Climate Change in the COG Region

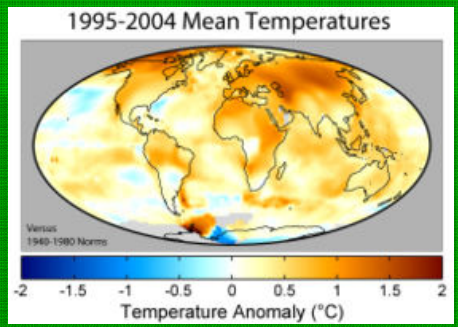
An Introduction to Impacts and Adaptation

Climate Change Steering Committee

March 25, 2008

Ted Graham

Water Resources Program Director



Mean surface temperature anomalies during the period 1995 to 2004 with respect to the average temperatures from 1940 to 1980

Mitigation vs. Adaptation

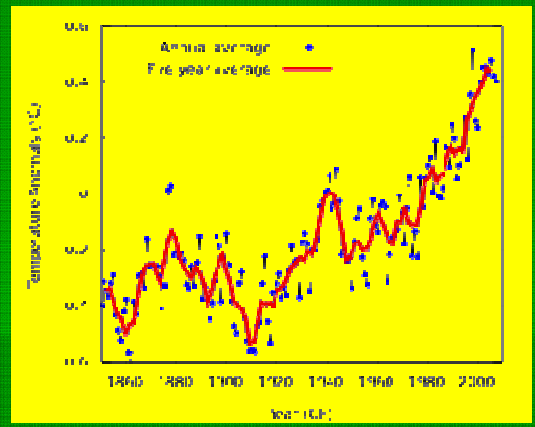
- Mitigation
  - Reducing the carbon footprint
  - Local actions for global benefit
    - May include local benefits
- Adaptation
  - Response to local impacts
  - Local actions for local benefits
    - May include global benefits

Numerous Recent Reports

- Describe potential impacts
- Suggest adaptation strategies
- Useful to help:
  - Understand local impacts
  - Initiate adaptation plans
- 25+ source documents reviewed
  - Federal, state, local, NGO, academic

Temperature: The Driver

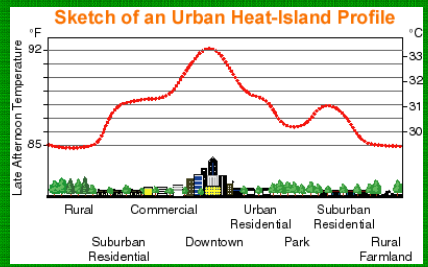
- Significant 20th century warming trend
- Warmer atmosphere
- Warmer surface
- Warmer oceans
- Melting ice
- Sea level rise



Global mean surface temperature anomaly 1850 to 2007 relative to 1961–1990

Anticipated Changes

- Altered Weather – intensification of:
  - Droughts
  - Storms – both wind and rain
  - Hot weather extremes
- Other potential changes include:
  - Increases in invasive species
  - Increases in infectious diseases
  - Impacts on forests and urban trees
  - Impacts on wetlands



Potentially Affecting

- Water Supply
- Public Safety/Infrastructure
  - Flood & Wind Damage:
    - Buildings, Roads, Bridges, Pipelines…
  - Emergency Services
- Public Health
- Environmental Health/Water Quality
- Energy Demand

“Green lawns could lead to brownouts”
CNN Headline, 2/15/08

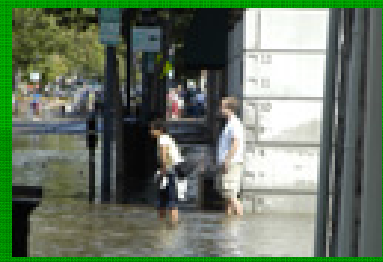
Water Supply

- More intense droughts and…
  - Increased demand
  - Insufficient reservoir capacity
  - Impaired emergency services
  - Threats to water-dependent services
- Adaptation:
  - Demand restrictions
  - New reservoir capacity
  - Water reuse

Public Safety: Floods & Wind

- Threats from more intense storms
  - Flood damage
  - Obsolete stormwater infrastructure
  - Wind damage
  - Vulnerable roads, bridges, buildings, dams, pipelines, etc.
- Adaptation
  - Inventory vulnerable buildings & facilities
  - Strengthen flood control system
  - Revise stormwater regulations
  - Revise 100-year flood plain maps
  - Strengthen building codes

Lake Needwood

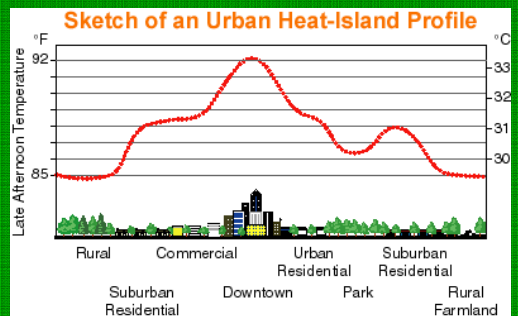


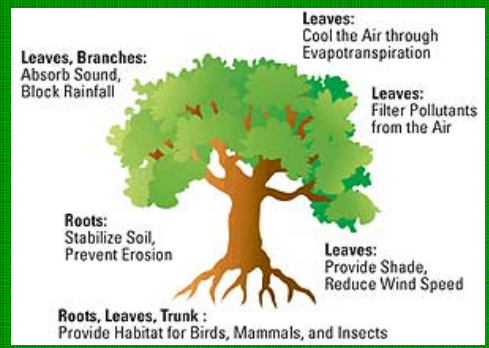
Old Town

Southern MD 2002

Public Health

- Threats from general warming
  - Increased ozone levels
  - Vector- & water-borne diseases
  - Heat wave crises
- Adaptation
  - Vaccination campaigns
  - Emergency cooling centers
  - Site features, trees to reduce heat island effect





Environmental Health; Water Quality

- Threats from general warming
  - Altered water quality
  - Increased invasive species
  - Altered birds' winter ranges
- Adaptation
  - Increased runoff & discharge controls
  - More stringent fishery rules

Energy Demand

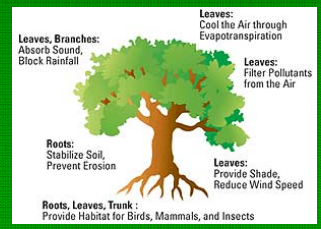
- Heat- and drought-driven increases in power consumption
  - Enhanced risk of brownouts & blackouts
- Adaptation
  - Renewable local power generation
  - Conservation; energy efficiency
  - Xeriscaping

Approaching Adaptation (1)

- Two Implementation Examples
  - Boston elevated its regional wastewater plant anticipating sea level rise
  - Los Angeles pursuing a “Million Trees L. A.” to counter the heat island effect

Approaching Adaptation (2)

- Consider “no regrets” adaptation strategies,* such as:
  - Water use efficiency
  - Large scale & strategic tree planting
- Assess need for water supply augmentation
  - New reservoirs; quarries
  - Water reuse
  - Access upper estuary



Approaching Adaptation (3)

- Regional workshops with appropriate partners
- Potential workshops include:
  - Future water supply, demand & alternative sources
  - Flood and wind risks: vulnerable buildings and infrastructure
  - Public health risks and responsive strategies
  - Multiple benefits of green infrastructure
  - Toward a local energy demand strategy
- Climate Change Strategy Includes:
  - Realistic assessment of impacts; and
  - Practical adaptation strategy