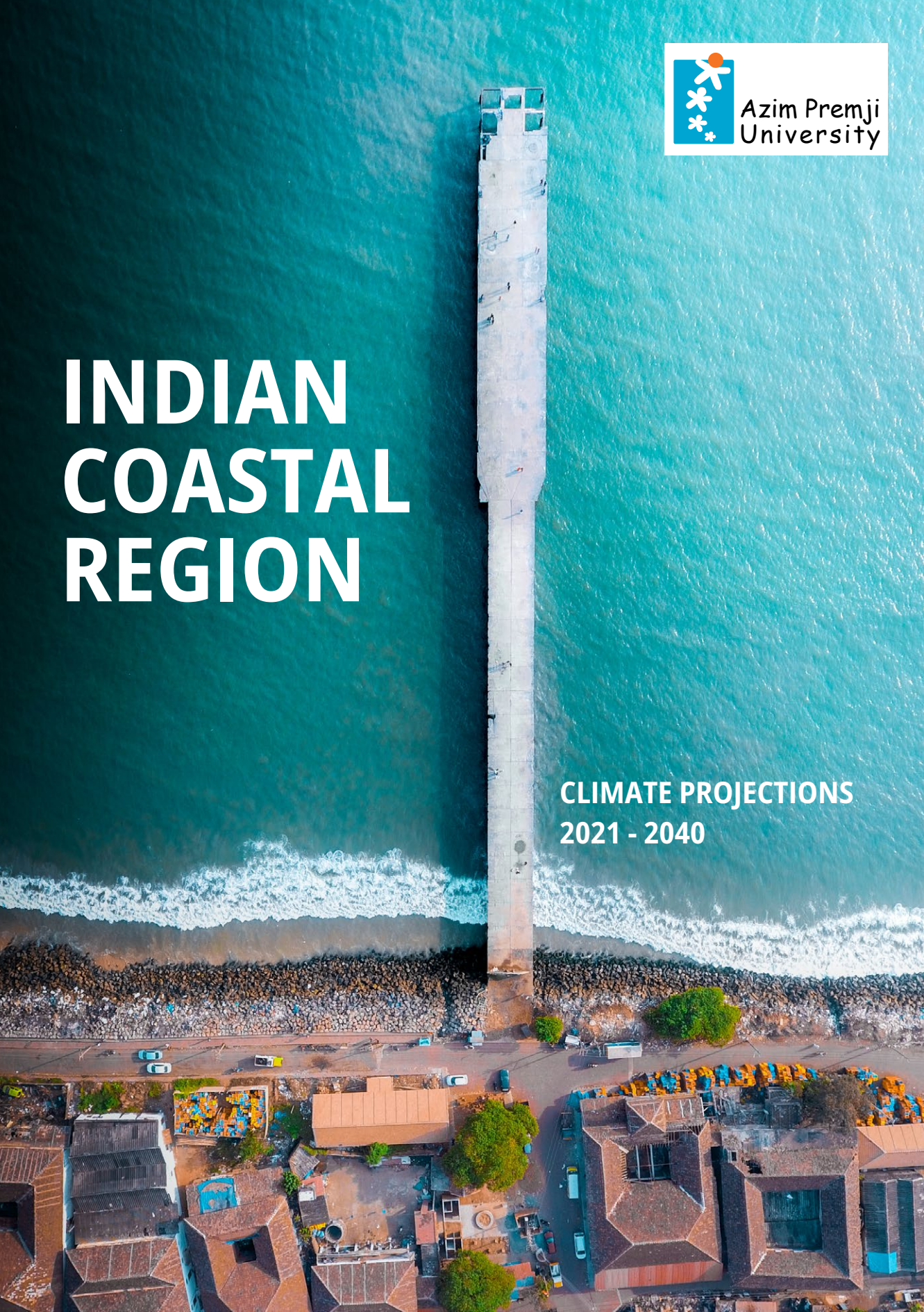
Azim Premji University

INDIAN COASTAL REGION

CLIMATE PROJECTIONS 2021 - 2040



Cover Photo - ‘Aerial View Of Thalassery Pier’, by DRONEHOLIC

Available from:

Azim Premji University
Survey No. 66, Burugunte Village, Bikkanahalli Main Road, Sarjapura
Bengaluru - 562125, Karnataka, India

Suggested Citation:
Indian Coastal Region - Climate Projections 2021-2040, School of Climate Change and Sustainability,
Azim Premji University, ISBN 978-93-7528-040-8, 2026

CONTENTS

IN THE NEAR FUTURE

FOREWORD

THE CLIMATE CRISIS is perhaps the greatest challenge that humanity is facing right now. All of us are reading about climate change in the media. We are perhaps experiencing what we are thinking of as climate change. However, I don't think we are really conscious of the extent of the changes that we will have to deal with, particularly in India.

Climate change is not some distant future challenge – it is the reality of today. Yet all the climate projections that we talk about tend to look way ahead – at what will happen 30, 40, 50 years later. This climate forecast for India, which looks at a period of 2021 to 2040, makes the extent of the crisis very real for all of us today. It highlights the damage to society, to individuals, to families, to the economy. This dataset looks at changes from 2021 to 2040 - 2040 is just 16 years away. It brings to life the impacts of climate change with much greater immediacy, especially the impacts in our immediate environment.

In this period, average temperatures in India are likely to rise by 1.5°C. The effect of this change is dramatic in the Himalayas and in the coastal regions of India, where the minimum temperatures will rise, increasing the number of heatwaves and the intensity of heatwaves. All of us are familiar with a three or five day period in May in very many parts of the country, where we experience an intense heat wave. Now imagine if those heat waves are not 4 or 5 days long, 8 or 9 days long. And they happen not just once or twice a year, but four, five, six, seven times in succession. Let me remind you, we are not talking about 2070 or 2090. We are talking about the near future, within the next 16 years.

Indian culture, economy and society is particularly driven by the monsoon, and changing rainfall patterns will especially affect India. This dataset shows that average precipitation is going to increase, but especially on the western side. Yet there are also locations where the rainfall reduces, so it's a very complex situation. Rainfall is also getting concentrated in bursts, occurring in a few days. These changes will have a significant effect on the daily lives of people. When we start looking at the impacts of climate change using a near-future time frame and with this kind of a resolution (for a specific city like Bombay or Bangalore, or a location like the coastal region of Odisha) then we can start relating to the impacts with more immediacy.

Climate change is one of the defining challenges that humanity faces. Particularly for a country like India, which is vulnerable from climate change in many more ways than some other countries. We must wake up to this reality and act with a great sense of urgency. We must also remember that when things of this nature happen, it's the more vulnerable who are impacted. Those who live in poverty, those who do not have the resources to fend for themselves, are far more affected. As much as India must grow and develop, we must become a more equal society, with greater equity and justice.

Our hope is that this dataset will help us as Indians to relate to the immediacy of climate change, and understand how it will affect our population even more than most parts of the world – especially the vulnerable. From a structural perspective on how our economy and society operates, datasets of this kind are very critical.

What greater call to action do we need? We must get together to shape policy action on the ground, also calling on business, civil society, and the general population. This dataset helps us understand how we must restructure our infrastructure, our business practices of governance, education and media awareness to ensure that we get together collectively to address the climate crisis.

- Anurag Behar
CEO, Azim Premji Foundation

CLIMATE CHANGE

INDIAN COASTAL REGION

THE INDIAN COASTLINE is a dynamic mosaic of diverse landscapes, stretching from the salt marshes of Kutch to the fertile deltas of the East. Characterized by golden beaches, dense mangrove forests like the Sundarbans, and rugged rocky cliffs, it hosts a vibrant marine ecosystem rich in biodiversity. These coastal waters support millions of livelihoods through fishing and trade, while acting as a crucial buffer against monsoonal shifts and rising sea levels.

This booklet offers a glimpse of how the climate of the Indian coastal region is expected to change in the coming decades. By using high-resolution data at a granular 25 x 25 km scale, this booklet provides precise climate projections that are essential for developing strategies to build climate resilience and adaptation. Derived from CMIP6 models corrected for regional bias, the booklet aims to help various stakeholders make informed decisions in the face of climate change.

By providing precise climate projections, it helps various stakeholders — including policymakers, local authorities, and communities — prepare for specific risks in their regions. These insights will guide decisions on how to adapt to climate changes and mitigate risks, ensuring that strategies are practical and effective in safeguarding lives, livelihoods, and ecosystems across India.

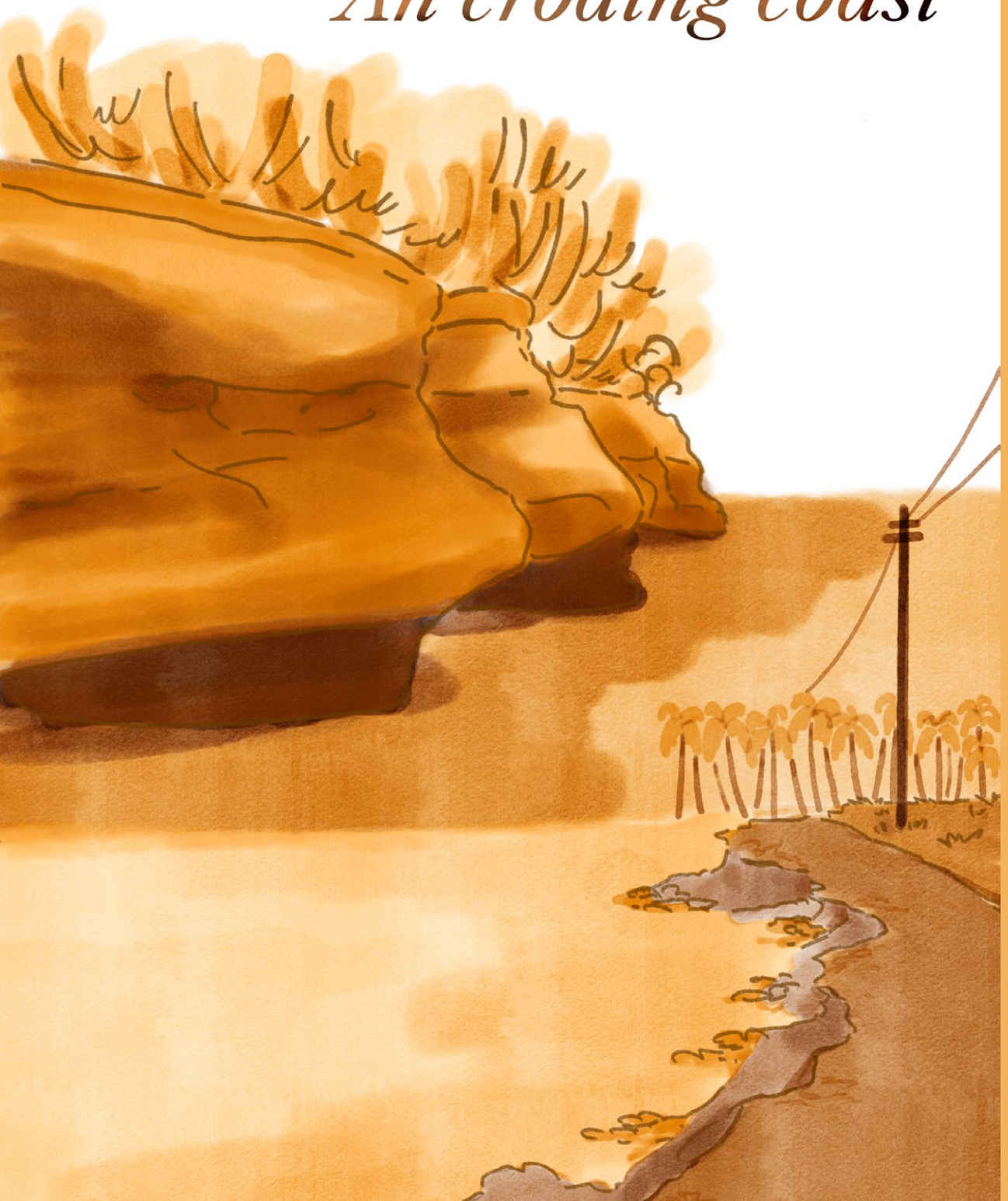
The Intergovernmental Panel on Climate Change (IPCC) developed Shared Socioeconomic Pathways (SSPs) to investigate the potential future impacts of climate change and possible responses to it. These scenarios describe different possible future worlds. Each one is based on a different set of assumptions about how people, the economy, and technology will change in the future.

The insights presented here are based on the SSP2-4.5 scenario which assumes that society will take moderate steps to reduce emissions and adapt to climate change, leading to a future with moderate effects.

Small boats made from wood and bus seats, lying on the Rameswaram shore

Photo:
Vivek Ganesh

A rising sea,
An eroding coast



Melting glaciers and the expansion of warming waters increases the level of the sea. Under the SSP2-4.5 scenario, global sea level is expected to rise 15 centimeters from 2020 to 2050, with a likely range from 13 to 20 centimeters. Intense storms and higher seas create more winds, waves, and floods, leading to increased coastal erosion.

* earth.gov/sealevel/sea-level-explorer/?type=global&scope=section_1

COASTAL EROSION

Kanyakumari, Tamil Nadu

Road along the shore
eroded by the Arabian sea at
Eraviputhenthurai village in
Kanyakumari district,
Tamil Nadu

Photo:
Timothy A Gonsalves

COASTAL EROSION

Puducherry

A family passes by the ruins at Bommayarpalayam along the Bay of Bengal coast following sea erosion. The eastern coast of India has one of the highest longshore drift or littoral drift in the world, due to its two monsoons, and hence, is a very dynamic, unstable and vulnerable environment.

Photo:
Pattabi Raman / Climate Visuals

COASTAL EROSION

Ganjam, Odisha

Houses destroyed in Old Podampetta village, Ganjam district, as a result of sea erosion over years. The villagers have been relocated to new settlements farther away from the coast, by the government.

Photo:
Abhijit Dutta

COASTAL EROSION

Beyt Dwarka, Gujarat

Strong waves, monsoon rains and a constantly rising sea level resulting in significant erosion at Beyt Dwarka in the Gujarat coast.

Photo:
Jayantibhai Movaliya

Uppada, Andhra Pradesh

A house in Uppada broken by the tidal waves.

Photo:
Manish Kumar / Mongabay

Udayakani, Odisha

The coast of Udayakani in Puri district has seen damages to its green belt. Several casuarina plants along the beach are now dried after series of cyclones and floods.

Photo:
Manish Kumar / Mongabay

Gotheeswaram, Kerala

A stretch of the Gotheeswaram beach in Kerala which has fast eroded due to surges. Even the trees planted for protection from the high winds are being lost to the erosion.

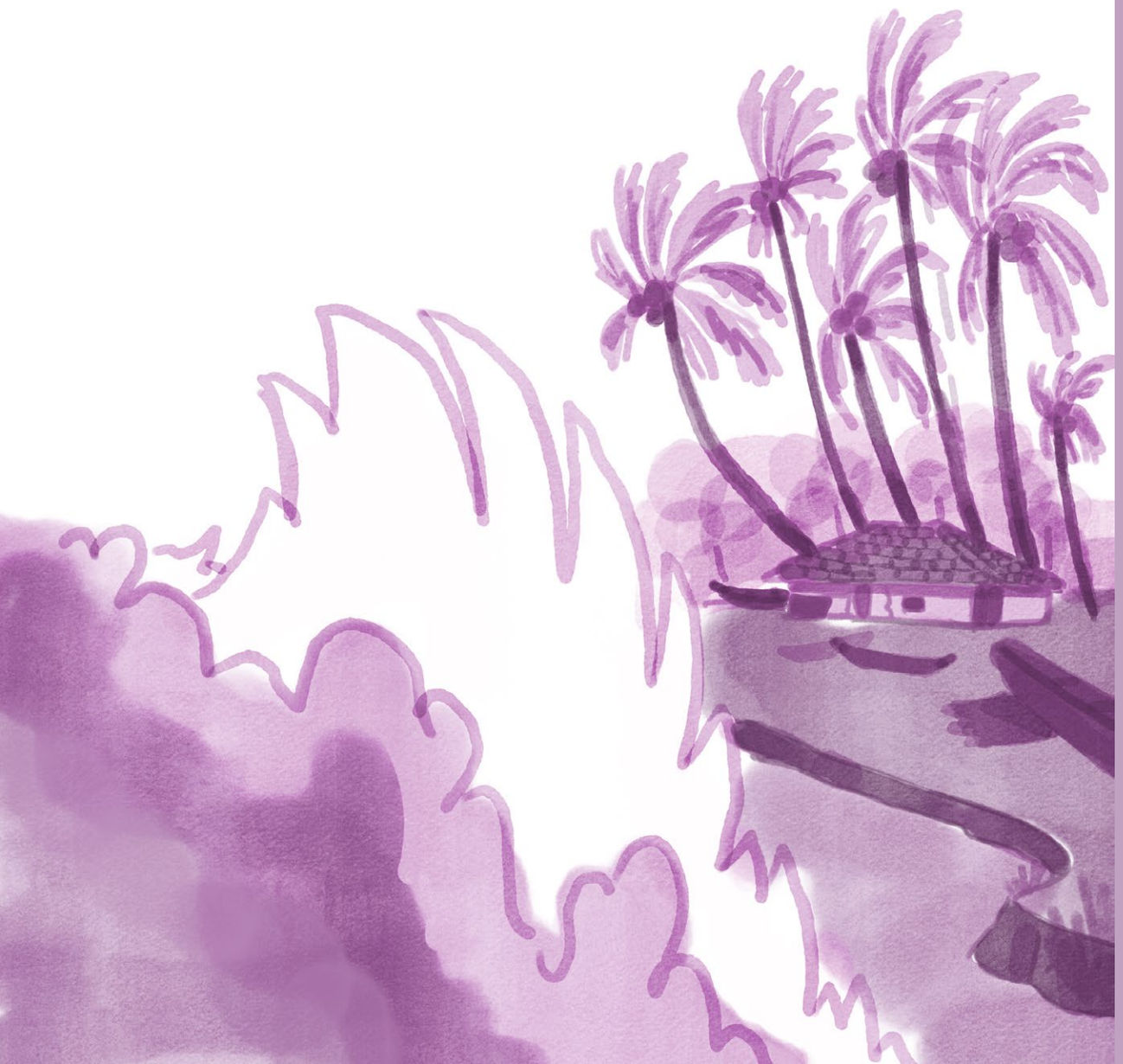
Photo:
Jeff Joseph Paul / InOldNews

Udupi, Karnataka

Every monsoon season the sea keeps eating away the shore of Manoor beach at Thekkatte in Udupi district.

Photo:
Jeevan Dhami

A warming sea, A cyclone hotbed



The oceans play a crucial role in shaping the weather and climate. According to a study published in Environmental Research Letters, there has been an unprecedented acceleration in global mean sea surface temperature over the past four decades. The warming rates used to be 0.06 C per decade in the late 1980s, but has now accelerated to 0.27 C per decade in recent years.*

The sea surface temperature needs to be at least 27°C for Tropical cyclones to form. A warming ocean creates favorable circumstances for the formation of more cyclones. Destructive winds, storm surges and torrential rainfall accompanying the cyclone cause a lot of damage especially when it crosses the coast.

* iopscience.iop.org/article/10.1088/1748-9326/adaa8a
climate.esa.int/en/news-events/Ocean-Surface-Temperature-rise-accelerating/

Mamallapuram, Tamil Nadu

Boats being shifted to safer places at Mamallapuram ahead of the Nivar cyclone.

Photo:
Seshadri Sukumar

CYCLONES

Villakudi, Tamil Nadu

At Villakudi village in Thiruvarur district, a man makes a desperate attempt to keep his roof in place just before the arrival of Cyclone Nivar.

Photo:
Balamurugan Veerabathiran

Pathar Prathima, West Bengal

These are damaged embankments destroyed during Cyclone Amphan at Kamdevnagar in *Pathar Prathima* bordering the Mrindangabhanga river. We were lucky that the impact happened during low tide in the morning. If it had happened during high tide in the afternoon around 2 pm the damage would have been severe.

Dipanjan Mishra

Sagar Island, West Bengal

People walk on a battered mud embankment in Sagar Island during Cyclone Remal.

Photo:
Swattik Jana

Pathar Prathima, West Bengal

What used to be a house that doubled as a shop in Pathar Prathima, damaged completely by Cyclone Amphan.

Photo:
Dipanjan Mishra

Kamdevnagar, West Bengal

A flooded neighborhood at Kamdevnagar as a result of Cyclone Yaas in 2021.

Photo:
Dipanjan Mishra

Sundarbans, West Bengal

Saline soil poses a major risk for agriculture and human consumption in the Sundarbans region.

Photo:
Dipanjan Mishra

During cyclones embankments break and there's sea water everywhere. This water mixes with ground water and results in the increase of salinity. The average TDS (Total Dissolved Solids) level in the Sundarbans region is alarming, making the water unfit for consumption.

To make farmers' lives better, we founded a cooperative. We encourage them to use indigenous seeds rather than high yielding ones. When the cyclone hit our area the high yielding varieties of paddy were destroyed, but the salt tolerant indigenous varieties survived.

Salinity & excessive temperature have also had an impact on the menstrual health of women. Thyroid, blood pressure, skin diseases and cancer are prevalent amongst the people living here.

Dipanjan Mishra

Sundarbans, West Bengal

Women queueing up to plant mangrove saplings along the riverbanks of the Matla river in the Sundarbans.

Photo:
Avijit Ghosh / Climate Visuals

South Twenty-Four Parganas

West Bengal

10 million

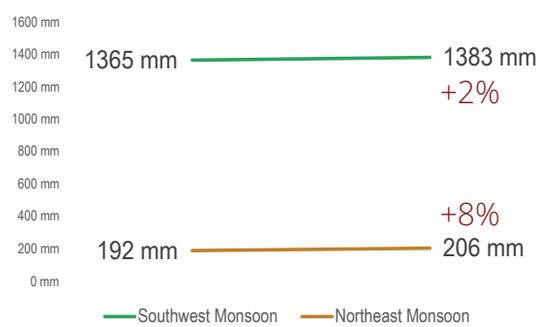
Estimated Population in 2030

Temperature parameters indicate a steady warming trend, with the summer wet-bulb temperature projected to see the highest increase of 1.0°C. Other metrics, including annual max, summer max, and winter minimum temperatures, are all expected to rise by a uniform 0.6°C from their respective baselines. Precipitation is also forecasted to increase. The southwest monsoon, the primary source of rain with a 1,365 mm baseline, is projected to grow by 2%. The northeast monsoon shows a higher proportional rise, with an expected 8% increase over its 192 mm baseline, suggesting a transition toward a warmer and wetter climate for the district.

	Baseline Average	Projection
Annual Max Temperature	30.8° C	+0.6° C
Summer Max Temperature	37.9° C	+0.6° C
Summer Wetbulb Temperature	22.3° C	+1.0° C
Winter Minimum Temperature	11.7° C	+0.6° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Purba Medinipur

West Bengal

5.8 million

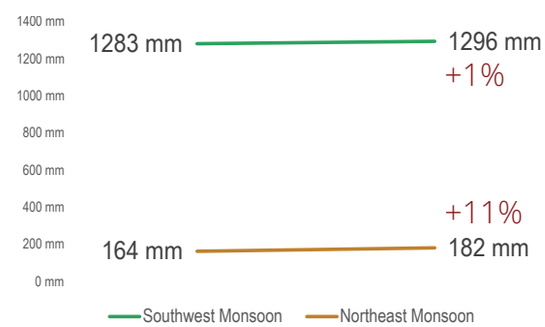
Estimated Population in 2030

Temperature parameters show a consistent warming trend, with the summer wet-bulb temperature projected to see the highest increase of 1.0°C. The summer max temperature is expected to rise by 0.8°C from its high 40.0°C baseline, while the winter minimum and annual max are projected to increase by 0.7°C and 0.6°C, respectively. Precipitation trends show a notable surge in the northeast monsoon, which is projected to grow by 11% over its 164 mm baseline. In contrast, the southwest monsoon, the district's primary rainfall source at 1,283 mm, is expected to remain relatively stable with a modest 1% increase.

	Baseline Average	Projection
Annual Max Temperature	31.4° C	+0.6° C
Summer Max Temperature	40.0° C	+0.8° C
Summer Wetbulb Temperature	22.5° C	+1.0° C
Winter Minimum Temperature	11.4° C	+0.7° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Puri, Odisha

Women from Sana Jhadling village carry mangrove saplings to the planting site as part of a community-led conservation effort. These saplings will be planted along the riverbank to protect against soil erosion and support local biodiversity.

Aishwarya Mohanty / Behanbox

Balasore

Odisha

2.6 million

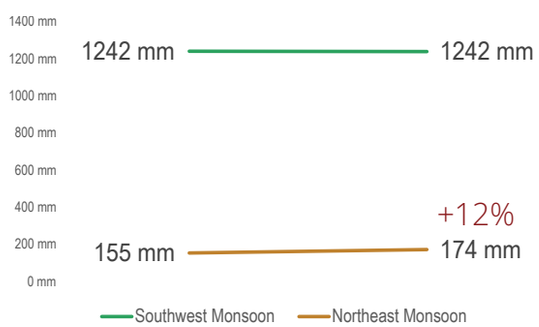
Estimated Population in 2030

Temperature parameters indicate a steady increase across the board. Both the summer max and summer wet-bulb temperatures are projected to rise by 1.0°C, with the summer peak reaching significantly higher than the 31.9°C annual average. The winter minimum and annual max temperatures are set to increase by 0.8°C and 0.6°C, respectively. Regarding precipitation, the data shows a stable southwest monsoon. However, the northeast monsoon is expected to increase by 12% from its 155 mm baseline.

	Baseline Average	Projection
Annual Max Temperature	31.9° C	+0.6° C
Summer Max Temperature	40.9° C	+1.0° C
Summer Wetbulb Temperature	22.8° C	+1.0° C
Winter Minimum Temperature	11.4° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Puri

Odisha

1.9 million

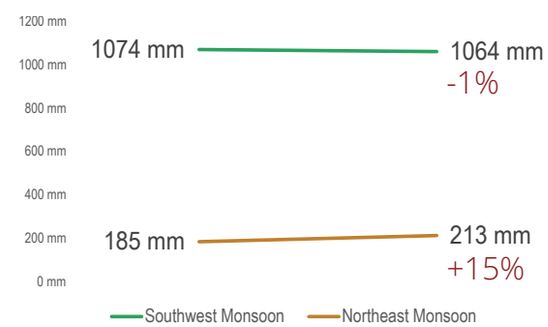
Estimated Population in 2030

Temperature parameters indicate a steady warming trend; both the summer max and summer wet-bulb temperatures are projected to rise by 1.0°C. The annual max and winter minimum temperatures are also expected to increase by 0.7°C from their respective baselines of 31.1°C and 13.2°C. Precipitation trends show a notable divergence between seasons. The northeast monsoon is projected to see a significant 15% increase over its 185 mm baseline. Conversely, the southwest monsoon, the district's primary rainfall source at 1,074 mm, is expected to experience a slight decline of 1%, suggesting a shift toward a hotter climate with redistributed rainfall patterns.

	Baseline Average	Projection
Annual Max Temperature	31.1° C	+0.7° C
Summer Max Temperature	36.8° C	+1.0° C
Summer Wetbulb Temperature	23.0° C	+1.0° C
Winter Minimum Temperature	13.2° C	+0.7° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Muthupet, Tamil Nadu

Muthupet - a coastal town in Thiruvarur district was devastated by Cyclone Gaja in 2018. Muthupet is home to one of Tamilnadu's largest mangrove forests and played a pivotal role in shielding villages around the region during the cyclone. The mangroves themselves though became severely degraded due to the impact of Gaja. Efforts have been taken to restore the mangroves and the land is healing.

Karthikaa Raja

Photo:
Vivek Ganesh

A woman wades through the flood water brought by Cyclone Ditwah in Rameswaram.

Rohith Fernando

Photo:
S Sikkandar

Tamil Nadu Heavy rains in Chennai city lead to water logging as Cyclone Nivar approaches the eastern Indian coast near Puduchery.

Photo:
Seshadri Sukumar

School children ferried across from their flooded neighbourhood to the road at Thangachimadam in Rameswaram post Cyclone Ditwah.

Rohith Fernando

Photo:
Nihal

Excess rains, Unpredictable patterns

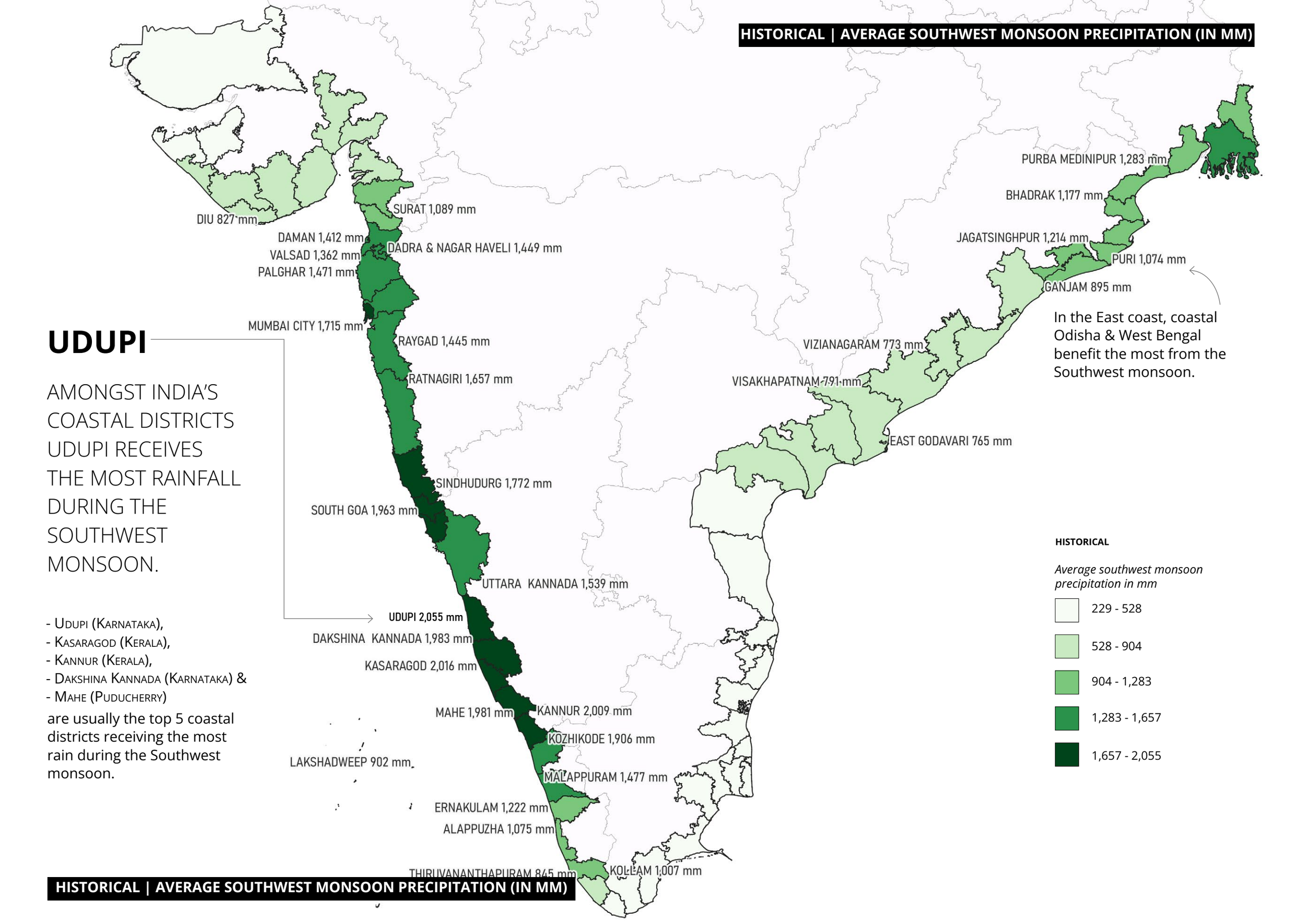
Coastal Gujarat and Maharashtra are projected to receive significantly excess rains in the near future. Unpredictable weather patterns can throw life out of gear in the Indian coast.

INTENSE RAINS

Alappuzha, Kerala

Dense rain clouds hover over Marari beach in Alappuzha district.

Photo:
Shamayita Das



UDUPI

AMONGST INDIA'S COASTAL DISTRICTS UDUPI RECEIVES THE MOST RAINFALL DURING THE SOUTHWEST MONSOON.

- Udupi (Karnataka),
- Kasaragod (Kerala),
- Kannur (Kerala),
- Dakshina Kannada (Karnataka) &
- Mahe (Puducherry)

are usually the top 5 coastal districts receiving the most rain during the Southwest monsoon.

In the East coast, coastal Odisha & West Bengal benefit the most from the Southwest monsoon.

HISTORICAL | AVERAGE SOUTHWEST MONSOON PRECIPITATION (IN MM)

Dakshina Kannada

Karnataka

2.5 MILLION

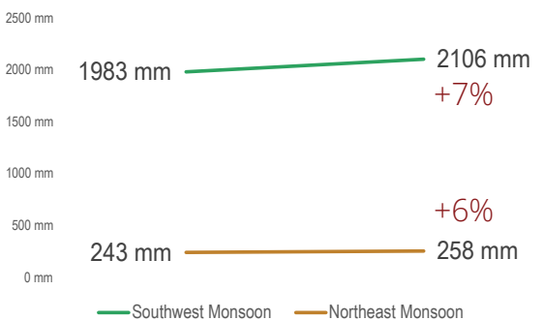
Estimated Population in 2030

Temperature parameters indicate a consistent warming trend, with summer max and summer wet-bulb temperatures both projected to increase by 1.1°C. The annual max and winter minimum temperatures are also set to rise by a steady 1.0°C from their respective baselines. Precipitation data forecasts an intensification of both monsoon seasons. The southwest monsoon, starting from a substantial 1,983 mm baseline, is projected to increase by 7%. Similarly, the northeast monsoon is expected to rise by 6% over its 243 mm baseline, indicating a transition toward a hotter and significantly wetter climate for the coastal district.

	Baseline Average	Projection
Annual Max Temperature	30.1° C	+1.0° C
Summer Max Temperature	35.8° C	+1.1° C
Summer Wetbulb Temperature	23.1° C	+1.1° C
Winter Minimum Temperature	16.3° C	+1.0° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Udupi

Karnataka

1.2 MILLION

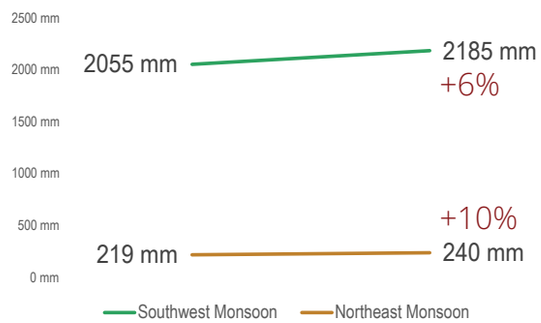
Estimated Population in 2030

Temperature parameters indicate a clear warming trend; both the summer max and summer wet-bulb temperatures are projected to rise by 1.1°C. Meanwhile, the annual max and winter minimum temperatures are expected to increase by a steady 1.0°C from their respective baselines of 30.5°C and 16.9°C. Precipitation data forecasts an intensification of both monsoon seasons. The southwest monsoon, starting from a massive 2,055 mm baseline, is projected to increase by 6%. Notably, the northeast monsoon is expected to see the highest proportional growth, rising by 10% over its 219 mm baseline, indicating a shift toward a significantly wetter future for the coastal district.

	Baseline Average	Projection
Annual Max Temperature	30.5° C	+1.0° C
Summer Max Temperature	36.1° C	+1.1° C
Summer Wetbulb Temperature	23.0° C	+1.1° C
Winter Minimum Temperature	16.9° C	+1.0° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



PROJECTIONS | SOUTHWEST MONSOON - CHANGE IN RAINFALL

COASTAL MAHARASHTRA & GUJARAT WILL RECEIVE CONSIDERABLE EXCESS RAIN FROM THE SOUTHWEST MONSOON IN THE NEAR FUTURE.

KACHCHH 31.1 %
JAMNAGAR 28.8 %
JUNAGADH 23.4 %
PORBANDAR 25.1 %
DIU 21.6 %
SURAT 22.8 %
DAMAN 21.7 %
PALGHAR 19.3 %
RAYGAD 15.5 %
RATNAGIRI 11.8 %
POTTI SRIRAMULU NELLORE 11.9 %
KANCHIPURAM 15.6 %
CHENNAI 12.1 %
VILLUPURAM 18.2 %
PUDUCHERRY 17.6 %
PUDUKKOTTAI 23.5 %
NAGAPATTINAM 19.5 %
THIRUVARUR 20.6 %
KOLLAM 12.0 %
THIRUVANANTHAPURAM 12.6 %
TIRUNELVELI 15.8 %

Coastal Tamil Nadu & Andhra Pradesh generally receive their major rain from the Northeast monsoon. But in the near future this region will also receive surplus rain from the Southwest monsoon.

PROJECTIONS

Projected change in %

- -1 - 3
- 3 - 10
- 10 - 17
- 17 - 24
- 24 - 31

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.

PROJECTIONS | SOUTHWEST MONSOON - CHANGE IN RAINFALL

INTENSE RAINS

Kozhikode, Kerala

The rain spells during the monsoon in Kozhikode are intense.

Photo:
Syed Hazeem Qadri

Alappuzha

Kerala

2.9 million

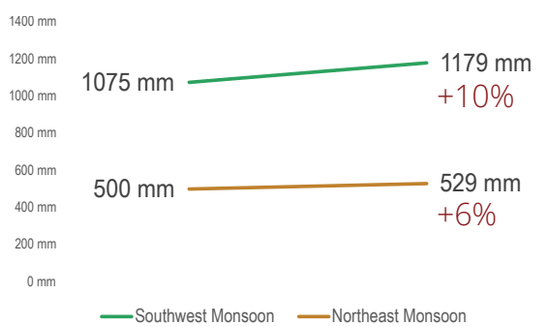
Estimated Population in 2030

Temperature data indicates a clear warming trend, with the summer max temperature projected to see the highest increase of 1.3°C from its 35.9°C baseline. The annual max and summer wet-bulb temperatures are expected to rise by 1.1°C and 1.0°C, respectively, while the winter minimum shows a 0.9°C increase. Precipitation is also forecasted to grow. The southwest monsoon, starting at a baseline of 1,075 mm, is projected to increase by 10%. Similarly, the northeast monsoon is expected to rise by 6% over its 500 mm baseline, indicating an overall trend toward a hotter and wetter climate.

	Baseline Average	Projection
Annual Max Temperature	31.2° C	+1.1° C
Summer Max Temperature	35.9° C	+1.3° C
Summer Wetbulb Temperature	25.0° C	+1.0° C
Winter Minimum Temperature	19.8° C	+0.9° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Kozhikode

Kerala

5.6 million

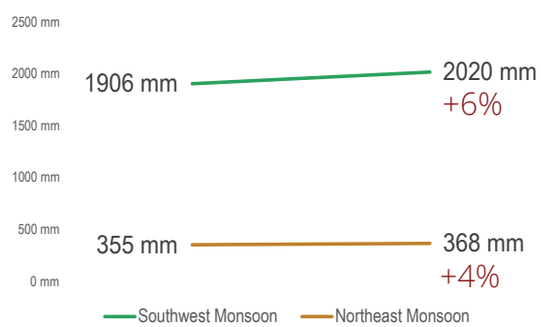
Estimated Population in 2030

Temperature metrics show a consistent warming trend, with the summer max temperature expected to see the highest increase of 1.2°C from its 36.1°C baseline. The annual max, summer wet-bulb, and winter minimum temperatures are all projected to rise by a steady 1°c. Regarding rainfall, both monsoon seasons are expected to intensify. The southwest monsoon, which has a significant baseline of 1,906 mm, is projected to increase by 6%. Meanwhile, the northeast monsoon is forecasted to grow by 4% from its 355 mm baseline.

	Baseline Average	Projection
Annual Max Temperature	30.2° C	+1.0° C
Summer Max Temperature	36.1° C	+1.2° C
Summer Wetbulb Temperature	23.6° C	+1.0° C
Winter Minimum Temperature	17.1° C	+1.0° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Gotheeswaram, Kerala

Old houses along the Gotheeswaram beach in Kozhikode bear the brunt of the monsoon rains. Residents fear they will have to move inland sooner or later.

Syed Hazeem Qadri

Alleppey, Kerala

People walk through a flooded road in Alleppey. Kerala was severely impacted by floods during the 2018 monsoon season.

Photo:
@ajijchan

Kasaragod

Kerala

1.2 million

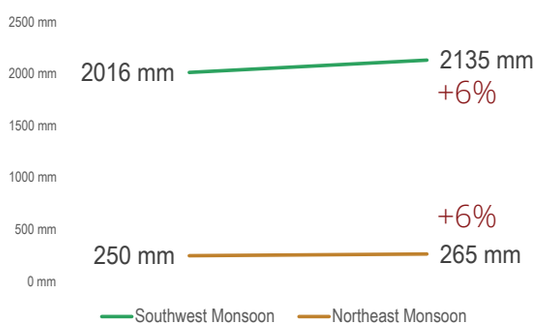
Estimated Population in 2030

Temperature parameters indicate a steady warming trend, with both the summer max and summer wet-bulb temperatures projected to rise by 1.1°C. The annual max and winter minimum temperatures are also expected to increase by a consistent 1.0°C from their respective baselines of 30.4°C and 18.4°C. Precipitation data forecasts an intensification of both major seasons. Both the northeast monsoon (baseline 250 mm) and the southwest monsoon (baseline 2,016 mm) are projected to increase by 6%. This suggests a transition toward a hotter and significantly wetter climate for the district.

	Baseline Average	Projection
Annual Max Temperature	30.4° C	+1.0° C
Summer Max Temperature	35.4° C	+1.1° C
Summer Wetbulb Temperature	24.1° C	+1.1° C
Winter Minimum Temperature	18.4° C	+1.0° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Ernakulam

Kerala

5.3 million

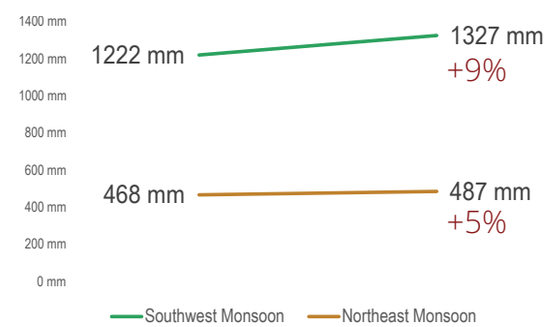
Estimated Population in 2030

Temperature data reveals a consistent warming trend, most notably in the summer max temperature, which is projected to rise by 1.4°C from its 35.5°C baseline. The annual max and summer wet-bulb temperatures are expected to increase by 1.1°C and 1.0°C, respectively, while the winter minimum shows a 0.9°C rise. Precipitation is also anticipated to grow. The southwest monsoon, starting from a baseline of 1,222 mm, is projected to increase by 9%. Similarly, the northeast monsoon is forecasted to rise by 5% over its 468 mm baseline, indicating a trend toward a hotter and wetter climate for the region.

	Baseline Average	Projection
Annual Max Temperature	29.7° C	+1.1° C
Summer Max Temperature	35.5° C	+1.4° C
Summer Wetbulb Temperature	23.2° C	+1.0° C
Winter Minimum Temperature	16.7° C	+0.9° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Kozhikode, Kerala

After a severe heat wave through the months of April and May with no summer rains, sudden precipitation led to flooding of low-lying areas.

Location:
Ramanattukara, Kozhikode

Photo:
Jeff Joseph Paul / InOldNews

Gokarna, Karnataka

A landslide at the Ram Mandir in Gokarna due to intense rainfall and anthropogenic activities. An opening in the hill near the Mandir is the main source of fresh water for the village. We collect the water in drums every 2 or 3 days. There is plenty of water during the monsoon but you will have to wait for 30 to 40 minutes to collect the water in drops during summer.

Chaitanya B Hegde

Goa

A cloudy day during the monsoon season at Vagator beach in North Goa.

Photo: @**pinaki1**

Uttara Kannada

Karnataka

1.6 million

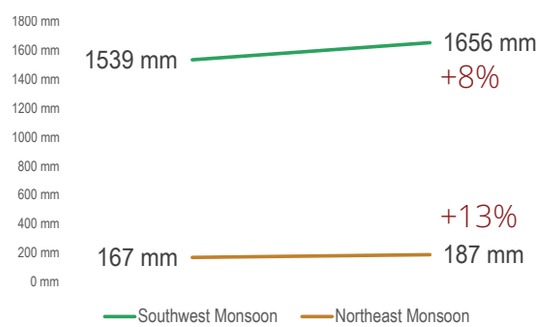
Estimated Population in 2030

Temperature data indicates a steady warming trend across all parameters. The winter minimum temperature is projected to see the highest increase of 1.2°C, followed by a 1.1°C rise in the summer wet-bulb temperature. The annual max and summer max temperatures are expected to climb by 0.9°C and 0.8°C, respectively. Precipitation is also forecasted to increase significantly. The southwest monsoon, starting from a massive 1,539 mm baseline, is projected to grow by 8%. Notably, the northeast monsoon is expected to see the largest proportional surge, rising by 13% over its 167 mm baseline, indicating a shift toward a warmer and wetter future for the district.

	Baseline Average	Projection
Annual Max Temperature	30.3° C	+0.9° C
Summer Max Temperature	37.3° C	+0.8° C
Summer Wetbulb Temperature	21.3° C	+1.1° C
Winter Minimum Temperature	13.8° C	+1.2° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



North Goa

Goa

0.8 million

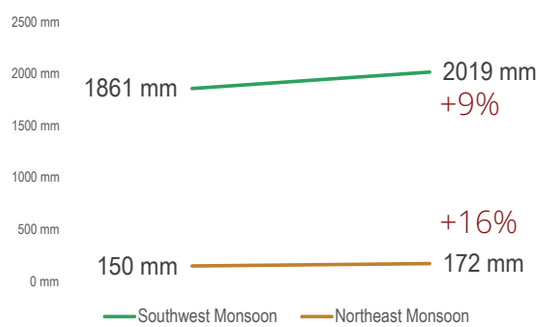
Estimated Population in 2030

Temperature parameters indicate a warming trend, with the winter minimum temperature projected to see the highest increase of 1.3°C, followed by a 1.2°C rise in summer wet-bulb temperature. The annual max and summer max temperatures are expected to climb by 0.9°C and 0.8°C, respectively. Precipitation data forecasts a significant increase in rainfall. The southwest monsoon, starting from a substantial 1,861 mm baseline, is projected to grow by 9%. Notably, the northeast monsoon is expected to see the largest proportional surge, rising by 16% over its 150 mm baseline, suggesting a trend toward a warmer and wetter climate.

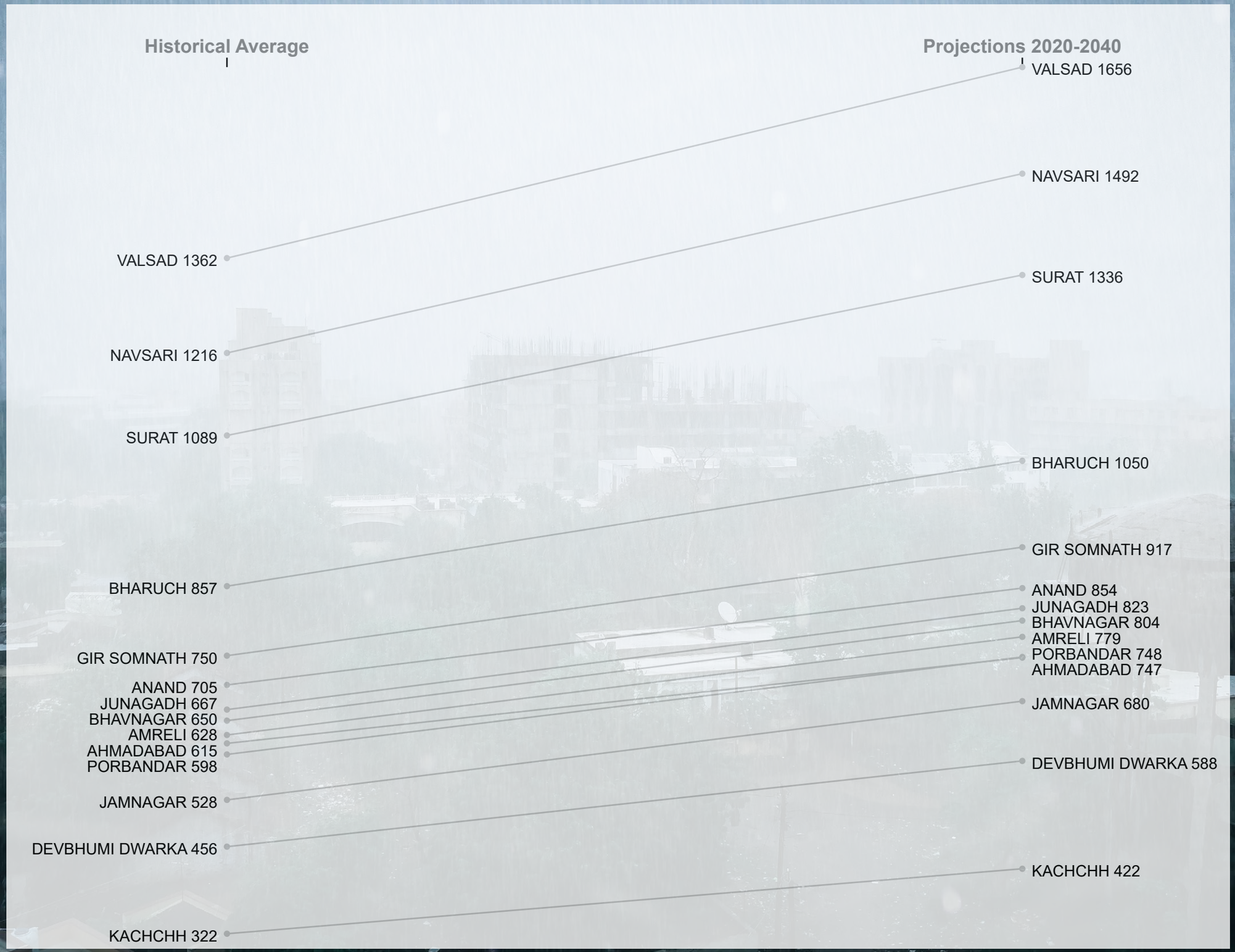
	Baseline Average	Projection
Annual Max Temperature	31.1° C	+0.9° C
Summer Max Temperature	37.3° C	+0.8° C
Summer Wetbulb Temperature	22.2° C	+1.2° C
Winter Minimum Temperature	15.6° C	+1.3° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



COASTAL GUJARAT TO RECEIVE MORE SOUTHWEST MONSOON RAINFALL IN THE NEAR FUTURE



Values shown are average Southwest Monsoon precipitation in mm.

Values in brackets indicate projected percentage of increase in precipitation.

Intense rainfall in Bhavnagar, Gujarat

Photo: Jemish Mayani

Surat

Gujarat

8.8 million

Estimated Population in 2030

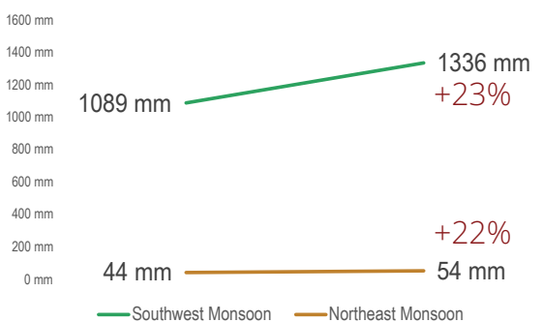
Temperature data indicates a steady warming trend across all metrics. The winter minimum temperature shows the most significant rise at 1.4°C, followed closely by a 1.3°C increase in summer wet-bulb temperature. The summer max and annual max temperatures are projected to climb by 1.1°C and 0.9°C, respectively. Precipitation is also expected to increase significantly.

The southwest monsoon, starting from a baseline of 1,089 mm, is projected to rise by 23%. Similarly, the northeast monsoon is forecasted to increase by 22% over its 44 mm baseline, suggesting a notably wetter future for the region.

	Baseline Average	Projection
Annual Max Temperature	33.7° C	+0.9° C
Summer Max Temperature	41.7° C	+1.1° C
Summer Wetbulb Temperature	19.3° C	+1.3° C
Winter Minimum Temperature	9.3° C	+1.4° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Bhavnagar

Gujarat

3 million

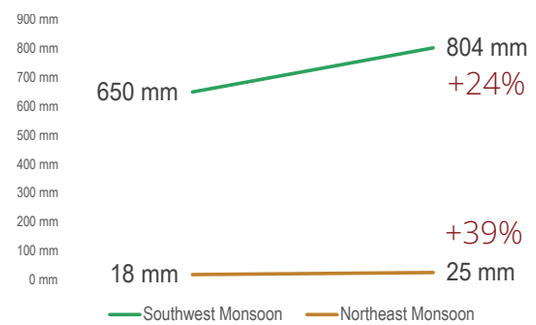
Estimated Population in 2030

Temperature parameters show a distinct warming trend, with both the summer wet-bulb and winter minimum temperatures projected to see the highest increase of 1.3°C. Additionally, the summer max is expected to rise by 1.1°C from its 41.0°C baseline, while the annual max increases by 1.0°C. Precipitation data forecasts a significant surge in rainfall. The southwest monsoon, the primary source of rain with a 650 mm baseline, is projected to increase by 24%. Notably, the northeast monsoon is expected to see the largest proportional growth, rising by 39% over its small 18 mm baseline.

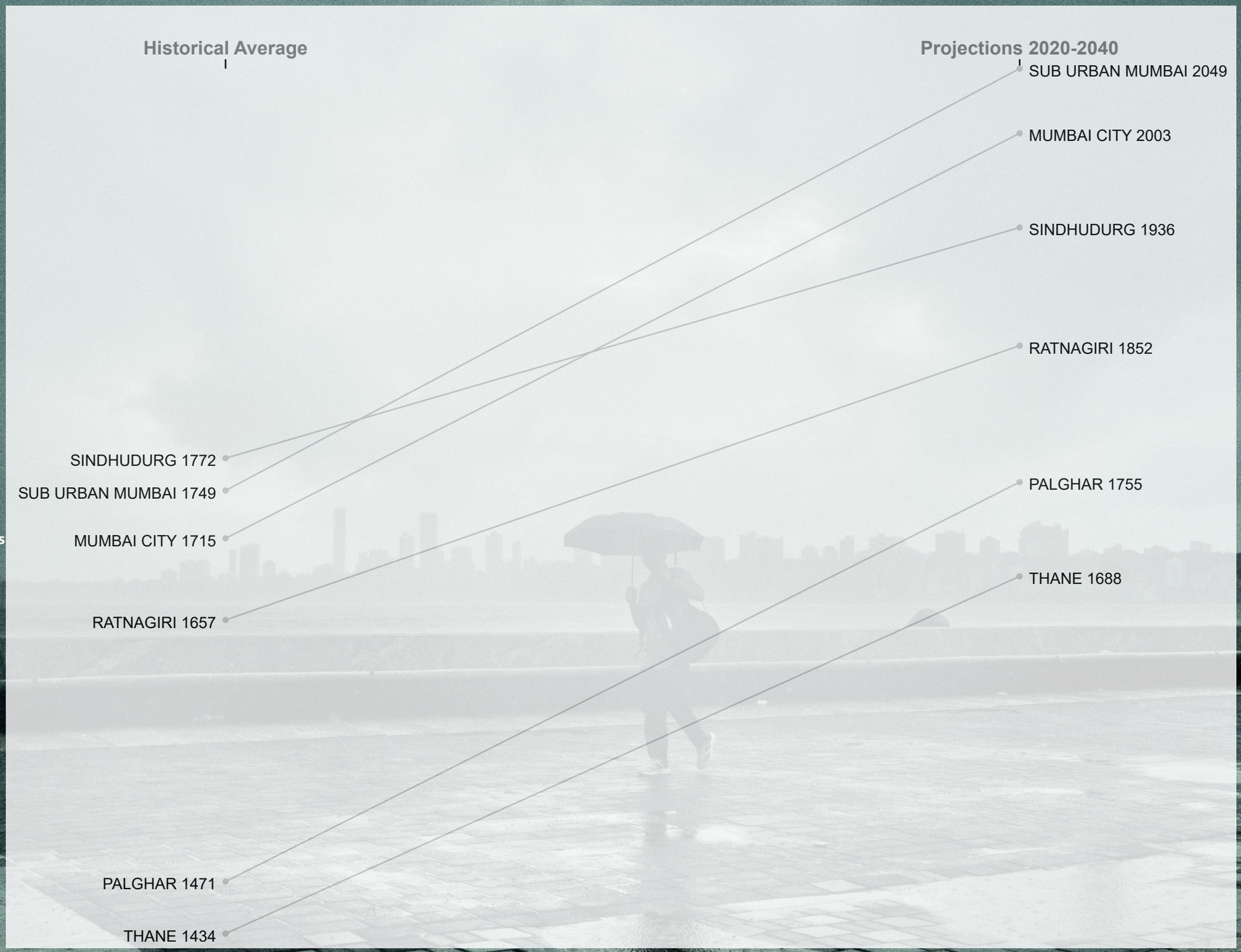
	Baseline Average	Projection
Annual Max Temperature	33.1° C	+1.0° C
Summer Max Temperature	41.0° C	+1.1° C
Summer Wetbulb Temperature	20.7° C	+1.3° C
Winter Minimum Temperature	9.2° C	+1.3° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



COASTAL **MAHARASHTRA** TO RECEIVE **MORE**
SOUTHWEST MONSOON RAINFALL IN THE NEAR FUTURE



Values shown are average Southwest Monsoon precipitation in mm.

Values in brackets indicate projected percentage increase in precipitation.

Monsoon clouds take over the Mumbai coastline

Photo: @AGuyWhoClicks

Sindhudurg

Maharashtra

0.9 million

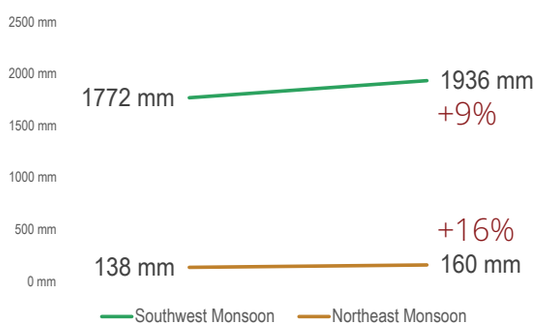
Estimated Population in 2030

Temperature data indicates a clear warming trend, with the summer wet-bulb temperature projected to see the highest increase of 1.2°C. The winter minimum is expected to rise by 1.1°C, while both the annual max and summer max temperatures show a steady 0.9°C increase from their respective baselines. Precipitation is also forecasted to grow significantly. The southwest monsoon, the primary source of rain with a 1,772 mm baseline, is projected to increase by 9%. Notably, the northeast monsoon is expected to see the largest proportional surge, rising by 16% over its 138 mm baseline, indicating a transition toward a hotter and wetter climate.

	Baseline Average	Projection
Annual Max Temperature	30.8° C	+0.9° C
Summer Max Temperature	36.6° C	+0.9° C
Summer Wetbulb Temperature	21.9° C	+1.2° C
Winter Minimum Temperature	15.8° C	+1.1° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Ratnagiri

Maharashtra

1.7 million

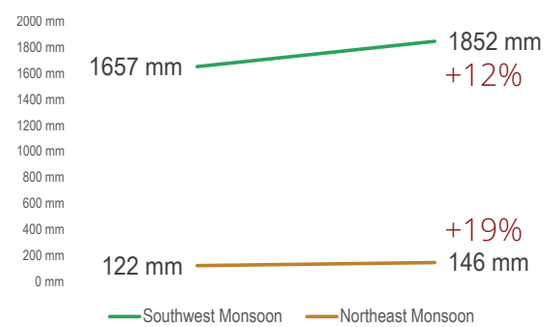
Estimated Population in 2030

Temperature data indicates a clear warming trend, with the summer wet-bulb temperature projected to see the highest increase of 1.2°C. The winter minimum and summer max are expected to rise by 1.1°C and 1.0°C, respectively, while the annual max shows a steady 0.9°C increase. Precipitation is also forecasted to grow significantly. The southwest monsoon, starting from a substantial 1,657 mm baseline, is projected to increase by 12%. Notably, the northeast monsoon is expected to see a sharp proportional surge of 19% over its 122 mm baseline, suggesting a transition toward a hotter and much wetter future for the district.

	Baseline Average	Projection
Annual Max Temperature	31.1° C	+0.9° C
Summer Max Temperature	37.1° C	+1.0° C
Summer Wetbulb Temperature	20.7° C	+1.2° C
Winter Minimum Temperature	13.8° C	+1.1° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Sindhudurg, Maharashtra

Fishermen on the shores of Malvan in Sindhudurg district. A changing climate means losing out on more fishing days because of rougher seas.

Photo: Kuntal Saha

INTENSE RAINS

Mumbai, Maharashtra

A flooded street in
Parel, Mumbai

Photo:
Augustine Fernandes

Suburban Mumbai

Maharashtra

12.8 million

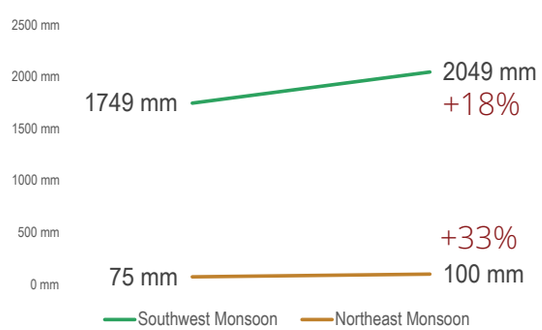
Estimated Population in 2030

Temperature parameters show a significant warming trend, with both summer wet-bulb and winter minimum temperatures projected to rise by 1.3°C. The summer max temperature is expected to increase by 1°c from its 38°c baseline, while the annual max rises by 0.9°C. Rainfall data indicates a substantial increase in precipitation across both monsoon seasons. The southwest monsoon, which has a massive 1,749 mm baseline, is projected to grow by 18%. Interestingly, the northeast monsoon shows the highest proportional surge, with a projected 33% increase over its 75 mm baseline.

	Baseline Average	Projection
Annual Max Temperature	32.0° C	+0.9° C
Summer Max Temperature	38.0° C	+1.0° C
Summer Wetbulb Temperature	20.4° C	+1.3° C
Winter Minimum Temperature	13.5° C	+1.3° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



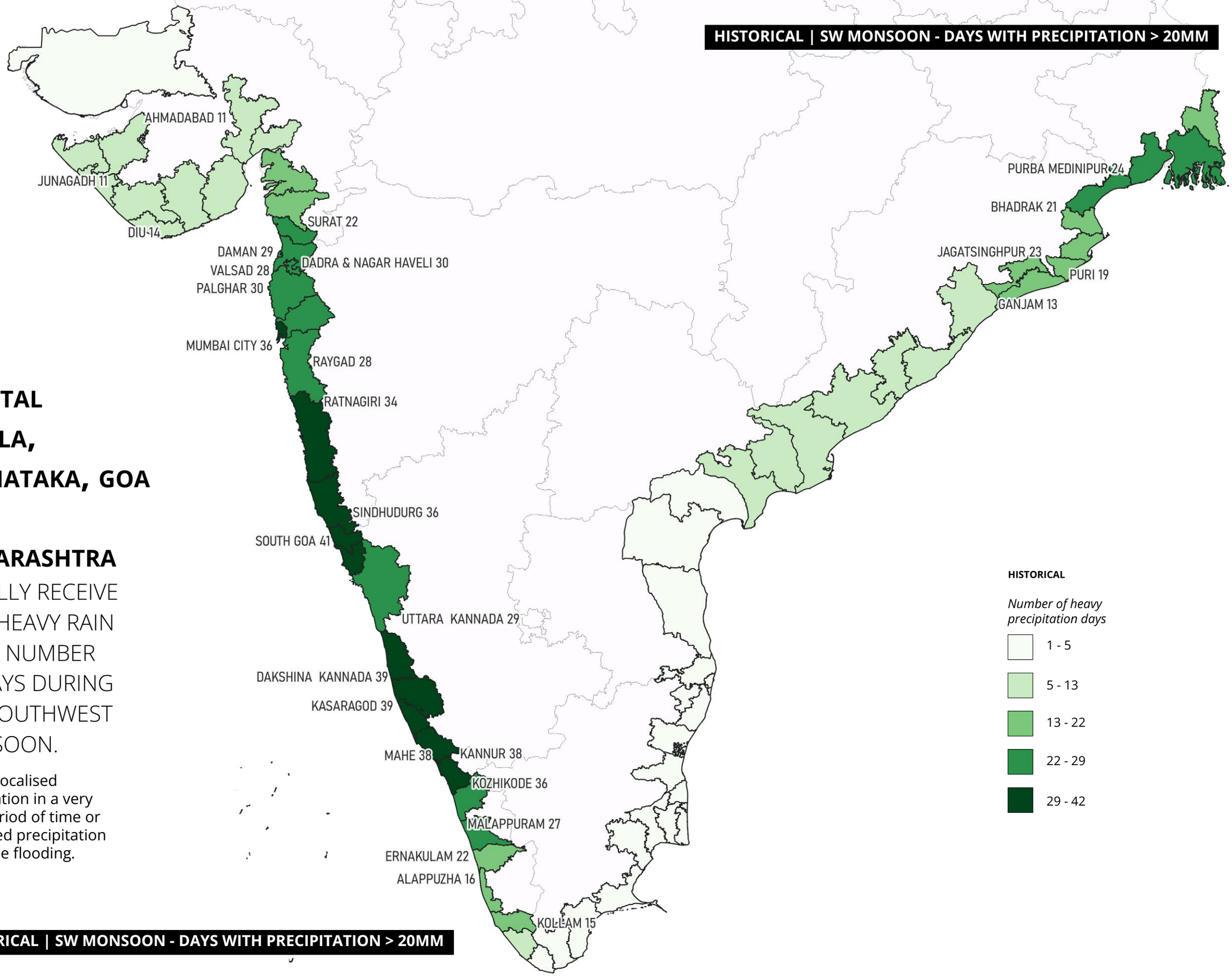
+ 6 days

*Suburban Mumbai will receive **almost an additional week of heavy rainfall** in the near future during the Southwest monsoon.*

COASTAL KERALA, KARNATAKA, GOA & MAHARASHTRA

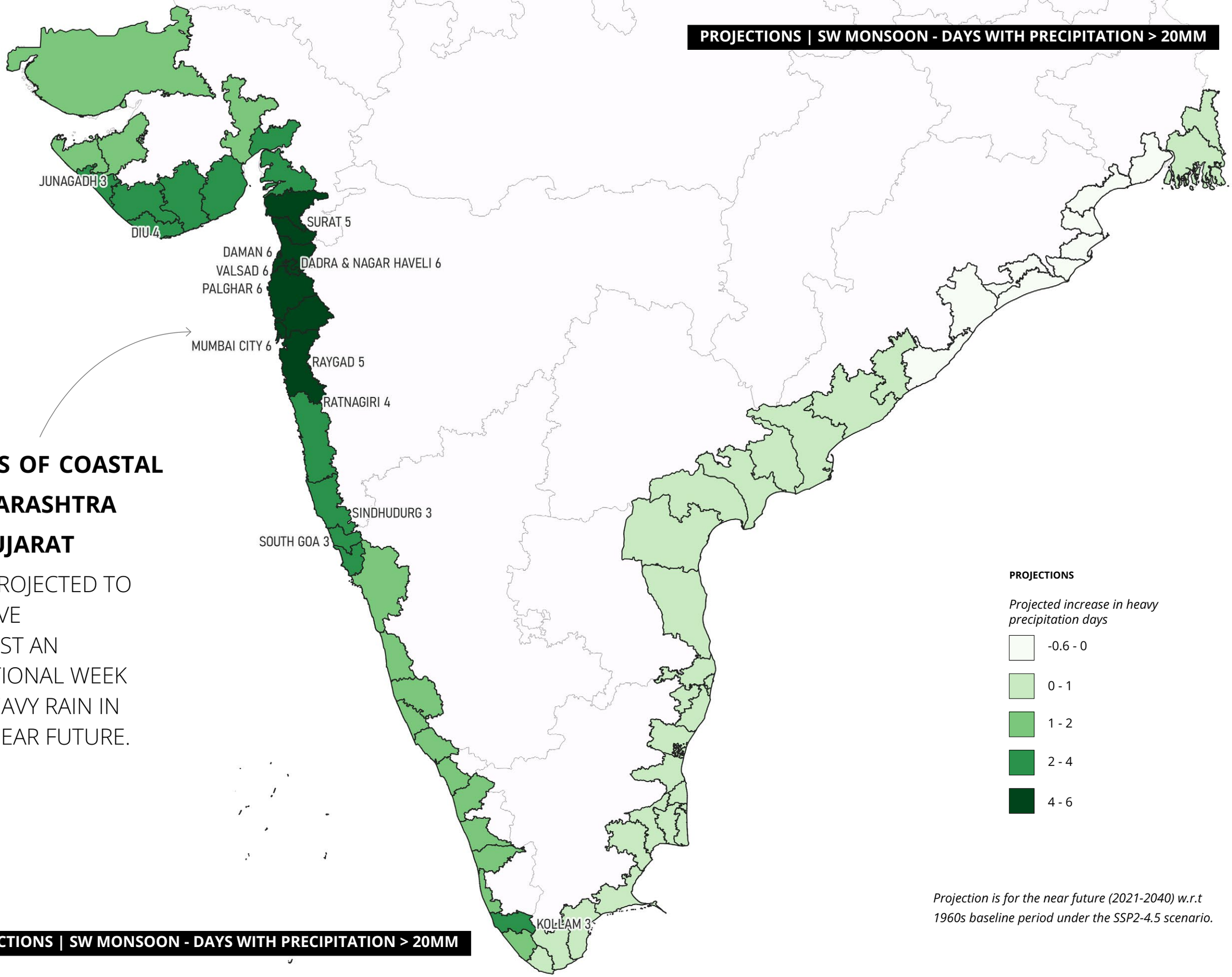
USUALLY RECEIVE VERY HEAVY RAIN FOR A NUMBER OF DAYS DURING THE SOUTHWEST MONSOON.

Intense localised precipitation in a very short period of time or prolonged precipitation can cause flooding.



HISTORICAL | SW MONSOON - DAYS WITH PRECIPITATION > 20MM

PROJECTIONS | SW MONSOON - DAYS WITH PRECIPITATION > 20MM



PARTS OF COASTAL MAHARASHTRA & GUJARAT

ARE PROJECTED TO RECEIVE ALMOST AN ADDITIONAL WEEK OF HEAVY RAIN IN THE NEAR FUTURE.

PROJECTIONS

Projected increase in heavy precipitation days

- -0.6 - 0
- 0 - 1
- 1 - 2
- 2 - 4
- 4 - 6

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.

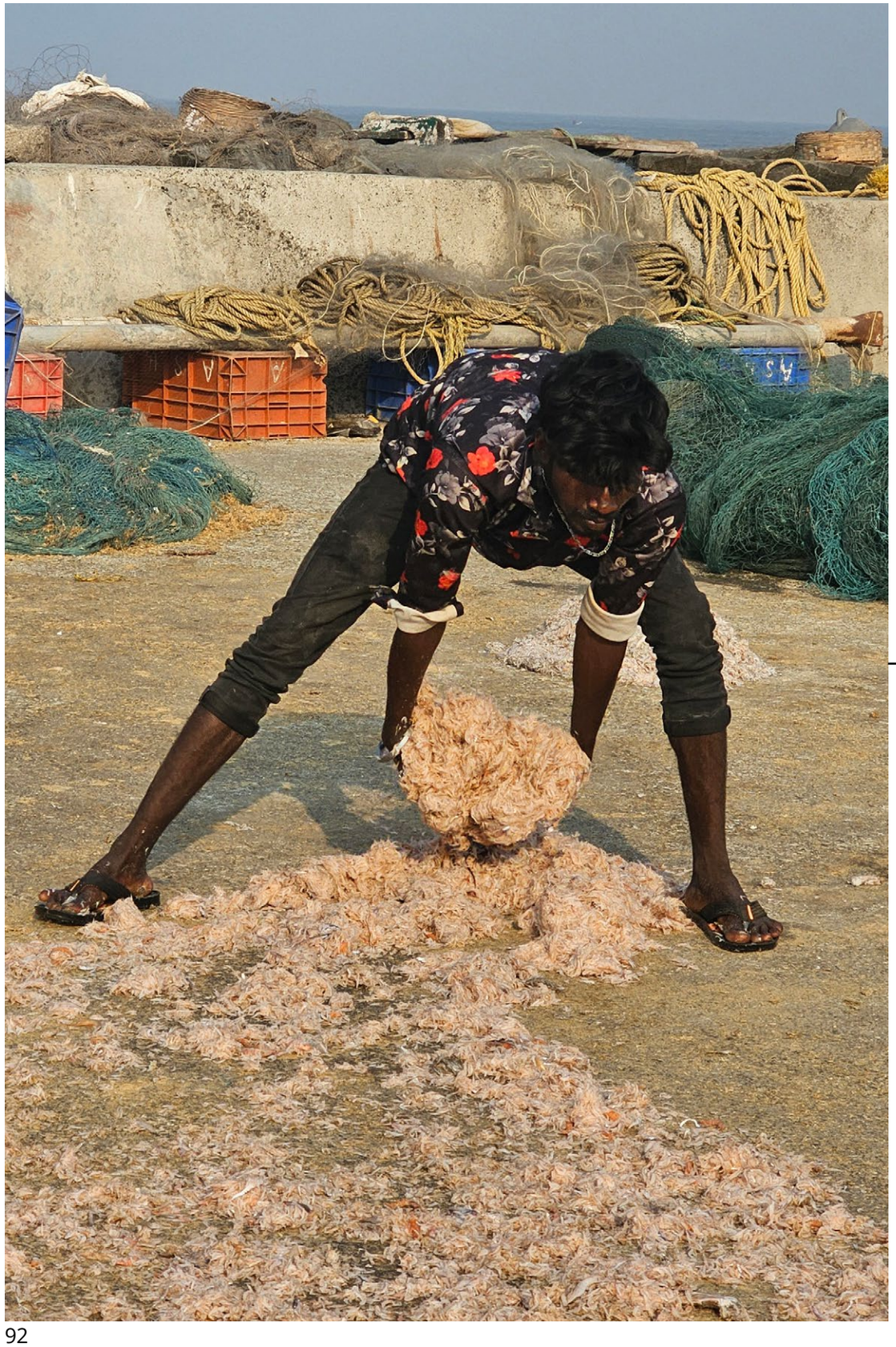
PROJECTIONS | SW MONSOON - DAYS WITH PRECIPITATION > 20MM

UNPREDICTABLE RAINS

Goa

Salt pan owners say that the quality of water and salt content is different these days adding to the disadvantages of unpredictable weather. The water is poured through pumps, the radiation of the sun vaporises the water and salt crystals are created. We visited this salt pan during the summer of 2025, and just the day before our visit it had rained. As a result of the rain the salt crystals that had formed got dissolved. One or two hours of rain had damaged the entire salt pan. It meant that they had to cure the water for two more days and hope for a perfect sunny day for the crystals to form again. It also affects livelihood since the laborer would now have to wait for two more days to receive payment, provided the curing process is successful.

Jyotiprakash Mirashi
Prachi Gupta



Mumbai, Maharashtra

A fisherman dries Jawla (prawn) at Khar Danda in Mumbai. Unpredictable spells of rain can result in loss to the business.

Photo:
Sharvari Sawai

CHANGING PATTERNS

Minicoy, Lakshadweep

Fisherfolk of Minicoy in Lakshadweep used to rely on the Nakaih calendar which has Maldivian origins, which told you the direction of winds, the best time to go for fishing and so on. But these days because of changing weather patterns the Nakaih calendar has become unreliable.

Yeshwanth Ramesh

Mumbai, Maharashtra

When you start seeing Porpita in Juhu beach, it means that rainy days are ahead. In 2025 though, they arrived quite early sometime during the last week of April, which was surprising. And as if on cue, the monsoon rains too followed much earlier than usual in May.

Advait Sanghavi
Khushi Doshi

HISTORICAL | AVERAGE NORTHEAST MONSOON PRECIPITATION (IN MM)

PURBA MEDINIPUR 164 mm
BHADRAK 158 mm
JAGATSINGHPUR 183 mm
PURI 185 mm
GANJAM 171 mm
VIZIANAGARAM 186 mm
VISAKHAPATNAM 218 mm
KRISHNA 243 mm
YANAM 355 mm
GUNTUR 237 mm
EAST GODAVARI 252 mm
PRAKASAM 284 mm
POTTI SRIRAMULU NELLORE 458 mm
UTTARA KANNADA 167 mm
DAKSHINA KANNADA 243 mm
KANCHIPURAM 650 mm
CHENNAI 730 mm
KASARAGOD 250 mm
CHENGALPATTU 690 mm
PUDUCHERRY 754 mm
MAHE 321 mm
KANNUR 292 mm
KOZHIKODE 355 mm
THIRUVARUR 762 mm
KARAIKAL 866 mm
LAKSHADWEEP 258 mm
MALAPPURAM 377 mm
ERNAKULAM 468 mm
ALAPPUZHA 500 mm
TUTICORIN 519 mm
THIRUVANANTHAPURAM 542 mm
TIRUNELVELI 494 mm
RATNAGIRI 122 mm
SINDHUDURG 138 mm
SOUTH GOA 164 mm

HISTORICAL

Average northeast monsoon precipitation in mm

- 2 - 88
- 88 - 219
- 219 - 377
- 377 - 593
- 593 - 866

KARAIKAL

AMONGST INDIA'S COASTAL DISTRICTS KARAIKAL RECEIVES THE MOST RAINFALL DURING THE NORTHEAST MONSOON.

- Karaikal (Puducherry),
- Nagapattinam (Tamilnadu),
- Thiruvarur (Tamilnadu),
- Puducherry &
- Chennai (Tamilnadu)

are usually the top 5 coastal districts receiving the most rain during the Northeast monsoon.

HISTORICAL | AVERAGE NORTHEAST MONSOON PRECIPITATION (IN MM)

PROJECTIONS | NORTHEAST MONSOON - CHANGE IN RAINFALL

COASTAL MAHARASHTRA & GUJARAT WILL RECEIVE EXCESS RAIN FROM THE NORTHEAST MONSOON IN THE NEAR FUTURE.

KACHCHH 32.4 %
JAMNAGAR 36.3 %
JUNAGADH 29.5 %
PORBANDAR 33.7 %
DIU 24.2 %
SURAT 21.6 %
DAMAN 26.2 %
PALGHAR 28.5 %
RAYGAD 26.5 %
RATNAGIRI 19.5 %
SINDHUDURG 16.2 %
SOUTH GOA 14.4 %
UTTARA KANNADA 12.3 %
LAKSHADWEEP 12.1 %
PURBA MEDINIPUR 10.9 %
BHADRAK 13.0 %
JAGATSINGHPUR 13.5 %
KENDRAPARHA 13.4 %

Coastal Odisha will receive a slight increase in rainfall from the Northeast monsoon.

PROJECTIONS

Projected change in %

- -0.6 - 4
- 4 - 9
- 9 - 16
- 16 - 29
- 29 - 44

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.

PROJECTIONS | NORTHEAST MONSOON - CHANGE IN RAINFALL

CHANGING PATTERNS

RAMESWARAM, TAMIL NADU

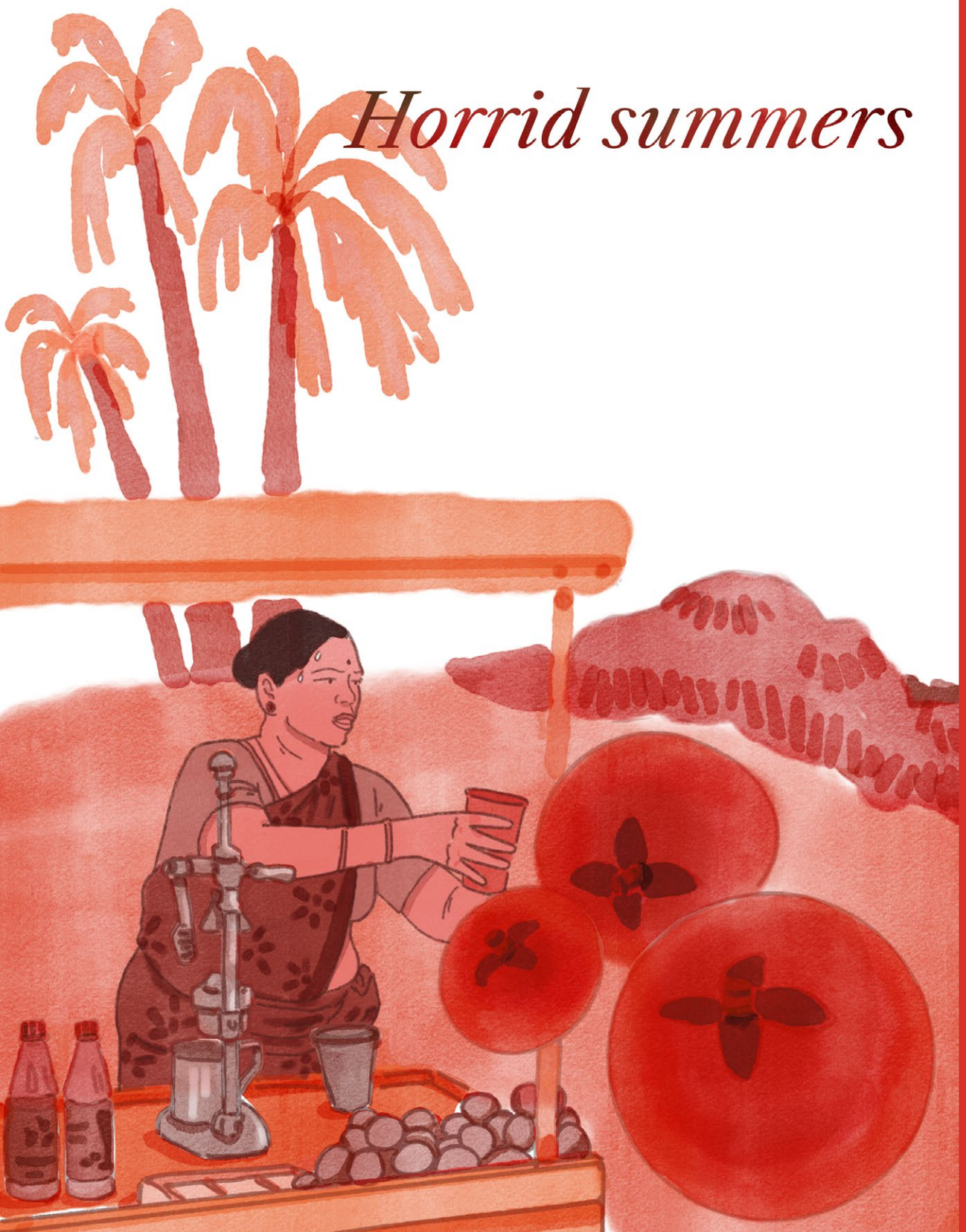
The fisherfolk of Rameswaram are knowledgeable about the 8 different wind directions and know which wind brings which sort of fish. Older fishermen from the shore would be able to look out into a spot in the ocean and say which kind of fish and how much of it is out there. That knowledge though is being challenged by unpredictable weather patterns these days.

ATHISAYA

A fisherman at Dhanushkodi in Rameswaram waiting for an opportune time to set sail to sea.

Photo:
BAMBAM KUMAR JHA

Horrid summers



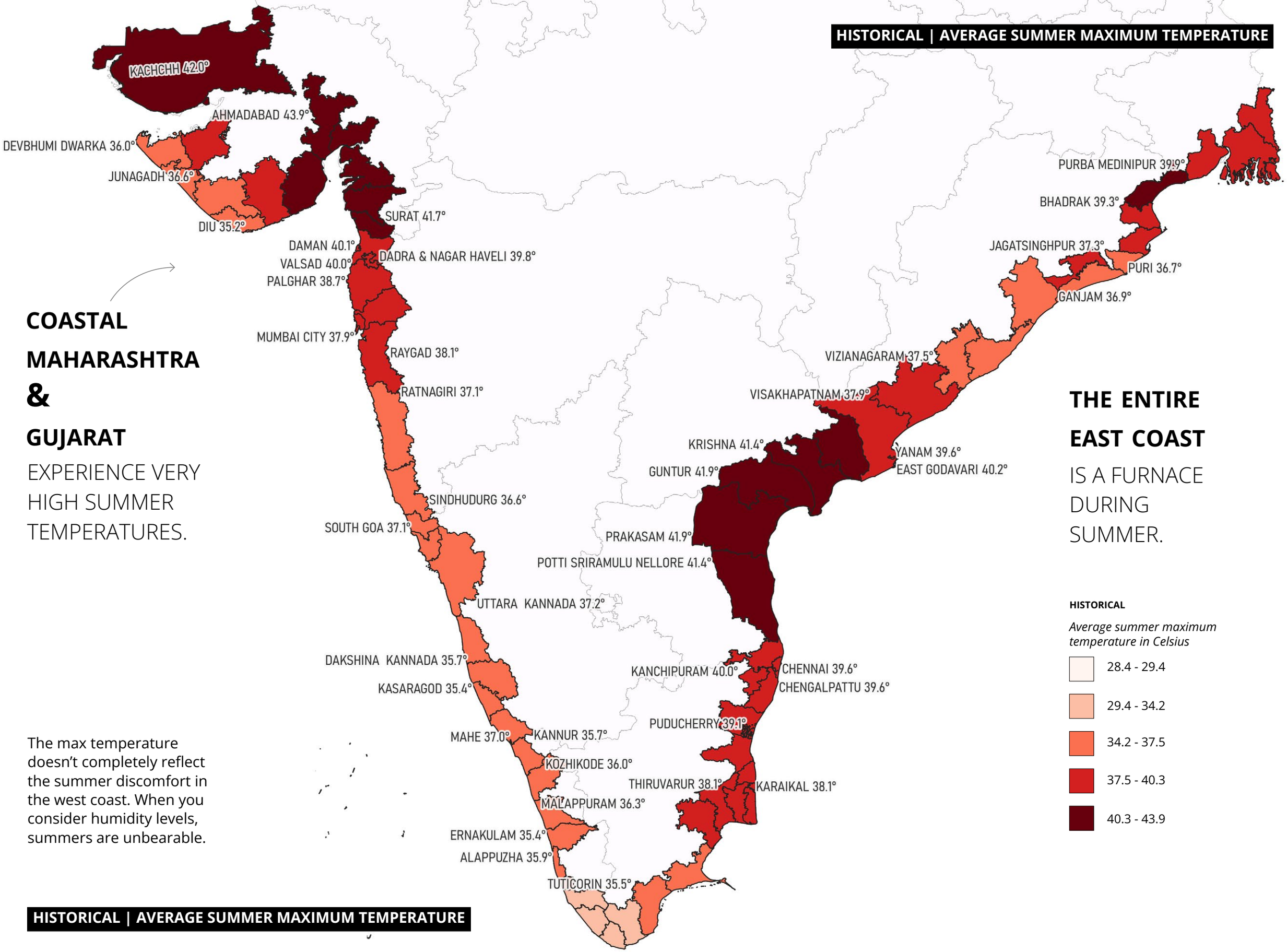
Excess heat in the near future will have an impact on health, work and coastal biodiversity.

HISTORICAL | AVERAGE SUMMER MAXIMUM TEMPERATURE

COASTAL MAHARASHTRA & GUJARAT

EXPERIENCE VERY HIGH SUMMER TEMPERATURES.

The max temperature doesn't completely reflect the summer discomfort in the west coast. When you consider humidity levels, summers are unbearable.



THE ENTIRE EAST COAST

IS A FURNACE DURING SUMMER.

HISTORICAL

Average summer maximum temperature in Celsius

- 28.4 - 29.4
- 29.4 - 34.2
- 34.2 - 37.5
- 37.5 - 40.3
- 40.3 - 43.9

HISTORICAL | AVERAGE SUMMER MAXIMUM TEMPERATURE

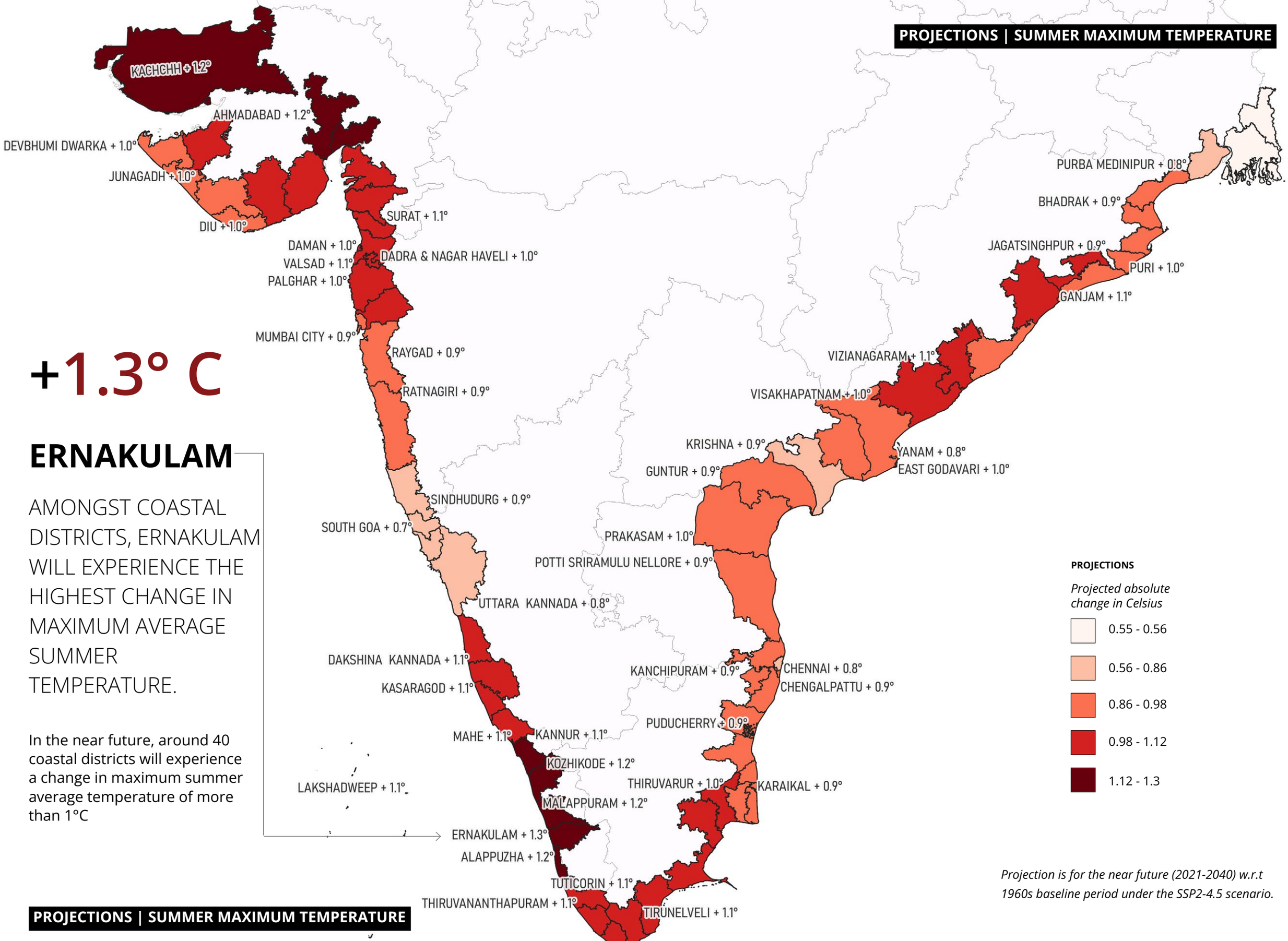
PROJECTIONS | SUMMER MAXIMUM TEMPERATURE

+1.3° C

ERNAKULAM

AMONGST COASTAL DISTRICTS, ERNAKULAM WILL EXPERIENCE THE HIGHEST CHANGE IN MAXIMUM AVERAGE SUMMER TEMPERATURE.

In the near future, around 40 coastal districts will experience a change in maximum summer average temperature of more than 1°C



PROJECTIONS

Projected absolute change in Celsius

- 0.55 - 0.56
- 0.56 - 0.86
- 0.86 - 0.98
- 0.98 - 1.12
- 1.12 - 1.3

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.

PROJECTIONS | SUMMER MAXIMUM TEMPERATURE

Visakhapatnam

Andhra Pradesh

4.8 million

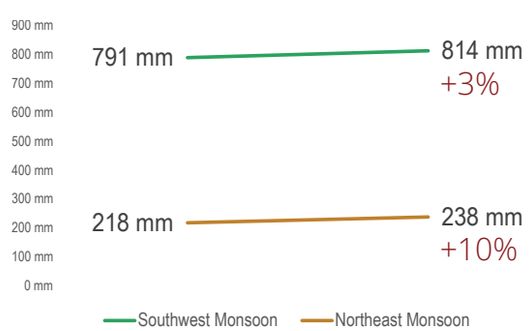
Estimated Population in 2030

Temperature parameters indicate a clear warming trend, with the summer max temperature projected to see the highest increase of 1.1°C from its 38.0°C baseline. The winter minimum and summer wet-bulb temperatures are expected to rise by 1.0°C and 0.9°C, respectively, while the annual max shows a 0.7°C increase. Precipitation is also forecasted to grow across both seasons. The southwest monsoon, starting from a 791 mm baseline, is projected to increase by 3%. Notably, the northeast monsoon is expected to see a more significant proportional rise of 10% over its 218 mm baseline, suggesting a transition toward a hotter and wetter climate for the district.

	Baseline Average	Projection
Annual Max Temperature	30.7° C	+0.7° C
Summer Max Temperature	38.0° C	+1.1° C
Summer Wetbulb Temperature	21.4° C	+0.9° C
Winter Minimum Temperature	12.0° C	+1.0° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Potti Sriramulu Nellore

Andhra Pradesh

3.1 million

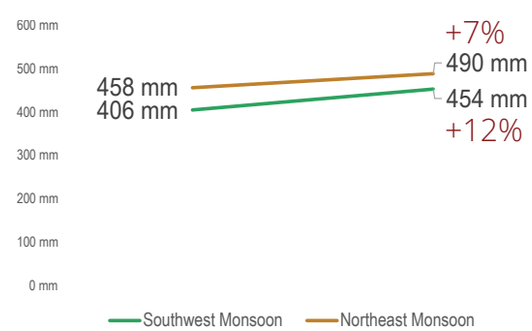
Estimated Population in 2030

Temperature parameters indicate a clear warming trend, particularly in summer; both the summer max and summer wet-bulb temperatures are projected to rise by 1.1°C. Meanwhile, the annual max and winter minimum temperatures are expected to increase by a steady 0.7°C from their respective baselines of 33.8°C and 16.5°C. Precipitation is forecasted to intensify across both monsoon seasons. The southwest monsoon is projected to see the highest growth at 12% over its 406 mm baseline. The northeast monsoon, which has a higher baseline of 458 mm, is expected to increase by 7%.

	Baseline Average	Projection
Annual Max Temperature	33.8° C	+0.7° C
Summer Max Temperature	41.4° C	+1.1° C
Summer Wetbulb Temperature	24.4° C	+1.1° C
Winter Minimum Temperature	16.5° C	+0.7° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Prakasam

Andhra Pradesh

3.7 million

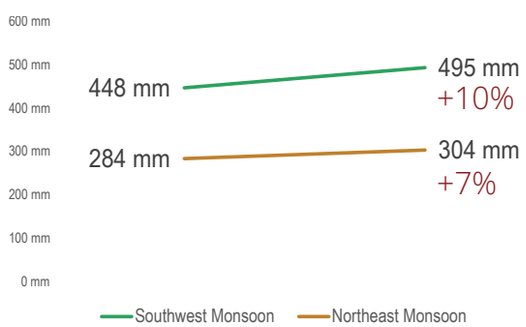
Estimated Population in 2030

Temperature parameters show a clear warming trend; the summer wet-bulb temperature is projected to see the highest increase of 1.1°C, followed by a 1.0°C rise in summer max temperature from its high 42.0°C baseline. The winter minimum and annual max temperatures are expected to increase by 0.9°C and 0.7°C, respectively. Precipitation is forecasted to grow across both seasons. The southwest monsoon is projected to see the highest growth at 10% over its 448 mm baseline. The northeast monsoon is expected to increase by 7% from its 284 mm baseline, suggesting a transition toward a hotter climate with slightly more annual rainfall.

	Baseline Average	Projection
Annual Max Temperature	33.5° C	+0.7° C
Summer Max Temperature	42.0° C	+1.0° C
Summer Wetbulb Temperature	22.8° C	+1.1° C
Winter Minimum Temperature	14.5° C	+0.9° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Srikakulam

Andhra Pradesh

2.8 million

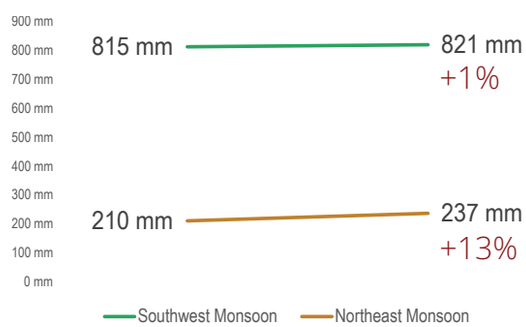
Estimated Population in 2030

Temperature parameters indicate a steady warming trend; the summer max temperature is projected to see the highest increase of 1.0°C from its 36.7°C baseline. The summer wet-bulb and winter minimum temperatures are expected to rise by 0.9°C and 0.8°C, respectively, while the annual max shows a 0.7°C increase. Precipitation trends show a significant rise in the northeast monsoon, which is projected to grow by 13% from its 210 mm baseline. In contrast, the southwest monsoon, the district's primary rainfall source at 815 mm, is expected to remain relatively stable with a modest 1% increase.

	Baseline Average	Projection
Annual Max Temperature	30.9° C	+0.7° C
Summer Max Temperature	36.7° C	+1.0° C
Summer Wetbulb Temperature	22.2° C	+0.9° C
Winter Minimum Temperature	12.9° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Thiruvananthapuram

Kerala

5.1 million

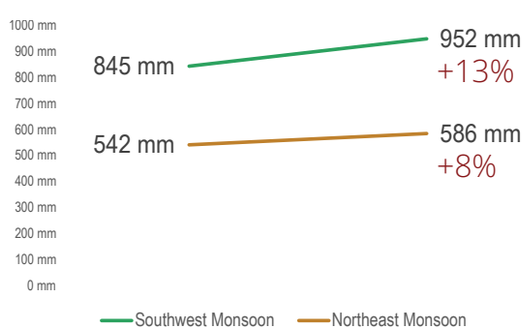
Estimated Population in 2030

Temperature trends show a consistent rise, with the summer max temperature projected to increase the most by 1.1°C from its 33.4°C baseline. Both the annual max and summer wet-bulb temperatures are expected to climb by 1.0°C, while the winter minimum sees a slightly lower increase of 0.9°C. Precipitation is also forecasted to grow significantly. The southwest monsoon, starting at a baseline of 845 mm, is projected to increase by 13%. The northeast monsoon is expected to rise by 8% over its 542 mm baseline, indicating an overall trend toward a warmer and wetter climate for the district.

	Baseline Average	Projection
Annual Max Temperature	29.6° C	+1.0° C
Summer Max Temperature	33.4° C	+1.1° C
Summer Wetbulb Temperature	23.8° C	+1.0° C
Winter Minimum Temperature	19.6° C	+0.9° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Kanyakumari

Tamil Nadu

2.1 million

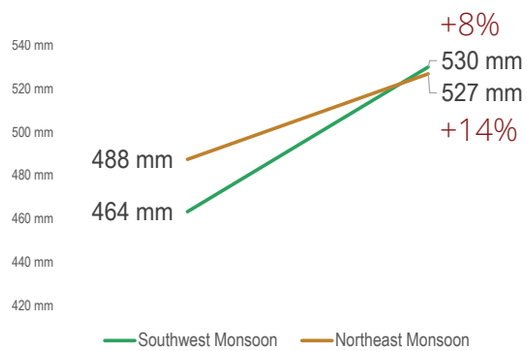
Estimated Population in 2030

Temperature parameters indicate a steady warming trend, with the summer max temperature projected to see the highest increase of 1.1°C from its 32.3°C baseline. Both the annual max and summer Wet-bulb temperatures are expected to rise by 1.0°C, while the winter minimum increases by 0.8°C. Precipitation is forecasted to grow significantly across both seasons. The southwest monsoon shows the largest proportional surge, rising by 14% over its 464 mm baseline. The northeast monsoon, the primary source of rain starting at 488 mm, is expected to increase by 8%, indicating a transition toward a hotter and much wetter future.

	Baseline Average	Projection
Annual Max Temperature	28.7° C	+1.0° C
Summer Max Temperature	32.3° C	+1.1° C
Summer Wetbulb Temperature	23.0° C	+1.0° C
Winter Minimum Temperature	19.2° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



One indicator of the human body's capacity to cool itself through perspiration is the wet bulb temperature.

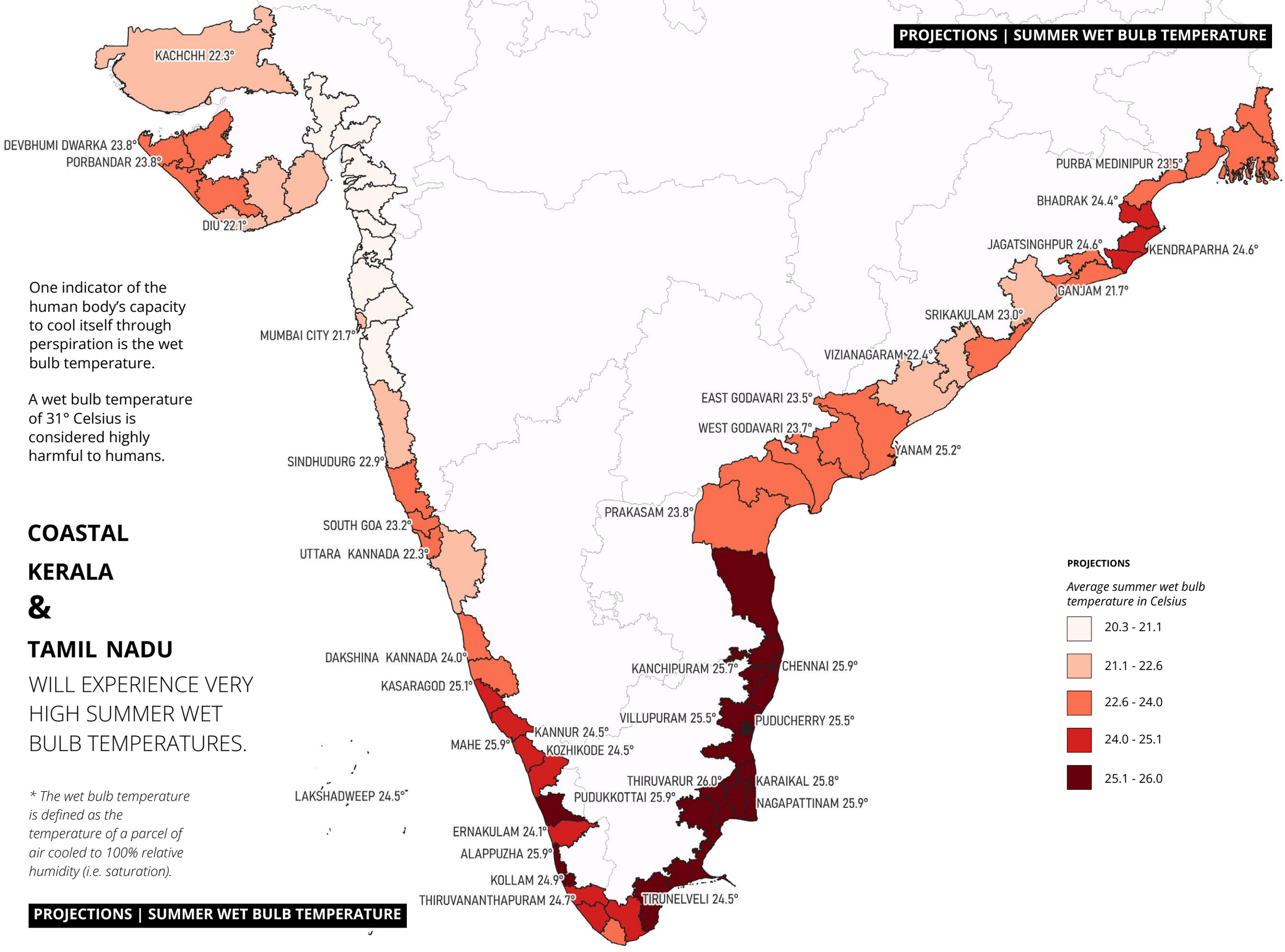
A wet bulb temperature of 31° Celsius is considered highly harmful to humans.

COASTAL KERALA & TAMIL NADU

WILL EXPERIENCE VERY HIGH SUMMER WET BULB TEMPERATURES.

** The wet bulb temperature is defined as the temperature of a parcel of air cooled to 100% relative humidity (i.e. saturation).*

PROJECTIONS | SUMMER WET BULB TEMPERATURE



Nagapattinam

Tamil Nadu

1.9 million

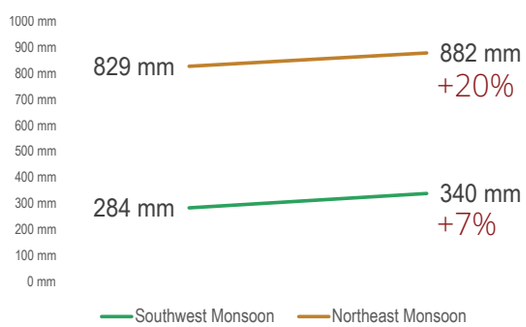
Estimated Population in 2030

Temperature parameters show a consistent warming trend, with the summer Wet-bulb temperature projected to see the highest increase of 1.1°C. The summer max temperature is expected to rise by 1.0°C from its 38.1°C baseline, while both the annual max and winter minimum temperatures are projected to increase by 0.8°C. Precipitation is also forecasted to grow significantly, particularly during the northeast monsoon, which is set to rise by 20% from its already high 829 mm baseline. The southwest monsoon shows a more modest projected increase of 7% over its 284 mm baseline.

	Baseline Average	Projection
Annual Max Temperature	32.6° C	+0.8° C
Summer Max Temperature	38.1° C	+1.0° C
Summer Wetbulb Temperature	24.9° C	+1.1° C
Winter Minimum Temperature	19.7° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Cuddalore

Tamil Nadu

3.1 million

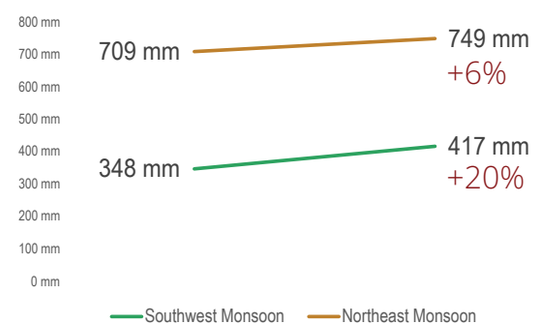
Estimated Population in 2030

The data indicates a consistent rise in temperature across all parameters. The summer wet-bulb temperature shows the highest projected increase at 1.1°C, while the summer max temperature is expected to rise by 1.0°C from its 39.0°C baseline. Both the annual max and winter minimum temperatures are projected to increase by 0.8°C. Precipitation is also set to increase. The southwest monsoon, starting from a 348 mm baseline, shows a significant 20% projected rise. Meanwhile, the northeast monsoon—the district's primary rainfall source at 709 mm—is expected to grow by 6%.

	Baseline Average	Projection
Annual Max Temperature	32.8° C	+0.8° C
Summer Max Temperature	39.0° C	+1.0° C
Summer Wetbulb Temperature	24.6° C	+1.1° C
Winter Minimum Temperature	18.4° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Fishing in the summer heat

At Morjim beach in Goa we met three fishermen who were going through a tedious process of preparing their huge nets, casting them into the sea from the shore and drawing them back. One cycle of this process took them 20 to 30 minutes and they had been doing this from 5 am in the morning. But after all this toil for such a long time, their catch for the day was very meagre. Of course the presence of trawlers left very little for the small fishermen to catch, but also the weather conditions played their part. In that intense summer heat, it was difficult for them to continue fishing for longer hours.

PRACHI GUPTA
JYOTIPRAKASH MIRASHI

Morjim Beach, Goa

12:08 PM Carrying a huge net to the sea

12:12 PM Casting the net for a catch

12:16 PM Drawing the net to shore

12:20 PM Just one fish and a crab

12:22 PM Time to pack up

12:28 PM Surrendering to the heat and heading back home

A tedious process that began at 5 am in the morning and continued through the heat of the day. After all this effort their day's catch was only so much.

Kozhikode, Kerala

Our team of waste collectors in Kozhikode used to go about their work between 9 am and 12 pm during all seasons. But to manage the heat we later changed the waste collection timings to between 8:30 am & 10:30 am, with another round of collection in the evening. We also taught our team how to check the UV index.

Lakshmi Menon / CleanHub

Ramanathapuram, Tamilnadu

Tourists at Dhanushkodi in Ramanathapuram district braving the heat on a hot summer day.

Photo:
Vivek Ganesh

RISING TEMPERATURES

Tuticorin, Tamilnadu

Seaweed are primitive plants. They do not have root or vascular systems. They stick (holdfast) to rocks or any hard surfaces. Seaweed can absorb carbon dioxide in the ocean and convert it into biomass and carbo-hydrates. This biomass can be used to make bio-simulants. Companies work with the fishing community in Arockiapuram at Tuticorin district to grow seaweed. Rising temperatures will make it difficult for seaweed to sustain.

Mukund

Tuticorin

Tamil Nadu

1.8 million

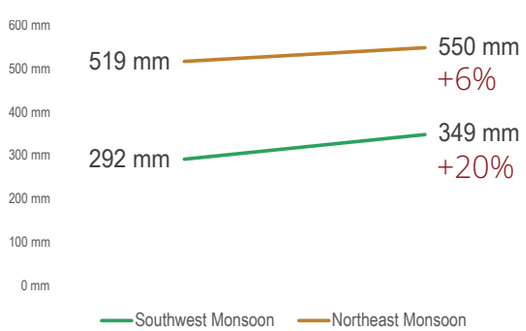
Estimated Population in 2030

Temperature metrics indicate a consistent warming trend, with the summer max temperature projected to rise by 1.1°C from its 35.6°C baseline. Both the annual max and summer wet-bulb temperatures are expected to increase by 1.0°C, while the winter minimum shows a slightly lower rise of 0.9°C. Precipitation is forecasted to grow across both monsoon seasons. Notably, the southwest monsoon is expected to see a significant proportional surge of 20% over its 292 mm baseline. The northeast monsoon, the district's primary rainfall source at 519 mm, is projected to increase by 6%, suggesting a hotter and wetter future for the region.

	Baseline Average	Projection
Annual Max Temperature	31.3° C	+1.0° C
Summer Max Temperature	35.6° C	+1.1° C
Summer Wetbulb Temperature	24.7° C	+1.0° C
Winter Minimum Temperature	19.7° C	+0.9° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Ramanathapuram

Tamil Nadu

1.5 million

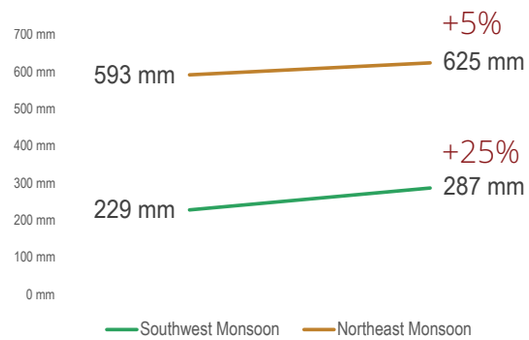
Estimated Population in 2030

Temperature parameters show a significant warming trend; both the summer max and summer wet-bulb temperatures are projected to rise by 1.1°C. The annual max is expected to increase by 0.9°C, while the winter minimum grows by 0.8°C from its 19.7°C baseline. Precipitation is forecasted to increase across both seasons. Most notably, the southwest monsoon is expected to experience a substantial proportional surge of 25% over its 229 mm baseline. The northeast monsoon, the district's primary rainfall source at 593 mm, is projected to increase by 5%, indicating a transition toward a hotter climate with intensified seasonal rains.

	Baseline Average	Projection
Annual Max Temperature	31.9° C	+0.9° C
Summer Max Temperature	36.6° C	+1.1° C
Summer Wetbulb Temperature	25.0° C	+1.1° C
Winter Minimum Temperature	19.7° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Konkan Coast

In Maharashtra & Goa during summer you get Kokum juice in almost every street corner. Kokum fruit juice is a coolant for the body and is one of the ways to manage the strong summer heat in these regions. The nut is used for oil, the pulp for making juice and the outer cover to make dye.

Jyotiprakash Mirashi

Photo:
@Phadke09

Puducherry

Women consuming fruit juice on a hot summer day at Puducherry.

Photo:
Venkatesaperumal K

Chennai

Tamilnadu

7 million

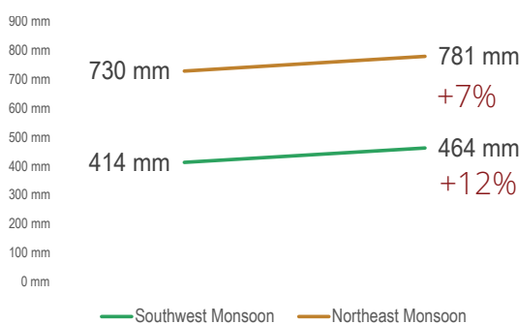
Estimated Population in 2030

Temperature parameters indicate a steady warming trend, with the summer Wet-bulb temperature projected to see the highest increase of 1.0°C. The summer max temperature is expected to rise by 0.9°C from its high 39.7°C baseline, while the annual max and winter minimum are forecasted to increase by 0.8°C and 0.7°C, respectively. Precipitation is also expected to grow. The southwest monsoon shows the largest proportional surge, rising by 12% over its 414 mm baseline. Meanwhile, the northeast monsoon, the primary source of rain for the region at 730 mm, is projected to increase by 7%, indicating a transition toward a hotter and significantly wetter climate.

	Baseline Average	Projection
Annual Max Temperature	33.1° C	+0.8° C
Summer Max Temperature	39.7° C	+0.9° C
Summer Wetbulb Temperature	24.9° C	+1.0° C
Winter Minimum Temperature	18.0° C	+0.7° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Karaikal

Puducherry

0.2 million

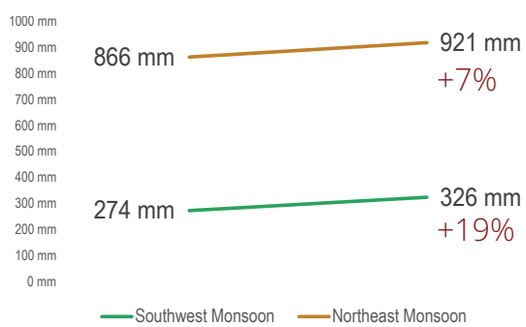
Estimated Population in 2030

Temperature parameters show a consistent warming trend, with the summer Wet-bulb temperature projected to see the highest increase of 1.1°C. The summer max temperature is expected to rise by 1.0°C from its 38.2°C baseline, while both the annual max and winter minimum temperatures are projected to increase by 0.8°C. Precipitation is also forecasted to grow significantly. The southwest monsoon shows the largest proportional surge, rising by 19% over its 274 mm baseline. Meanwhile, the northeast monsoon, the district's primary rainfall source starting at 866 mm, is expected to increase by 7%, indicating an overall trend toward a hotter and wetter climate.

	Baseline Average	Projection
Annual Max Temperature	32.5° C	+0.8° C
Summer Max Temperature	38.2° C	+1.0° C
Summer Wetbulb Temperature	24.8° C	+1.1° C
Winter Minimum Temperature	20.0° C	+0.8° C

Rainfall

Projection is for the near future (2021-2040) w.r.t 1960s baseline period under the SSP2-4.5 scenario.



Warm seas make fish move away from the shores impacting the lives of small fishermen. Fisherfolk are pushed to the brink to make ends meet.

Photo: Athisaya

LIFE

Dhanushkodi, Tamilnadu

Karavalai is an age old seine fishing tradition practised by the fisherfolk of Dhanushkodi. Men, women and even children get involved in the fishing process that goes on for at least 3 to 4 hours. On a good day when the catch is decent they get Rs 200 to 300 per day per person. Back in the day the entire community used to be involved in Karavalai fishing, but now very few families are involved.

Athisaya

A great escape

One late November in 2017, I was in school when of a sudden the air became chill. In Kerala we are mostly used to humidity and the sudden arrival of this chillness was a welcome respite and got us excited. But soon it was announced that a storm was expected and schools would be shut immediately. We were advised to get back home at the earliest. As I walked out of school to get back home I glanced at the TV news in the bus station nearby. There were reports about a cyclone and it was then it occurred to me that my father was at sea. I could sense the anxiety and fear when I reached home.

Meanwhile my father along with other fishermen was at sea somewhere to the north of Kerala. They could not control the boat as the storm raged. The boat was tossed up and down by the rough wind and waves while the men on board wept and prayed. Some opened the Bible and started reading portions of Scripture, believing God would answer their cries for help.

After a number of hours the wind slowed down and they somehow managed to reach the harbour. My father got into a train, and was dumbstruck because of what he just experienced at sea. Though he didn't have a ticket, thanks to the kindness of co-passengers & ticket inspector, he reached Ernakulam safely. On reaching home, he did not speak to anyone for some time. We knew he was shaken by what he went through at sea.

REESHMAL MS

Shibu George (Reeshmal's father) in the engine cabin of his boat.

Photo:
REESHMAL MS

Cuddalore, Tamilnadu

Ezhilarasan from Cuddalore used to be a fisherman involved in deep sea fishing. He once experienced a cyclone at sea and it made him realise the risks involved. Triggered by the experience, he left fishing and went on to become a coast guard.

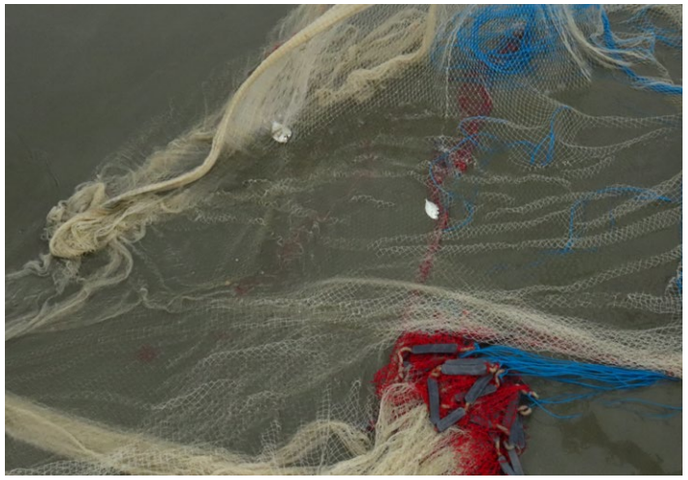
Achyutt Nadgouda

Rameswaram, Tamilnadu

Sanjay from Rameswaram has faced trouble in the past venturing into international waters in search of fish. Now he fishes in shallow waters where there is not much fish. He and his wife also run a gobi-manchurian stall at the beach to make ends meet.

Achyutt Nadgouda

Empty nets



Mahe

Jigesh had returned early in the morning almost empty handed after a difficult night of fishing. With the weather getting rough and their fuel almost running dry, he and the other fishermen had no choice but to return to shore. So he tries to catch fish from the harbour for that day's lunch.

But his attempts are in vain. It still remains an empty net.

Down but not out, Jigesh still manages a smile.

Syed Hazeem Qadri

Photos:
Syed Hazeem Qadri

Udupi, Karnataka

At Udupi I met these fisherfolk who were repairing their nets. I asked them if they would consider moving to the city for a better life. 'No' came the reply.

Garima Jain

LIFE

Andhra Pradesh

A fisherman’s hut at Hope Island near Kakinada.

Photo:
Gunnam Varshitha

Sambar being cooked for an afternoon meal at a fisherman’s hut at Peddaganagallapeta village in Srikakulam.

Photo:
Pallavi Ravada

Ernakulam, Kerala

Sheeja is glued to the radio for weather alerts whenever her husband Shibu is at sea.

Photo:
Reeshmal ms

LIFE

Kozhikode, Kerala

Khadeeja (R) and Zubaida (L) have had to resort to loans due to the poor fishing income. Khadeeja also worries about the rising sea levels posing a threat to their homes as they live very close to the sea and there is no breakwater to protect them from the force of the waves.

Syed Hazeem Qadri

Khadeeja (R) and Zubaida (L) in front of their homes near the sea in Kozhikode

Photo:
Syed Hazeem Qadri

Sundarbans, West Bengal

Women fishing in the waters of the Sundarbans. With crocodiles lurking in these waters, the lives of these women are constantly at risk.

Photo: Supratim Bhattacharjee

LIFE

Udupi, Karnataka

Women in coastal Udupi make a living transporting fish from the harbour to the market. When the men are out fishing, the women and the larger community come together to help each other out. They want their children to study and are not very keen that they should take up fishing.

Photo:
Garima Jain

Puducherry

Maheshwari's husband doesn't own a boat of his own, but goes with other fishermen to the sea to catch fish. To make ends meet Maheshwari goes around the streets selling fish, something she has been doing the past 21 years. Irrespective of the weather, she has to be out on the streets in order to put food on the table.

Maheswari selling fish on a rainy November day

Photo:
Sankara Devi

LIFE

Mumbai, Maharashtra

A woman from the Koli community of Mumbai is all set to take the fish to the market from the dock

Photo:
Sharvari Sawai

LIFE

Srikakulam, Andhra Pradesh

Rain, heat or cold, the women go about their work at the Srikakulam fish market as usual.

Three days a week during the fishing season, these women travel from Peddaganagallapeta village and reach the Srikakulam district market around 3 am in the morning. After they buy the desired quantity from the middlemen, starting at around 6:30 or 7:00 am they go around the streets selling the fish. There have been days where they had to wait until late in the evening to sell all the fresh fish and return home with an empty tub, else they would end up making a loss.

Pallavi Ravada

Photos:
Pallavi Ravada

"We are in a race against time to limit global heating to 1.5°C. And we are losing. The Intergovernmental Panel on Climate Change (IPCC) has demonstrated that nearly half of humanity is already in the danger zone. If we don't see significant and sustained emissions reductions this decade, the window of opportunity to keep 1.5°C alive will be closed — and closed forever. And that will be disaster for everyone."

- ANTÓNIO GUTERRES
(UN Secretary-General)

Remarks made at the launch of the High-Level Expert Group on Net-Zero Emissions Commitments of non-State entities, in New York on 31 March 2022.

NAVIGATING INDIA'S CLIMATE FUTURE

A COMPREHENSIVE CLIMATE PROJECTION FOR INDIA

Visit

https://azimpremjiuniversity.edu.in/navigating-indias-climate-future

to know more

CREDITS

- Navigating India's Climate Future - Climate projections for India (2021 — 2040)
azimpremjiuniversity.edu.in/navigating-indias-climate-future

- Quantifying the acceleration of multidecadal global sea surface warming driven by Earth's energy imbalance
Christopher J Merchant et al 2025 Environ. Res. Lett. 20 024037
iopscience.iop.org/article/10.1088/1748-9326/adaa8a

- Global Sea Level Change
earth.gov/sealevel/sea-level-explorer/?type=global&scope=section_1

- Ocean Surface Temperature Rise Accelerating
climate.esa.int/en/news-events/Ocean-Surface-Temperature-rise-accelerating

- Kumar, Manish. 2022. Environment factors push people out of their homes on India's east coast, leaving behind 'ghost villages'
india.mongabay.com/2022/02/environment-factors-push-people-out-of-their-homes-on-indias- east-coast-leaving-behind-ghost-villages/

- Mohanty, Aishwarya. 2025. Women Who Guard The Tides: Mangrove Conservation In The Absence Of Land Rights
behanbox.com/2025/04/24/women-who-guard-the-tides-mangrove-conservation-in-the-absence-of-land-rights/