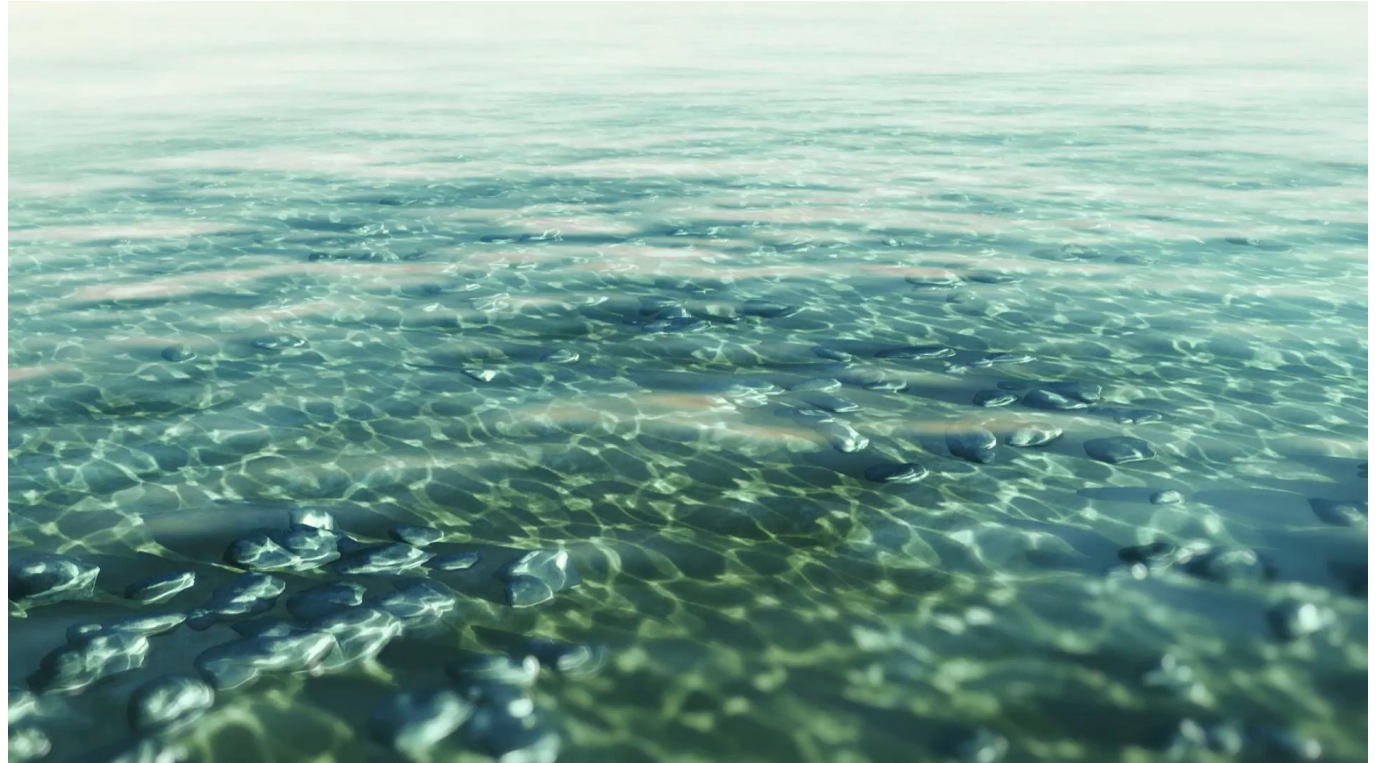
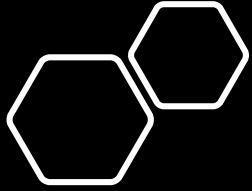


# Impacts of Climate change

Dr. Shyamli Singh  
IIPA, New Delhi





# Climate Change Has an Impact on

Biodiversity: Carbon  
storage, habitats,

Human systems  
:Agriculture, fresh  
water, health, ...

Urban systems  
:Transport, buildings,  
lifestyle, ...

Economic systems :  
Energy, manufacturing,  
natural capital  
industries,

Social systems : Equity,  
migration, peace and  
conflict, ...



Developing  
Countries are  
the Most  
Vulnerable to  
Climate  
Change

- **Impacts are worse**
- **Lower capacity to adapt**
- **Impacts disproportionate upon the poorest countries and the poorest people**

Urban poor at  
greatest risk







# Observed impacts

# Increasing sea level rise

- Total sea level rise in 20th century was 17 cm
- Contributions from thermal expansion (57%), melting glaciers & ice caps and polar ice sheets
- **Projected sea level rise** of 18-59 cm by the end of the 21st century

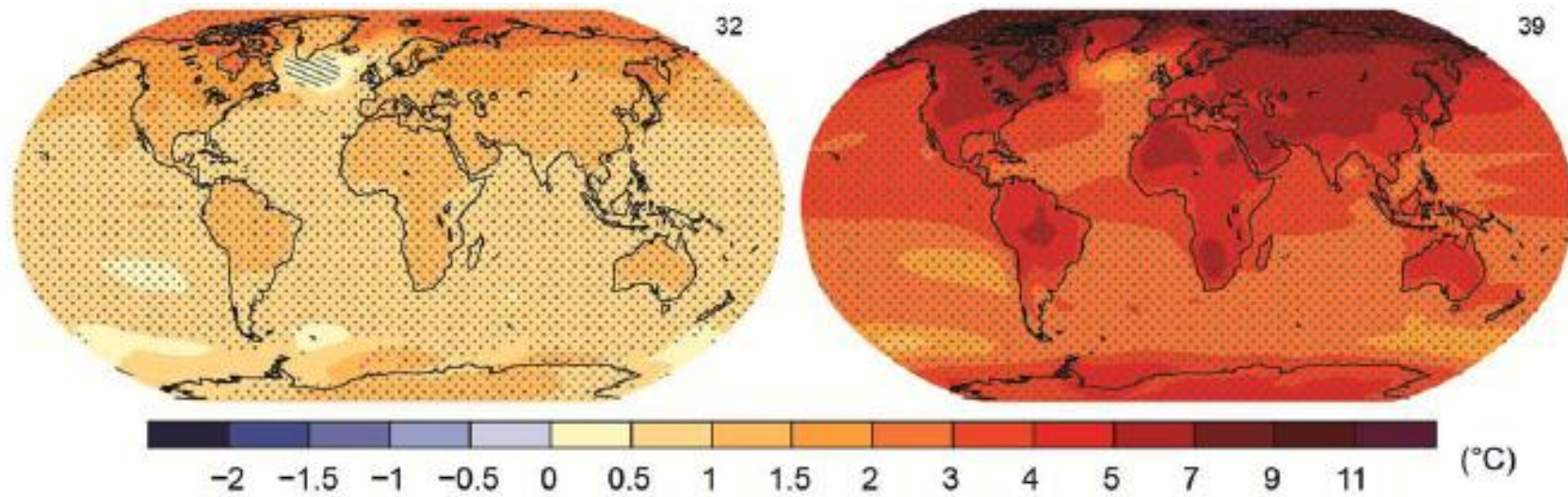


# Projected Change in Average Surface Temperature

Time Period: 1986-2005 to 2081-2100

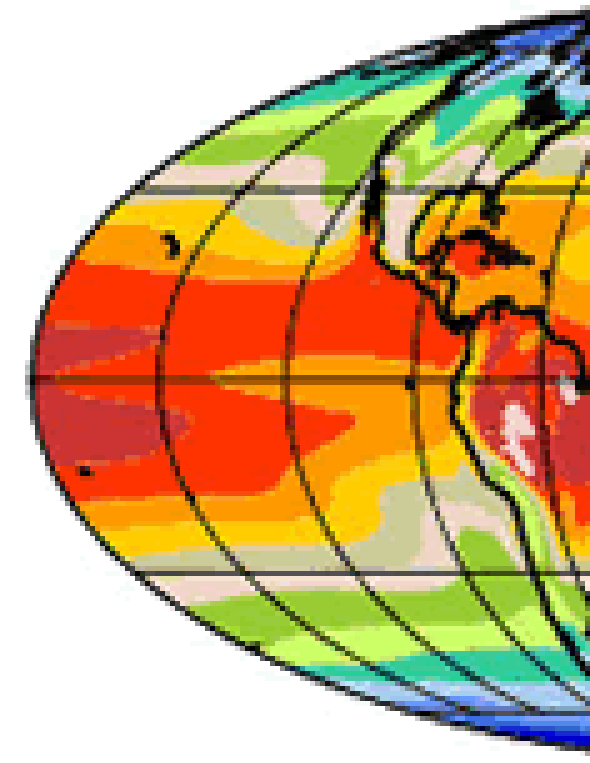
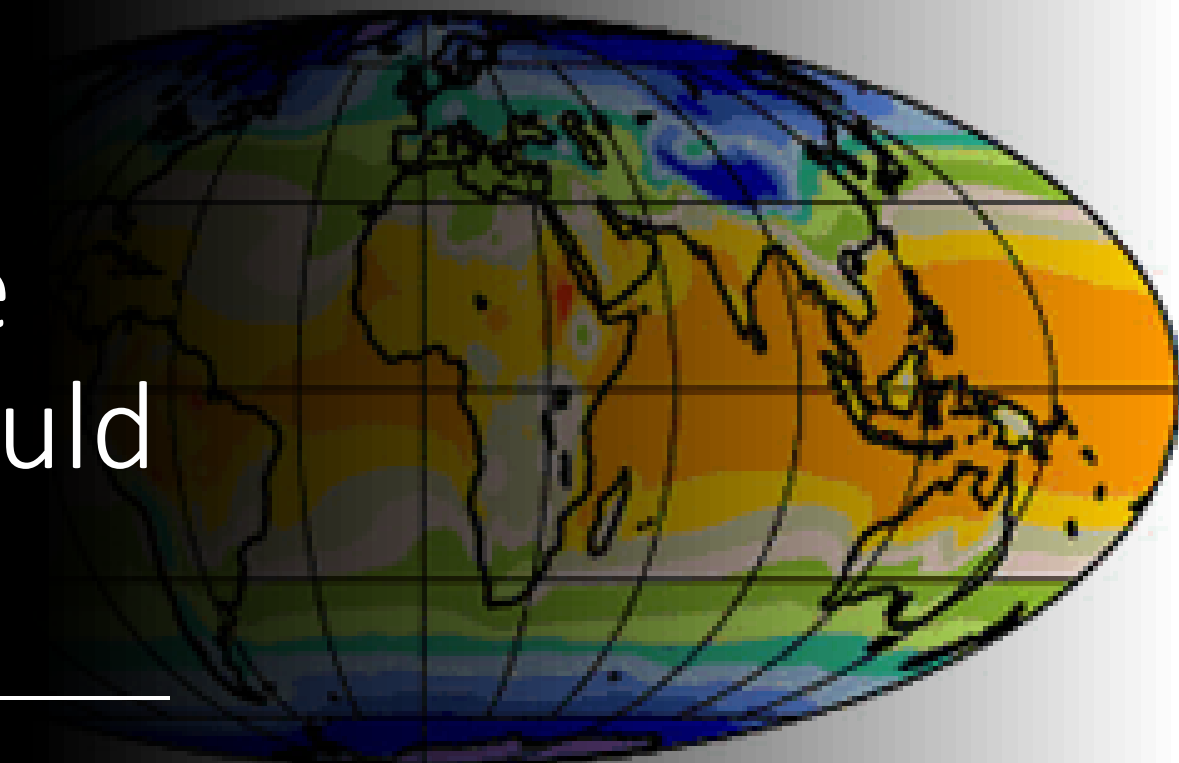
Scenario RCP 2.6

Scenario RCP 8.5



Source: IPCC 2013, p20

Present Day  
(1990s)



Projected  
Temperature  
Increase should  
we care?

°F

-4 25 32 39 46 54 61 68 72 7

Air Temperature



-20 -4 0 4 8 12 16 20 22 2

°C









# Response



TWO APPROACHES  
MAY BE FOLLOWED



MITIGATION



ADAPTATION

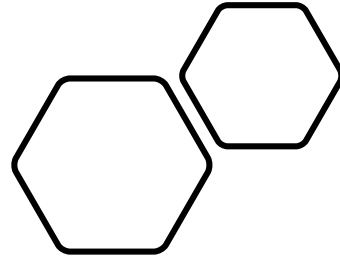
# Mitigation & Adaptation

**Mitigation** is defined as any anthropogenic interventions that can either reduce the sources of greenhouse gas (GHG) emissions (abatement) or enhance their sinks (sequestration).

Adaptation is defined as the degree to which adjustments are possible in practice, processes or structure of systems to projected or actual change of climate.

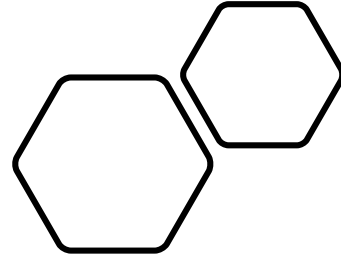


# Integrating Mitigation and Adaptation



- There are increasing calls to better integrate these two fields.
- Long lag times in the climate system, no mitigation efforts will be able to prevent climate change.
- Conversely, reliance on adaptation alone would lead to a large magnitude of climate change, to which it would be very expensive to adapt.

# Mitigation



# Benefits of Mitigation

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**PRIMARY**



**CO-BENEFITS**



**ANCILLARY BENEFITS**



# IPCC Video on the Human Influence on the Climate System

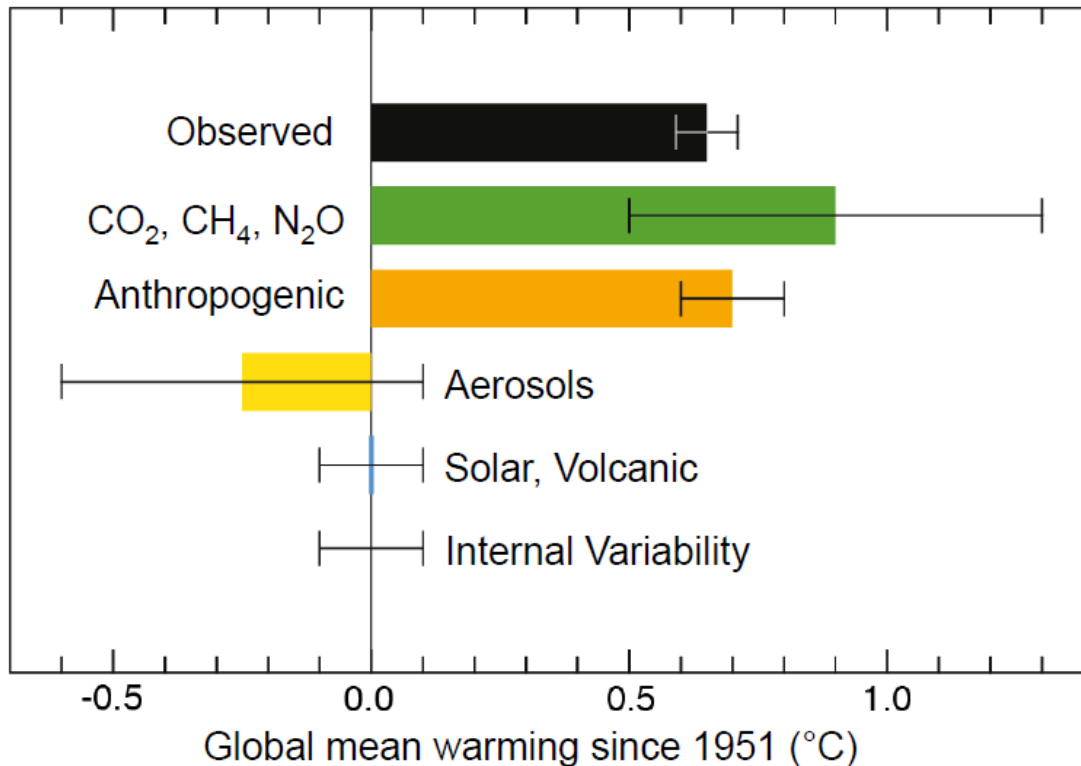


Video: The video summarizes the main findings of the 2013 IPCC Report on the physical science basis of climate change.

URL: [https://static.uncclean.org/Introductory\\_e\\_Course\\_on\\_Climate\\_Change/Videos/2013\\_IPCC\\_Report\\_Summary%20.mp4](https://static.uncclean.org/Introductory_e_Course_on_Climate_Change/Videos/2013_IPCC_Report_Summary%20.mp4)



# Human Influence on the Climate System



It is extremely likely that more than 50% of the warming since 1951 is due to the increase in greenhouse gases and other anthropogenic forcings together.

Source: [IPCC 2013](#). Further info: [WMO website](#)



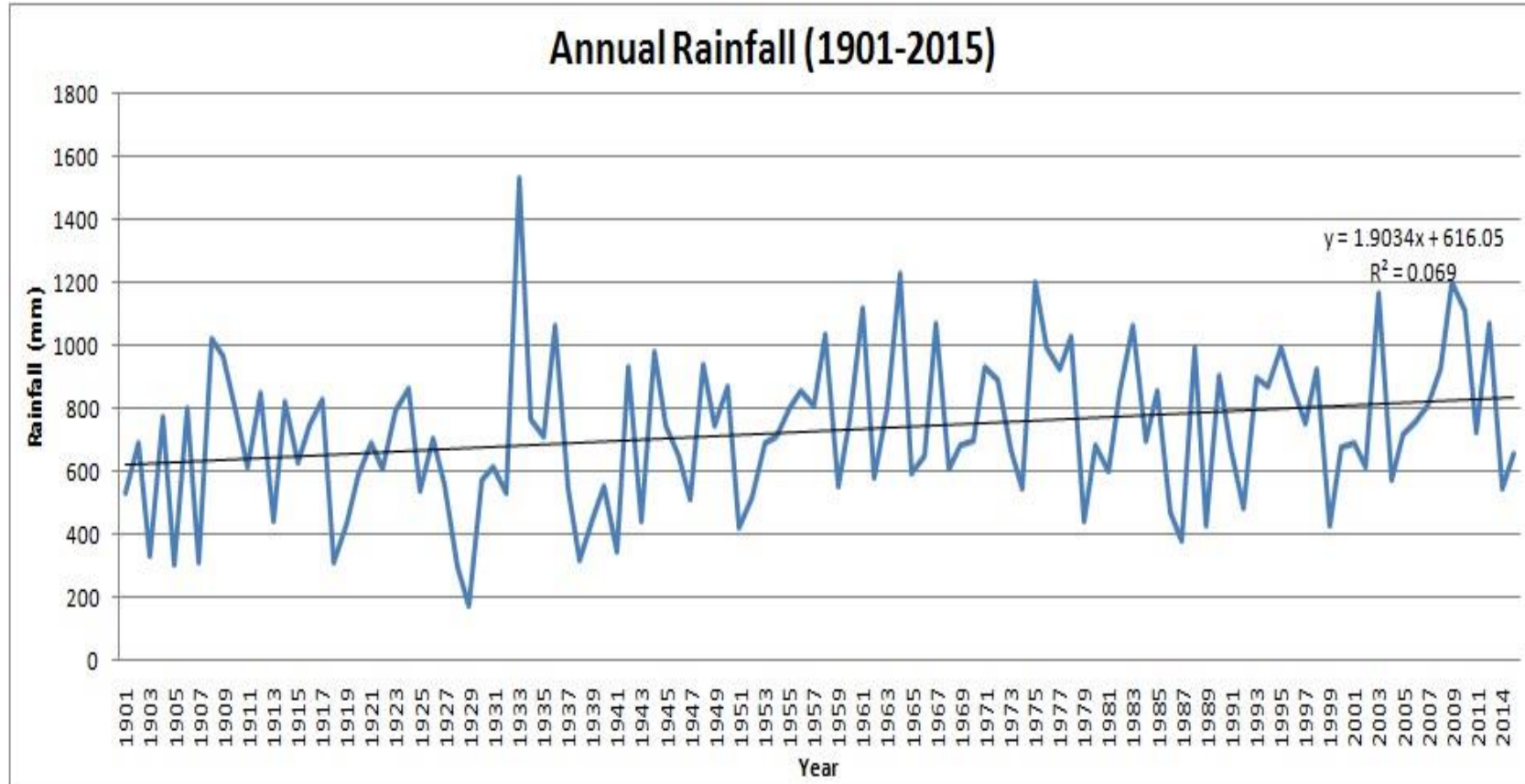
# Temperature and Precipitation Projections for the 21<sup>st</sup> Century



Video: This NASA video shows how temperature and precipitation patterns could change throughout the 21st century.

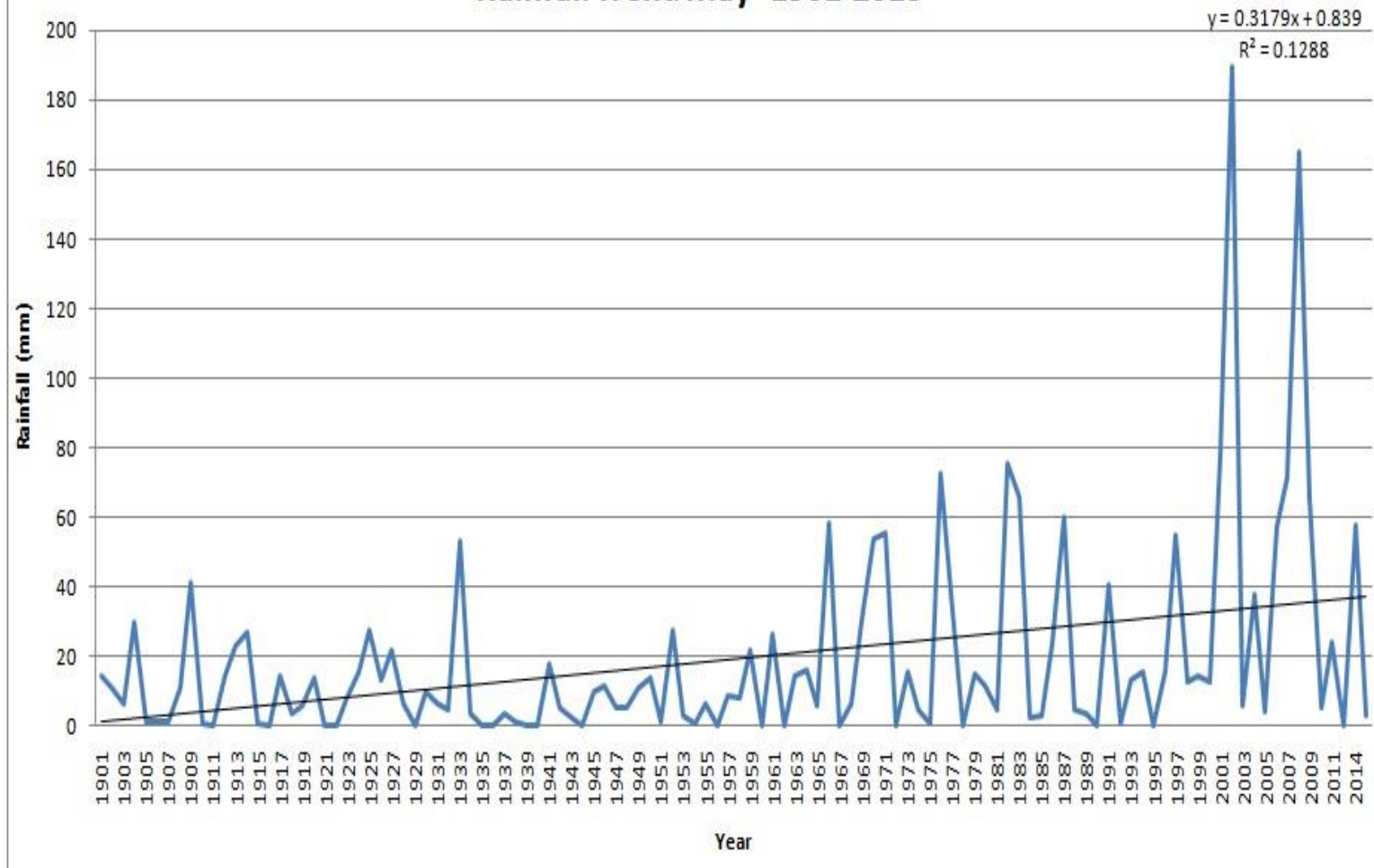
URL: <https://www.youtube.com/watch?v=d-nl8MBylL8>

# Variation in the Rainfall trend- Delhi



Source:  
IMD

### Rainfall Trend May- 1901-2015





# Key Concepts Related to Climate Change Mitigation



Mitigation Option: A technology, practice, or policy that reduces or limits emissions of GHGs or increases their sequestration



Carbon/Emission Development : Low carbon development refers to economic development with minimal output of GHG emissions



Green Economy: An economy that results in “improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP 2010)

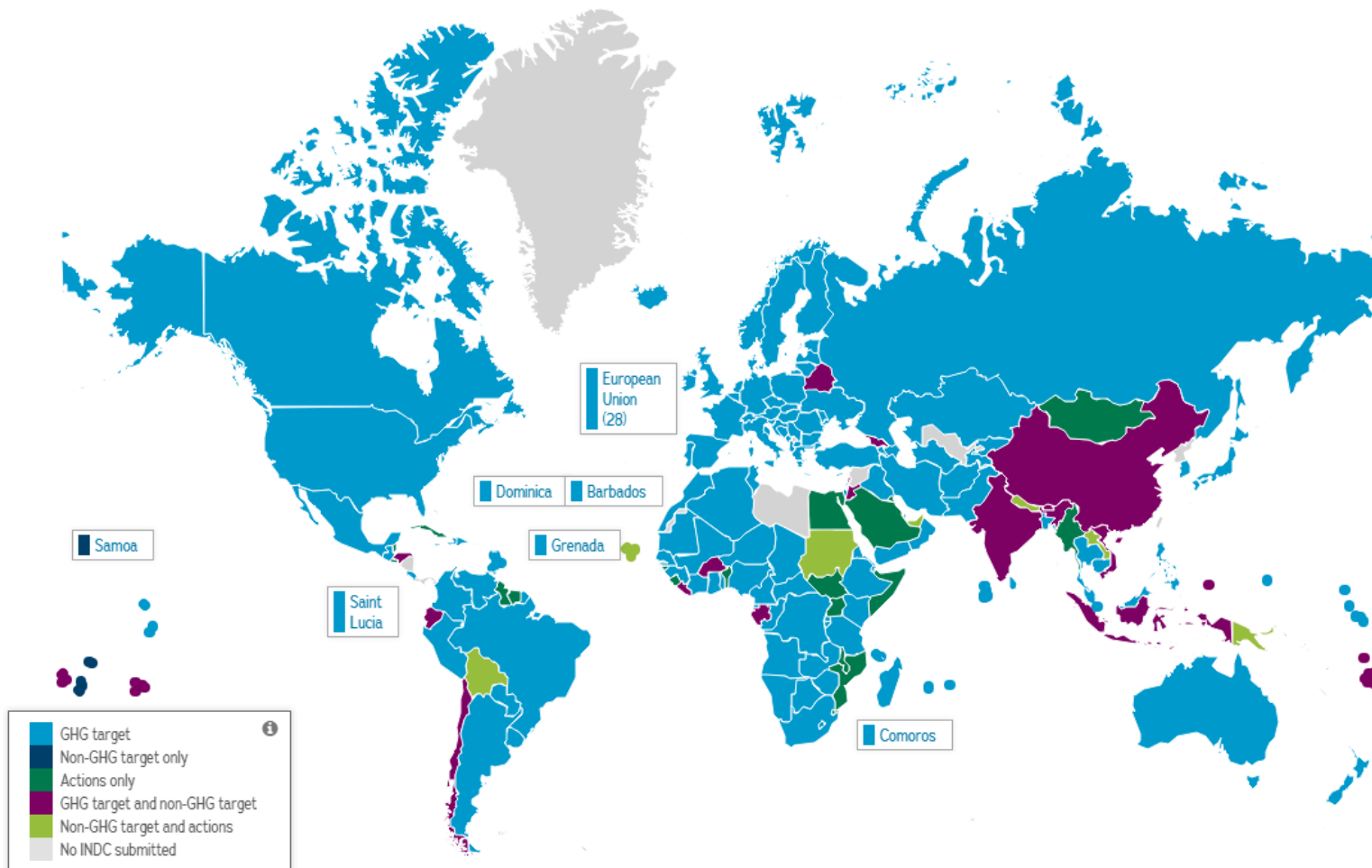
# Global “Carbon Budget” to Avoid Warming Beyond 2°C

Total budget of anthropogenic CO <sub>2</sub> emissions to limit warming to 2°C	appr. 1,000 GtC
Total anthropogenic CO <sub>2</sub> emissions 1870-2011	appr. 500 GtC
Remaining “carbon budget”	appr. 500 GtC

**If no action is taken,  
carbon budget will be exhausted in 30 years**

Source: Based on IPCC 2013

# Mitigation Contributions



Source: [WRI 2015](#)

## Low Carbon Development Requires

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- **Political thinking** to develop and implement plans and strategies resulting in less carbon intense economic development
- Patterns of consumption and production which are resource and energy efficient
- Redirection of **investments** towards clean technologies, renewable energy, and sustainable management of water, agriculture and forests





# Co-Benefits Resulting from Mitigation and Low Carbon Development



## Environmental

Conservation of  
biodiversity  
and ecosystems

Improved  
water and air  
quality

Restoration of  
degraded land

...



## Economic

Employment  
creation

Energy security

New economic  
opportunities

Potential cost  
savings

...



## Social

Access to  
better  
services

Health  
benefits

Lifestyle  
benefits

...



# Co-Benefits from Biogas Energy Production in Rural China



Video: Example of a project for biogas energy production in China.

URL: <http://www.youtube.com/watch?v=ilda6HiXc4k>



Closing  
Thoughts on  
Adapting to  
Climate  
Change



# Quiz

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1. What are the observable Global climate change effects on the environment?

- (a) Glaciers have shrunk (b) Plant and animal ranges have shifted trees are flowering sooner (c) ice on rivers and lakes is breaking up earlier (d) All of the above

2. Which populations are worst hit due to the Climate Change

- (a) Marginal populations (b) rich people (c) middle class (d) upper middle class

3. When did European heat wave first happened

- (a) 2003 (b) 2000 (c) 2018 (d) 2012

4. How much drop in Ph is expected by IPCC

- (a) lowest point in at least 20 million years (b) lowest point in at least 10 million years (c) lowest point in at least 40 million years (d) lowest point in at least 05 million years

5. Global Carbon Budget commits itself to hold warming below compared to pre-industrial temperatures

- (a) 2°C (b) 1.5°C (c) 0.002°C (d) 0.2°C

# References

## 1. EFFECTS OF CHANGING CLIMATE ON WEATHER AND HUMAN ACTIVITIES

<http://www.cgd.ucar.edu/staff/trenbert/books/ChangingClimate.pdf>

## 2. Climate Change and its impact on environment

[https://www.researchgate.net/publication/327500266\\_Climate\\_Change\\_and\\_its\\_impact\\_on\\_environment](https://www.researchgate.net/publication/327500266_Climate_Change_and_its_impact_on_environment)

## 3. Climate change consequences and its impact on agriculture and food security

[https://www.researchgate.net/publication/328730152\\_Climate\\_change\\_consequences\\_and\\_its\\_impact\\_on\\_agriculture\\_and\\_food\\_security](https://www.researchgate.net/publication/328730152_Climate_change_consequences_and_its_impact_on_agriculture_and_food_security)

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ThankYOU

