subcommittee on disaster reduction

Maximizing Public Investment:

Disaster Risk Reduction meets Climate Change Adaptation

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U.S. National Institute of Environmental Health Sciences

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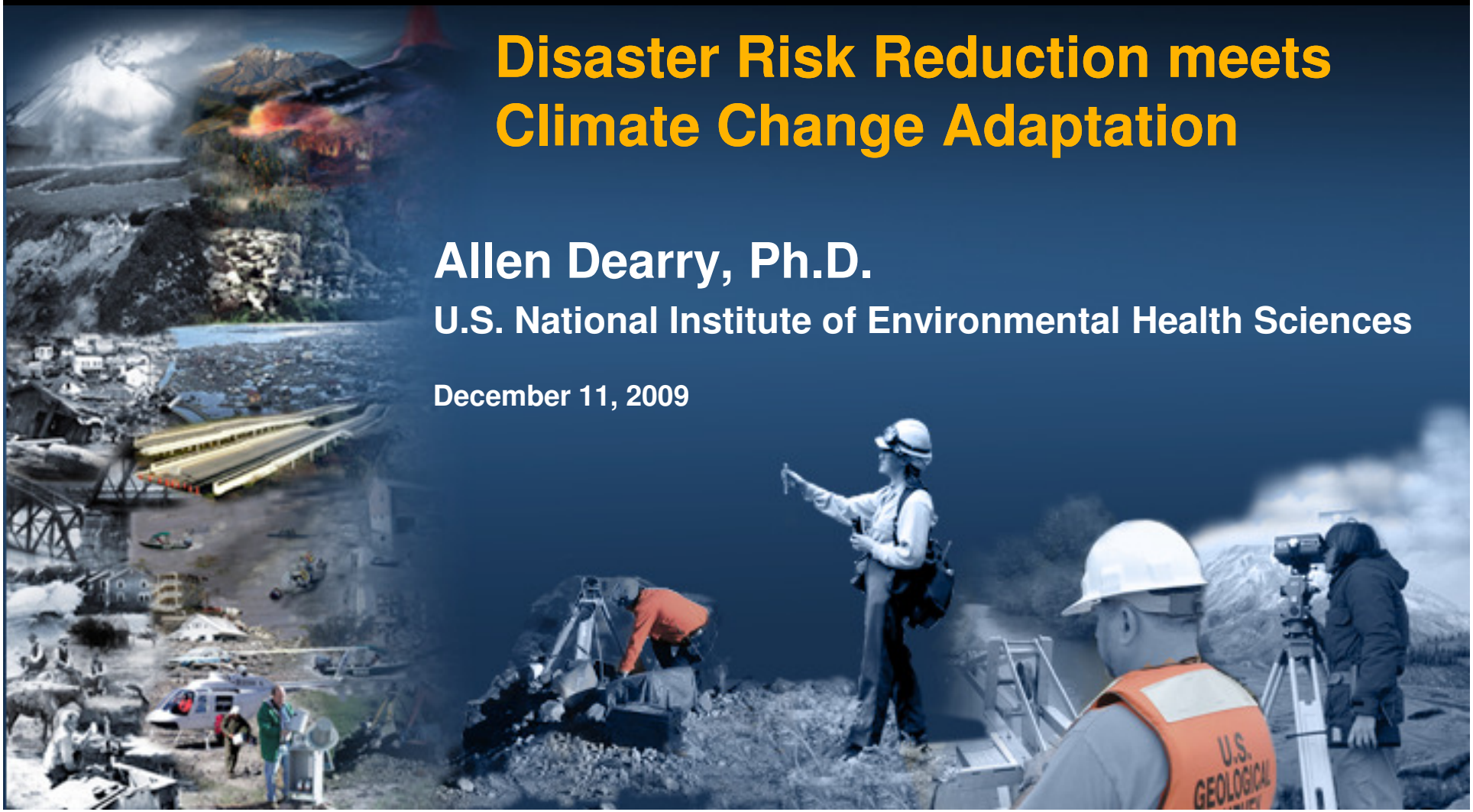

Overview

- Subcommittee on Disaster Risk Reduction (SDR)
- Disaster risk reduction and climate change
- International cooperation
- "Grand Challenges for Disaster Reduction"
- Climate change and health
  - Potential health effects
  - Cobenefits
  - Adaptation

U.S. National Science & Technology Council Subcommittee on Disaster Reduction

- SDR is an element of the President's National Science & Technology Council, charged with establishing clear national goals for Federal science and technology investments in disaster reduction.
- Promotes interagency cooperation for natural and technological hazards and disaster planning.
- Facilitates interagency approaches to identification and assessment of risk, and to disaster reduction.
- Advises the Administration about relevant resources and the work of SDR member agencies.
- Serves as the US national platform for UN International Strategy for Disaster Reduction

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sdr subcommittee on disaster reduction

National Science & Technology Council
Subcommittee on Disaster Reduction

- Centers for Disease Control and Prevention
- Department of Defense
- Department of Energy
- Department of Homeland Security
- Department of Housing & Urban Development
- Department of the Interior
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- U.S. Coast Guard
- U.S. Department of Agriculture
- U.S. Forest Service
- U.S. Geological Survey
- U.S. Public Health Commissioned Corps

Disaster Risk Reduction and Climate Change

- Over the past 30 years, disasters kill fewer people but affect more.
- Climate change expected to increase threat from weather hazards.
- $1 invested in reducing disasters in developing countries estimated to save $7 in losses (UNFCCC).
- Poverty, political instability, and environmental degradation increase vulnerability to disasters.
- Children, women, and older people also face higher risk.

Sahena Begum makes a portable clay oven, which can be easily stored in a high place away from flood waters, Kunderpara village, Bangladesh. OXFAM/Amin

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Projected Changes during the 21st Century in Extreme Climate Phenomena and their Likelihood

Simple Extremes

Higher maximum temperatures; more hot days and heat waves† over nearly all land areas (very likely‡)

Higher (increasing) minimum temperatures; fewer cold days, frost days, and cold waves† over nearly all land areas (very likely‡)

More intense precipitation events (very likely‡ over many areas)

Complex Extremes

Increased summer drying over most mid-latitude continental interiors and associated risk of drought (likely‡)

Increase in tropical cyclone peak wind intensities, mean and peak precipitation intensities (likely‡ over some areas)§

Intensified droughts and floods associated with El Niño events in many different regions (likely‡)

Increased Asian summer monsoon precipitation variability (likely‡)

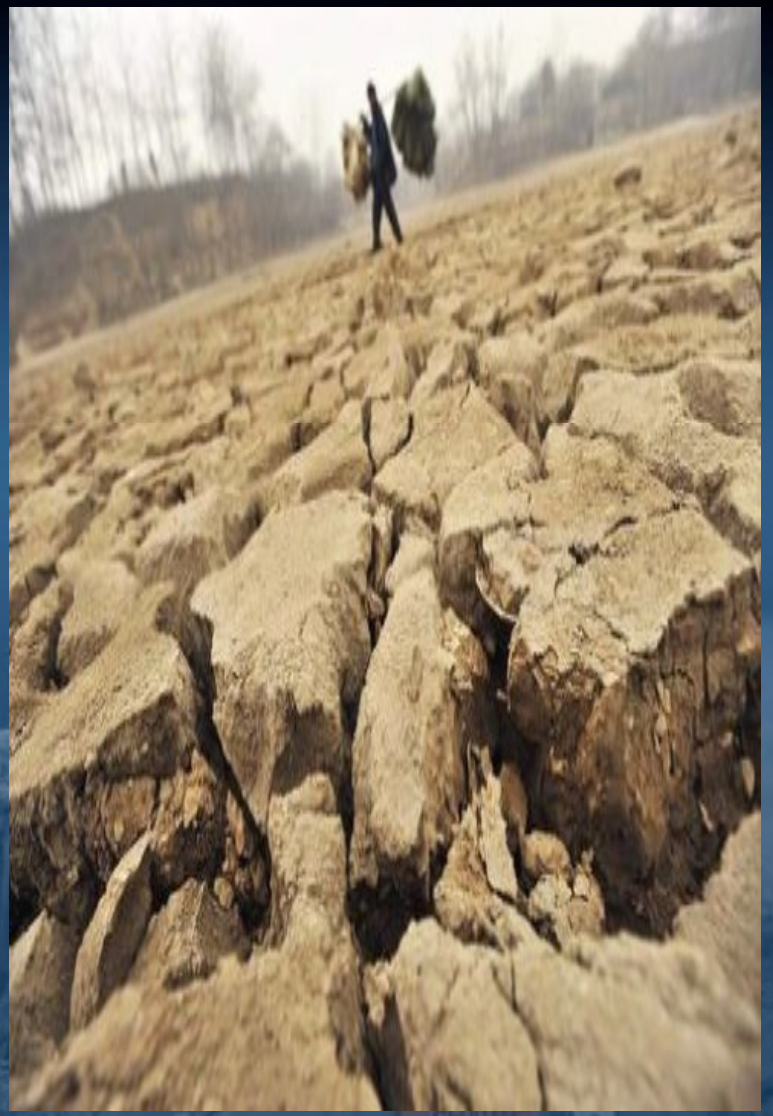
Increased intensity of mid-latitude storms (little agreement between current models)†

*Adapted with permission from Houghton et al.[1] Likelihood refers to judgmental estimates of confidence used by the Intergovernmental Panel on Climate Change (IPCC) Working Group 1 in its Third Assessment Report.

†Information from the IPCC Working Group 1, Technical Summary.[1]

‡Summary for policy makers: very likely (90%-99% chance); likely (66%-89% chance).

§Changes in regional distribution of tropical cyclones are possible but have not been established.



Who's at Risk?

- When natural disasters strike, some people are more vulnerable than others.
- 98 % of people killed or affected by natural disasters live in developing countries.
- By 2025, more than 50 % of people in developing countries will be vulnerable to extreme-weather hazards like floods and storms (IFRC).
- Vulnerability can be associated with physical, social, economic, political and environmental factors.

On the Bangladeshi island of Hatiya in the Bay of Bengal, many homes and farms are lost each year to erosion.

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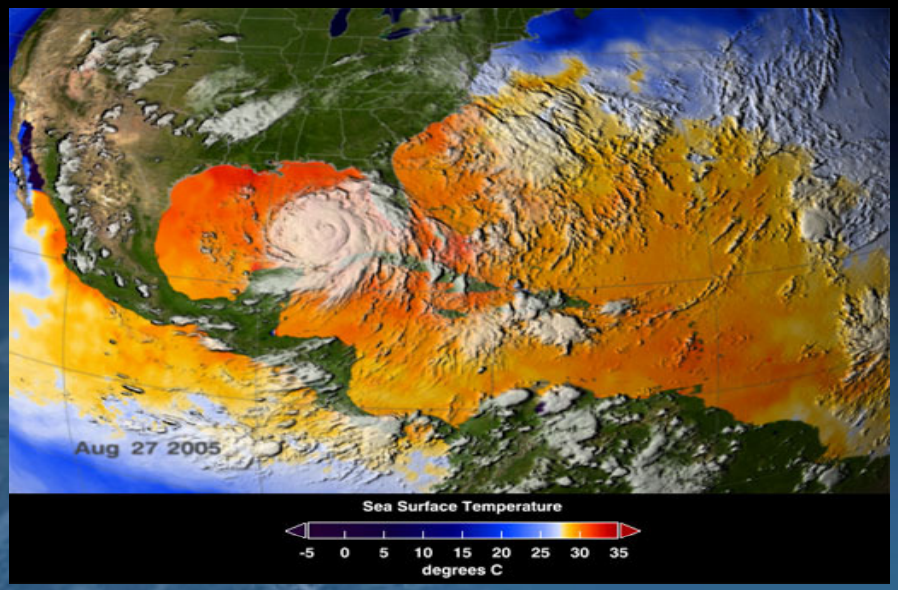
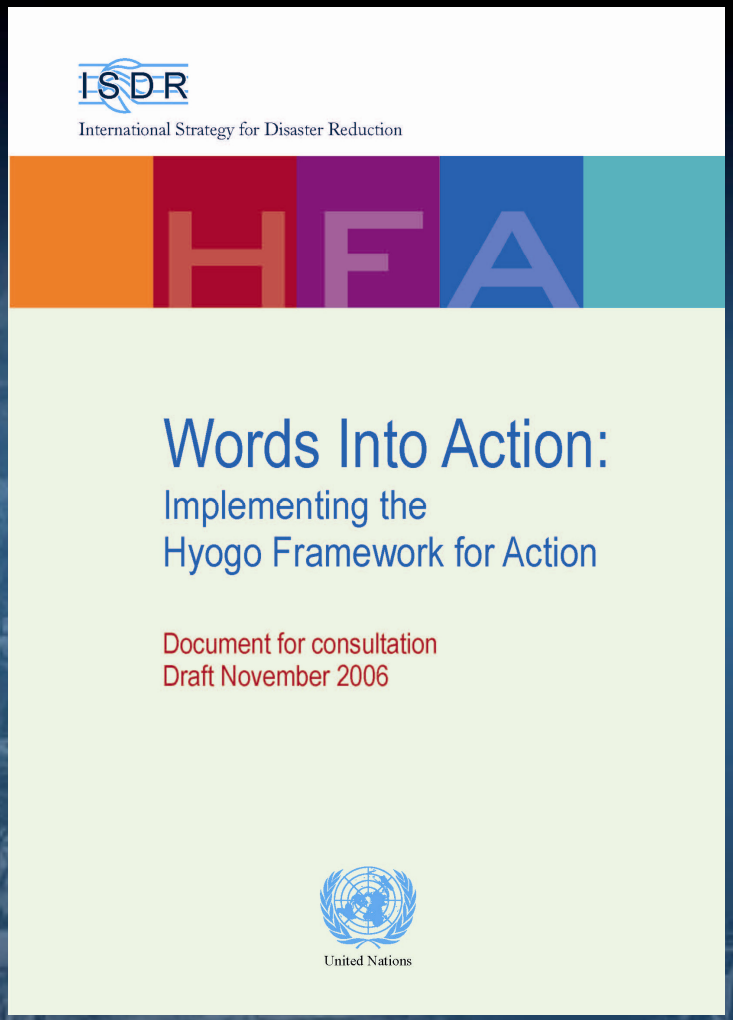
Hurricane Katrina and Vulnerable Populations



- In 2005, Katrina caused 1500 deaths along the US Gulf Coast.
- Complicated by catastrophic failure of the levee system.
- Resource availability, e.g., transportation.
- Socioeconomic status.
- 45% of victims were ≥ 75 YOA.
- Chronic illness was the most commonly reported health problem.
  - Preexisting cardiovascular disease.
  - Exacerbated and new respiratory disease.
  - 100,000 diabetic evacuees.
  - Negative effect on reproductive outcomes among pregnant women.
  - Psychological stress.

The Hyogo Framework for Action, 2005

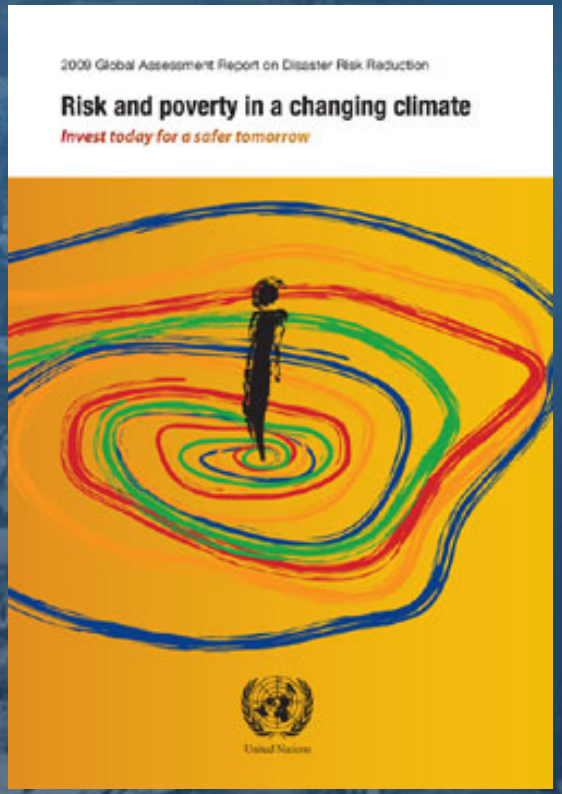


1. Ensure that disaster risk reduction is a national and local priority.
2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels.

Global Assessment Report on Disaster Reduction, 2009

UN International Strategy for Disaster Reduction Secretariat

Risk and poverty in a changing climate



- Floods, droughts, storms, earthquakes, fires and other events, when combined with 'risk drivers' such as increasing urbanization, poor urban governance, vulnerable rural livelihoods and decline of ecosystems, can lead to massive human misery and crippling economic losses.

- While we cannot prevent natural phenomena such as earthquakes and cyclones, we can limit their impacts. The scale of any disaster is linked closely to past decisions taken by citizens and governments – or the absence of such decisions. **Pre-emptive risk reduction is the key. Sound response mechanisms after the event, however effective, are never enough.**

Global Platform for Disaster Risk Reduction, 2009

- Urgent action is required to harmonise and link the frameworks and policies for disaster risk reduction and climate change adaptation, and to do so within the broader context of poverty reduction and sustainable development.
- Disaster risk reduction must be a concrete part of the deal on climate change that is sealed at the United Nations Climate Conference in Copenhagen in December 2009.
- Addressing the underlying drivers of disaster risk therefore offers the potential for a **triple win** – for adaptation, disaster risk reduction and poverty reduction.

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Disaster risk reduction needs to inform climate adaptation strategies

In the slums of Phnom Penh, Cambodia, locals face regular flooding.

"Given the relationships between climate change and extreme events, the community of researchers, engineers and other experts who work on reducing risks from natural and human-caused disasters will have an important role to play in framing climate change adaptation strategies and in providing information to support decision-making during implementation."

-- US Presidential science advisor John Holdren

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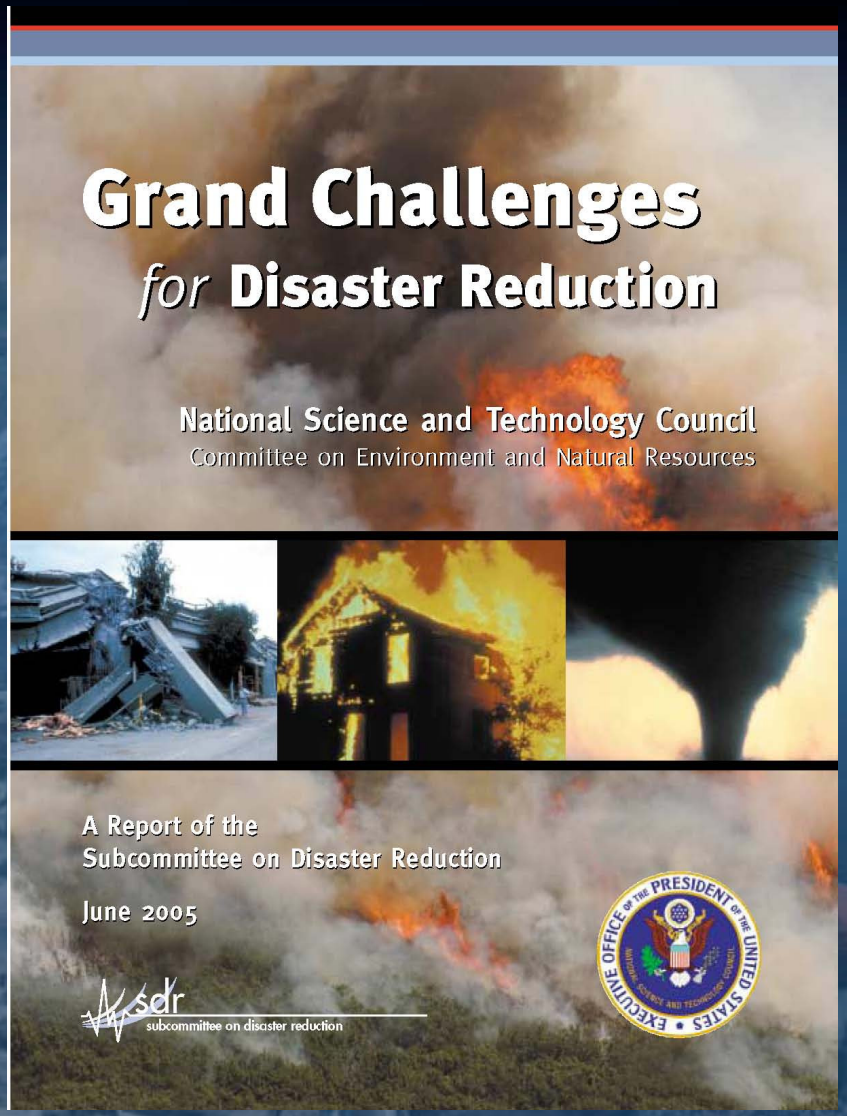
Framing the Grand Challenges for Disaster Reduction

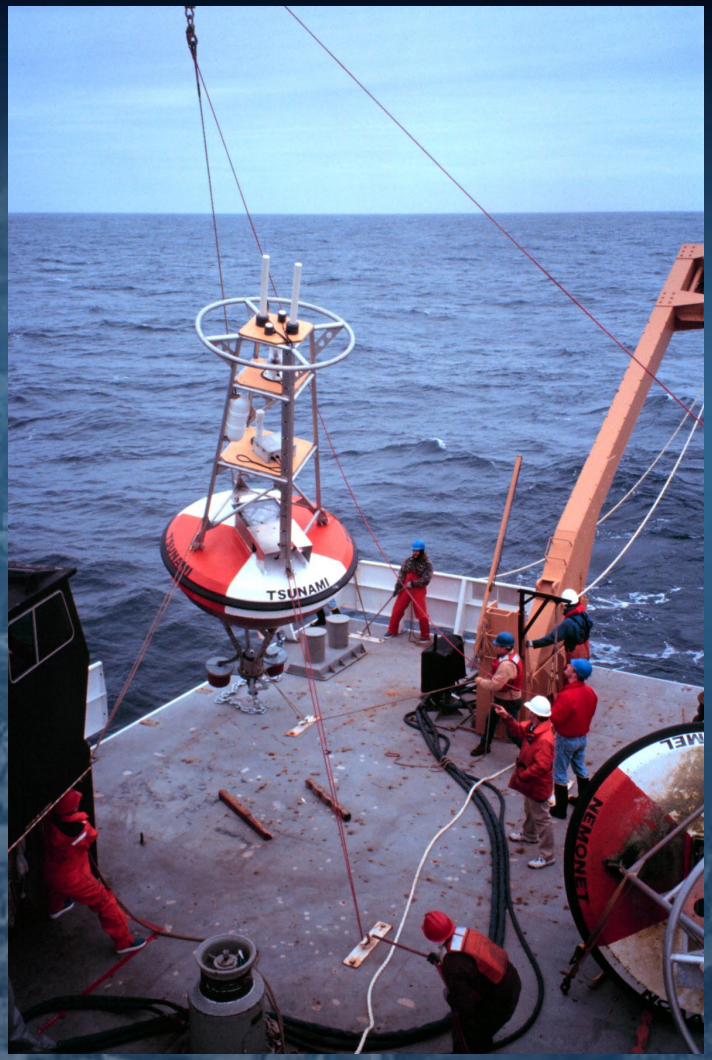
Objective: Enhance disaster resilience by composing a ten-year agenda for science and technology activities that will produce a dramatic reduction in the loss of life and property from natural and technological disasters.

Grand Challenges for Disaster Reduction



1. Provide hazard and disaster information where and when it is needed.
2. Understand the natural processes that produce hazards.
3. Develop hazard mitigation strategies and technologies.
4. Recognize and reduce vulnerability of interdependent critical infrastructure.
5. Assess disaster resilience using standard methods.
6. Promote risk-wise behavior.

Grand Challenge 1. Provide hazard and disaster information where and when it is needed.



- "To identify and anticipate the hazards that threaten communities, a mechanism for real-time data collection and interpretation must be readily available to and usable by scientists, emergency managers, first responders, citizens, and policy makers.
- Developing and improving observation tools is essential to provide pertinent, comprehensive, and timely information for planning and response."

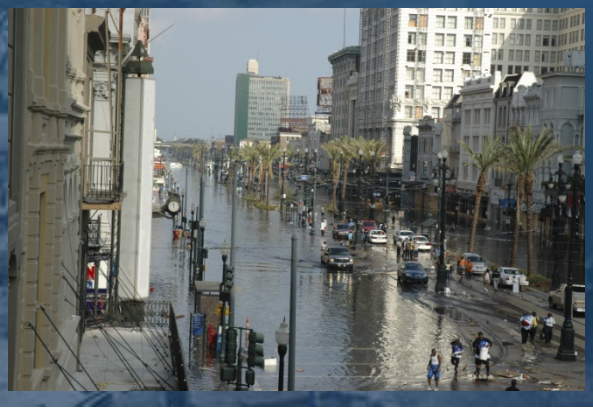
Warn the right people in the right place at the right time.

Grand Challenge 2. Understand the natural processes that produce hazards.

"Continuous and useful information about the hazard must be available to everyone affected."

- "To improve forecasting and predictions, scientists and engineers must continue to pursue basic research on the natural processes that produce hazards and understand how and when natural processes become hazardous.
- New data must be collected and incorporated into advanced and validated models that support an improved understanding of underlying natural system processes and enhance assessment of the impacts."

Grand Challenge 3. Develop hazard mitigation strategies and technologies.



- "To prevent or reduce damage from natural hazards, scientists must invent – and communities must implement – affordable and effective hazard mitigation strategies, including land-use planning and zoning laws that recognize the risks of natural hazards.
- Technologies such as disaster-resilient design and materials and smart structures that respond to changing conditions must be used for development in hazardous areas."

"By designing and building structures and infrastructures that are inherently hazard resilient, communities can greatly reduce their vulnerability."

Grand Challenge 4. Recognize and reduce vulnerability of interdependent critical infrastructure.

- "Protecting critical infrastructure systems, or lifelines, is essential to developing disaster-resilient communities.
- Scientists and communities must identify and address the interdependencies of these lifelines at a systems level (e.g., communications, electricity, financial, gas, sewage, transportation, and water)."

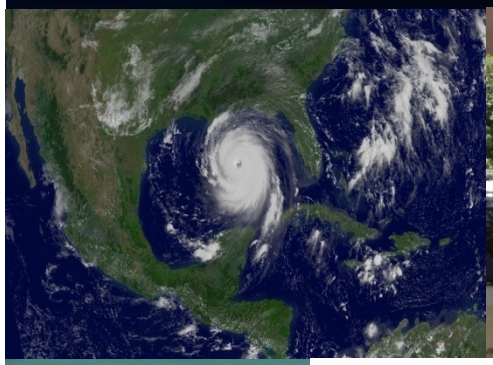
"Protecting critical infrastructure provides a solid foundation from which the community can respond to hazards rapidly and effectively."

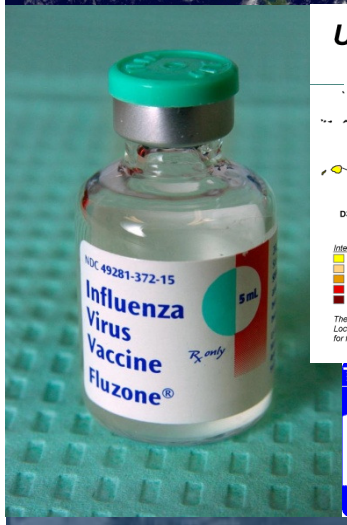
Grand Challenge 5. Assess disaster resilience using standard methods

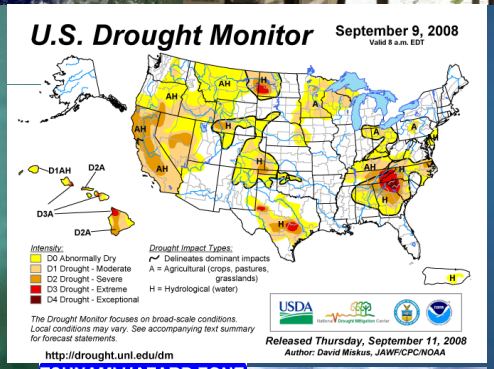
- "Federal agencies must work with universities, local governments, and the private sector to identify effective standards and metrics for assessing disaster resilience.
- With consistent factors and regularly updated metrics, communities will be able to maintain report cards that accurately assess the community's level of disaster resilience."

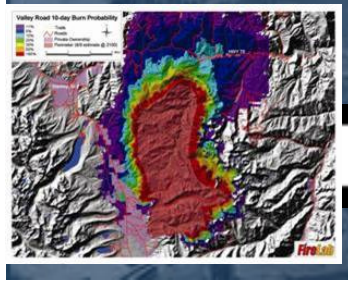
"Learn from each hazard event…to support ongoing hazard research and future mitigation plans."

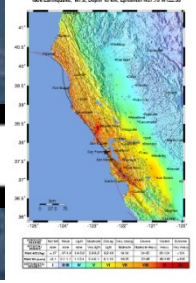
Grand Challenge 6: Promote risk-wise behavior







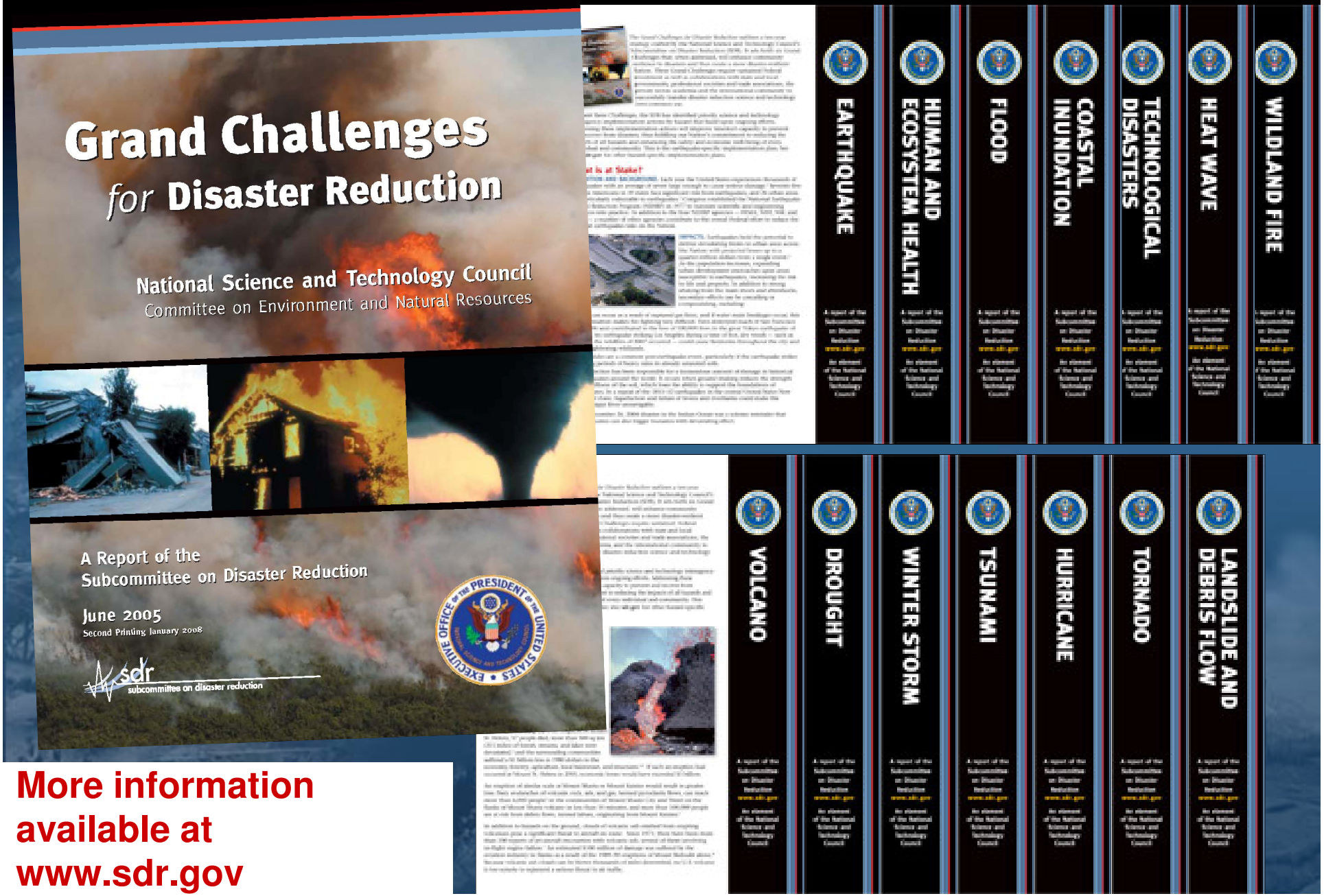




- "Develop and apply principles of economics and human behavior to enhance communications, trust, and understanding within the community to promote 'risk-wise' behavior.
- Hazard information (e.g., forecasts and warnings) must be communicated to a population that understands and trusts messages. The at-risk population must then respond appropriately to the information."

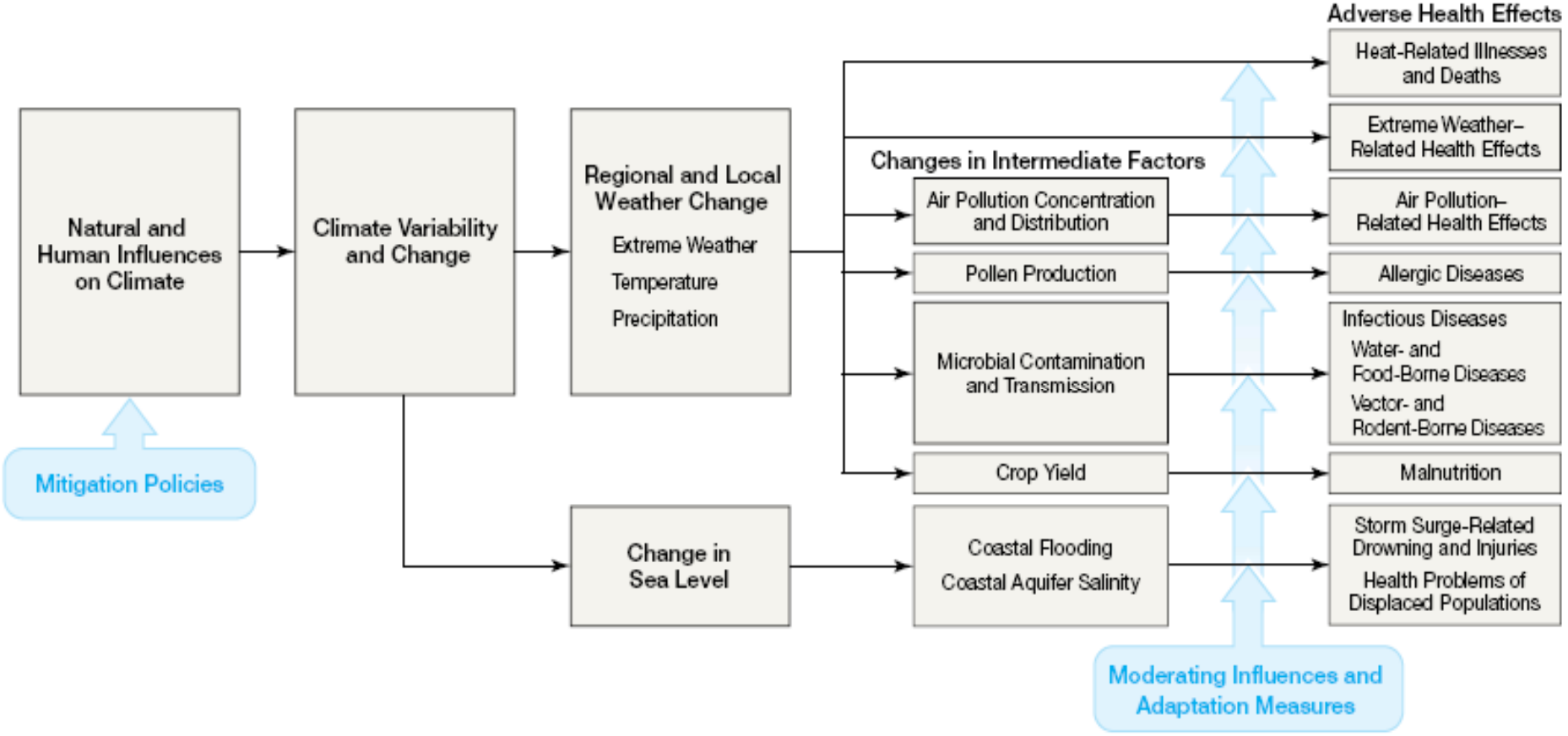
"This is an ongoing challenge that can only be met by effectively leveraging the findings from social science research."

Implementation plans, 2008



More information available at www.sdr.gov

Potential Health Effects of Climate Variability and Change

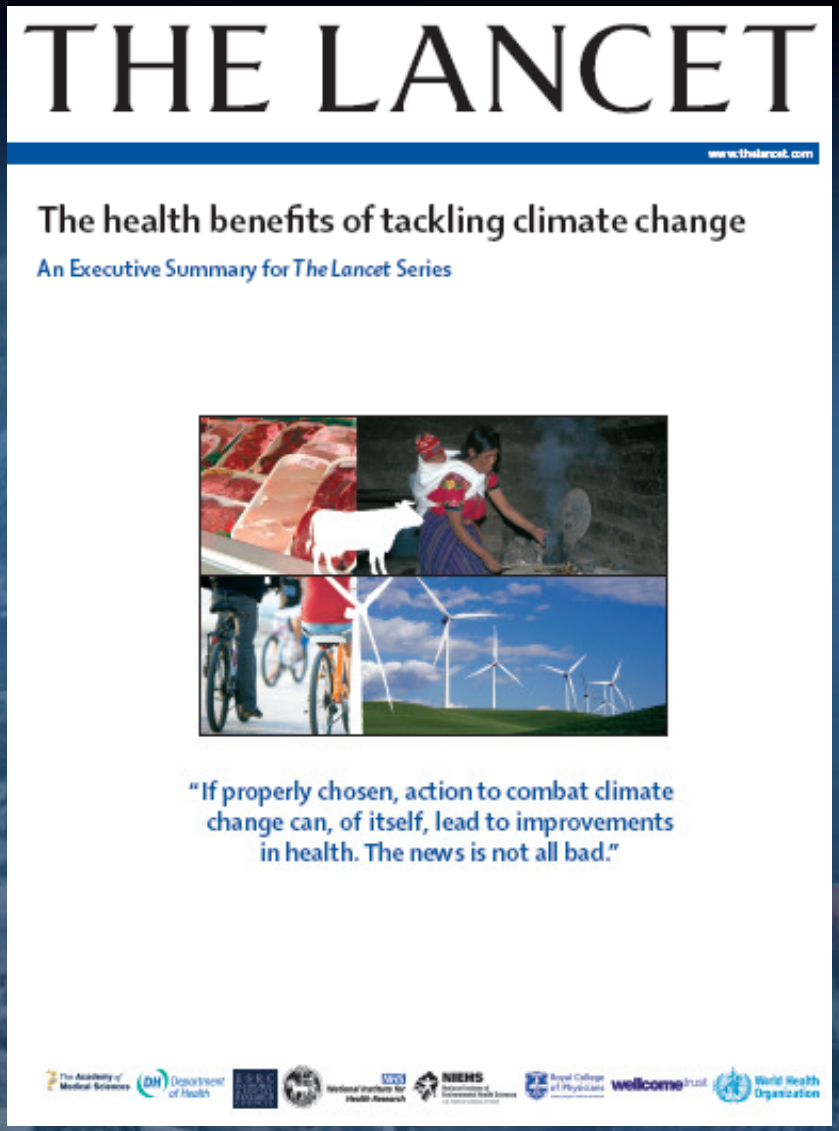


Mitigation Policies for Reduction of Greenhouse Gas Emissions
- Energy Efficiency
- Use of Renewable Energy Sources
- Forest Preservation

Moderating Influences
- Population Density and Growth
- Level of Technological Development
- Standard of Living and Local Environmental Condition
- Preexisting Health Status
- Quality and Access to Health Care
- Public Health Infrastructure

Adaptation Measures
- Vaccination Programs
- Disease Surveillance
- Protective Technologies
- Weather Forecasting and Warning Systems
- Emergency Management and Disaster Preparedness
- Public Health Education and Prevention
- Legislation and Administration

Health Benefits of Tackling Climate Change



- Examine potential health effects (or "cobenefits") of mitigation strategies.
  - Household energy use
  - Urban land transport
  - Electricity generation
  - Food and agriculture
  - Short-lived greenhouse pollutants
- Measures to restrict our output of greenhouse gases may also result in benefits to public health.
- These cobenefits will offset at least some of the costs of climate change mitigation, and should be taken into account in international negotiations.
- Cobenefits to health arising from action on climate change are not widely appreciated.

Household Energy Emissions

- In the UK, improvements in household energy efficiency could have net benefits for health, mainly through improved indoor temperature and air quality.
- In low-income countries, the products of incomplete combustion in traditional solid fuel stoves create heart and respiratory problems.
- Low-emission stove technology for burning local biomass fuels in poor countries could, over time, avert millions of premature deaths, and constitute one of the strongest and most cost-effective climate–health linkages.

Urban Land Transport

- Transport-related greenhouse-gas emissions are increasing, especially in countries of low and middle income.
- Meeting targets to reduce greenhouse-gas emissions will require more walking and cycling and less motor vehicle use, which will bring substantial health benefits, including reduced cardiovascular disease, depression, diabetes, and dementia.
- Reducing motor vehicle use would decrease injury risk for existing pedestrians and cyclists.

Low-Carbon Electricity Generation

- Changing methods of electricity generation to reduce CO_2 emissions would reduce particulate air pollution and deaths. The effect would be greatest in India and lowest in the EU.
- The cost of these changes would be significantly offset by reduced costs of death from pollution, especially in China and India.

Agriculture and Food

- The food and agriculture sector contributes 10–12% of total global greenhouse-gas emissions, with additional contributions from land use change.
- Demand for animal source foods is increasing.
- Decreasing greenhouse-gas emissions will depend on reducing the production of food from livestock and on technological improvements in farming.
- Reduction in consumption of animal source foods could benefit cardiovascular health.

Short-Lived Greenhouse Pollutants

- Pollutants include sulphate, black carbon, carbon monoxide, volatile organic compounds, and other gases responsible for ozone creation, such as methane and nitrogen oxides.
- Combination of sulphate and black carbon is a risk factor for cardiovascular mortality. Ozone may also increase morbidity and mortality. Reduction of atmospheric concentrations of all three will benefit health.
- Because of their short lifetimes in the atmosphere, reducing emissions of black carbon and ozone precursors offers almost immediate benefits.

Adaptation Strategies for Moderating Impacts of Climate Change on Human Health

Climate Event	Examples of Possible Impacts on Health	Likelihood of Impacts Given Climate Event Occurs	Potential Adaptation Strategies
More heat waves and extreme high temperatures	Heat stress/stroke. Uncertain impacts on mortality	Very likely in Midwest and northeast urban centers	Early watch and warning systems and installation of cooling systems in buildings
Changes in precipitation, especially extreme precipitation	contaminated water and food supplies with associated gastrointestinal illnesses including salmonella and giardia	Likely in areas with out-dated or over-subscribed water treatment plams	Improve insfrastructure to guard against combined sewer overflow; public health response to include "boil water" advisories
Hurricane and storm surge	Injuries from flying debris and drowning / exposure to contaminated flood waters and to mold and mildew / exposure to carbon monoxide poisoning from portable generators	Likely in coastal zones of the southeast Atlantic and the Gulf Coast	Increase knowledge and awareness of vulnerability to climate change; public health advisories in immediate aftermath of storm; coordinate storm relief efforts to insure that people receive necessary information for safeguarding their health
Temperature-related effects on ozone	Ozone concentrations more likely to increase than decrease; possible contribution to cardiovascular and pulmonary illnesses, including exacerbation of asthma and chronic obstructive pulmonary disorder (COPD) if current regulatory standards are not attained	Likely in urban centers in the mid-Atlantic and the northeast	Public warning via air quality action days; encourage public transit, walking and bicycling to decrease emissions
Wildfires	Degraded air quality, contributing to asthma and COPD aggravated	Likely in California, the Intermountain West, the southwest and the southeast	Public health air quality advisories

In a more disaster-resilient world…

- Relevant hazards are recognized and understood.
- Communities at risk know when a hazard event is imminent.
- Property losses and lives at risk in future natural hazard events are minimized.
- Disaster-resilient communities experience minimum disruption to life and economy after a hazard event has passed.

NIEHS

More Information

www.sdr.gov

www.preventionweb.net

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