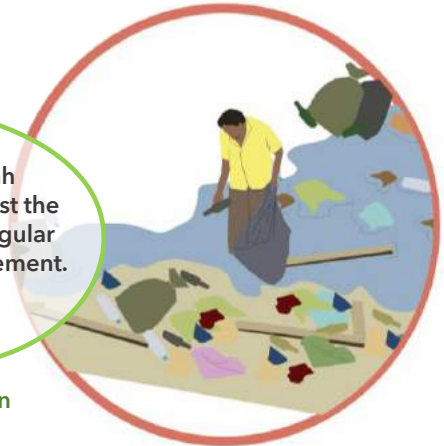
Plant more trees in the settlement and have a community garden.



! The nallah is polluted with garbage and sewage. The water cannot be used even for washing clothes or bathing now.

Clean the nallah collectively. Request the municipality for regular solid waste management.

Solution

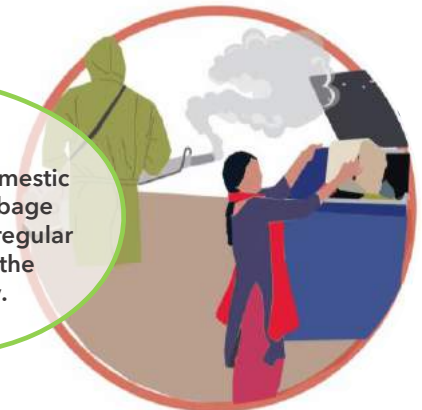


Issue

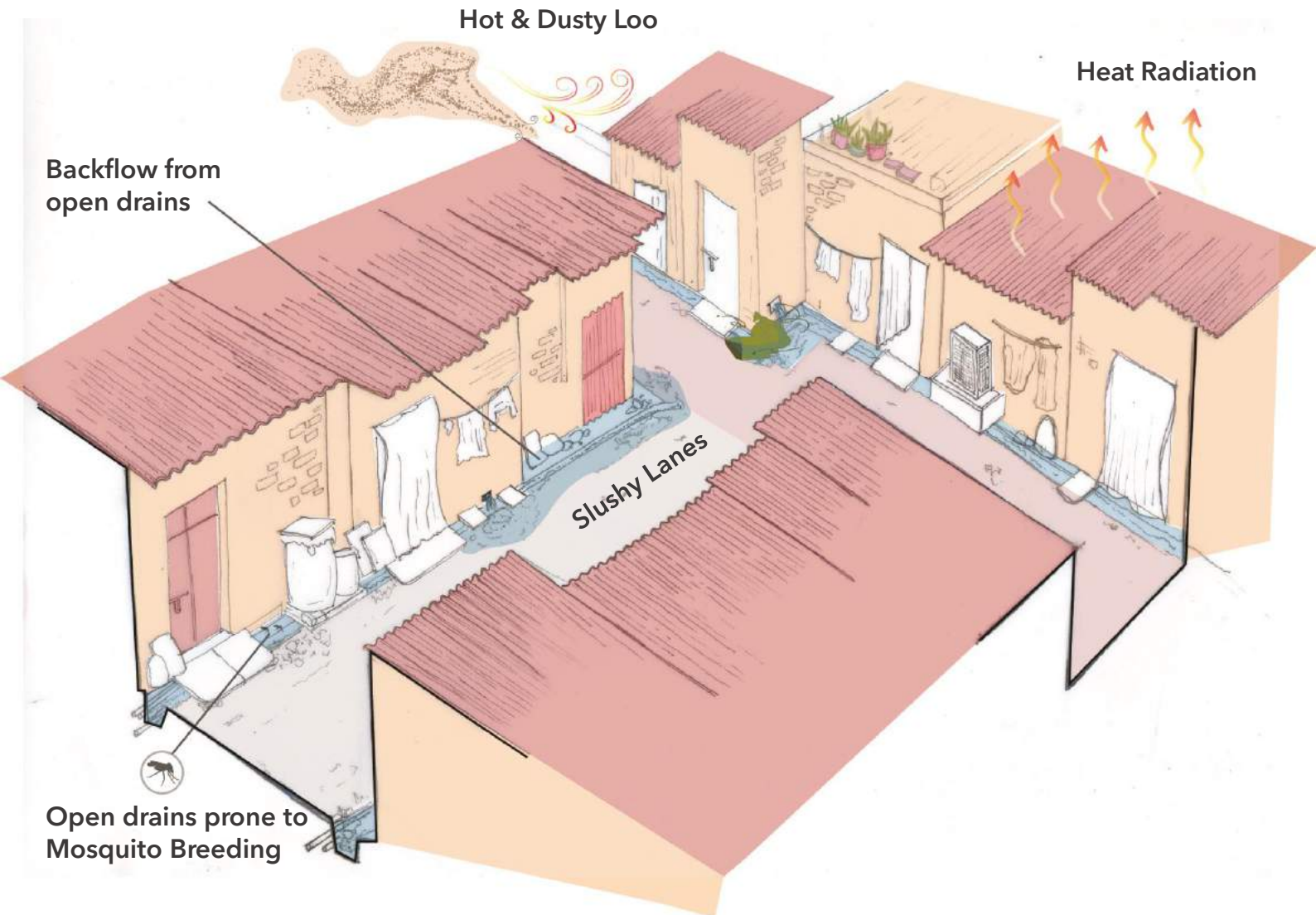
! Garbage dumping has led to an increase in mosquitoes and associated diseases in the settlement.

Solution

Segregate the domestic waste in the garbage bins and request regular fumigation by the municipality.

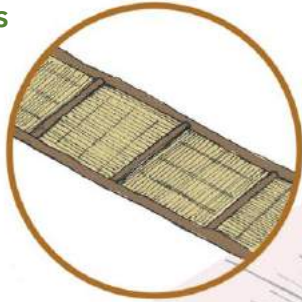


Risks associated with a typical inner street

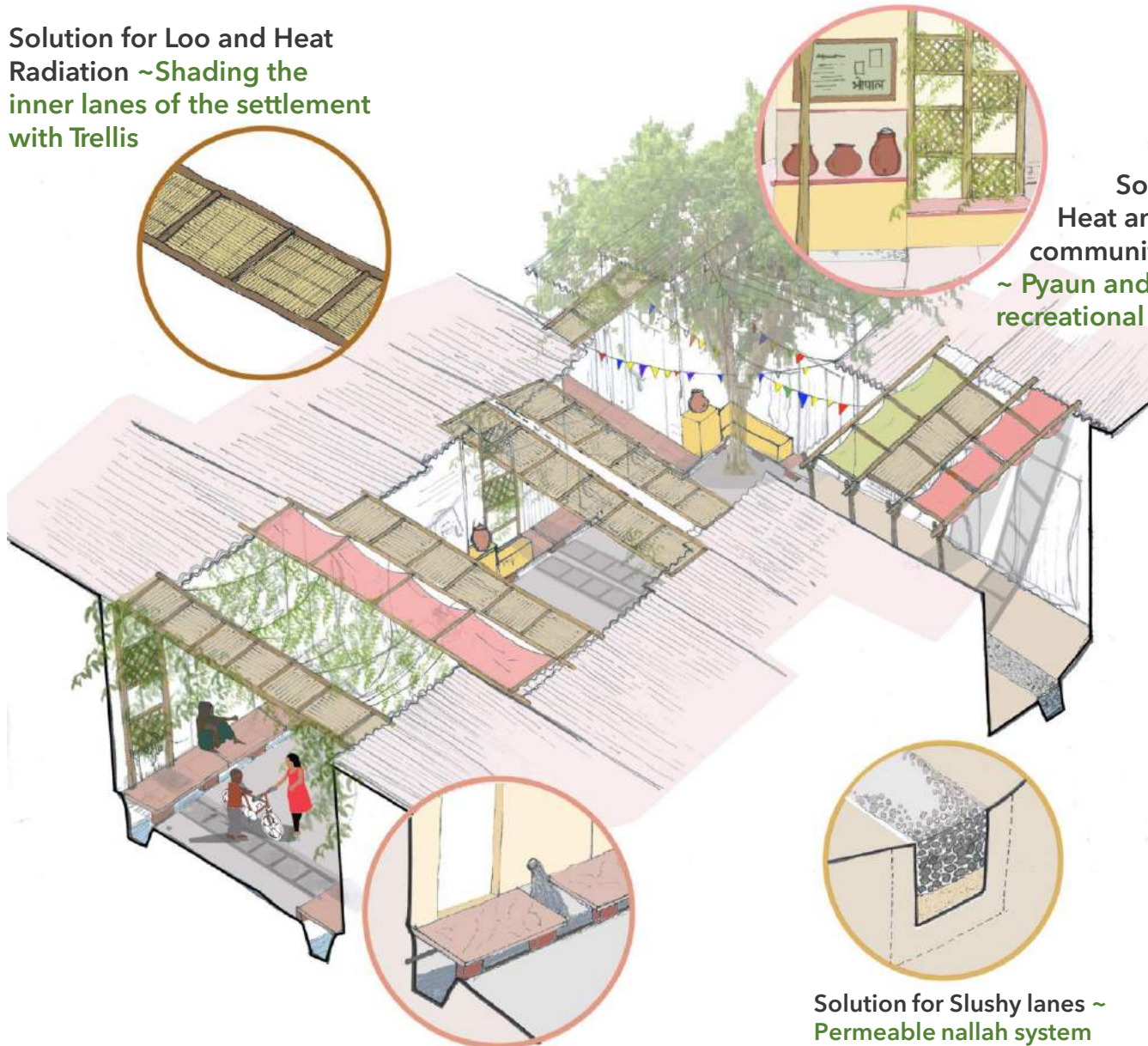


Proposed solutions for the inner street

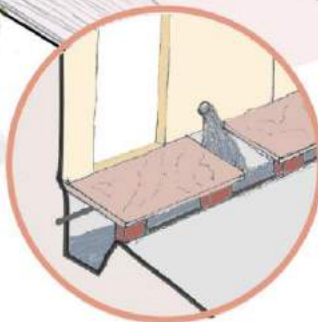
Solution for Loo and Heat Radiation ~Shading the inner lanes of the settlement with Trellis



Solution for Heat and lack of community spaces ~ Pyaun and Opla for recreational activities



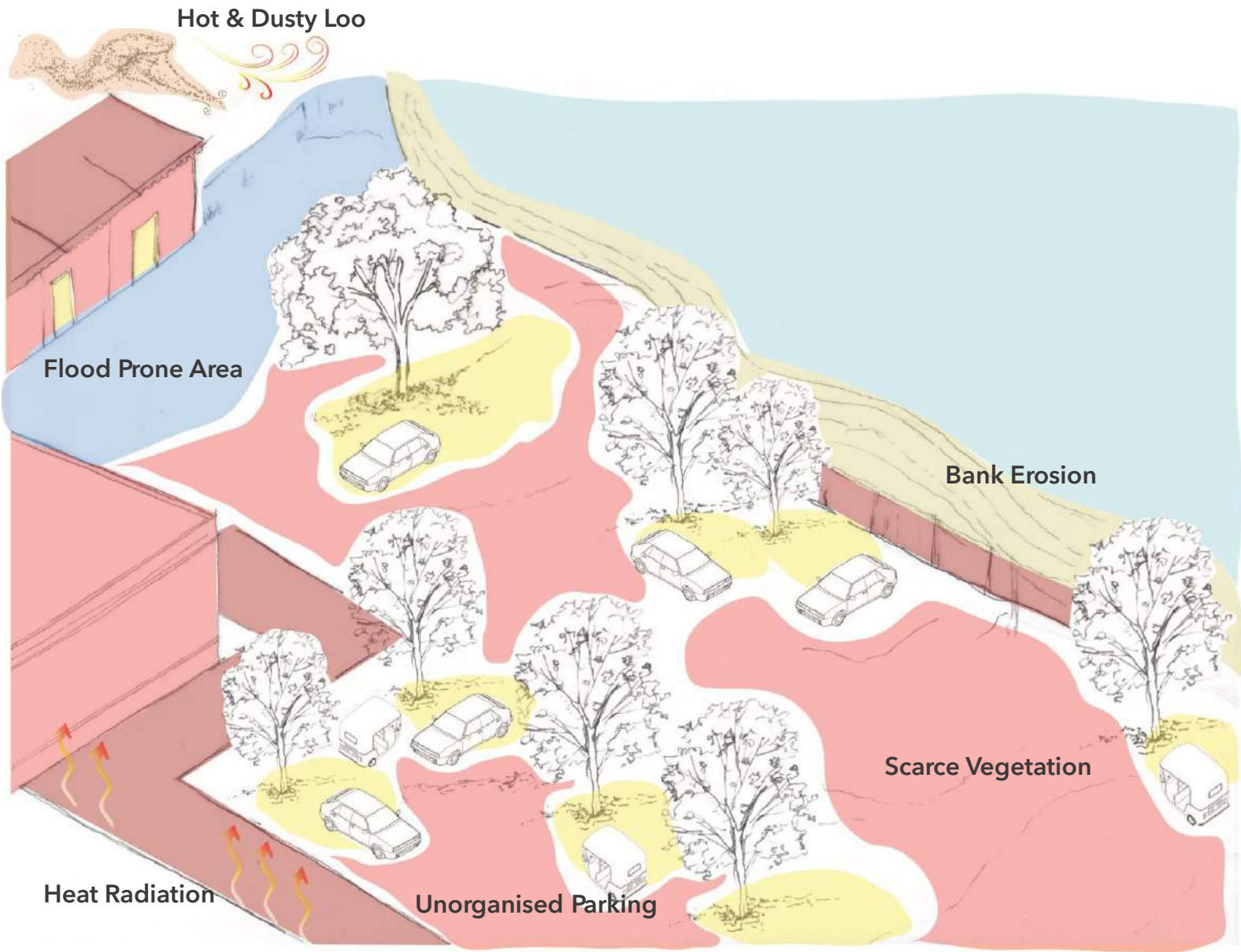
Solution for Mosquito Breeding and Backflows ~ Covering concretised drains



Solution for Slushy lanes ~ Permeable nallah system



Risk posed for unused and barren land



Proposed solution for the barren land

Heat radiation and
grazing lands
~ Fodder Crop Pocket

Wetland bank erosion ~
Wetland buffer system



Flooding and heat radiation
~ Orchard, lined with fruit
and medicinal trees



Heat radiation and unorganized parking
~ Play Area, recreation space for
children and open gym for adults.

Heat radiation and unorganized
parking ~ Multi purpose
Maidan, for recreational, and
cultural activities lined with
vegetation.





**What precautions
should we take ?**

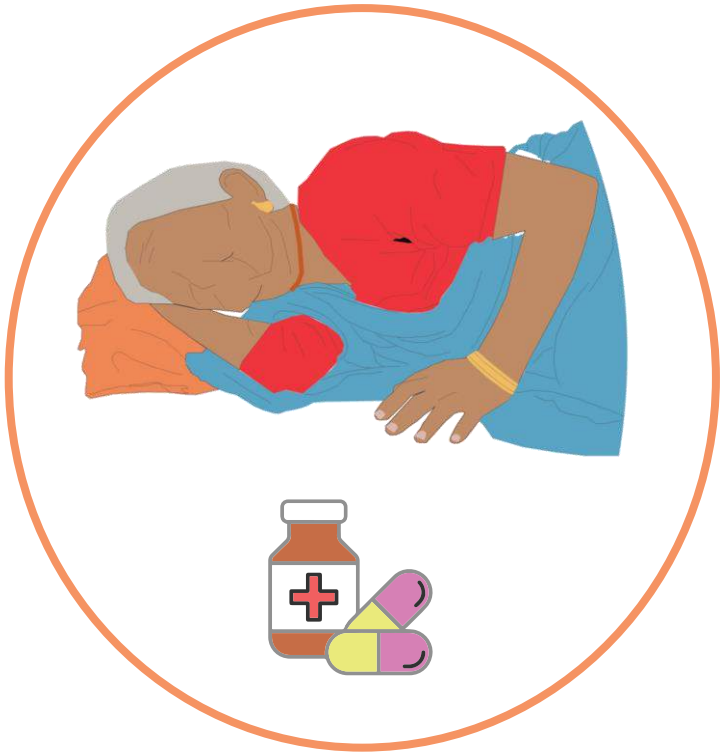
Be alert for following symptoms



Body temperature more than 40° C



Dizziness, light headedness



Hot, red and dry skin



Rapid and shallow breathing



Throbbing headache



Muscle weakness and cramps



Nausea and vomiting

Do's



- Drink sufficient water
- While travelling, carry water



- Keep your home cool
- Use curtains and open windows at night.



- Keep animals in shade
- Give them plenty of water



- Wear lightweight, light-coloured, loose cotton clothes.
- Use protective gear while going out in sun.



- Seek medical assistance if one faints or is ill



- Drink ORS, homemade drinks that help to re-hydrate the body

Don't s



- Avoid going out in the sun, between 12-3 p.m.



- Don't cook between 2-4 pm



- Avoid drinks that dehydrate the body.



- Avoid strenuous activities.
- Avoid working outside between 12 noon to 3 p.m.

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