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CLIME CHANGE AND HEALTH

Introduction

- Climate change is one the biggest global health treats of the new century
- Billions of people will be at risk of the effects of climate change
- Northern areas of Canada, Greenland and Siberia will be the most affected



History of climate sciences and effect on health

Figure 1.1. Variations in Earth's average surface temperature, over the past 20,000 years

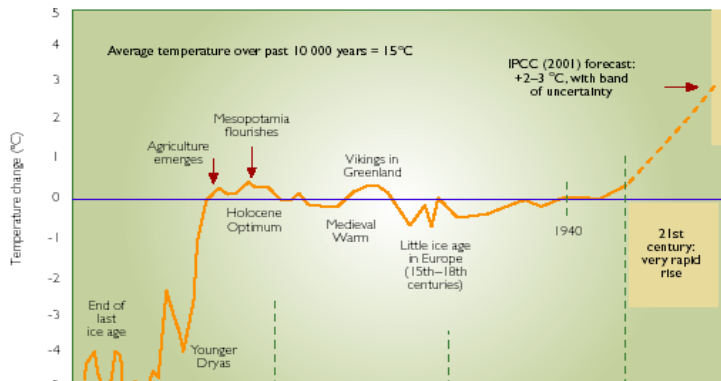
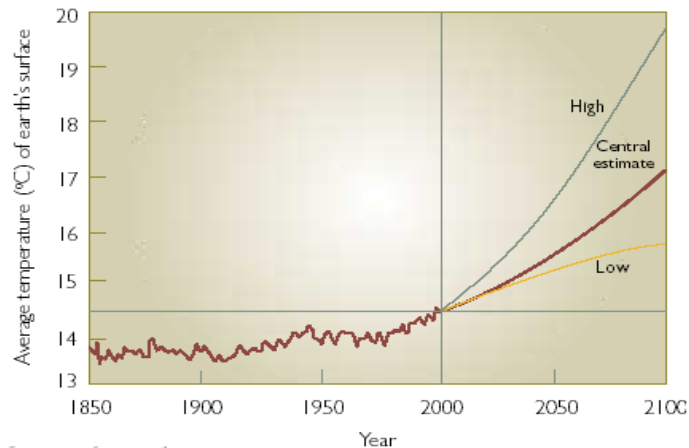


Figure 1.2 Global temperature record, since instrumental recording began in 1860, and projection to 2100, according to the IPCC



Source: reference 1

In 1896 the Sweden scientist, Svante Arrhenius adverted about the effects of global warming caused by CO₂ produced by human activity.

The observations were confirmed later by Thomas Chamberlin

The green house effect

- When animals or plants die the carbon is retained in oceans or land
- This is the way how plants and marine animals died 350 millions ago and formed fossil fuels such as: oil, coal, and natural gas.



The photo "Smoke over roofs" by Nigel Bruce won a special mention in the WHO photo and video contest Images of Health and Disability 2007 Special Theme: Health and Environment. The photo is of roofs in Gatlang, Nepal. Solid fuel use is not only damaging to people's health – it is unsustainable for the

Nigel Bruce



The green house effect



- One third of sun's energy is reflected by the earth
- The remainder is absorbed by lands and oceans
- Atmospheric gases like: water vapor, CO_2 , ozone, methane, and nitrous oxide can absorb sun's energy and can be warmed by it.

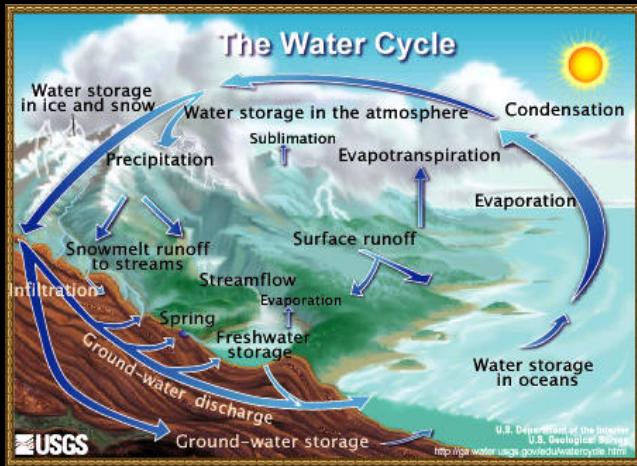
The green house effect



- Industrial revolution by combustion of these fossil fuels, started to release carbon back into the atmosphere.



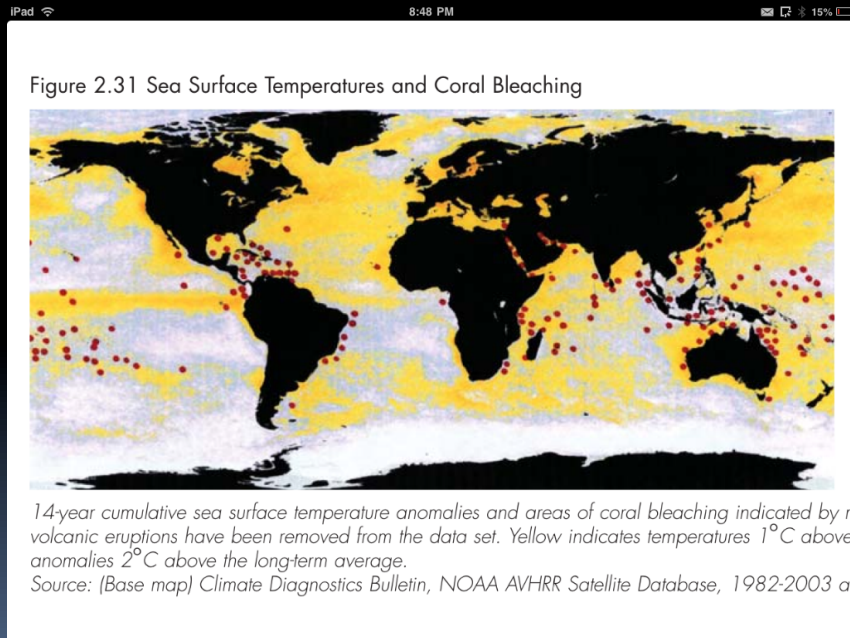
Impact on oceans and ground water



- Higher concentration of salt and algae in oceans
- Sal deposit in ground water
- Low level of river tributaries
- Algae blooms
- Melting of the Greenland ice sheet can change salt concentrations in the ocean water



Impact on Coral bleaching



- Coral bleaching is the damage of the zoozanthellae of the coral reefs area by sunlight because of increase in the temperature
- This phenomenon can be catastrophic especially for the tropical marine ecosystems

CO₂ and climate change



Sources of CO₂

- Deforestation
- Industrialization



Impact of climate change in the global environment

- Global surface temperature could rise between 2 and 4 °C by 2100
- Global sea level could increase between 28-79 cm
- Melting of Greenland ice sheet
- The Atlantic thermohaline circulation
- El Niño southern oscillation
- The Indian summer monsoon
- Amazon rainforest
- Boreal forest

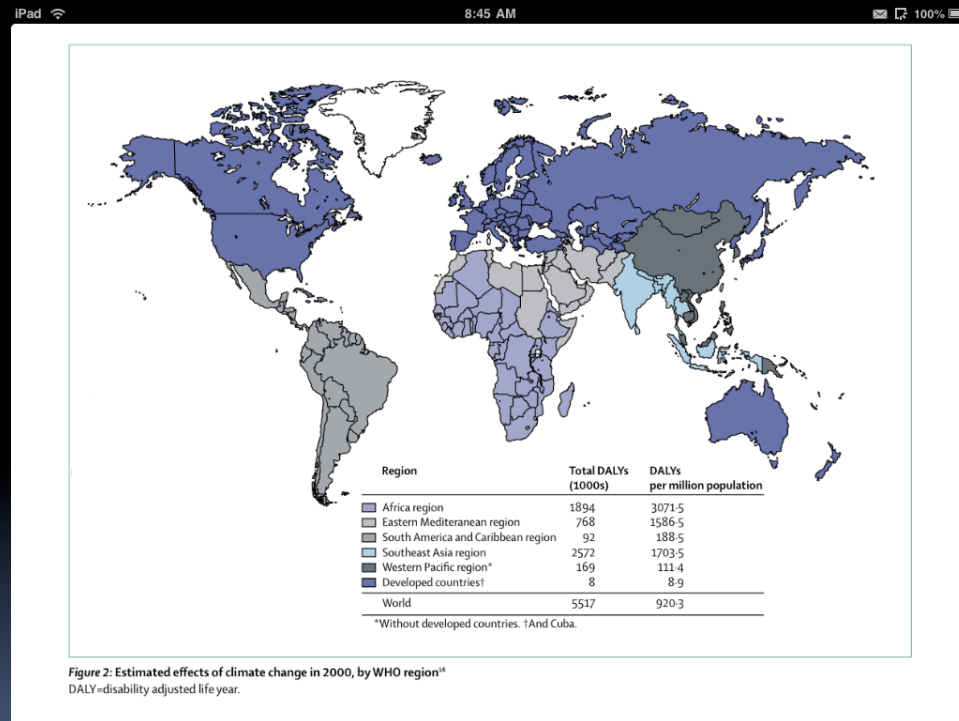




Specific Effects

- Floods
 - Droughts
 - Heatwaves
 - Storms
 - Food supply
 - Water supply
 - Biodiversity
 - Human and animal migration
- 

What level of global warming is safe? In 2005, the United Kingdom recommended that global warming must be limited to 2 oC



Shelter and Human



Global human migration

Migration from rural areas to urban areas

Migration from flooded or arid areas


Migration from overpopulated areas

Migration from low altitudes to high altitudes

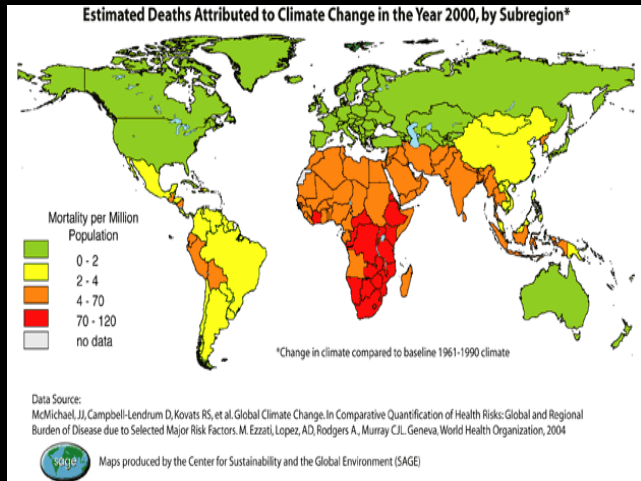
Conflicts between countries may arise



Health Impacts

- Malnutrition
 - Diarrheal Diseases
 - Vector borne diseases
 - Respiratory infections
 - Deaths and disease caused by heat waves, floods, droughts
 - Cardiovascular diseases
 - Allergies
 - Skin diseases caused by UV light
 - Water-borne disease (e.g. schistosomiasis, fascioliasis)
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Impact on Mortality



Most affected:

- People from developing countries
- Children and elderly

Did you know?

262 million people were affected by climate disasters in 2004, more than 98 per cent of them in developing countries



Research of effects of climate change on health

Evidences
and
projections
on health
effects

Adaptation
capacity to a
3-4 °C rise in
temperature



The photo "Slum Dwellers" by Dennis Rito won a special mention in the WHO photo and video contest Images of Health and Disability 2007 Special Theme: Health and Environment. The photo shows children who live under a bridge in Manila in the Philippines. People who live in urban slums and insanitary housing conditions face a high risk diarrhoeal and other infectious diseases, while children are the most vulnerable to these environment-related diseases.



Malnutrition

- Crops, forestry, livestock, fishery will be affected
- Food insecurity
- Chronic under nutrition will increase
- Acute under nutrition will increase



Nimai Chandra Ghosh

The photo "Sleeping on the river bed" by Nimai Chandra Ghosh won a special mention in the WHO photo and video contest Images of Health and Disability 2007 Special Theme: Health and Environment. A boy sleeps on a dried-up river bed in India. Experts believe that climate change is increasing the frequency and severity of droughts.

Water and Sanitation



- Green algae blooms
- Reduce rainfall
- Unsafe water
- Increase in diarrheal diseases
- Increase in water-borne parasite diseases
- Increase in fecal oral transmitted diseases

Water-borne Diseases

iPad 8:53 PM 13%

HARMFUL ALGAL BLOOMS

Figure 2.32 Red Tide




Image: P.J.S. Franks/Scripps Institution of Oceanography

in suppressing the immune system susceptibility to infections and ca study.

Brown tides cause hypoxia and contributing to the over 150 "dead zones" in bays and estuaries around the world (White 2003 UNEP 2005), as well as grass beds, nurseries for shellfish

Mangroves — whose dropped leaves whose roots hide them — are being lost to aquaculture and coastal development also threatened by sea level rise. coral reefs, sea level rise and global warming threaten beaches, roads, homes, water "lenses," nutrition and livelihoods

The 2005 HAB outbreak of *Alexandrium* in New England was associated with a storm in May and two nor'easters in June (spawned by high pressure system

- Algae blooms associated with: cholera, red tide intoxication, diarrheal diseases
- Red tide algae blooms can cause respiratory diseases and skin diseases

Water-borne Diseases



Diarrheal Diseases can increase substantially. Among the gastrointestinal pathogens that may cause epidemic outbreaks:

- V. Cholera
- Salmonella
- Cryptosporidium
- Campylobacter

Water and Sanitation



Boniface Mwangi

The photo "Camel boy" by Boniface Mwangi won third prize in the WHO photo and video contest Images of Health and Disability 2007 Special Theme: Health and Environment. A child eats as he waits for his parents to water the family herd of camels at a watering point in Al-Akaburu, Garish district in Kenya. During water scarcity many nomad families are forced to share their water with their livestock. Many deaths from dysentery and diarrhoea are caused by drinking contaminated water.



Vector-borne Diseases

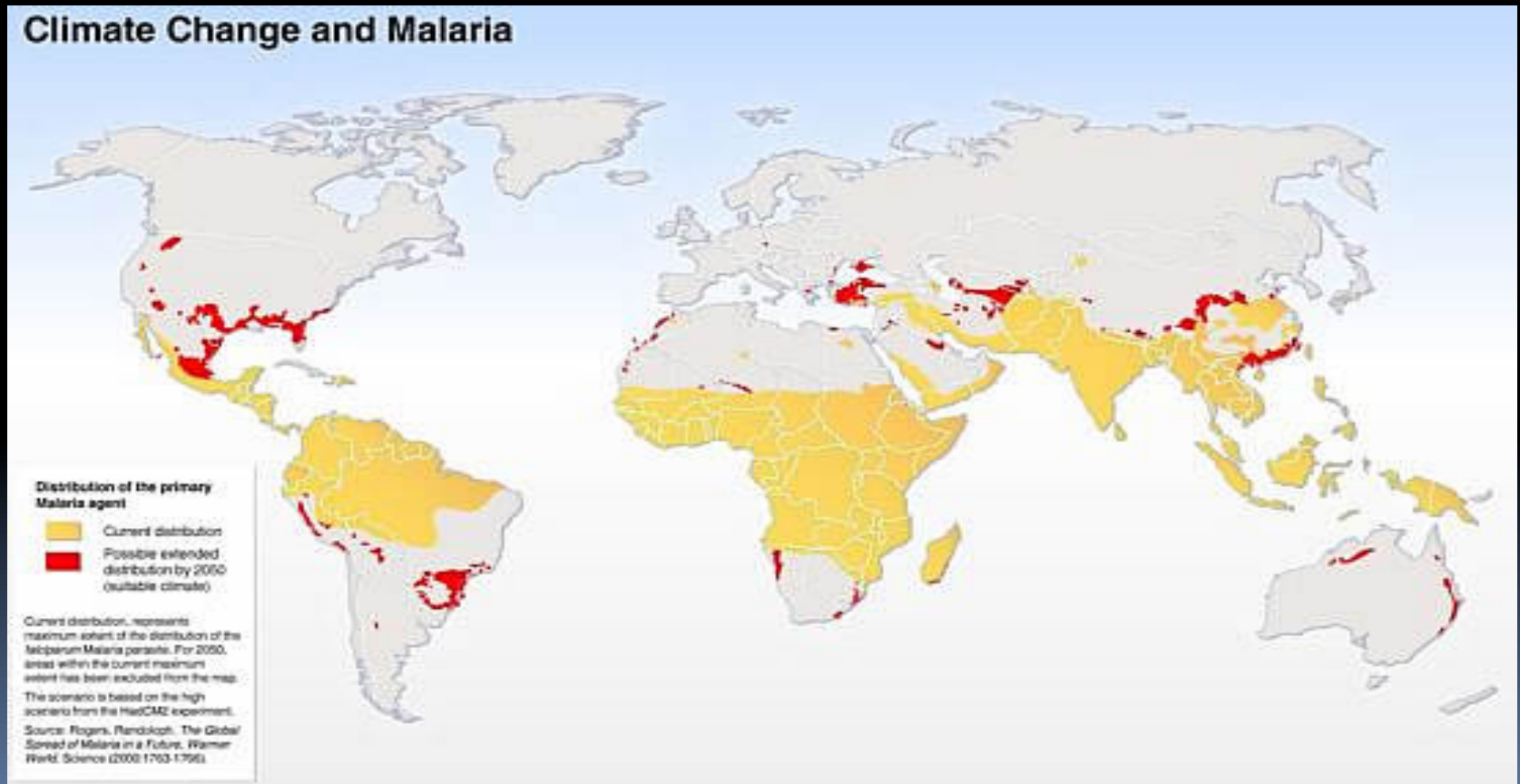


Morbidity and mortality caused by the following diseases will increase:

- Malaria
- Dengue
- Leishmaniasis
- West Nile Virus
- Eastern Equine Encephalitis
- Lyme's disease

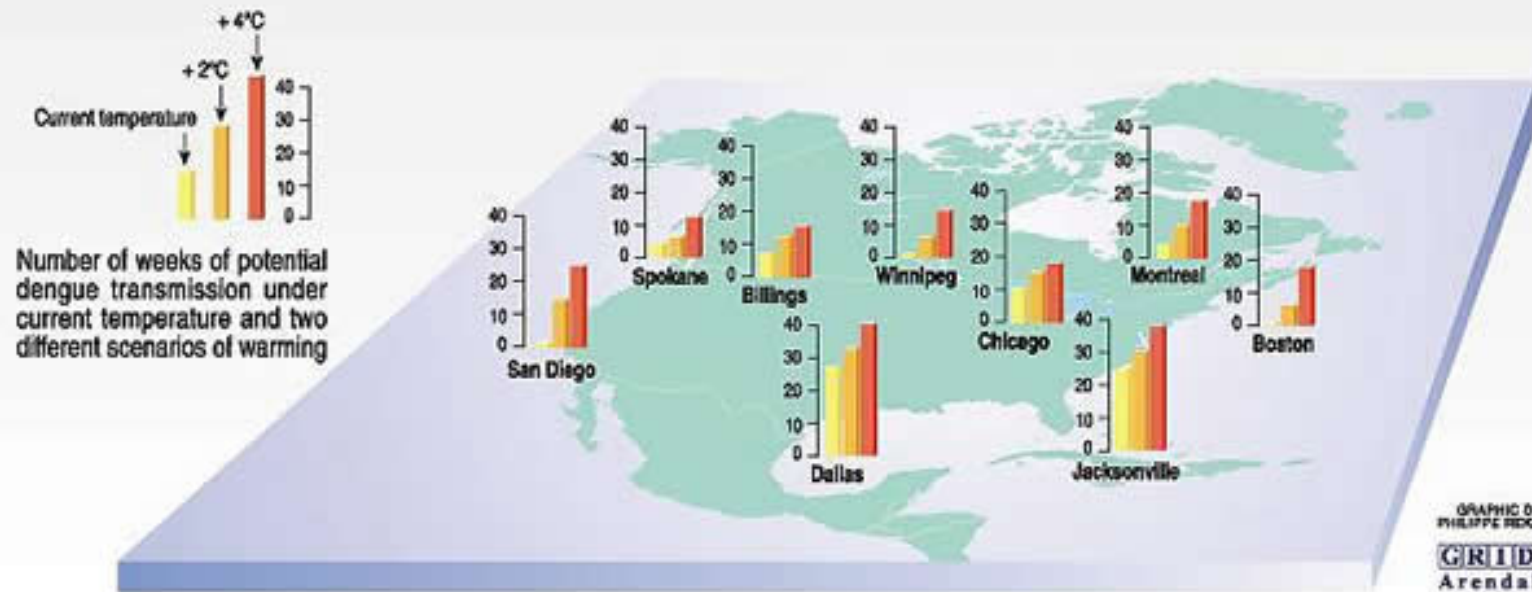


Current malaria endemic areas (yellow) and areas where malaria map will expand (red)



Potential dengue transmission in case of temperature increase in the USA

Potential dengue transmission in case of temperature rise



Source: Fooks et al. 1995, Jekan and Fedor, 1997; "The Regional Impacts of Climate Change", IPCC, 1998.

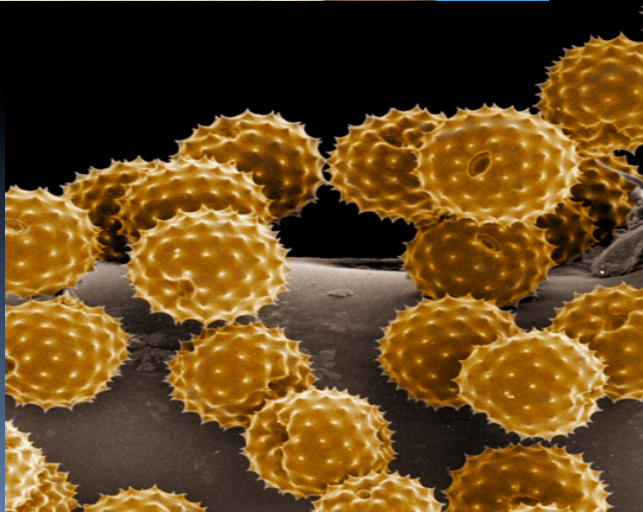
Note: Presence of dengue virus mosquito vector and exposed human populations are required for disease transmission.


Respiratory Allergies




Climate Change will contribute to the increase of

- Respiratory allergies
- Asthma
- Chronic obstructive diseases






Challenges to manage health impact of climate change

- Changing patterns of morbidity and mortality
 - Access to food
 - Water and sanitation
 - Housing and human settlements
 - Population growth and migration
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Responses

- Disease Surveillance
 - Food Security
 - Water and Sanitation
 - Shelter
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Prevention strategies to reduce the impact

- Vector-borne diseases control
- Food security
- Access to safe water and sanitation
- Improved buildings
- Reforestation
- Family planning programs
- Disaster risk assessment



How to reduce the adverse effects of climate change

- Global policies to reduce carbon emission
 - Research should be done to establish causal relationships and associations between climate change and health
 - Interventions to reduce impact of climate change on human's health
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Attenuating the Impact of Adverse Health Effects

- Vector control
- Vaccines
- Bed nets
- Early diagnosis and treatment
- Improve food access
- Improve housing
- Improve access to safe water and sanitation



Thanks