

Coping with Climate Change: Is Development in India and the World Sustainable?

By

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2007 K R Narayanan Oration

Australia

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A tribute to Shri K R Narayanan

- His distinguished record of service
- My association with him
- Privilege of receiving the Padma Bhushan from him
- Mr Narayanan's dedication to sustainable development

The relevance of sustainable development in today's world

- 20 years since the Brundtland Commission report
- The wake up call on climate change
- Findings of the three IPCC Working Groups
- Climate change and sustainable development

Dealing with externalities and vested interests

- The euphoria of escalating consumption in neglect of natural resource implications
- Rachel Carson's clarion call
- 2007 as her centenary
- Club of Rome study "Limits to Growth", 1972
- The updated version of 2004
- The finiteness of resources and coping with scarcity

Direct observations of recent climate change

Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level.

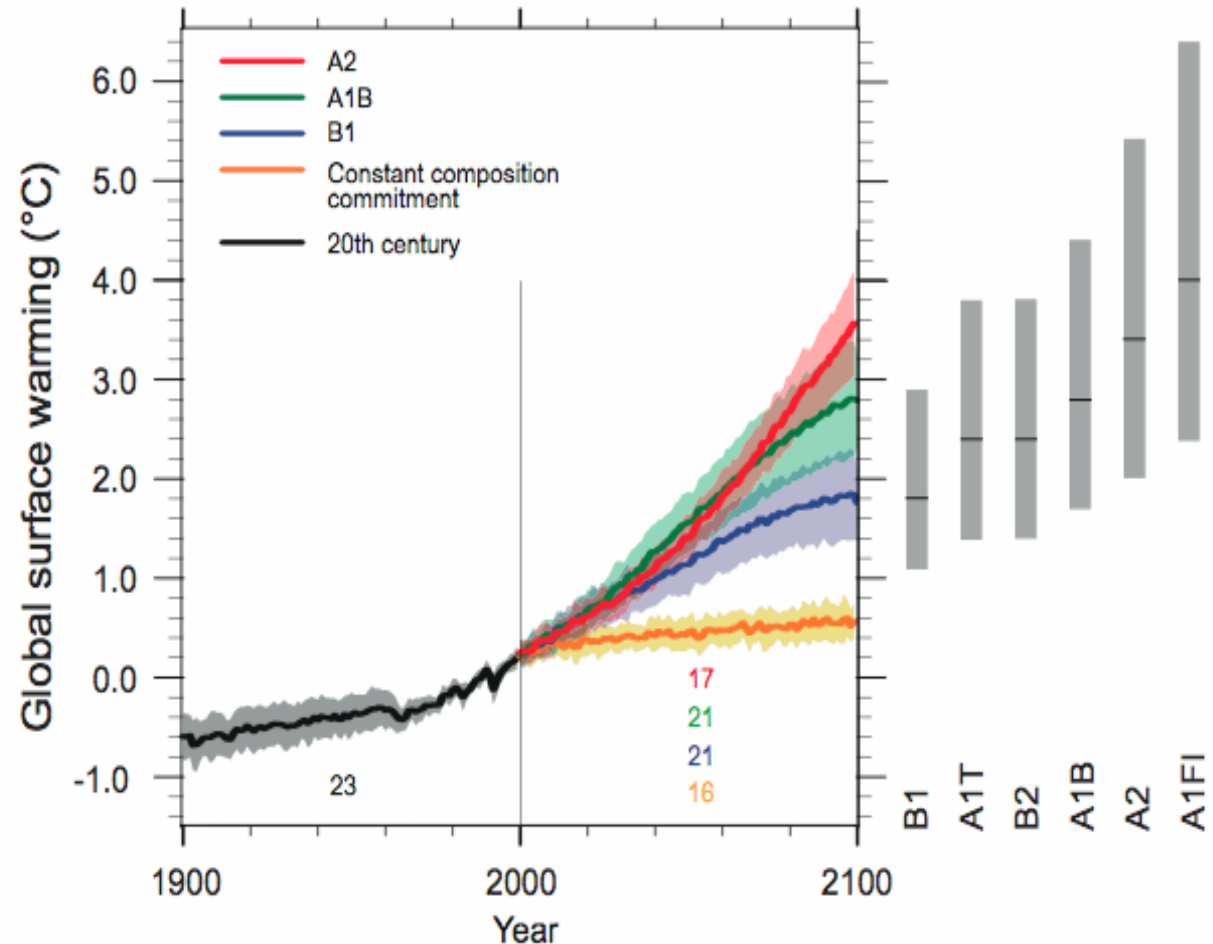
Understanding and attributing climate change

Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations. This is an advance since the TAR's conclusion that "most of the observed warming over the last 50 years is *likely* to have been due to the increase in greenhouse gas concentrations". Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns

Projections of future changes in climate

Best estimate for low scenario (B1) is 1.8°C (*likely* range is 1.1°C to 2.9°C), and for high scenario (A1FI) is 4.0°C (*likely* range is 2.4°C to 6.4°C).

Broadly consistent with span quoted for SRES in TAR, but not directly comparable



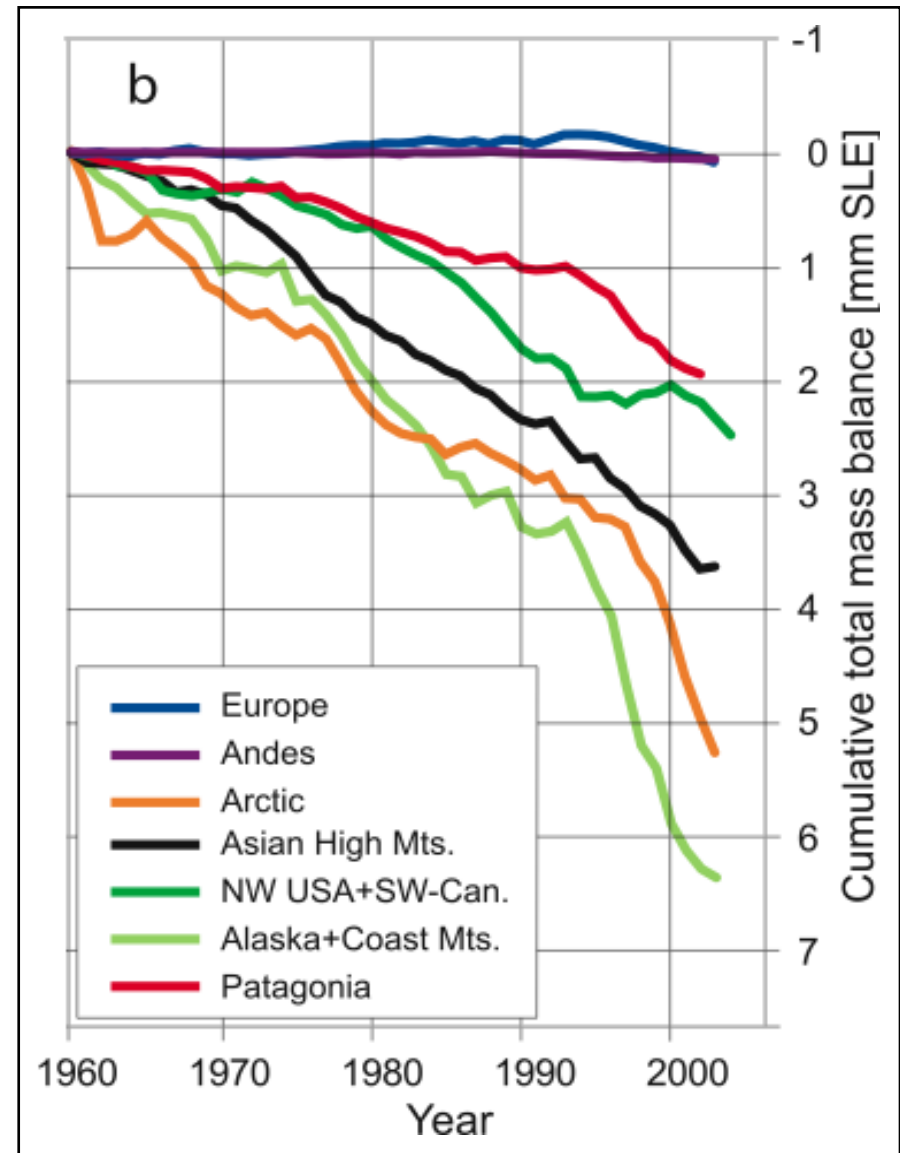
Dealing with the impacts of climate change

- Much greater regional detail in the AR4
- India's vulnerability
- The problem of water availability
- Melting of glaciers
- Sea level rise and its implications

Glacier mass balance

Cumulative loss of glacier mass in many regions

During the 20th century, glaciers and ice caps have experienced widespread mass losses and have contributed to sea level rise.



Dealing with extreme events

- Decline in annual precipitation in lower latitudes
- Extreme precipitation events
- More frequent floods and droughts
- Heat waves
- Health implications

In Indian context.....agricultural concerns

- Substantial losses predicted for rainfed wheat
- 0.5° C rise in winter temperatures to reduce wheat yield by 0.45 t/ ha
 - **(Present average yield of wheat ~ 2.6 t/ ha)**
- Besides yields impacts on production area also likely
 - **Loss of cultivated land and nursery areas for fishery/ aquaculture activity in coastal low-lying regions**
- Gross per capita water availability to decline from 1820 m³/ yr in 2001 to 1140 m³/yr in 2050

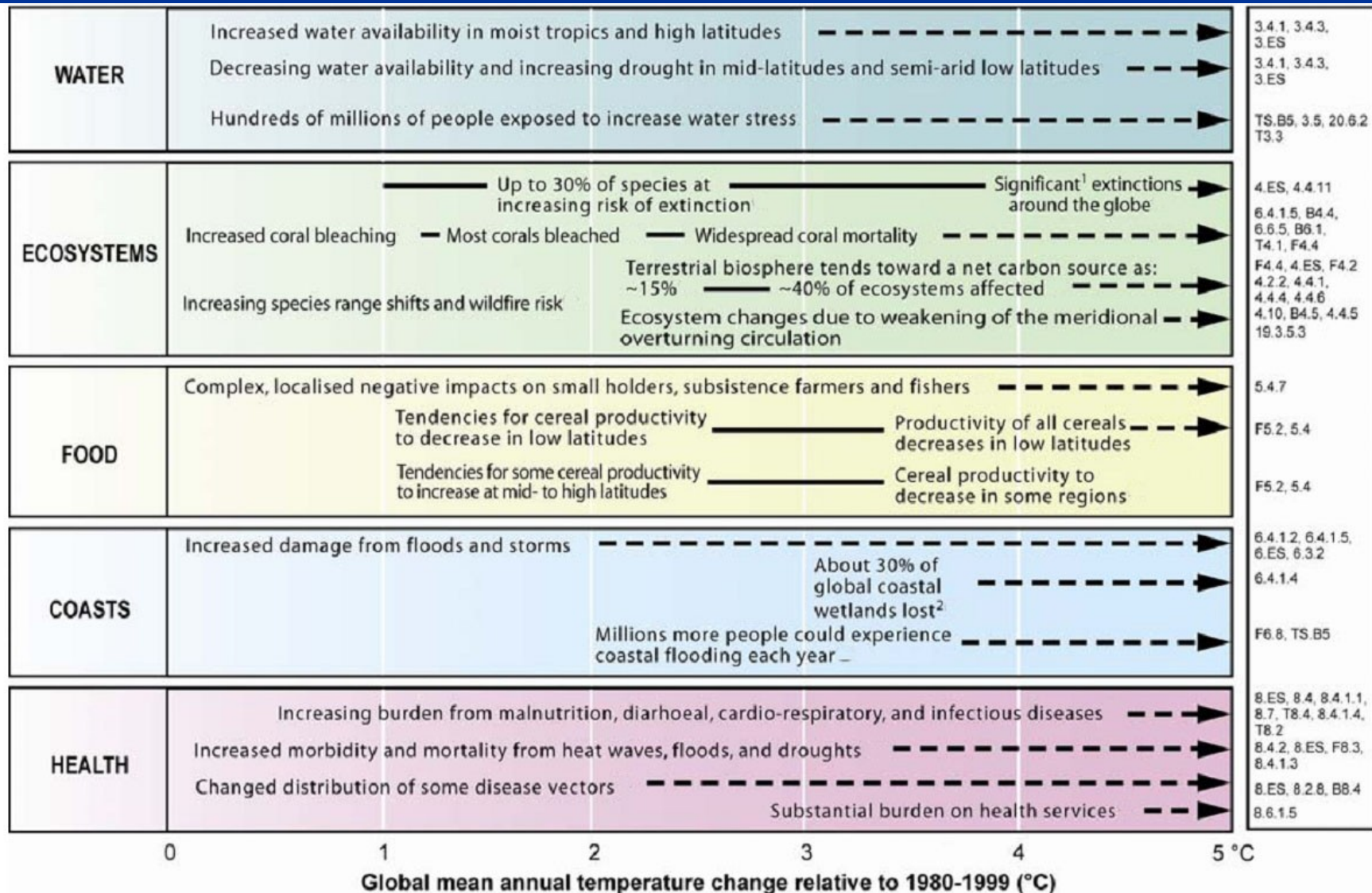
The threat of food security and nutrition

- 300 million people undernourished today
- Limits to adaptation with existing technology and know-how
- The problem of rainfed agriculture – nearly 2/3rd of the area under agriculture
- Decline per capita water availability –
 - 1820 cubic meters per capita in 2001
 - 1140 cubic meters per capita in 2050

Food security a global challenge

- Decline in global food stocks
- Over 850 million people undernourished globally
- 54 nations in food deficit
- Problem of increasing food prices in global market
- Climate change and other factors affecting food security

Key impacts as a function of increasing global average temperature change



¹ Significant is defined here as more than 40%.

² Based on average rate of sea level rise of 4.2 mm/year from 2000 to 2080.

Equity aspects of climate change

- Responsibility for increased concentration of GHGs
- Worst impacts and the highest vulnerability
- The problem of Asian megadeltas
- Implications for infrastructure – the case of Mumbai

Combining adaptation with mitigation

- Resources required for adaptation
- Co-benefits from mitigation measures –
 - Health
 - Energy security
 - Increased agricultural production
- Time available for stabilization of the atmosphere

Long term mitigation (after 2030)

- Mitigation efforts over the next two to three decades will have a large impact on opportunities to achieve lower stabilization levels

Stab level (ppm CO ₂ -eq)	Global Mean temp. increase at equilibrium (°C)	Year CO ₂ needs to peak	Year CO ₂ emissions back at 2000 level	Reduction in 2050 CO ₂ emissions compared to 2000
445 – 490	2.0 – 2.4	2000 - 2015	2000- 2030	-85 to -50
490 – 535	2.4 – 2.8	2000 - 2020	2000- 2040	-60 to -30
535 – 590	2.8 – 3.2	2010 - 2030	2020- 2060	-30 to +5
590 – 710	3.2 – 4.0	2020 - 2060	2050- 2100	+10 to +60
710 – 855	4.0 – 4.9	2050 - 2080		+25 to +85
855 – 1130	4.9 – 6.1	2060 - 2090		+90 to +140

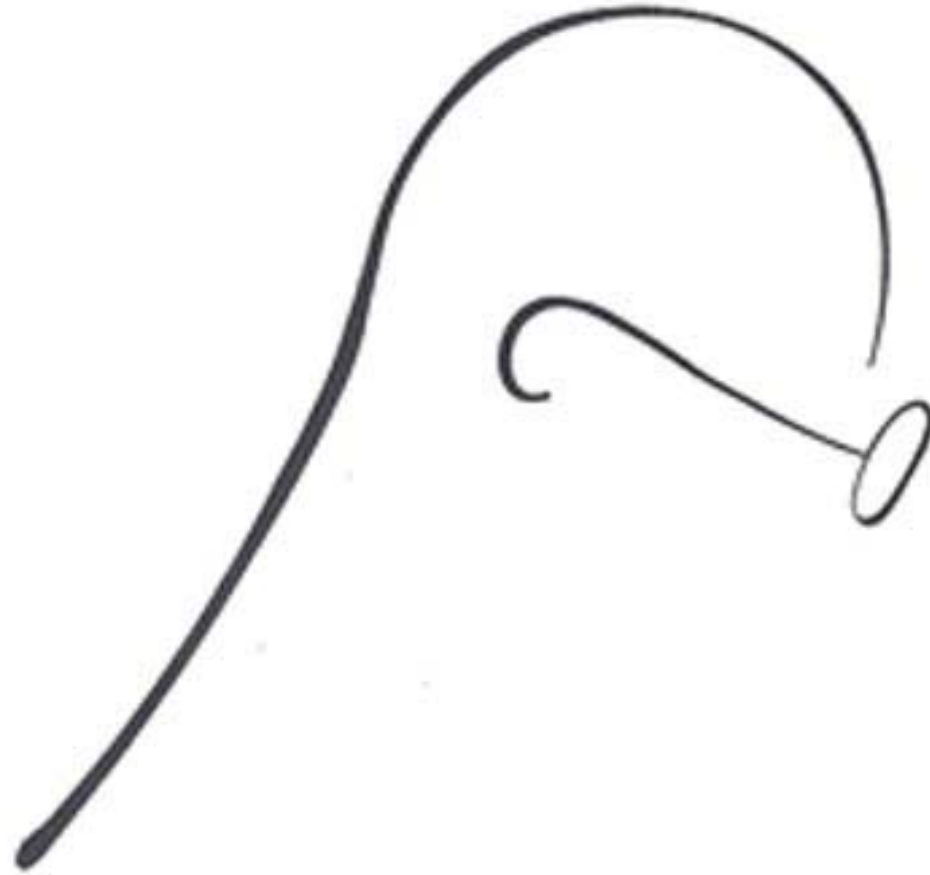
The challenge for India

- Can India lead and become a model?
- The GREEN India 2047 study
- Should we be jolted into action
- Reviving the GREEN India 2047 message

Science and change - The Prime Minister's Advisory Council on Climate Change

- Converting challenges into opportunities
- Indian and Australia in partnership
- The message of Mr Narayanan and Mahatma Gandhi





Be the change you want to see in the world