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Chairman, Intergovernmental  
Panel on Climate Change

**ISAP 2014**  
**Accelerating Low Carbon, Resilient and Inclusive  
Development in the Region: Implications of the  
IPCC AR5 for Asia**  
**R. K. Pachauri**  
23 July 2014, Japan



*“Sustainable development is  
development that meets the needs of  
the present without compromising the  
ability of future generations to meet  
their own needs.”*

## Working Group I: The Physical Science Basis

Human influence of the climate system is clear

- 95% certainty that human influence has been the dominant cause of the observed warming since the mid-20th century
- Since the 1950s, many of the observed changes are unprecedented over decades to millennia.
- Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes

Source : IPCC AR5

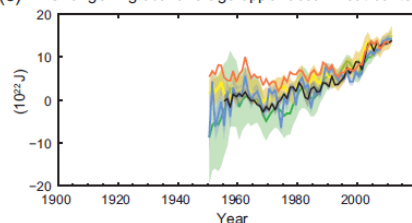
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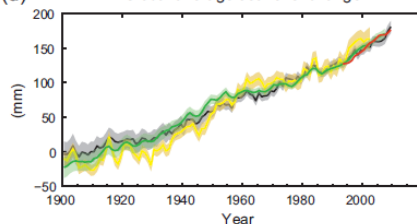
## Observed changes in the climate system

Climate change is unequivocal

(c) Change in global average upper ocean heat content



(d) Global average sea level change



- The oceans have warmed and risen
- The amounts of snow and ice have diminished
- Sea level has risen
- The concentrations of greenhouse gases have increased

Source : IPCC AR5

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## Observed changes in Asia

Warming trends and increasing temperature extremes have been observed across most of the Asian region over the past century.



- Increasing numbers of warm days and decreasing numbers of cold days
- Warming trend continuing into the new millennium
- Precipitation trends including extremes are characterized by strong variability
- Increasing and decreasing precipitation trends in different parts and seasons of Asia
- Widespread damage to coral reefs linked with episodes of high sea-surface temperature in recent decades

Source : IPCC AR5

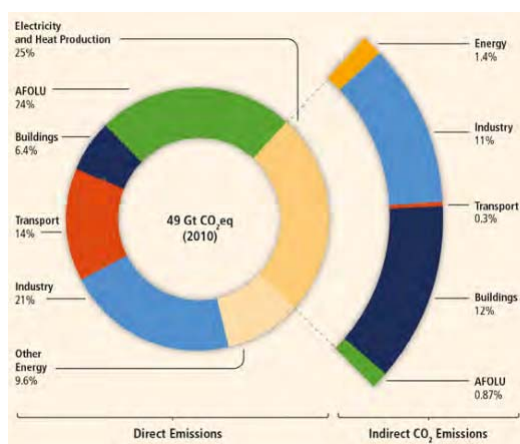
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## Trends in GHGs and their drivers

Total anthropogenic GHG emissions were the highest in human history from 2000 to 2010

Greenhouse gas emissions by economic sectors



- Globally, economic and population growth continue to be the most important drivers of increases in CO<sub>2</sub> emissions from fossil fuel combustions

- These are expected to continue to drive emissions growth without additional efforts to reduce GHG emissions.

Source : IPCC AR5

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## Extreme events during and by the end of the 21<sup>st</sup> Century

- It is very likely that the length, frequency, and/or intensity of warm spells or heat waves will increase over most land areas
- Under some scenarios, a 1-in-20 year hottest day is *likely* to become a 1-in-2 year event in most regions
- It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase over many areas of the globe

Source : IPCC SREX

## Future risks of climate change in Asia



- Water scarcity is expected to be a major challenge due to increased water demand and lack of good management
- Higher temperatures can lead to lower rice yields. A number of regions are already near the heat stress limits for rice.
- Sea level rise will inundate low lying areas and especially affect rice growing regions.
- Coastal and marine systems are under increasing stress from climatic and non-climatic drivers
- Damage to coral reefs will increase during the 21st century as a result of ocean warming and acidification.

Source : IPCC AR5

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## Future risks of climate change in Asia



- Adverse effects on the sustainable development capabilities of most Asian developing countries by aggravating pressures on natural resources and the environment.
- Increasing impact of extreme events on human health, security, livelihoods, and poverty, with the type and magnitude of impact varying across Asia.

Source : IPCC AR5

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## Implications for sustainable development

Limits to resilience are faced when thresholds or tipping points associated with social and/or natural systems are exceeded, posing severe challenges for adaptation.



- The interactions among climate change mitigation, adaptation, and disaster risk management may have a major influence on resilient and sustainable pathways.
- Interactions between the goals of mitigation and adaptation will play out locally, but have global consequences.

Source : IPCC SREX

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## Adaptation and Mitigation

IPCC Fifth Assessment Report



*“Climate-resilient pathways combine adaptation and mitigation to reduce climate change and its impacts. Since mitigation reduces the rate and magnitude of warming, it also increases the time available for adaptation to a particular level of climate change, potentially by several decades.”*

Source : IPCC AR5

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**EFFECTIVE CLIMATE  
CHANGE ADAPTATION**  
A MORE VIBRANT WORLD

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## There are strategies that can help manage disaster risk now and also help improve people's livelihoods and well-being

The most effective strategies offer development benefits in the relatively near term and reduce vulnerability over the longer term



Source : IPCC SREX

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## Effective risk management and adaptation are tailored to local and regional needs and circumstances

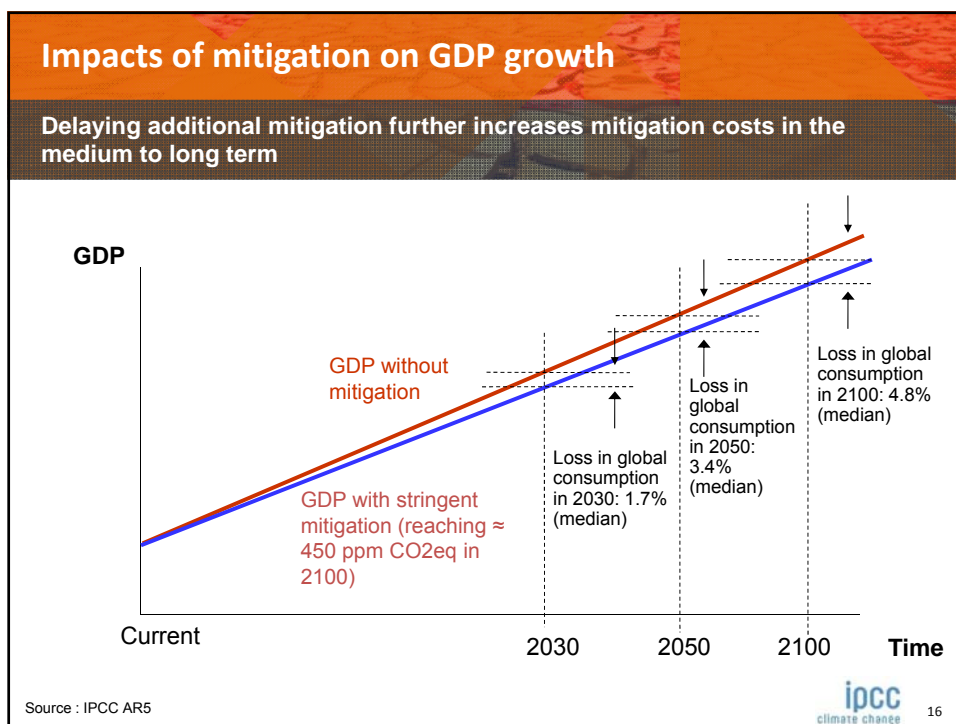


- Changes in climate extremes vary across regions
- Each region has unique vulnerabilities and exposure to hazards
- Effective risk management and adaptation address the factors contributing to exposure and vulnerability

Source : IPCC SREX

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## Stringent mitigation scenarios

Characteristics of scenarios reaching levels of about 450 ppm CO<sub>2</sub>eq by 2100 (likely chance to keep temperature change below 2°C relative to preindustrial levels):

- Lower global GHGs in 2050 than in 2010 (40% to 70% lower globally)
- Emissions levels near zero GtCO<sub>2</sub>eq or below in 2100
- More rapid improvements in energy efficiency
- A tripling to nearly a quadrupling of the share of zero- and low-carbon energy supply from renewables by 2050
- Nuclear energy, biomass and fossil energy with CCS, and BECCS by the year 2050

Source : IPCC AR5

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## CDR technologies



Many scenarios reaching 450, 500 and 550 ppm CO<sub>2</sub>eq by 2100

Require availability and widespread deployment of BECCS and afforestation post 2050

But the availability and scale of these and other CDR technologies are uncertain and associated with challenges and risks.

Source : IPCC AR5

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## Co-benefits and adverse side effects

The intersections of mitigation and adaptation with other societal goals, if well managed, can strengthen the basis for undertaking climate action:



- Improved energy efficiency and security
- Cleaner energy sources
- Air quality and human health
- Reduced energy and water consumption in urban areas
- Sustainable agriculture and forestry
- Protection of ecosystems for carbon storage

Source : IPCC AR5

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## Climate change and sustainable development

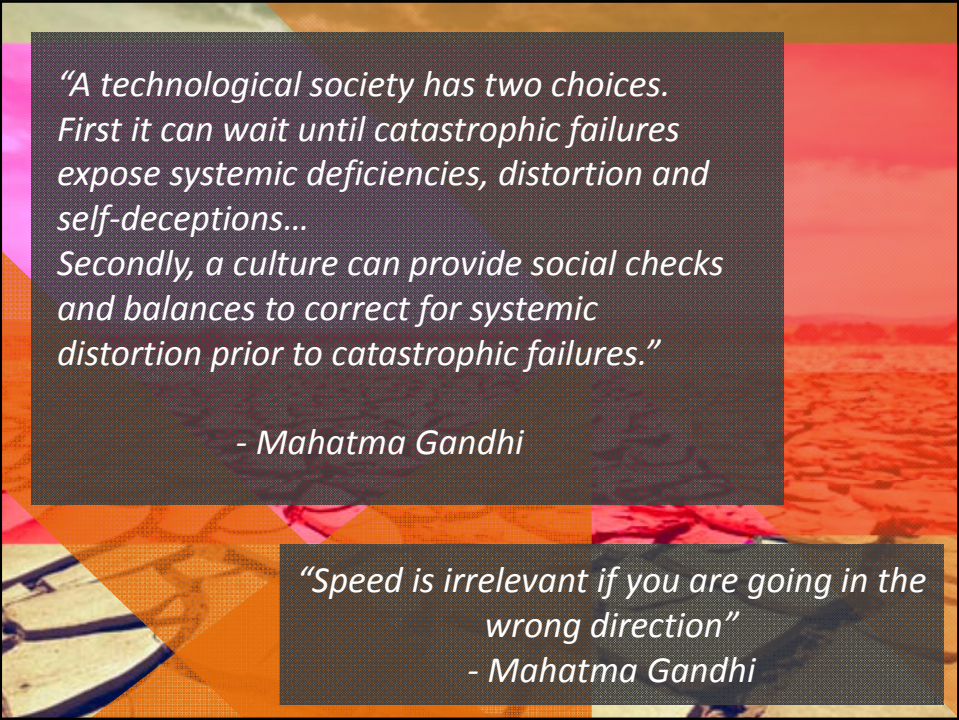
Governing a transition toward an effective climate response and SD pathway is a challenge involving rethinking our relation to nature.



- A stable climate is one component of SD.
- Limiting the effects of climate change is necessary to achieve SD and equity, including poverty eradication.
- Designing an effective climate policy involves “mainstreaming” climate in the design of SD strategies.
- Options for equitable burden-sharing can reduce the potential for the costs of climate action to constrain development.

Source : IPCC AR5

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*"A technological society has two choices.  
First it can wait until catastrophic failures  
expose systemic deficiencies, distortion and  
self-deceptions...*

*Secondly, a culture can provide social checks  
and balances to correct for systemic  
distortion prior to catastrophic failures."*

*- Mahatma Gandhi*

*"Speed is irrelevant if you are going in the  
wrong direction"*

*- Mahatma Gandhi*