



# Climate Change and Health

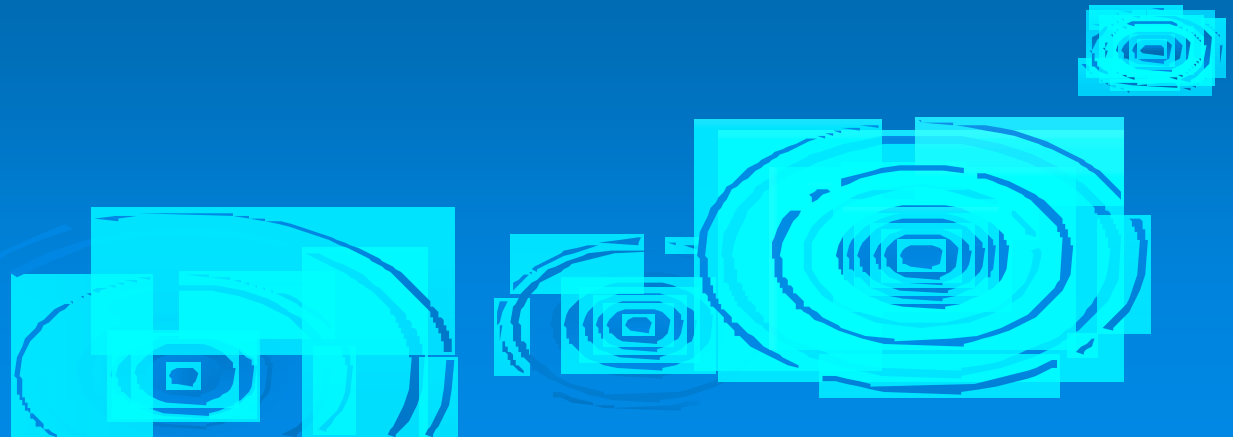
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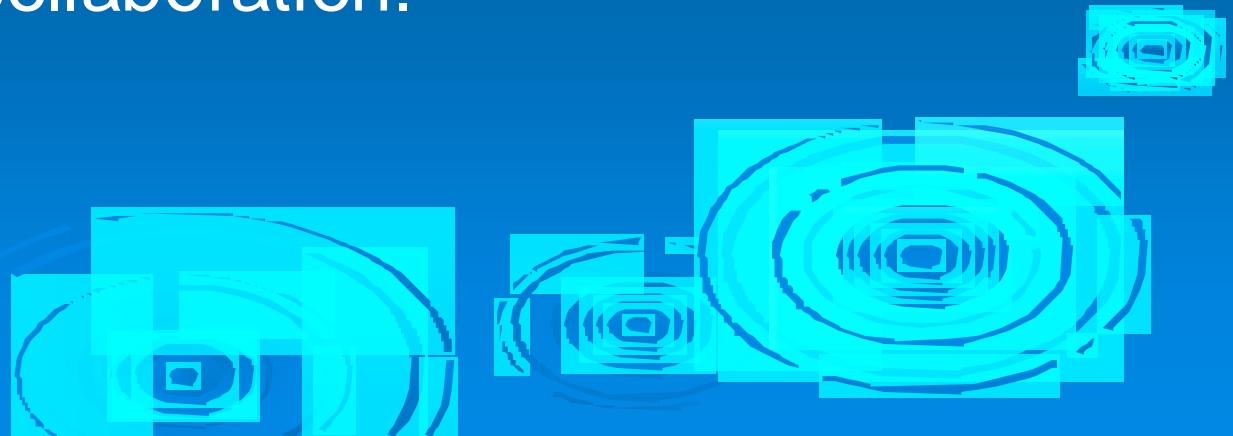
# Goal

- Educate and engage public health and community planning stakeholders concerning the effects of climate change on public health and identify promising practices, standards and partnerships to address such effects.



# Objectives

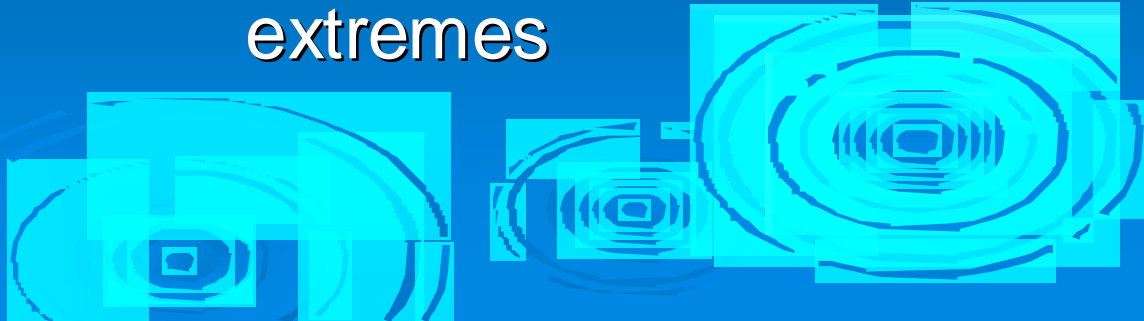
- Provide an overview of climate change and identified threats to public health.
- Assess what initiatives are foreseen or underway by county health departments that are addressing climate change.
- Seek workshop participant input to help prepare an agency strategic plan development and to improve local collaboration.



# What is Climate Change



- Any significant change in measure of climate, i.e., temperatures, precipitation, wind, and other weather patterns.
- World's climate is showing signs of shifting
  - Warmer weather, more precipitation and weather extremes



# Causes of Climate Change

- Climate change may result from:
  - Natural factors, such as changes in the Sun's energy or slow changes in the Earth's orbit around the Sun;
  - Natural processes within the climate system (e.g., changes in ocean circulation);
  - Human activities that change the atmosphere's makeup



# EPA Endangerment Findings

➤ Greenhouse gases are:

- Carbon Dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous Oxide (N<sub>2</sub>O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF<sub>6</sub>)



➤ These gases in the atmosphere threaten public health

➤ Also, emissions of these gases from motor vehicle engines threaten public health

# The Greenhouse Effect



- The temperature of the earth is determined by balance between energy input from the sun and its loss back into space.
- Also, the earth's incoming solar short wave radiation (UV radiation and visible spectrum) and about a third is reflected back into space.
- The remainder is absorbed by land and ocean, which radiate their acquired warmth as long wave in from atmospheric gases, water vapor, CO<sub>2</sub>, ozone, methane are known as greenhouse gases and can absorb some of the long wave radiation and is warmed by it.

# Greenhouse Gases in the Atmosphere

- Heat-trapping greenhouse gases are now at record-high levels.
- These high atmospheric levels are the clear result of human activity.
- Average global carbon dioxide concentrations have increased about 38 percent.



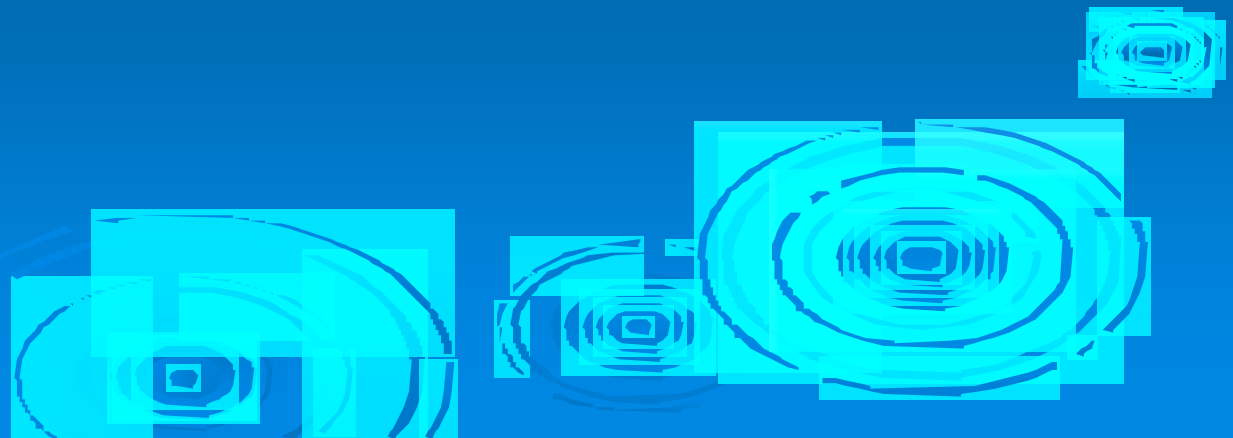
# Health Impacts of the Greenhouse Effect

- Heat related stress
- Cardiovascular and respiratory illness
- Thermal issues
- Infectious vector-borne diseases



# Health Impacts of the Greenhouse Effect

- Rising temperatures will effect the spread and transmission of vector-borne and rodent-borne diseases.
- Pathogen maturation
- Density of insect in a particular area
- Likelihood of infection
- Vector reproduction, parasite development cycle and bite



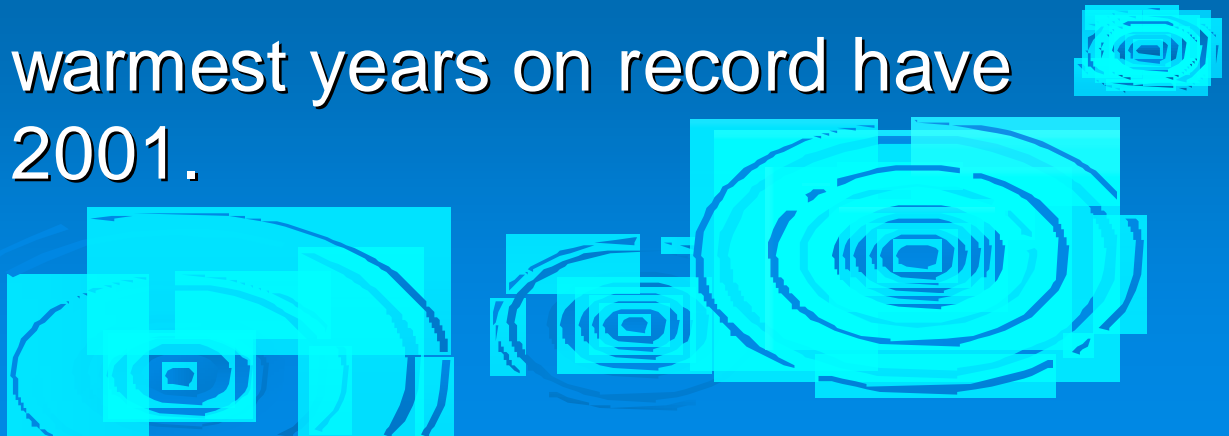
# Greenhouse Gases in the Atmosphere



- Atmospheric concentrations of greenhouse gases carbon dioxide and methane are well above the natural range.
- Projected atmospheric concentrations of the six greenhouse gases show an increase under all scenarios by 2030 compared to 2000

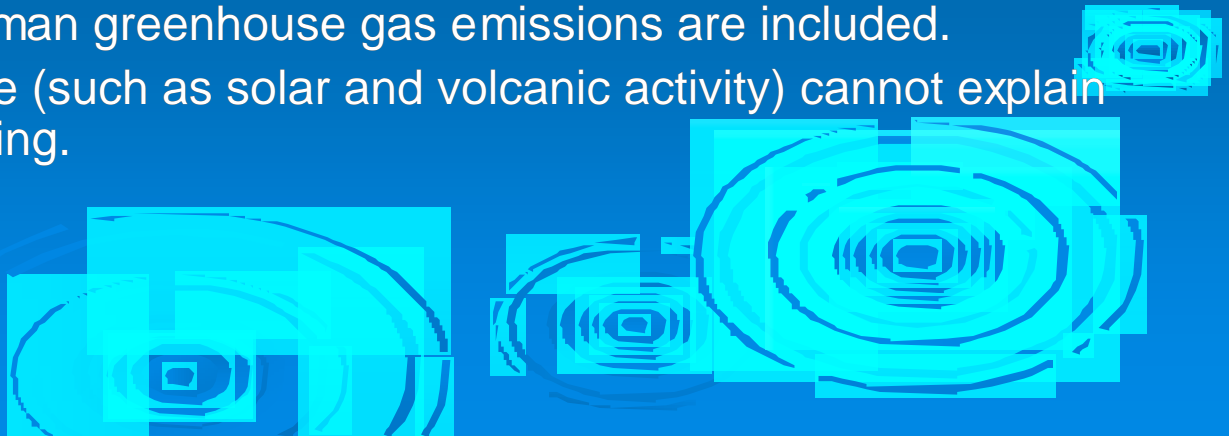
# The Climate is Warming

- Warming of the climate system is evidenced by increases in:
  - Global average air and ocean temperatures
  - Widespread melting of snow and ice
  - Rising global average sea level
- Global surface temperatures have risen by 1.3 degrees Fahrenheit over the last 100 years.
- Eight of the 10 warmest years on record have occurred since 2001.



# Greenhouse Gas Emissions

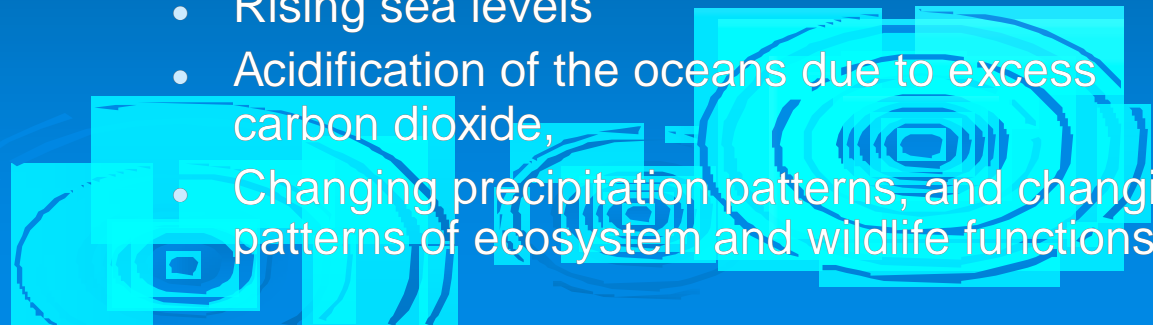
- Most of the global warming of the last 50 years is very likely due to human-induced increases in greenhouse gas emissions.
- Multiple lines of evidence support this:
  - Our basic physical understanding of the climate system: greenhouse gas concentrations have increased and their warming properties are well-established.
  - Historical estimates of past climate changes suggest that the recent changes in global surface temperature are unusual.
  - Computer-based climate models are unable to replicate the observed warming unless human greenhouse gas emissions are included.
  - Natural forces alone (such as solar and volcanic activity) cannot explain the observed warming.



# Climate Change is Projected to Continue During This Century



- Future warming during the 21st century even with low emissions growth is very likely to be larger than warming during the 20th century.
- The Intergovernmental Panel on Climate Change projects a temperature rise of between 3 and 7 degrees Fahrenheit by the end of the 21st century.
- Multiple increases in average surface temperatures; it includes:
  - Melting ice in the Arctic
  - Melting glaciers around the world
  - Increasing ocean temperatures
  - Rising sea levels
  - Acidification of the oceans due to excess carbon dioxide,
  - Changing precipitation patterns, and changing patterns of ecosystem and wildlife functions.



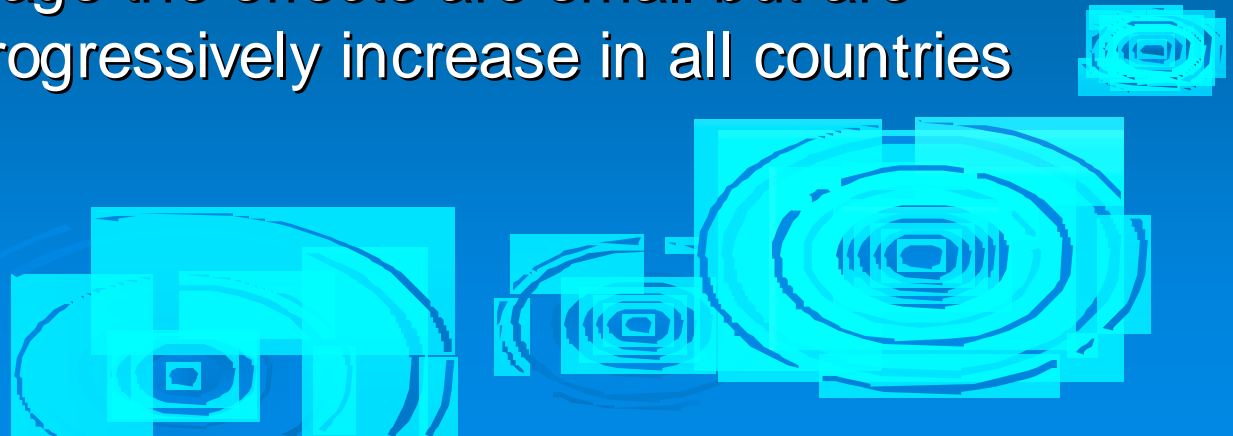
# Potential Effects of Climate Change

- More variable weather
- Stronger and longer heat waves
- More frequent heavy precipitation events
- More frequent severe droughts
- Extreme weather events such as flooding and tropical cyclone
- Rises in sea level
- Increased air pollution
- Other effects may result from ecosystem shifting and disruption



# How are we exposed

- The Intergovernmental Panel on Climate Change ([IPCC, 2007](#)) concluded:
  - Human beings are exposed to climate change through changing weather patterns (for example, more intense and frequent extreme events) and indirectly through changes in water, air, food quality and quantity, ecosystems, agriculture, and economy.
  - At this early stage the effects are small but are projected to progressively increase in all countries and regions.



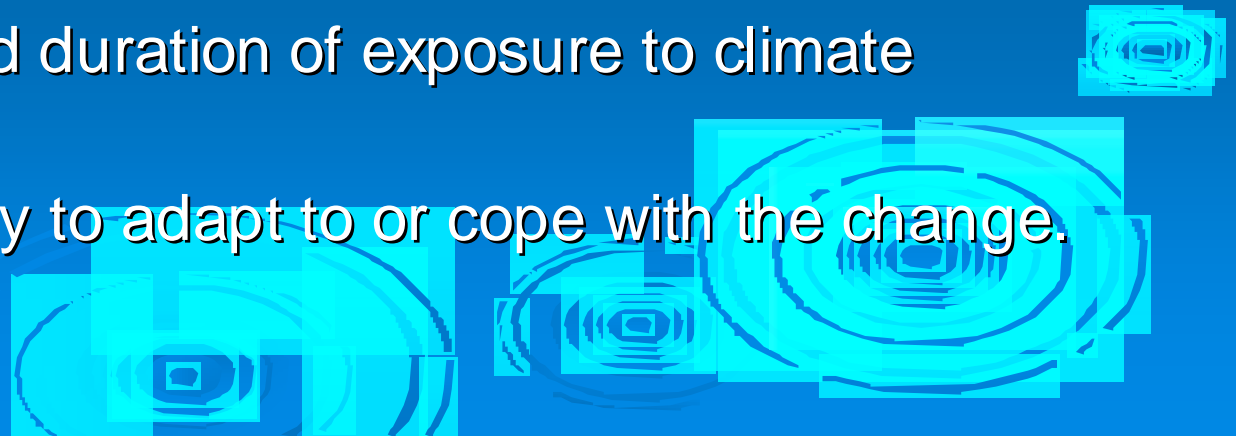
# Health Effects of Climate Change

- The prevalence of some diseases and other threats to human health depend largely on local climate.
- Climate-related disturbances in ecological systems, can indirectly impact the incidence of serious infectious diseases.
- Warm temperatures can increase air and water pollution, which in turn harm human health.



# Human Health and Climate Change

- Human health is strongly affected by social, political, economic, environmental and technological factors.
- The extent and nature of climate change impacts on human health vary by:
  - Region
  - Relative vulnerability of population groups
  - The extent and duration of exposure to climate change itself
  - Society's ability to adapt to or cope with the change.

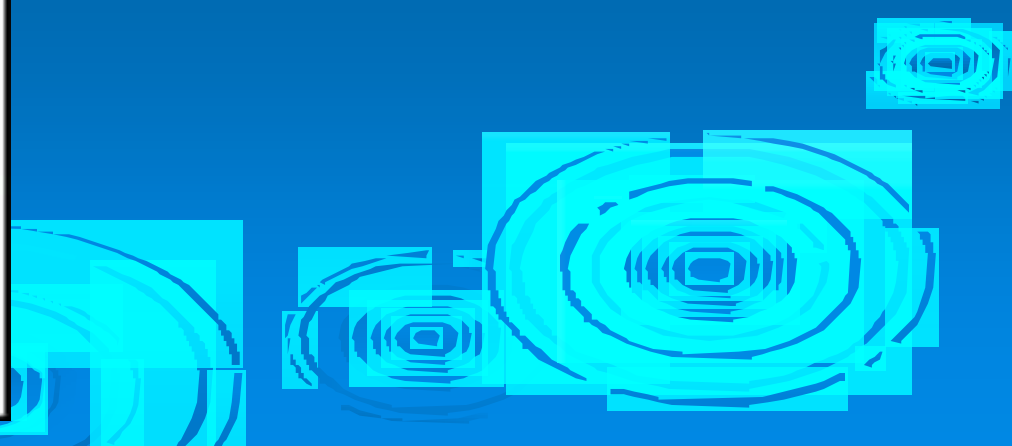
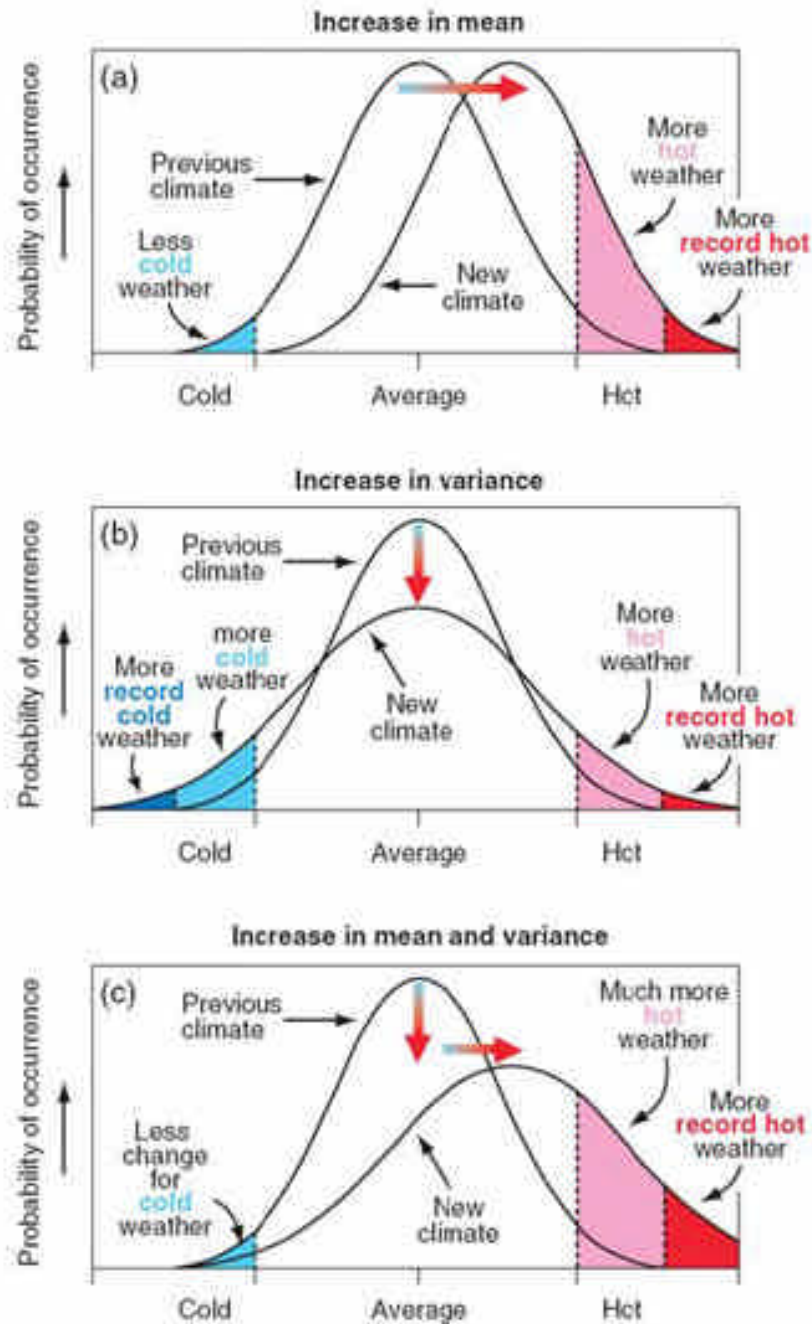


# Direct Temperature Effects



- Climate change may directly affect human health through increases in average temperature.
- Such increases may lead to more extreme heat waves during the summer while producing less extreme cold spells during the winter.
- Particular segments of the population such as those with heart problems, asthma, the elderly, the very young and the homeless can be especially vulnerable to extreme heat.

# Shifts in the distribution of cold and hot weather



# Extreme Events



- Extreme weather events can be destructive to human health and well-being.
- The extent to which climate change may affect the frequency and severity of these events, such as hurricanes and extreme heat and floods, is being investigated by the U.S. Climate Change Science Program.
- An increase in the frequency of extreme events may result in more event-related deaths, injuries, infectious diseases, and stress-related disorders.

	Heat waves	Poor air quality	Extreme weather: hurricanes	Extreme weather: floods	Extreme weather: wildfires	Extreme weather: droughts	Increased average temperatures	Rising CO2 levels
Northeast	✓	✓		✓			✓	✓
Southeast	✓		✓	✓	✓	✓	✓	✓
Midwest	✓	✓		✓		✓	✓	✓
Great Plains	✓					✓	✓	✓
Southwest	✓	✓		✓	✓	✓	✓	✓
Northwest				✓	✓	✓	✓	✓
Alaska					✓	✓	✓	✓
Islands*			✓	✓			✓	✓

Source: U.S. Global Climate Research Project, Global Climate Change Impacts in the United States, 2009.<sup>41</sup>

\* Note: This includes the state of Hawaii and U.S. territories Puerto Rico, the U.S. Virgin Islands, Guam, and other Pacific island territories.



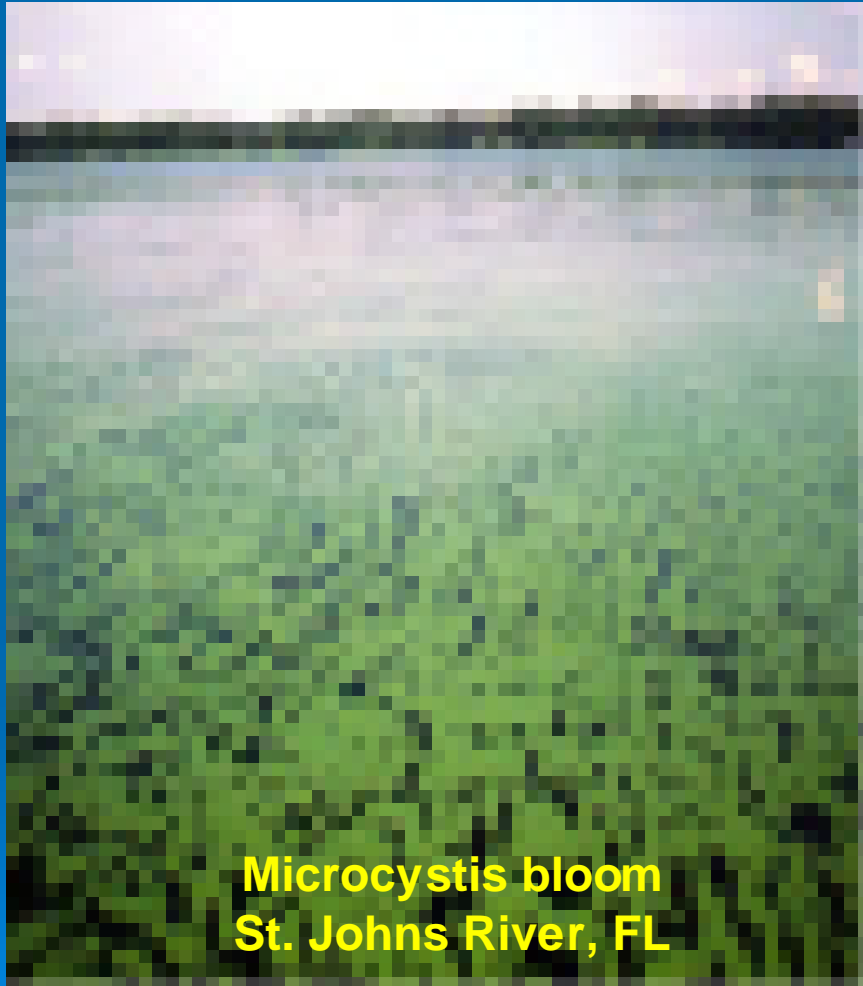
# Climate-Sensitive Diseases



- Climate change may increase the risk of some infectious diseases, particularly those diseases that appear in warm areas and are spread by mosquitoes and other insects.
- These "vector-borne" diseases include malaria, dengue fever, yellow fever, and encephalitis.



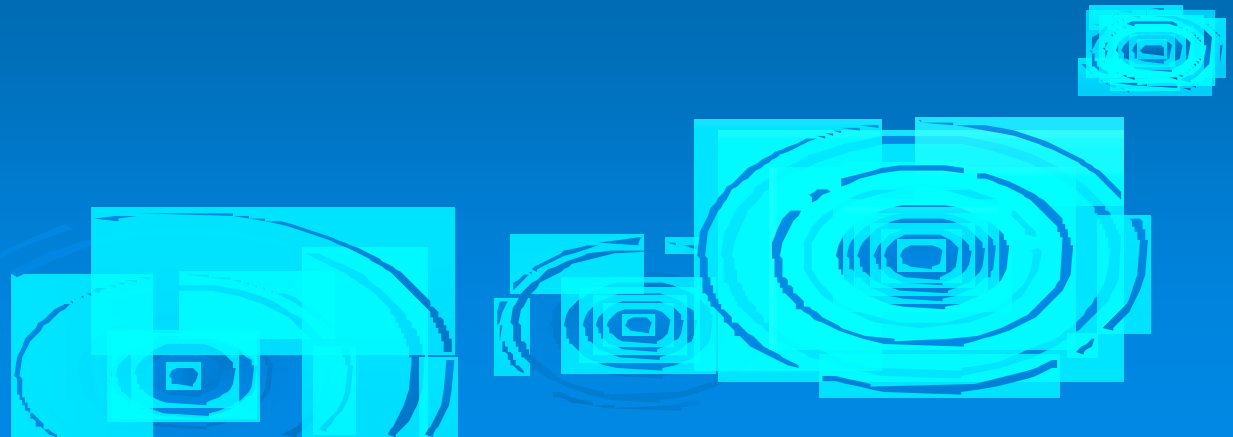
# Climate-Sensitive Diseases



- Also, Red Tide and blue-Green algal blooms could occur more frequently as warmer temperatures that tend to accompany algal blooms could become more frequent.

# Climate-Sensitive Diseases

- Higher temperatures, in combination with favorable rainfall patterns, could prolong disease transmission seasons in some locations where certain diseases already exist.
- In other locations, climate change will decrease transmission via reductions in rainfall or temperatures that are too high for transmission.



# Air Quality



- Climate change is expected to contribute to some air quality problems (IPCC, 2007).
- Respiratory disorders may be exacerbated by warming-induced increases in the frequency of smog (ground-level ozone) events and particulate air pollution.
- Ground-level ozone can damage lung tissue, and is especially harmful for those with asthma and other chronic lung diseases.

# Air Quality



- Another pollutant of concern is "particulate matter," also known as particle pollution or PM.
- Particulate matter is a complex mixture of extremely small particles and liquid droplets. When breathed in, these particles can reach the deepest regions of the lungs.
- Climate change may indirectly affect the concentration of PM pollution in the air by affecting natural or "biogenic" sources of PM such as wildfires and dust from dry soils.

# Health Impacts on Nutrition

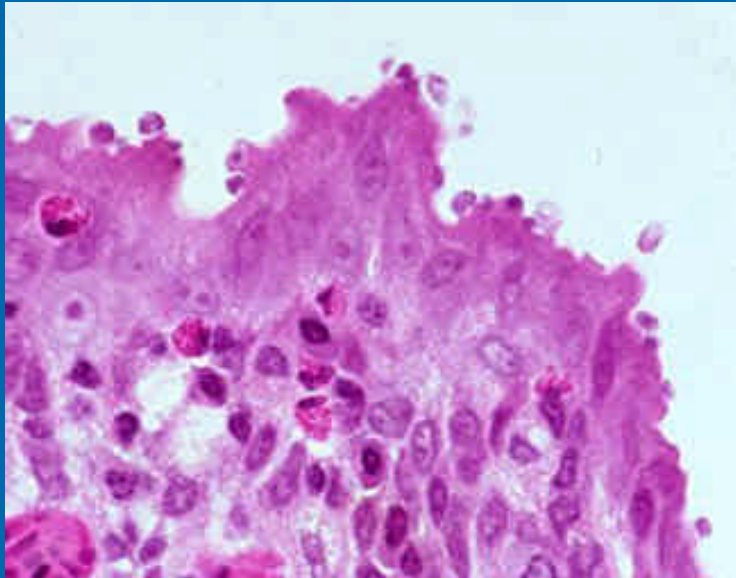
- Regional climate change expected to impact agricultural yields, production, and pricing
  - Expect increase in yields at higher latitudes, decrease in lower latitudes
  - Most negative effects expected in developing countries
- Expected increase in the number of undernourished people globally
  - Leads to complications in child development



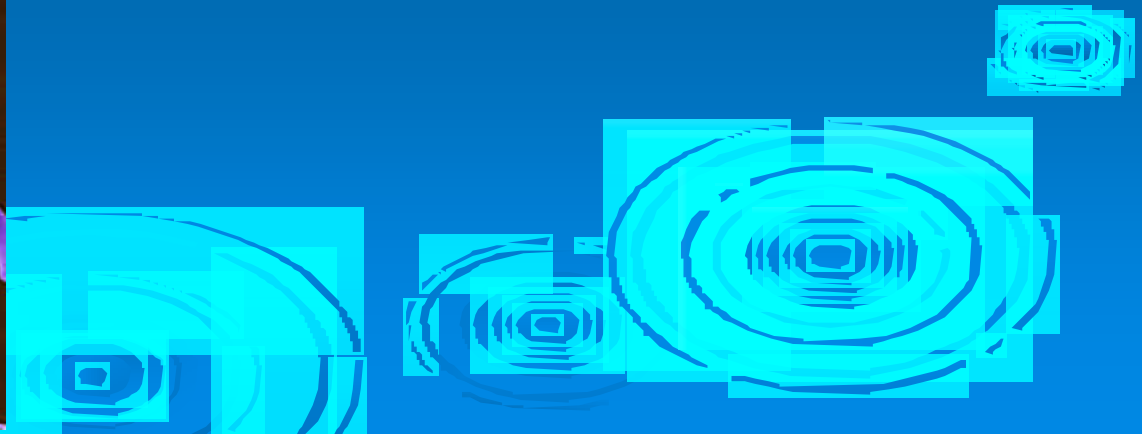
# Impact on Infectious Disease

- Change in range of some infectious disease vectors
- Mixed effects on malaria; in some places the geographical range will contract, elsewhere the range will expand
- Increased number of people at risk of dengue
- Spatial distribution, intensity, and seasonality of meningococcal meningitis appear to be linked to climatic, particularly drought

# Impact on Waterborne Disease



- Extreme precipitation has been linked to waterborne disease outbreaks
  - Cryptosporidiosis, typhoid fever, cholera, and other diarrheal illnesses
- Droughts can cause waterborne illnesses by depleting drinking water and concentrating contaminants
- Sea surface temperature and height correlated with cholera epidemics
  - *Vibrio* spp. are expected to increase with warming temperatures





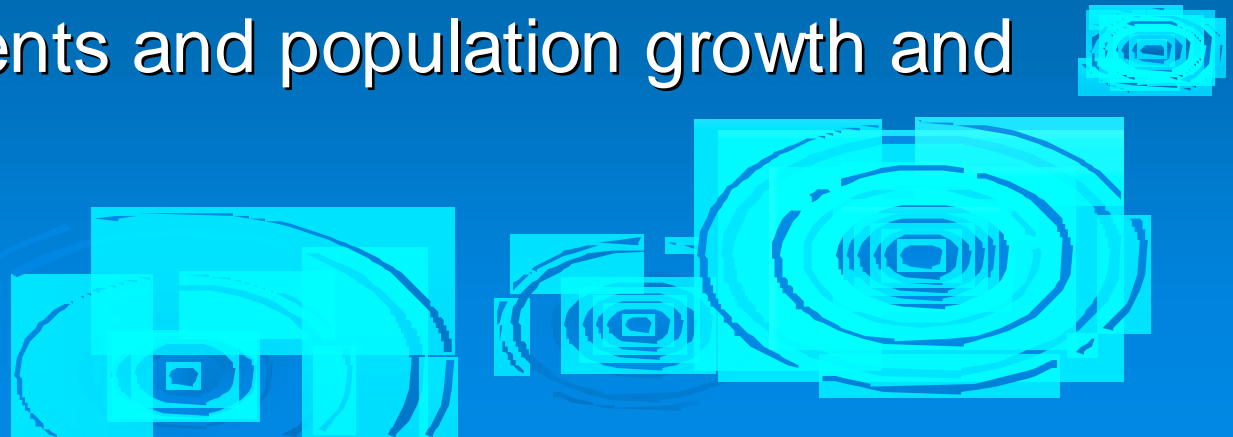
# Collaborative efforts to address climate change

- Environmental Health
- Infectious Disease
- Emergency Preparedness



# The Lancet “The Climate Dividend”

- Climate change is the biggest global health threat of the 21<sup>st</sup> century
  - Changing patterns of disease
  - Food insecurity
  - Unsafe water and sanitation
  - Damage to human settlements
  - Extreme events and population growth and migration



# Interacting Trends

- These trends include:
  - Geologic and political limitations on the supplies of fossil fuels;
  - Increasing worldwide population;
  - Decreased freshwater availability worldwide
  - Worldwide migration to urban areas
  - Increasing worldwide cost of food and resulting food shortages



What can we do?



# At Home



- Making a few small changes in your home and yard can lead to big reductions of greenhouse gas emissions and save money.
- Below are some simple steps you can take around the house and yard to reduce greenhouse gas emissions:
  - Look for ENERGY STAR qualified products
  - Heat and cool smartly
  - Reduce, Reuse, and Recycle
  - Use water efficiently

# At Work



- Manage office equipment energy use better
- Look for ENERGY STAR qualified products for the Office
- Ask your office building manager if your office building has earned the ENERGY STAR.
- Reduce, Reuse, Recycle
- Introduce a “Going Green” program in your area, to help move your company toward a greener work place

# DCHD Going Green Initiative

## ➤ Our Goal

- To be a leader by supporting more “green” decisions and behavior; to establish more sustainable choices in public service operations by implementing energy conservation methods to lower utility costs, energy consumption, and carbon footprint emissions **as we can.**



# GOING GREEN



## The Green Workplace 5 Tips for a More Eco-Friendly Office

- Start a bring-your-own coffee mug policy for the break room and ditch the foam cups. Your company will reduce waste and save money as well.
- Bring real plants into the office. Fake greenery might be low-maintenance, but the real thing adds beauty and oxygen to your surroundings.
- Reprogram the thermostat. Each degree warmer you leave the thermostat in summer and each degree cooler you set it in the winter can save 6 to 8 percent in energy costs.
- Watch the paper and ink. Avoid printing unnecessary documents that could just as easily be emailed and print necessary papers on both sides. It also helps to institute a recycling program and switch to recycled paper and water-based inks.
- Turn off any equipment that doesn't need to be on when you're not in the office. Every computer left turned on overnight and every coffee pot left plugged in eats up electricity and costs your company money.

**What does Going Green mean?**  
These are actions that a person can consciously take to curb harmful effects on the environment through better consumer habits.

**How can you help?**  
It's simple: By learning and applying ways you can change your behavior to be more Green.

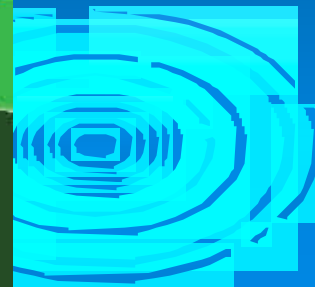


Please tell us what you think about this idea.  
You can send your comments to [Gale\\_Tucker@doh.state.fl.us](mailto:Gale_Tucker@doh.state.fl.us)

**DCHE**  
Doral County Health Department



FLORIDA DEPARTMENT OF  
**HEALTH**





# Conclusions/Co-Benefits

- Track data on environmental conditions, disease risks, and disease occurrence related to climate change.
- Expand capacity for modeling and forecasting health effects that may be climate-related.
- Enhance the scientific data to better understand the relationship between climate change and health outcomes.
- Develop partnerships with other government agencies, the private sector, nongovernmental organizations, universities, and international organizations to more effectively address U.S. and global health aspects of climate change.



Thank You



# References

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