



Surat  
Municipal  
Corporation



The Southern  
Gujarat  
Chamber of  
Commerce &  
Industry



**Namaste !**



SUPPORTED BY  
THE ROCKEFELLER FOUNDATION

**\*Creating sustainable Surat\***  
**Climate Change Plan**  
**Surat**



# Agenda

## Topics of Discussion

- ◎ **About Surat**
- ◎ **Results to-date**
  - ◎ Climate Hazards
  - ◎ Apparent Areas of Climate Vulnerability and Likely Future Issues
- ◎ **Activities and Methods**
  - ◎ Work Plan
  - ◎ Organizations Involved
  - ◎ CAC Arrangement
  - ◎ Activities undertaken so far
  - ◎ Methods Used for Analysis
- ◎ **Sectoral Studies**
- ◎ **Pilot Projects**
- ◎ **Challenges and Questions**
- ◎ **Next Steps**



# Glory of Surat

- ◎ **Historical Centre for Trade & Commerce**
- ◎ English, Dutch, Armenian & Moguls Settled
- ◎ Leading City of Gujarat
- ◎ **9th Largest City of India**
- ◎ Home to Textile and Diamond Industries
- ◎ **60% of Nation's Man Made Fabric Production**
- ◎ **600,000 Power Looms and 450 Process Houses**
- ◎ Traditional Zari and Zardosi Work
- ◎ **70% of World's Diamond Cutting and Polishing**
- ◎ Spin-offs from Hazira, Largest Industrial Hub
- ◎ **Peace-loving, Resilient and Harmonious Environment**

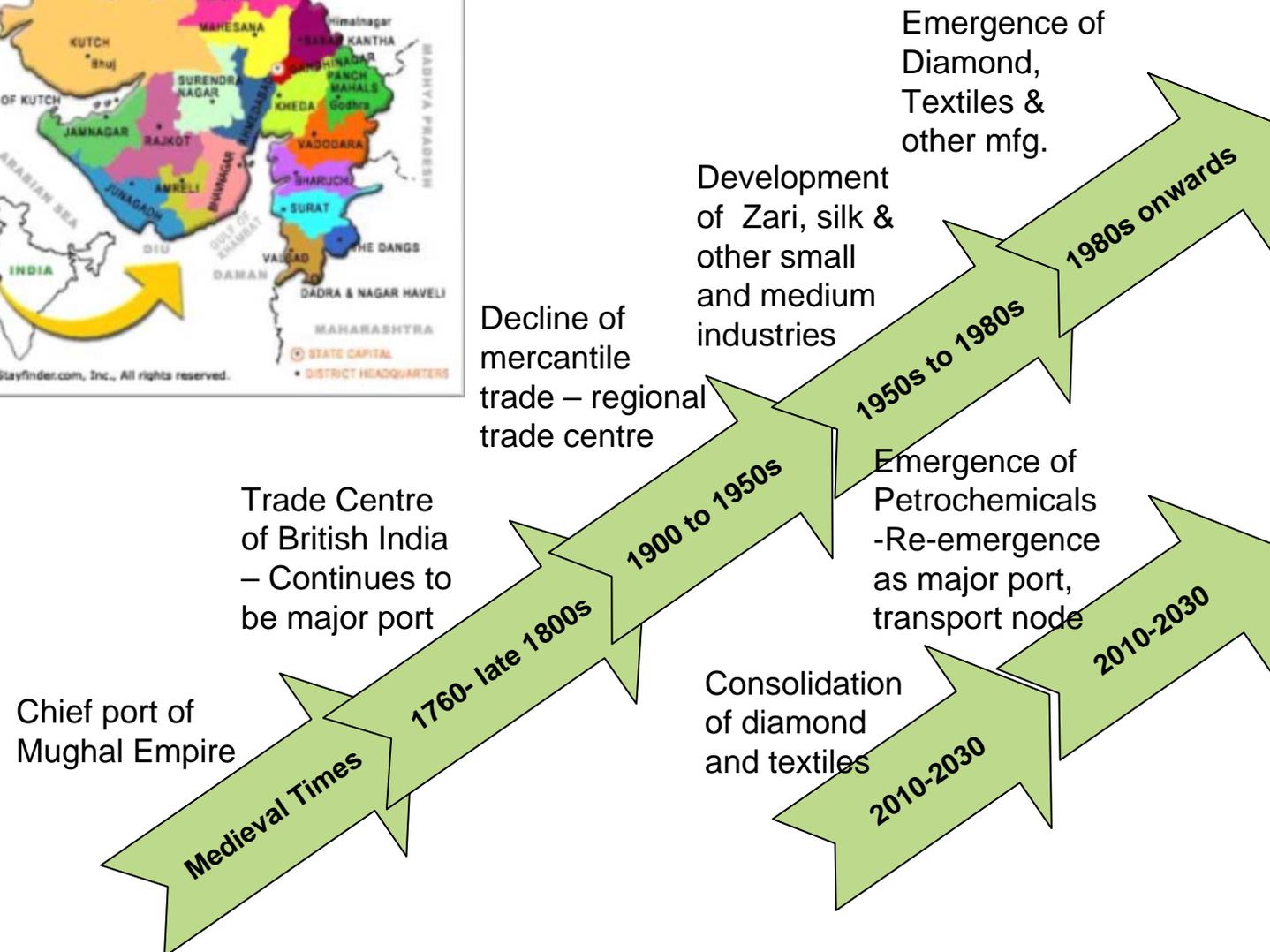




# Growth of Surat



Year	Area in Sq. Km	Population
1951	8.18	223,182
1961	8.18	288,026
1971	33.85	471,656
1981	55.56	776,583
1991	111.16	1,498,817
2001	112.27	2,433,785
2001*	326.51	2,877,241
2009	326.51	~ 4 million



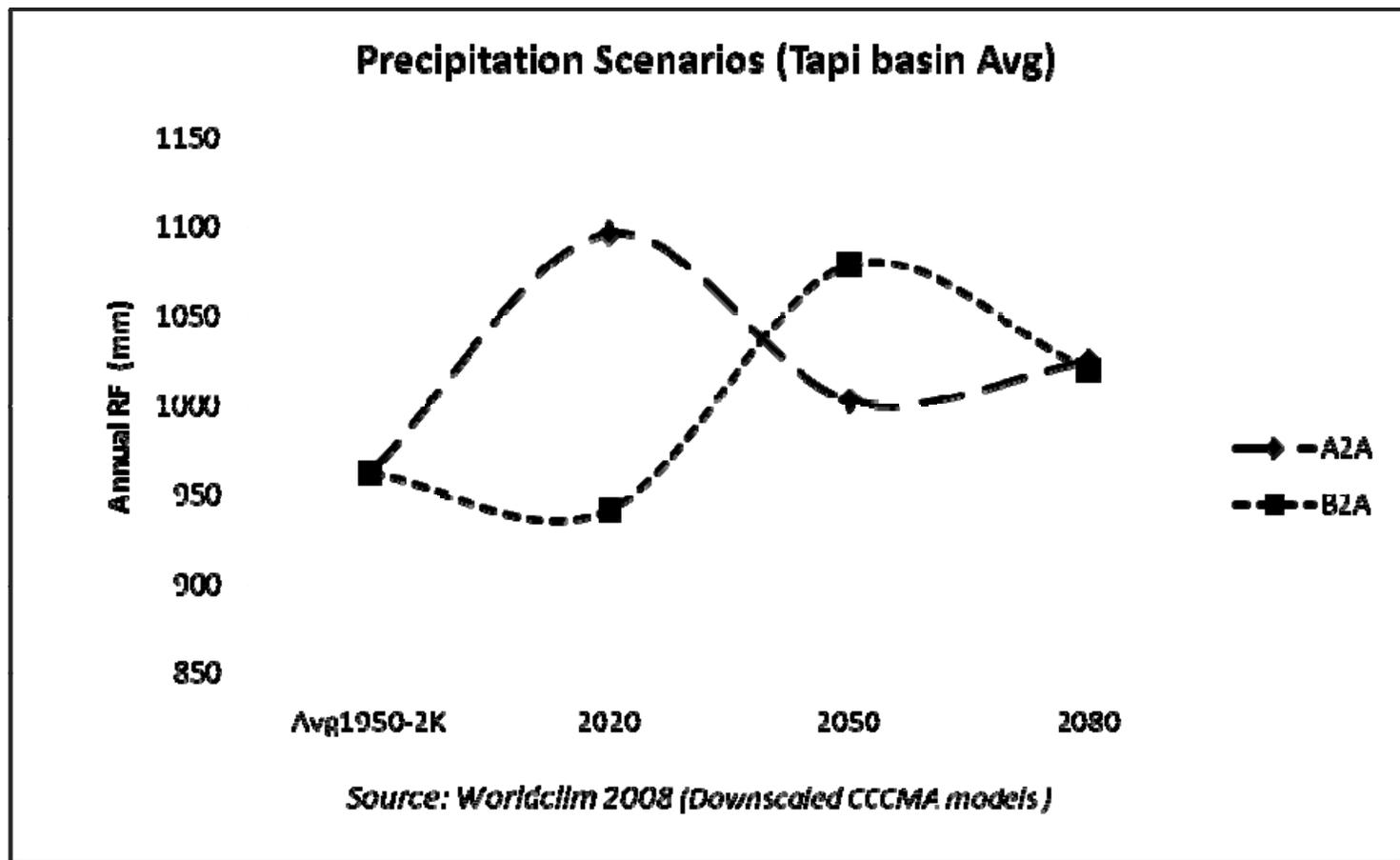


# Barriers and Challenges at Surat

- Very high urban growth and rise in per capita demand straining infrastructure investments and resource availability**
  - **Water and energy resource constraints**
  - **Transport infrastructure overburdened**
  - **Risk free land constraints**
- Management of Ukai multipurpose dam with conflicting objectives under extreme event dominated precipitation pattern**
- Monitoring and management of epidemics and community health**
- Finance, Capacity & Roles**
  - Dependency on State/Central, Tax Reforms**
  - Capacity Building**
  - Overlapping Roles (Sewage & Storm water management)**
- Growing boundaries & meeting demands of periphery**
- Push and pull migration from hinterland, Creating awareness amongst population with very high diversity in knowledge, skills and worldviews - especially new immigrants**



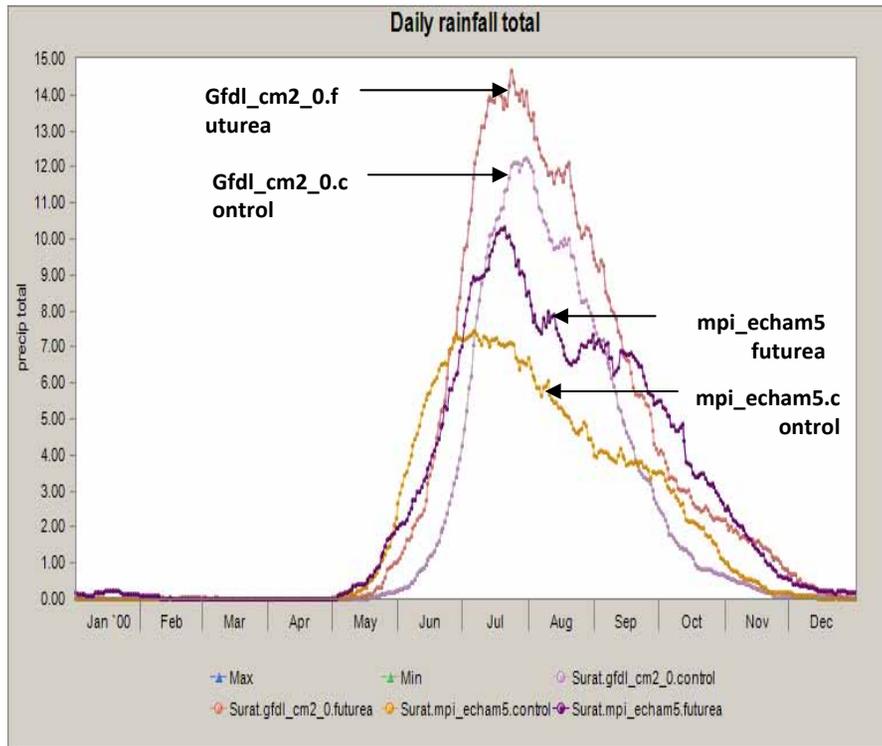
# Precipitation Scenarios



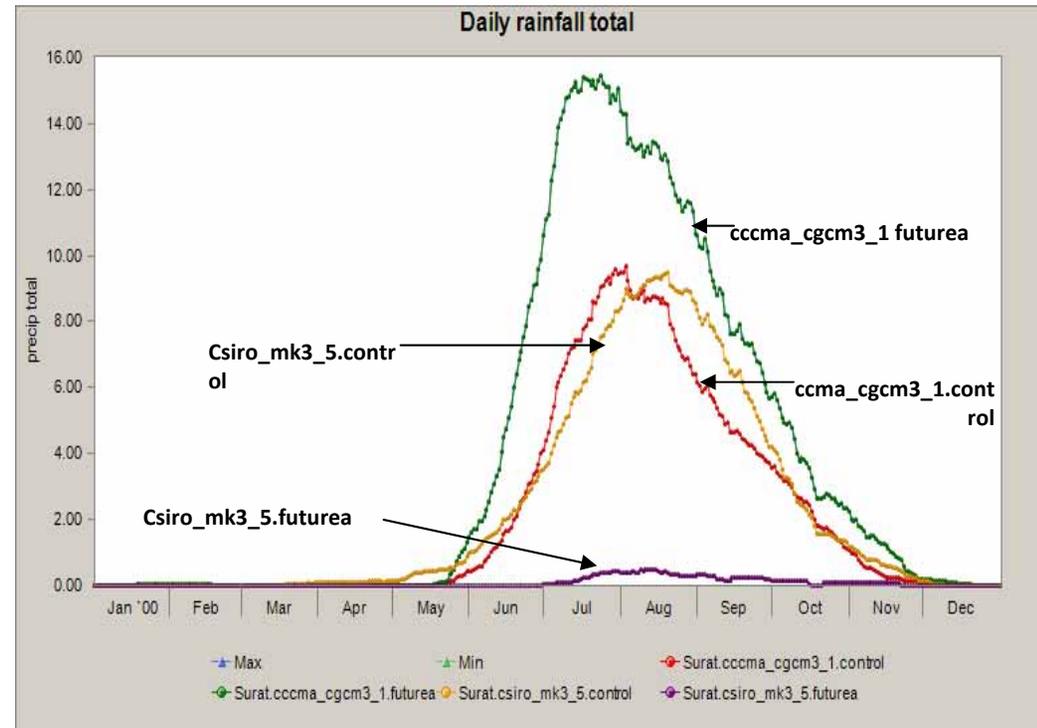
- Both Scenarios indicate significant rise in precipitation after 2020 (14% rise)
- Country level models indicate high frequency of dry spells & extreme rainfall events
- Life & siltation rate of Ukai as well as upstream usage and consequence of emergency releases
- Uncertainty is high given the location of Surat at the junction of per-humid south and arid north and also near the Tropic of Cancer.



# Precipitation Scenarios



Daily Precipitation: Control & Future A  
Models: (gfdl\_cm2\_0 & mpi\_echam5)

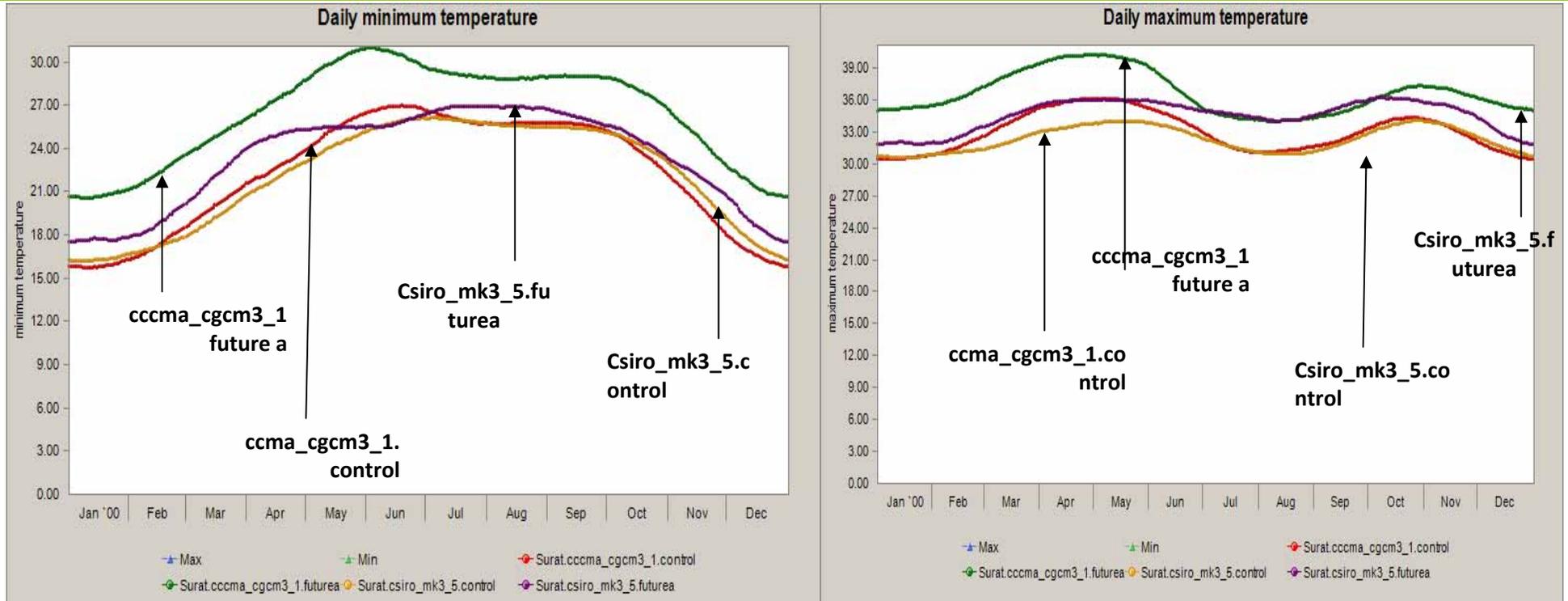


Daily Precipitation : Control & Future A  
Models: (cccma\_cgcm3, csiro\_mk3\_5 )

Source: Climate Change Explorer 1.0

- ⊙ Increase in precipitation expected
- ⊙ Some models indicate shift in rainy season towards July, which has been observed.
- ⊙ Increase in precipitation can have adverse effects on flooding of the city and impacts on health issues

# Temperature Scenarios

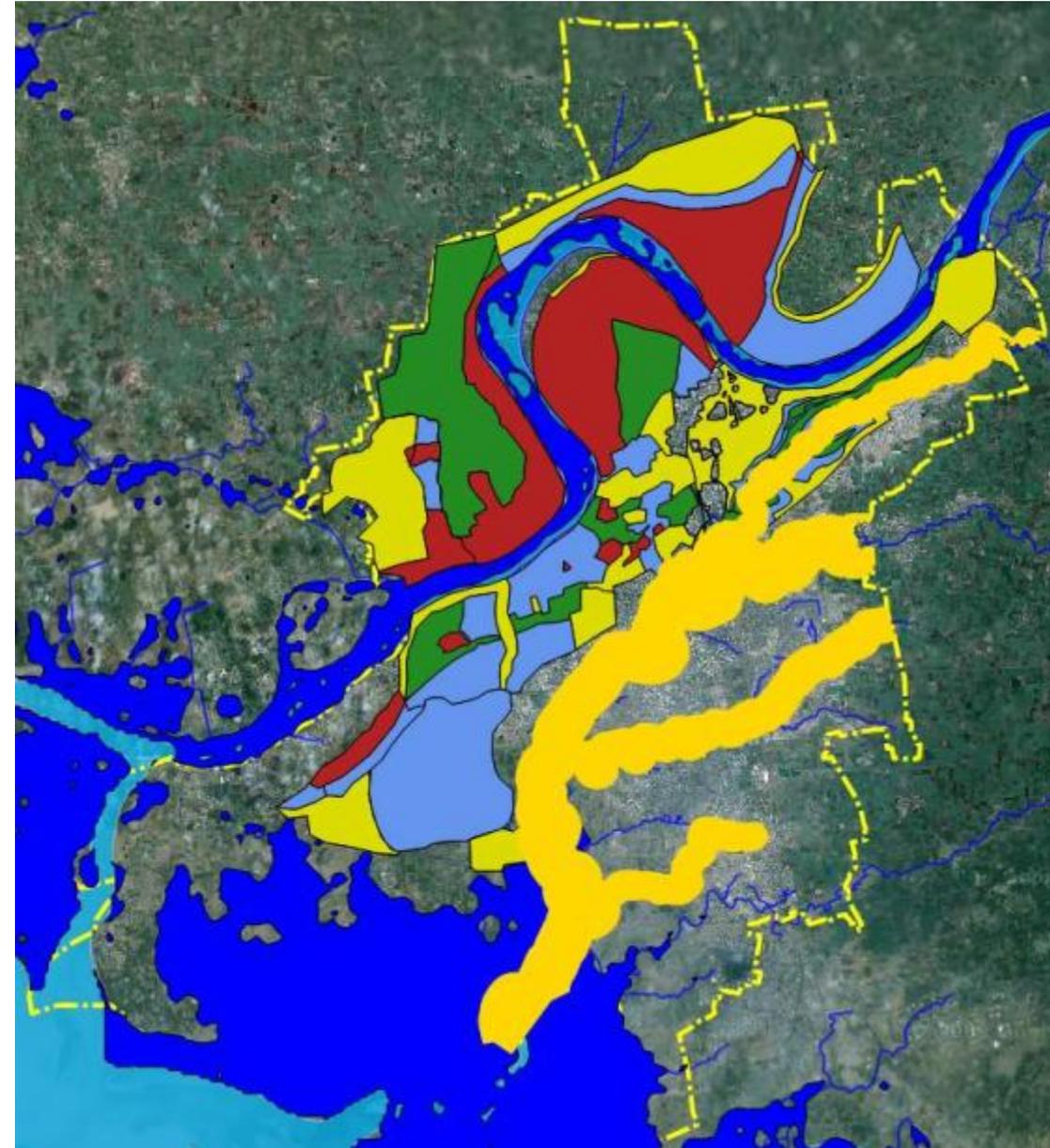


Surat: Daily Min and Max Temperature Control & Future A (CCCMA\_CGCM3, CSIRO\_mk3\_5)

Source: CCE 1.0

- ⊙ Impacts of heat islands not known, actual temp raise may be higher
- ⊙ Humid tropical Coastal environment – Temperature increase likely to increase discomfort levels
- ⊙ Major increase in per capita energy consumption expected
- ⊙ Malaria is endemic in Surat. Possible changes in incidence of vector borne diseases is unknown.
- ⊙ High humidity related diseases reported during rainy season

# Flood & Sea Level Rise Risks



City extended up to coast in 2006

Sea level rise likely to impact western part as well as saline water intrusion in to aquifers

Ukai dam floods inundate core and northern parts of the city at least once a decade

Khadi (Tidal creek) floods are more common (once in at least three years) and affect poorest parts of the city



# Cross Sectoral Impacts

- ◎ **Floods**
  - ◎ Risk to infrastructure, productive assets, households likely to increase
  - ◎ Health risks during and after floods (Lepto, Rheumatic fever, Malaria, Gastro)
- ◎ **Delayed monsoon-Prolonged summers**
  - ◎ Current summer water demands nearing the allocated water resources
  - ◎ Increased demand for water and energy would need development of alternate sources
  - ◎ Water quality issues-Algae and weed growth in river source during summers-expected to increase during peak summers
  - ◎ Increased concentration of pollutants during lean seasons
- ◎ **Urban growth**
  - ◎ Push and pull migration would necessitate focus on affordable housing in safe areas/flood resistant housing in less risk prone areas.
- ◎ **Sea level rise**
  - ◎ Landward intrusion of sea and salt water intrusion into aquifers
  - ◎ Seasonal Inundation of Khadi (Creek) areas during annual high tide periods
  - ◎ Increased inundation risk to informal settlements located along Khadi (Creek).



# Surat Response to Climate Change: from Reactive to Proactive action

Reactive (driven by actual  
perceived climate variability)

Proactive (driven by climate  
forecasting / future scenarios)



Disaster  
mitigation/  
response  
(post  
extreme  
event)

Disaster  
preparedness  
measures  
(based on  
current  
variability)

“Climate  
proofing”  
at project  
level

Mainstreaming  
climate  
forecasts into  
sectoral policies  
and processes

Strategic multi-  
stakeholder  
adaptation  
planning

## *Key actors:*

Households,  
community  
groups, relief  
organizations  
and institutions

Hazard  
management  
agencies

**Private  
developers,  
insurers,  
development  
NGOs**

Sectoral agencies  
(environment,  
water, housing,  
etc.)

Centralized unit  
 (“climate watch  
department”) with  
strategic planning  
authority



# Organisations Involved

- ◎ **Surat Municipal Corporation - [www.suratmunicipal.gov.in](http://www.suratmunicipal.gov.in)**
- ◎ **Gujarat State Disaster Management Authority - [www.gsdma.org](http://www.gsdma.org)**
- ◎ **The Southern Gujarat Chamber of Commerce and Industry - [www.sgcci.in](http://www.sgcci.in)**
- ◎ **Industrial Representatives - Hazira Industrial Area**
- ◎ **Veer Narmad South Gujarat University - [www.sgu.ernet.in](http://www.sgu.ernet.in)**
- ◎ **Centre for Social Studies - [www.css.ac.in](http://www.css.ac.in)**
- ◎ **Sarvajanik College of Engineering and Technology - [www.scet.ac.in](http://www.scet.ac.in)**
- ◎ **TIFAC-CORE in Environmental Engineering - [www.tifac-core-scet.org](http://www.tifac-core-scet.org)**
- ◎ **Urban and Social Health Advocacy and Alliance (NIWCD, Surat)**
- ◎ **Government Medical College, Surat**
- ◎ **Surat Citizens Council Trust, Surat**
- ◎ **NGOs and Concerned individuals**

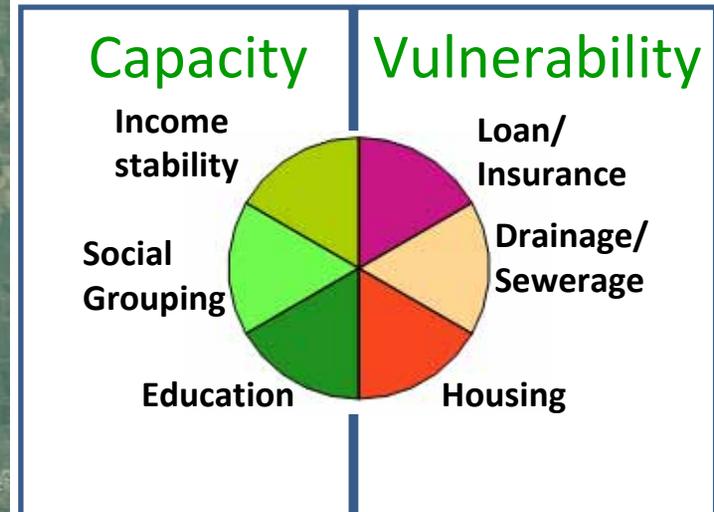
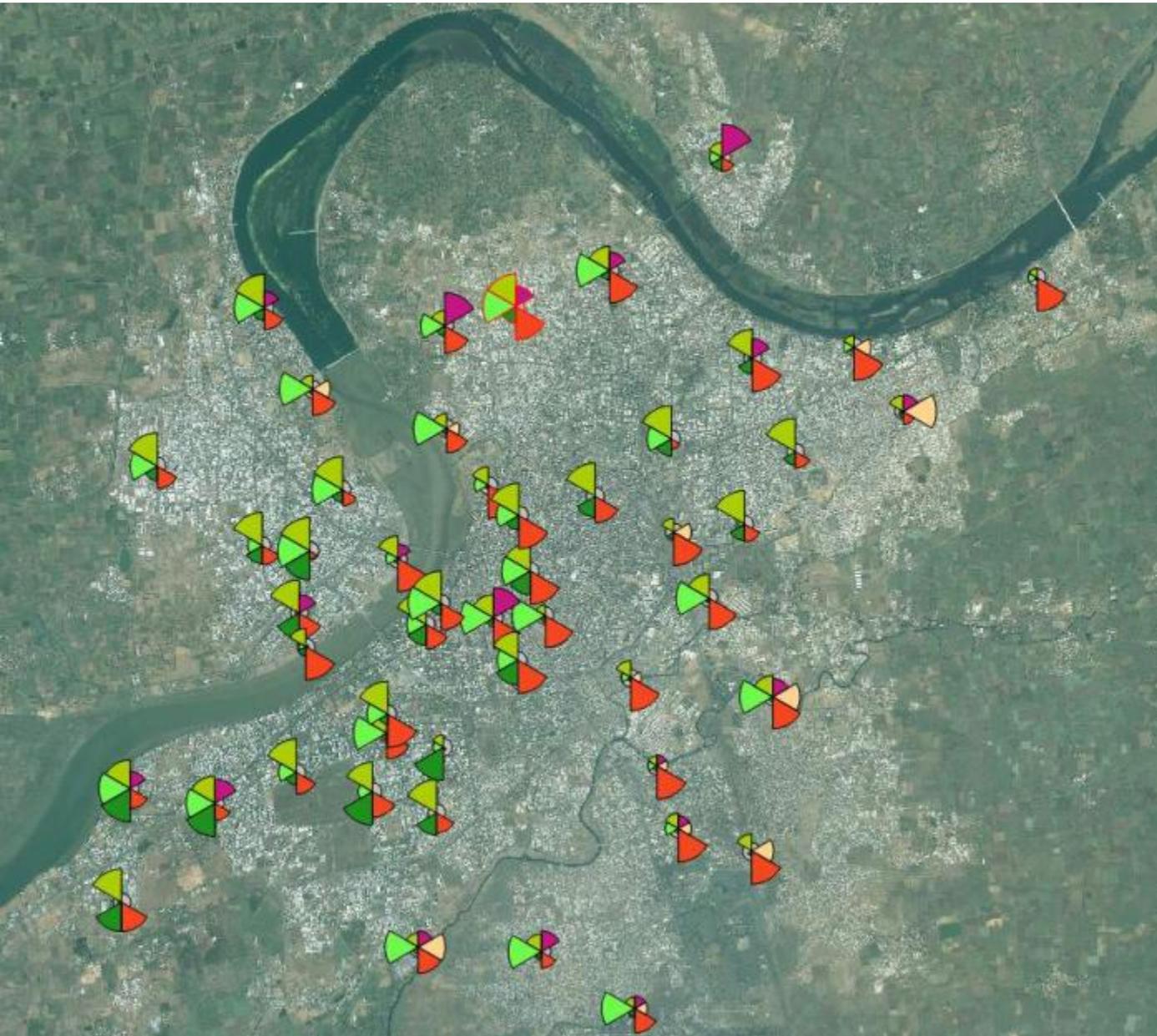


# Activities So Far

- Series of meetings held to include various stakeholders in the process (SMC, Industry, Academia, Civil society, Media etc)
- City Advisory Committee formed and regular meetings held
- Vulnerability Survey being completed- Results being discussed and Data distributed to Sector study groups
- Five Sectoral study groups formed (Flood, Water, Energy, Environment, Health)
- CC Awareness & CC Watch group formed to supervise the activities
- Linkage with GSDMA (Gujarat State Disaster Management Authority) established
- Pilot project identification process initiated
- Architectural competition process being discussed
- Two Vision sheets released ( Surat 2025, Energy Vision)
- Climate Change Website released  
[www.suratclimatechange.org](http://www.suratclimatechange.org)



# Capacity and Vulnerability Across Communities





# Pilot Projects

- ◎ Focused pilot projects being identified
- ◎ Candidate Projects
  - ◎ Architectural competition for flood resistant low income group housing/ Indicative Flood adaptation for one ward
  - ◎ Khadi (Tidal Creek) Risk zonation and development planning
  - ◎ Asset bank system for saving valuables
  - ◎ Near real-time Emergency management system
  - ◎ Database creation and Online Flood support for Aged/infirm
- ◎ To be shortlisted and initiated by CAC



# Adaptation Projects

- ◎ **Architectural & Urban Designers Competition**
  - ◎ Will be organized at national level
  - ◎ Focus on flood resistant design for various buildings
  - ◎ Affordability and availability of building materials
- ◎ **Flood resistance planning**
  - ◎ Innovative concept & proposal for urban planning
  - ◎ To integrate contour and water ways in spatial planning
  - ◎ Identification of appropriate land usage
- ◎ **Khadi Risk Zoning & Development Planning**
  - ◎ Topographical survey of creeks
  - ◎ Restoration of flood caring capacity
  - ◎ Planning for appropriate use of creek side land
  - ◎ Identification of sustainable usage zones
- ◎ **Database & Online Flood Support System**
  - ◎ Household survey to identify location of vulnerable individuals/groups
  - ◎ Public consultation / open registration of individuals requiring support
  - ◎ Creation of database management system for maintaining / updating and sharing
  - ◎ Establishing protocol for providing support to vulnerable individual during flood
  - ◎ Identification agencies, resources and support groups
  - ◎ Communication system



# Challenges and Questions

- ◎ Challenges
  - ◎ Very high urban growth straining infrastructure investments and resource availability
  - ◎ Water and energy resource constraints
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  - ◎ Risk free land constraints
  - ◎ Management of Ukai multipurpose dam with conflicting objectives under extreme event dominated precipitation pattern
  - ◎ Monitoring and management of epidemics and community health issues
  - ◎ Creating awareness amongst population with very high diversity in knowledge, skills and worldviews - especially new immigrants
- ◎ Questions
  - ◎ Cross learning between other cities across Asia
  - ◎ Platform for information/technologies/processes exchange



# Cities and National Action Plan

1. National CC adaptation policy that addresses diversity across the Indian urban landscape
2. Create experience and knowledge bank based on vulnerabilities or creation of Champion City or Role Model
3. Central-State relationship to build resilience
4. Constitution (74<sup>th</sup> Amendment) Act, 1992 has empowered Urban Local Bodies to perform effectively as vibrant democratic units of self-government
5. Empowering cities to provide pro-active inputs in forming National Agenda
6. Develop local political consensus regard to CC from city level upwards
7. Scale, Funds and selection process of Pilot projects to increase resilience
8. Cross learning between current partners and other cities
9. National level Platform for information/technologies/processes exchange



# Next Steps

- ◎ Discussions on vulnerability and sectoral studies outputs
- ◎ Developing Surat city specific adaptation options with state of the art technologies and best practices
  - ◎ Use of IT enabled advance warning and disaster management
  - ◎ Involvement of variety of city stakeholders
- ◎ Engagement with national and international agencies involved with Climate Change adaptation
- ◎ Creating awareness amongst city population about CC adaptation issues
- ◎ Engagement with media on
  - ◎ Awareness generation
  - ◎ Enabling Advance warning systems and emergency information
  - ◎ Communication plan for Disaster management



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**Surat Municipal Corporation**

**Preparing for...  
the change to come...  
for the change that is here!**

**Thank You**