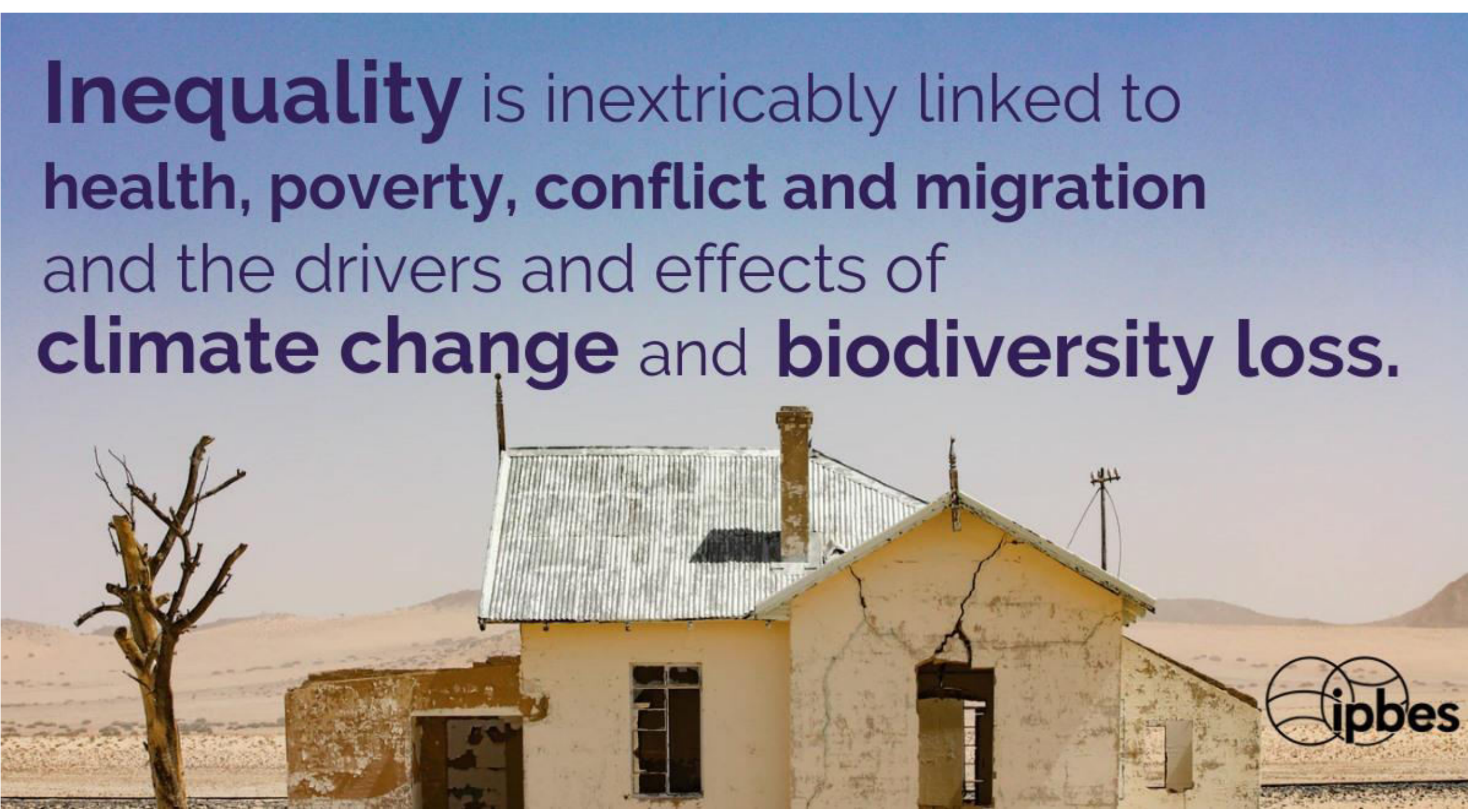
MGNREGS and Climate Action

Dr Jyothis Sathyapalan

CWE, NIRDPR

Sept 13 2019

Inequality is inextricably linked to **health, poverty, conflict and migration** and the drivers and effects of **climate change** and **biodiversity loss.**



Rich and Poor Nations

Parameters	Rich Nations (beckys world)	Poor Nations (Destas world)
Population	1.0	2.3
GDP Per caita	30,000	2,100
Human Development Index	High	Low
Annual Population Growth Rate	0.8	2.4
Annual growth rate of GDP	2.4	1.8
Total fertility rate	1.8	3.7
Adult literacy	95	58
Index of Government corruption	low	High
Life expectancy at Birth	78	58
Under 5 mortality (per 1000)	7	120
Rural Population % tot pop	10	70
Agri share GDP	2	25

Conflicting view points 1

- Strong evidence of natural resource extraction rates
- Strong evidence of population growth
- Industrial production 40 times
- Energy use 16 times
- Methane producing cattle increased
- Fish catch increased by a multiple of 35
- Carbon and sulphur dioxide emissions by 10
- Application of nitrogen
- Ecologist estimates that 40% of net energy created by photosynthesis is currently being used by human use
- These figure put the scale of our presence on earth in a perspective that reveals the amount of disturbance to nature

Conflicting view points-2

- Earlier generation invested in science and technology, education, machines and equipment's-present ability to make high income in turn invested for higher living standers in future
- Historical trends in marketed natural resources like minerals and ores are flat that there is no reason for alarm
- Economic growth allowed more people to access to potable water
- Better protection against water air borne diseases
- Physical environment improved inside home
- Natural resources can be shifted today
- Capital accumulation and technological improvement compensate environmental degradation
- Economic growth is compatible with sustainable development
- Contemporary societies are obsessed with survival and dismiss any suggestion that we need to find way to survive ecologically
- Nature will not appear in economists accounts

Discounting and climate change

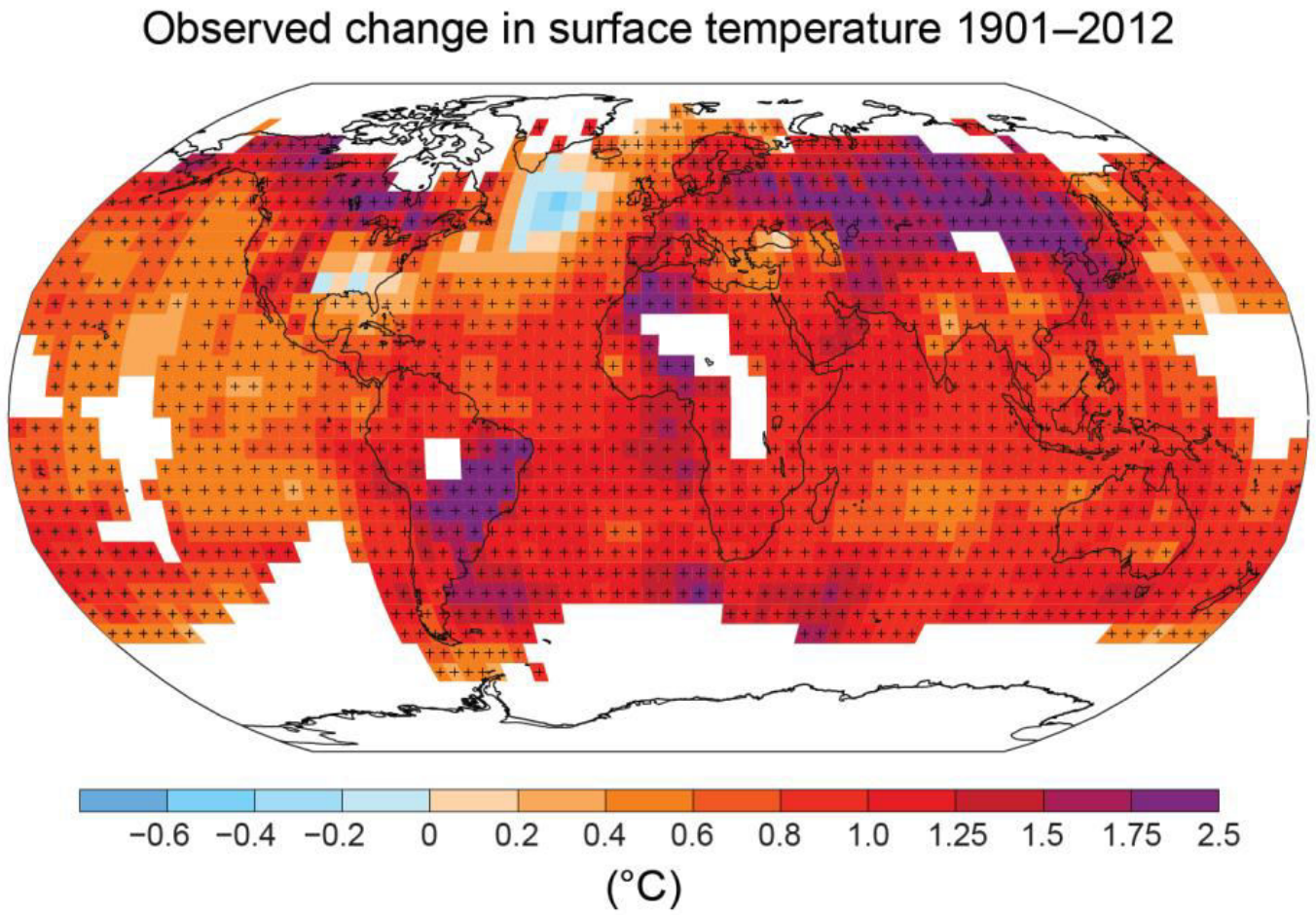
- CO2-286 ppm till in 18th century, it is increased to 385 ppm now (ignore methane)
- If the current trend continue CO2 will reach 500 ppm which is twice the pre industrial period by middle of this century and 750 ppm by the next centaury
- A doubling of CO2 will rise a temperature of 3 to 7 degrees
- With a trebling of concentration it will go to 6 to 11 degrees
- The speed of that change is particular significance because half of our productive asset become less than useful
- Some of our infrastructure diapered due to rising seas

Discounting and climate change

- In-order to restructure our assets , humanity need to reinvest or divert from current consumption
- if we add the impact of rapid climate change, the cost huge
- Change in diseases to which human population are not immune
- Degradation of ecosystems
- 4 economist invited to Copenhagen to find most useful way of spending 50 billion USD for next 5 years, climate change was at the bottom of their list

Climate Change

A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels



Global warming projections from AR4

- The projections apply to the end of the 21st century (2090–99), relative to temperatures at the end of the 20th century (1980–99).
- Add 0.7 °C to projections to make them relative to pre-industrial levels instead of 1980–99.
- Descriptions of the greenhouse gas emissions scenarios can be found in Special Report on Emissions Scenarios.
- SSP5 (Economic optimism)

4th Assessment report : AR4 global warming projections

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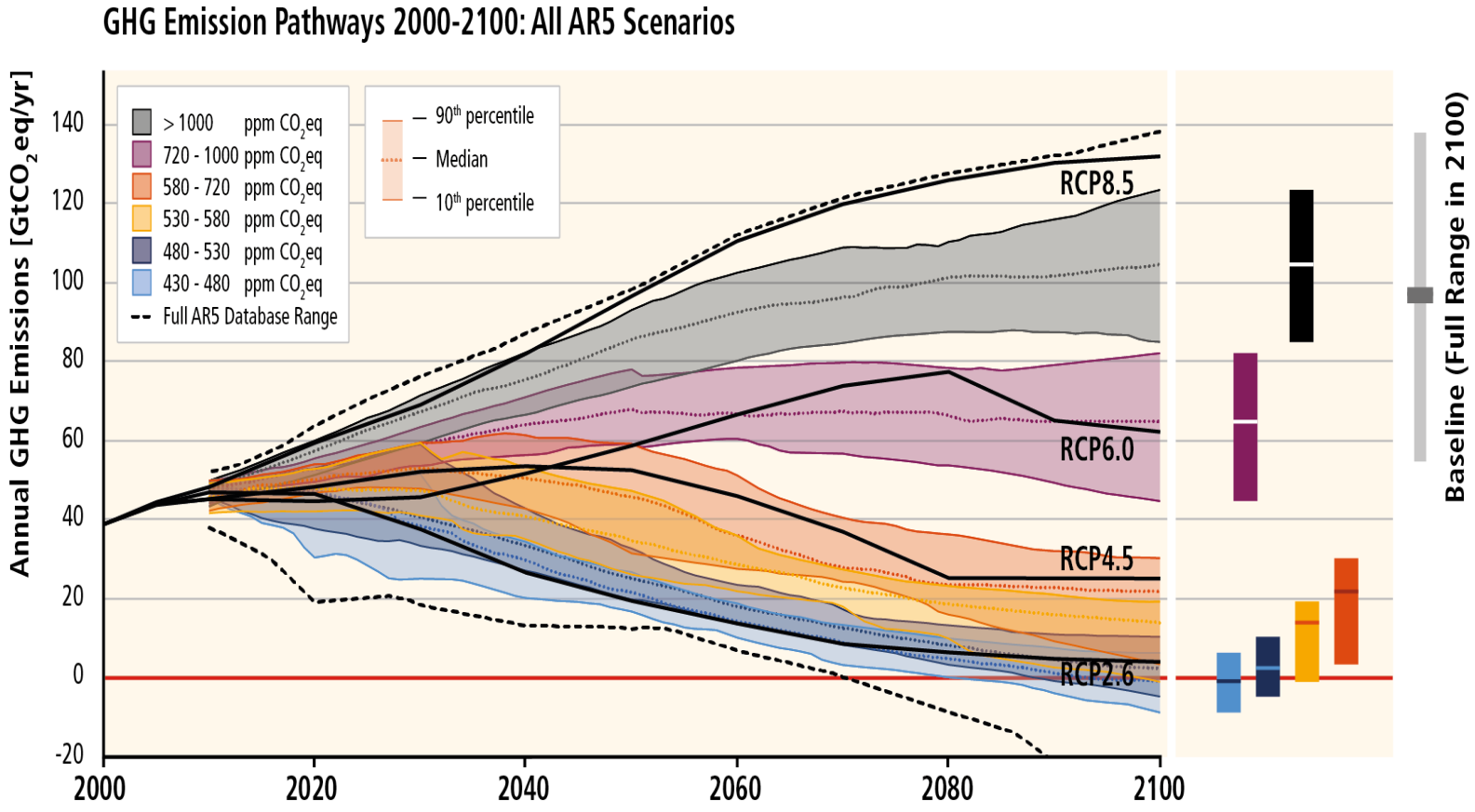
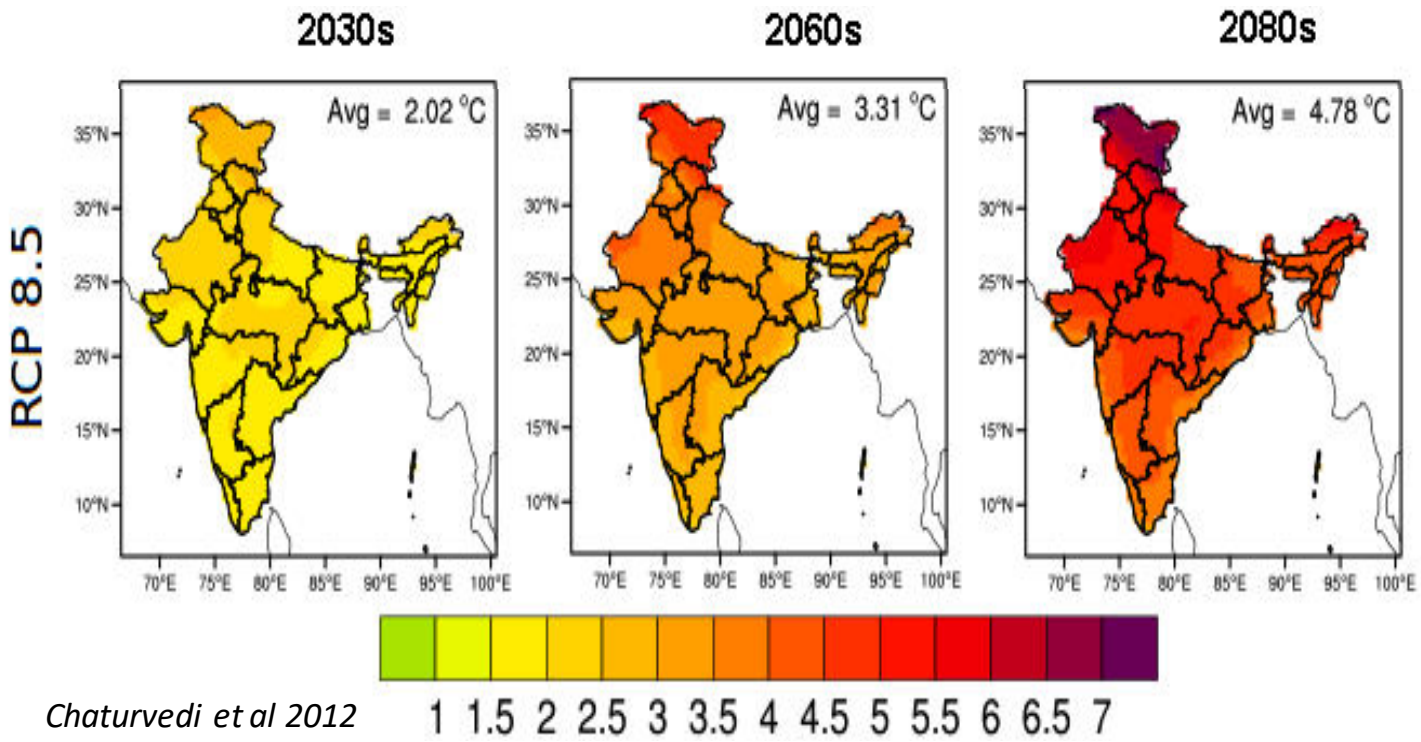
Emissions scenario	Best estimate (°C)	"Likely" range (°C)
B1	1.8	1.1 – 2.9
A1T	2.4	1.4 – 3.8
B2	2.4	1.4 – 3.8
A1B	2.8	1.7 – 4.4
A2	3.4	2.0 – 5.4
A1FI	4.0	2.4 – 6.4

5th Assessment report

- Projections in AR5 are based on "Representative Concentration Pathways" (RCPs).
- The RCPs are consistent with a wide range of possible changes in future anthropogenic greenhouse gas emissions.
- Projected changes in global mean surface temperature and sea level are given in the main RCP article.


GHG Emission Pathways 2000-2100: All AR5 Scenarios
Annual GHG Emissions [GtCO2eq/yr]
140
120
100
80
60
40
20
0
-20
2000
2020
2040
2060
2080
2100
> 1000 ppm CO2eq
720 - 1000 ppm CO2eq
580 - 720 ppm CO2eq
530 - 580 ppm CO2eq
480 - 530 ppm CO2eq
430 - 480 ppm CO2eq
Full AR5 Database Range
90th percentile
Median
10th percentile
RCP8.5
RCP6.0
RCP4.5
RCP2.6
Baseline (Full Range in 2100)

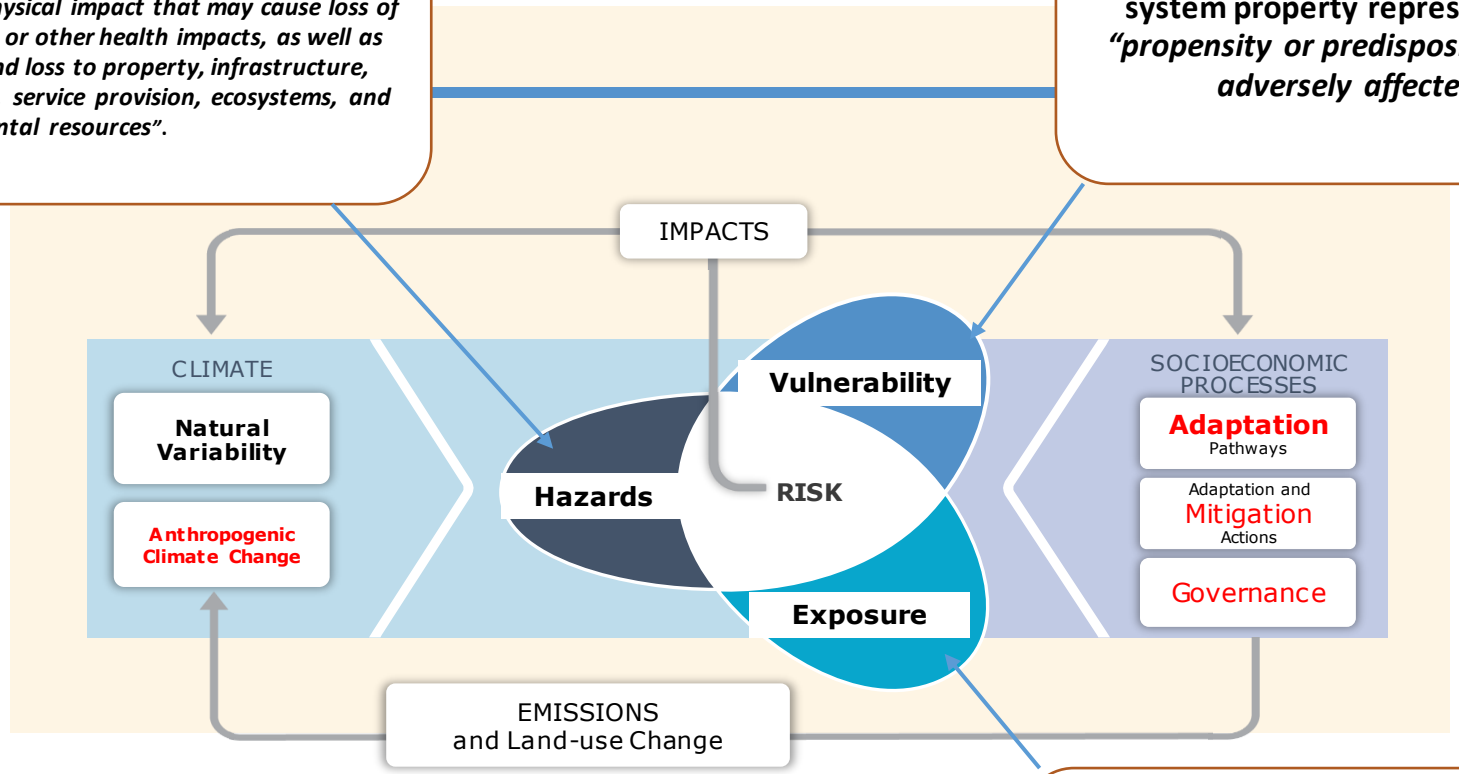
Projections of climate change - Warming



Chaturvedi et al 2012

'hazard' is *"the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources"*.

vulnerability' is considered as a system property representing its *"propensity or predisposition to be adversely affected*



Exposure' is *"the presence of people, livelihoods, ecosystems, envi. functions, services, and resources, infrastructure, cultural assets in places and settings that could be adversely affected"*;

CC - IMPACT – VULNERABILITY MODELING FRAMEWORK – IPCC, 2014

Nationally Determined Contribution (NDC)

- The Paris Agreement and the “Katowice Climate Package” highlight the need for estimation and reporting of ‘mitigation co-benefits of adaptation’ actions. Article 4 and Article 7 of the Paris Agreement and the Rulebook provide clear guidance for reporting the mitigation co-benefits of adaptation actions. India’s Nationally Determined Contribution (NDC) has a large carbon sequestration target of 2.5 to 3 billion tonnes of CO2 by 2030 through increased forest and tree cover.

SDG Goal- 13 Climate Action

- **13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries**

- **13.2 Integrate climate change measures into national policies, strategies and planning**

- **13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning**

- **13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities**

Natural Resource Management critical for Adaptation of Ecosystems to climate change

1. Maintaining and restoring native ecosystems
2. Protecting and enhancing ecosystem services
3. Actively preventing, and controlling, invasive alien species
4. Managing habitats for rare, threatened, and endangered species
5. Establishing networks of terrestrial, freshwater and marine protected areas that take into account projected changes in climate.
6. Developing agroforestry systems in transition zones between ecosystems
7. Monitoring results and changing management regimes accordingly.

Works or activities under MGNREGA which have the potential to impact carbon stocks

Category –A Works -Public works relating to natural resources management	Category B Works - Individual assets for vulnerable sections
i) Watershed management works such as contour trenches, terracing, contour bunds, boulder checks, gabion structures and springshed development resulting in a comprehensive treatment of a watershed	i) Improving productivity of lands of households specified in Paragraph 5 through land development and by providing suitable infrastructure for irrigation including dug wells, farm ponds and other water harvesting structures
ii. Water conservation and water harvesting structures to augment and improve groundwater like underground dykes, earthen dams, stop dams, check dams with special focus on recharging groundwater including sources of drinking water	ii. Improving livelihoods through horticulture, sericulture, plantation, and farm forestry

Category –A Works -Public works relating to natural resources management	Category B Works - Individual assets for vulnerable sections
iii) Micro and minor irrigation works and creation, renovation and maintenance of irrigation canals and drains	iii) Development of fallow or wastelands of households defined in Paragraph 5 to bring it under cultivation
iv) Renovation of traditional water bodies including desilting of irrigation tanks and other water bodies	iv) Unskilled wage component in construction of houses sanctioned under the Indira Awaas Yojana or such other State or Central Government Scheme
v) Afforestation, tree plantation and horticulture in common and forest lands, road margins, canal bunds, tank foreshores and coastal belts duly providing right to usufruct to the households covered in Paragraph 5 of Schedule I	v) Creating infrastructure for promotion of livestock such as, shelters for poultry goats, piggery, cattle and fodder troughs for cattle; and 9 CRISP Modules
vi) Land development works in common land	vi) Creating infrastructure for promotion of fisheries such as, fish drying yards, storage facilities, and promotion of fisheries in seasonal water bodies on public land

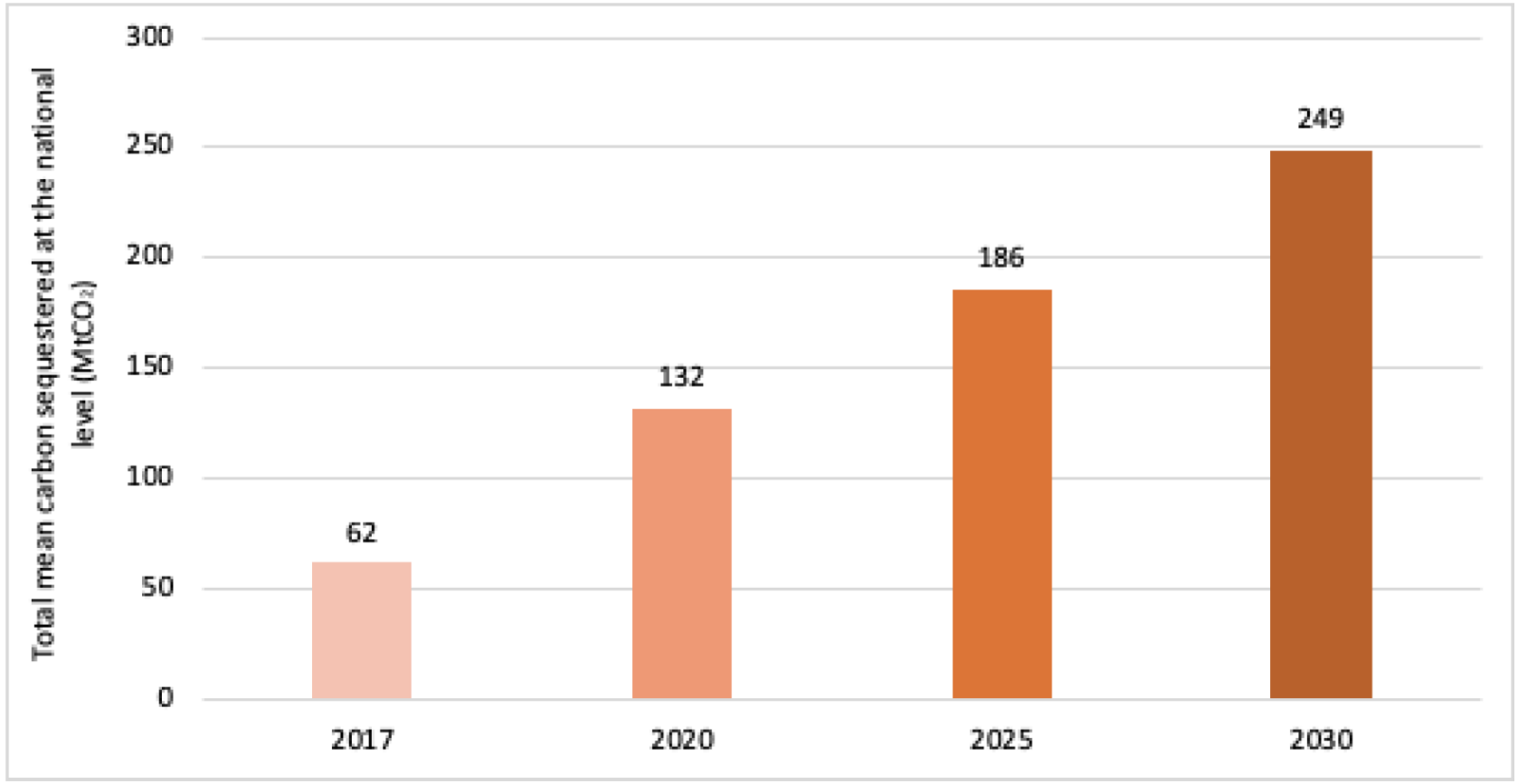
Environmental benefits of NRM works implemented under MGNREGA (Tiwari et al., 2011)

Natural resources impacted	MGNREGA Works	Potential Environmental benefits
Water	➢ Water conservation and harvesting ➢ Irrigation provisioning and improvement ➢ Renovationof traditional water bodies ➢ Flood control	❖ Ground water recharge, soil moisture retention and protection (erosion control), provisioning of water for irrigation, improved drinking water availability and soil quality (nutrient cycling) ❖ Enhance resilience through reduced crop yield variability, provides irrigation to rainfed crops, enhance soil fertility and water holding capacity ❖ Carbon sequestration indirectly

Natural resources impacted	MGNREGA Works	Potential Environmental benefits
Land	➢ Land development such as, land levelling, conservation bench terracing, contour and graded bunding ➢ Field bunding ➢ Pasture development ➢ Silt application ➢ Drought proofing ➢ Flood control	❖ Reclamation of degraded land for agriculture, improve soil organic matter, improve soil moisture retention and protection (erosion control) in cultivated fields, in turn improving crop productivity and reducing crop yield variability leading to enhance resilience. ❖ Enhanced SOC and biomass carbon leading to carbon sequestration
Crop production systems	➢ Water conservation and Harvesting ➢ Irrigation provisioning and improvement ➢ Renovation of traditional water bodies ➢ Flood control ➢ Land development	❖ Increasing the availability of water for irrigation, reclaiming degraded ands for agriculture, improving soil moisture retention, protection (erosion control) and improving soil quality on cultivated lands, flood control for crop protection, etc. ❖ All these directly impact area under irrigation, crop productivity, cropping patterns and reduce crop yield variability and incomes leading to resilience. ❖ Carbon sequestration indirectly

Natural resources impacted	MGNREGA Works	Potential Environmental benefits
Forests	➢ Drought proofing works such as, afforestation/tree plantation, boundary and block plantation ➢ Agroforestry ➢ Mixed plantation of trees having minor forest productand medicinal value, pasture development / silvipasture, etc.	❖ Conservation and regeneration of biomass and carbon stock improves soil moisture retention and protection, aids flood control ❖ Improves soil quality, regulates local climate and provides an alternate source of income for those households, dependent on minor forest products, fodder and fuelwood, contributing to resilience. ❖ ***Carbon sequestration through enhanced biomass and soil carbon in trees (orchards, trees and forms and afforestation)***

Carbon Sequestrated under MGNREGS 2017-18



Natural Resource Management Works under MGNREGS and Carbon Sequestration

- Among the NRM works, ‘Drought Proofing’ provides about 40% of the total carbon sequestration, considering all NRM works at the national level.
- Carbon sequestration projected for the period 2020 to 2030 shows a continuous increase, due to an increase in cumulative NRM works implemented.
- During 2017-18, the total mean carbon sequestered is estimated to be about 62 $MtCO_2$ (estimated likely range 47 to 181 $MtCO_2$).
- The annual mean carbon sequestration is projected to increase to about 132 $MtCO_2$ by 2020, 186 $MtCO_2$ by 2025 and 249 $MtCO_2$ (estimated likely range 150 to 540 $MtCO_2$) by 2030.
- The Government of India could leverage MGNREGA for meeting the targets of Paris Agreement, NDC and SDGs, and for reporting under United Nations Framework Convention.