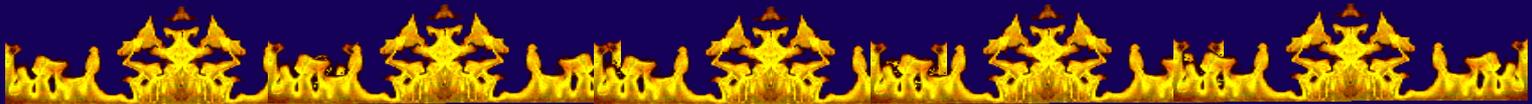


Global Warming

Dr. S.M. Talekar
Head, P.G. Dept. of Botany
Mrs. K.S.K. College Beed

What is Global Warming ?



Global warming refers to an average increase in the earth's temperature, which in turn causes change in climate.

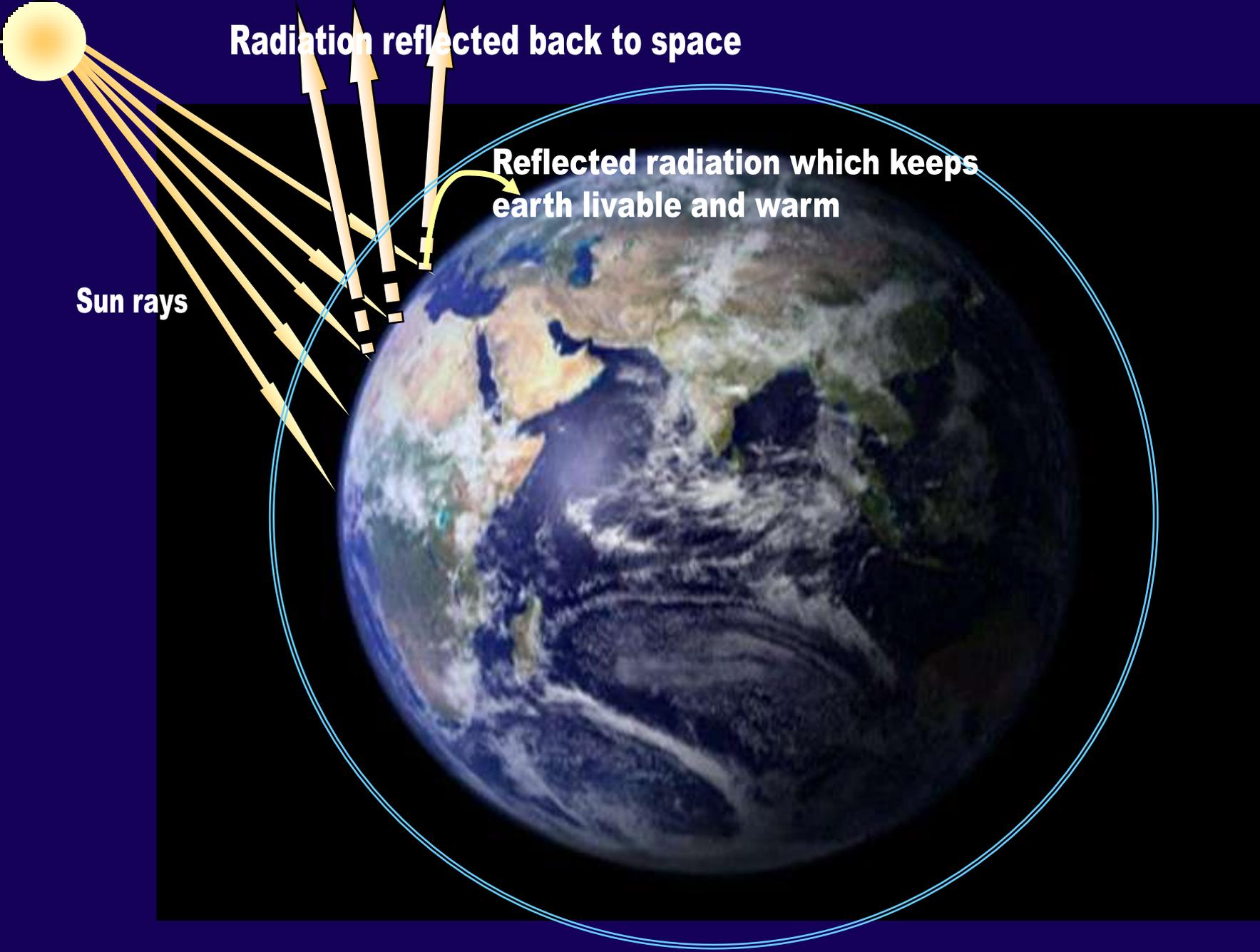
What changes climate?

Changes in:

- Sun's output
- Earth's orbit
- Drifting continents
- Volcanic eruptions
- Greenhouse gases



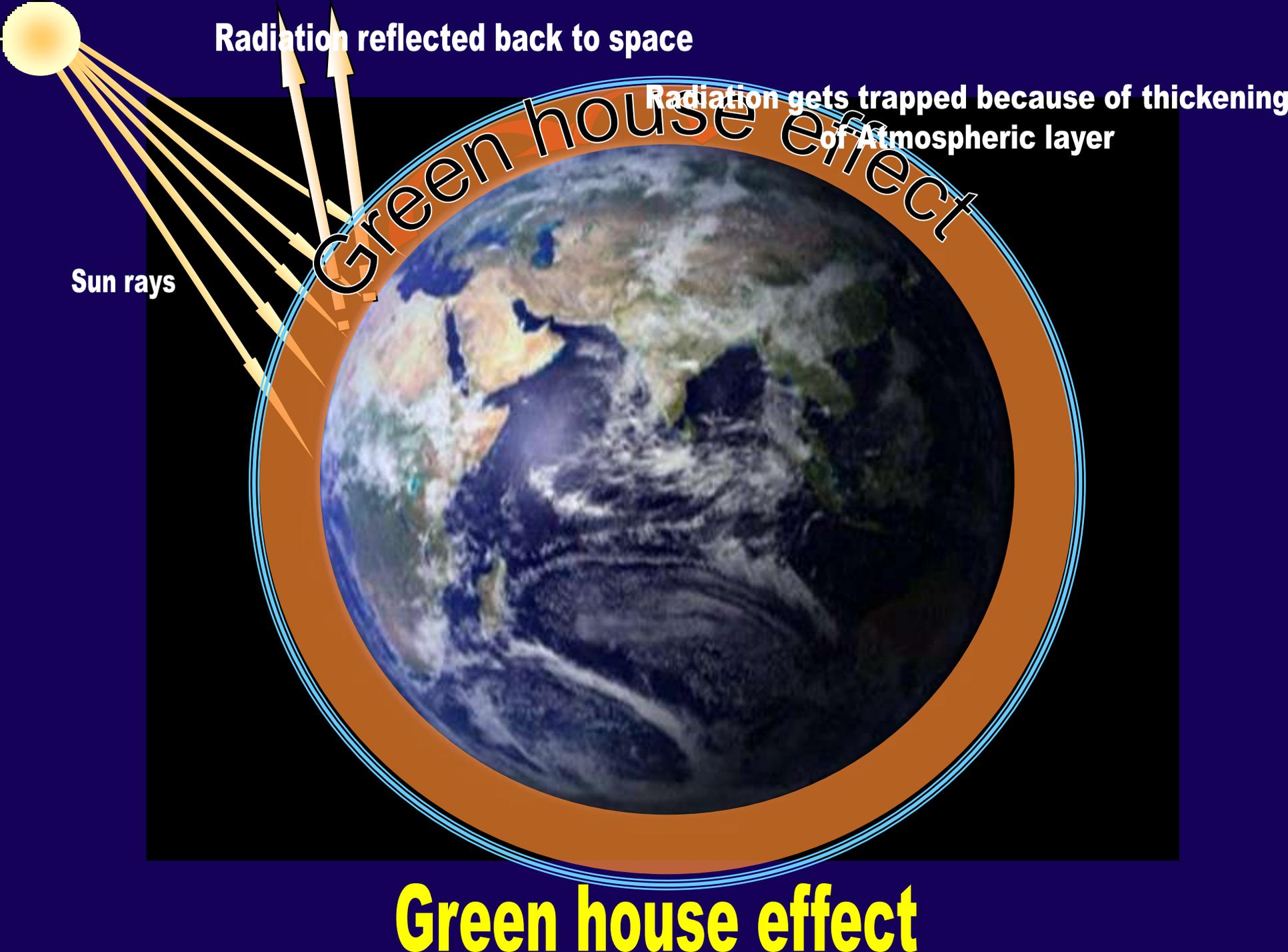
Green House Effect



Radiation reflected back to space

Reflected radiation which keeps earth livable and warm

Sun rays



Radiation reflected back to space

Radiation gets trapped because of thickening of Atmospheric layer

Green house effect

Sun rays

Green house effect

Greenhouse gases trap some of the Sun's energy with in our atmosphere and increase the warming of the earths surface and atmosphere. This is called Green House Effect.

1. Solar energy passes through the atmosphere, is absorbed by the earths surface, and warms it up.

3. Human actions gradually increase concentration of green house gases in the atmosphere and accelarate the global warming process.

2. Greenhouse gases absorb some of the reflected heat energy.



4. The Accelerated warming process has a number of dangerous impacts

The greenhouse effect

The greenhouse gases, in order of relative abundance:

- water vapor (H₂O)
- carbon dioxide (CO₂)
- methane (CH₄)
- nitrous oxide (N₂O)
- ozone
- chlorofleurocarbons (CFCs).

Quantity is not the relevant measure:

- methane and some of the less abundant gases absorb more heat than does CO₂ .

– Most except H₂O are produced in part or in total by human activity.

The greenhouse gas: Water vapours

- Water vapour comes from air passing over water bodies,
 - especially when the water is warmer than the air.
 - But the warmer the air the more water vapour it can hold,
 - There is a feedback effect in which higher air temperature leads to more water vapour, which leads to a higher air temperature

The greenhouse gas: CO₂

- CO₂ comes from volcanic eruptions but also from respiration of animals and from organic wastes.
- CO₂ is also a byproduct of combustion (which is just a fast form of decomposition of organic wastes)
 - so CO₂ has always been recycled into the atmosphere by naturally occurring fires.
 - With the industrial revolution there has been a dramatic increase in the combustion, especially from fossil fuels.
 - **As a result, it is virtually without question that human activity is increasing the amount of CO₂ in the air, with an attendant greenhouse effect.**

The greenhouse gas: Methane

- Methane is about 75% (or 97%?) of natural gas
- Methane also comes from volcanoes, fermentation in the process of digestion by animals, and decomposition of garbage.
- There are huge amounts on the bottom of oceans, and smaller amounts in the ice of the arctic tundra.
 - Enough (perhaps a trillion tons) so that some scientists think that methane released from the ocean might have caused some of the great extinctions in ancient times.
 - There are documented cases of human deaths caused by release of methane from lake bottoms (1800 in one case in Africa).

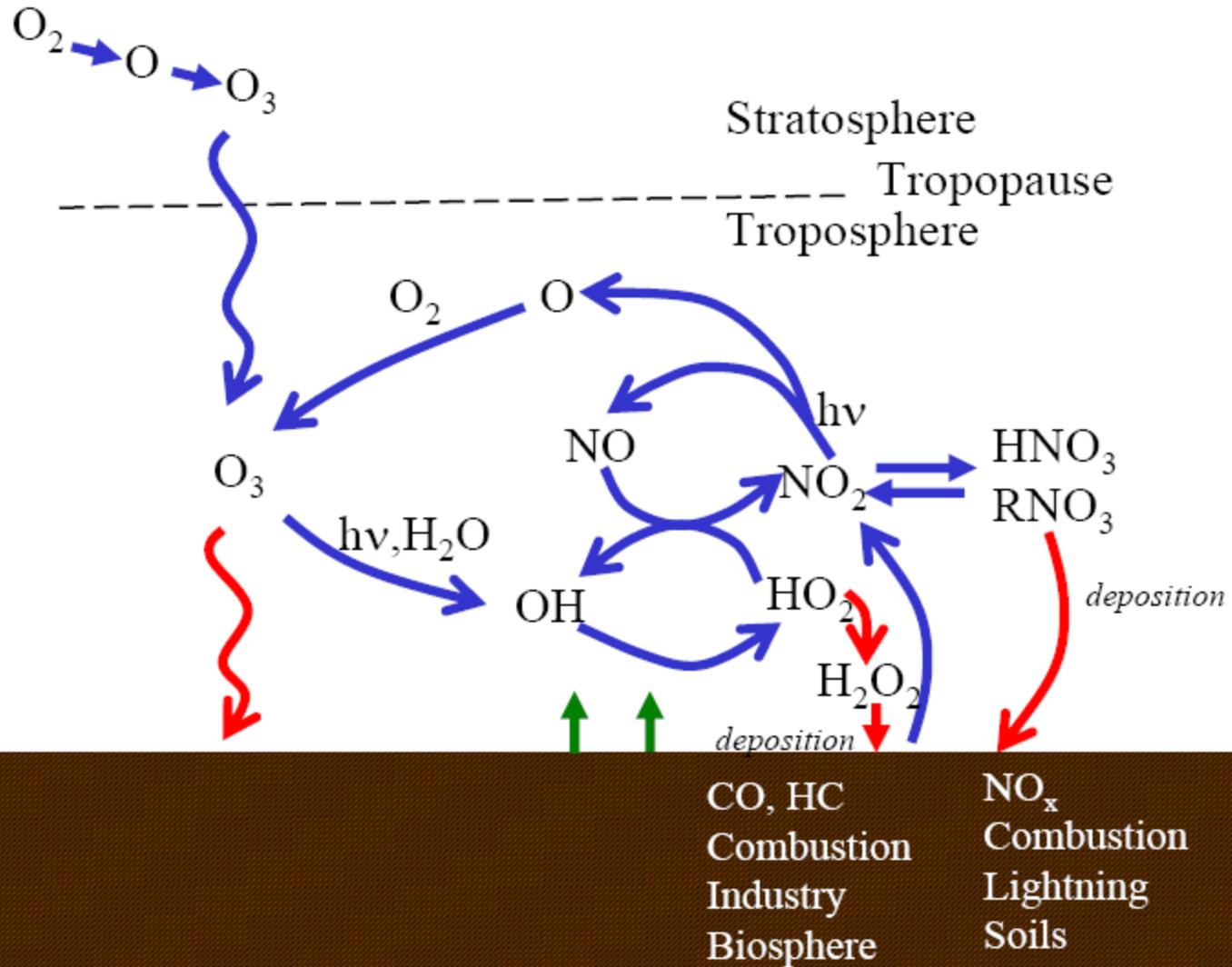
The greenhouse effect: Methane

- Most of the methane in the atmosphere oxidizes into CO₂ and water.
- Some is sequestered into soils, and some lost into the stratosphere and then to space.
- Its half-life is about 7 years; within that 7 year period it is about 20 times as effective as CO₂ as a greenhouse gas.

The greenhouse effect: Ozone

- Ozone (O_3 , a molecule consisting of 3 oxygen atoms), unlike normal oxygen (O_2) absorbs infrared radiation in the troposphere, and so is another greenhouse gas.
- It is the equivalent of about 25% of the same amount of CO_2 and has a short half-life.
- Sources are mostly from products of fuel combustion or evaporation, reacting with sunlight with oxygen as a byproduct.
- It is also created by lightning.

Origin of Tropospheric Ozone



The greenhouse effect: Nitrous Oxide

- **Human sources**

- burning of fossil fuels, esp. coal;
- nitrogen fertilizer.
- Only about 1/2 as large as natural sources.

- **Natural source**

- burning vegetation
- Volcanoes
- Soils
- lightning.

- N₂O stays in the atmosphere for approx. 150 yrs.

The greenhouse effect:CFCs

- Chlorofluorocarbons (CFCs) come from
 - aerosol propellants
 - Refrigerants
 - Solvents
 - Plastics
 - resins.
- There are **no natural sources.**
- CFCs are 100,000 times as effective a heat trap by CO₂.
- Their lifetime in the atmosphere is approx. 75 – 110 years.

The greenhouse effect

- Based on the most recent scientific report:
- “the current level of CO₂
 - (plus other greenhouse gases, in CO₂ equivalents) is today about 430 parts per million (ppm)
 - compared with 280 ppm before the Industrial Revolution.
- With the present and growing rate of emissions, the level could reach 550 ppm by 2035.
- This is almost twice the pre-industrial level, and a level that has not been reached for several million years”. (Arrow, *ibid.*)

Potential climate change and its impact

- Recently developed climate change models say that this concentration of CO₂ would raise the temperature of the earth by at least 2 degrees Celsius (almost 40F).
- Current trends would be likely to lead to a threefold increase in the amount of CO₂ by the end of the 21st century,

Potential climate change and its impact

- These forecasts, and the likely consequences, are both highly uncertain.
- Recall the possible reinforcing feedback from CO₂ to higher temperature to increased water vapour to still higher temperature.
- Increased water vapour also leads to more cloud formation, and clouds have two effects.
 - First, they reflect heat to the ground that would otherwise radiate to space.
 - Second, they reflect light that would otherwise radiate from the sun to the earth back to space.



Except one all other are
MAN-MADE EMISSIONS

ENVIRONMENTAL ASPECTS

In the past few years we have experienced:

Heat waves / Famine

Unprecedented rain / Floods

Damage and loss of crop

Increase in vector diseases

Health problems on the increase

Flooding of rivers

Cyclones

Deaths and devastation of property

Rise in Indian subcontinent summer Temperatures

India

June 2003

Temperature: 50° C (122° F)
More than 1400 Deaths



- Temperature record of 50°C in Andhra Pradesh in June 2003 more than 1400 deaths
- 51.47°C in Pakistan (Multan, May 2006)

Chhota Shigri glacier, HP



CURRENT SCIENCE, 74 VOL. 92, NO. 1, 10 JANUARY 2007



terminus region of Patsio glacier, Bhaga river basin, HP

Himalaya under threat

A stylized illustration of a mountain range with snow-capped peaks, rendered in shades of grey and white against a blue background.

1/4/2007 10:37:04 AM

(Source: Reuters)

Scientists and officials from more than 100 countries meet in Belgium -

- report predicts that glaciers in the Himalayas, the world's highest mountain range, will melt away, affecting hundreds of millions of people.
- "If current warming rates are maintained, Himalayan glaciers could decay at very rapid rates, **shrinking from the present 500,000 square kilometres to 100,000 square kilometres by 2030s,**" according to a draft technical summary.

Argentina's Upsala Glacier was once the biggest in South America, but it is now disappearing at a rate of 200 metres per year.





No snow

As the climate warms up, mountainous regions may experience lower levels of snowfall. This image shows Mount Hood in Oregon at the same time in late summer in 1985 and 2002.



Vanishing islands

Other parts of the world could face even more drastic change. The Intergovernmental Panel on Climate Change (IPCC), a consortium of several thousand independent scientists, predicts that sea levels could rise by between **9 and 88cm** in the next century. This would threaten low-lying islands such as Tuvalu in the Pacific. These images, taken this year, show the effects of a higher than usual tide.

Increase of storms



- Globally, the annual number of storms doubled from around 8 (early 70's) to 18 (2000-2004).
- The magnitude of damages caused by the 27 tropical storms in the Atlantic (2005) were the highest yet recorded.





More pests

Tree-eating wood beetles are likely to benefit from a warmer climate and reproduce in ever-increasing numbers.

These images show damage to White Spruce trees in Alaska caused by the pests.

Increasing threat of Diseases

- As an effect of global warming the diseases like **Malaria, Dengue fever, Leptospirosis and Avian flu (Bird flu)** are reemerging.
- This happens because warmer temperatures create good breeding/multiplying grounds for insects and microorganisms.

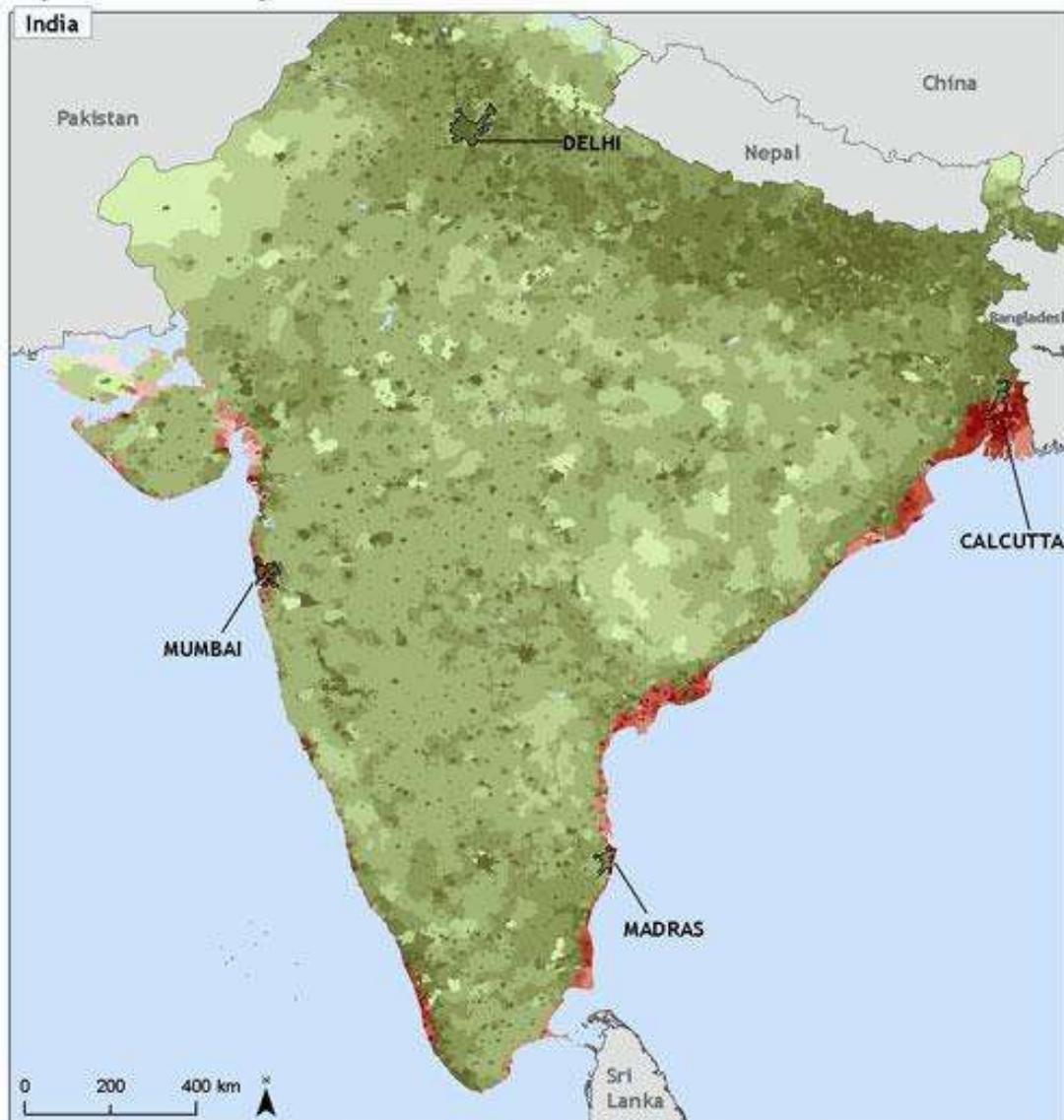


© 2014 ISTOCK/ANTONY
RENEWED THREAT: India will face a higher risk of dengue epidemics than China

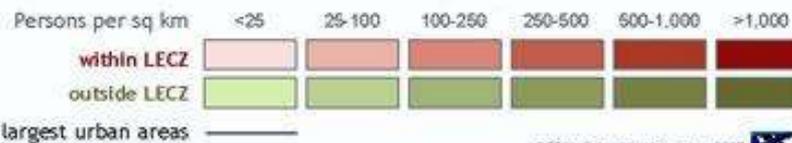


Indians are already facing increased patients suffering from epidemics

Population Density within and outside of a 10m Low Elevation Costal Zone



Population Density within and outside of a 10 meter low elevation coastal zone (LE CZ), 2000



GATEWAY OF INDIA 2020



An artist's impression of the future

PLUS: HOW TO REVIVE INDIAN CRICKET • THE TRANS FAT THREAT

APRIL 23, 2007

INDIA TODAY

GLOBAL WARMING

- Mumbai's Nariman Point will be submerged
 - 40% of Himalayan glaciers would vanish
 - Ganga delta will turn infertile
 - 25% wildlife will perish
 - Food and water shortages will be the norm
 - Dengue and cholera will spread ...
- ... says the latest UN panel report.

GATEWAY OF INDIA 2020



An artist's impression of the future

WHAT WE CAN DO TO **SAVE INDIA**

Floods in Mumbai



©mid-day.com

Mumbai 26th July 2005

- 37 inches of rain in 24 hours
- 1000 deaths







1999



2004

© GARY BRANSON

Rising tides

Some scientists predict that a warmer climate will trigger more violent storms, which will cause increased rates of coastal erosion.

This is a section of shoreline at **Cape Hatteras in North Carolina in the USA**, pictured in 1999 and 2004. The southern United States and Caribbean region were battered by a series of powerful hurricanes last year.

Rising sea levels are also expected to speed up coastal erosion.

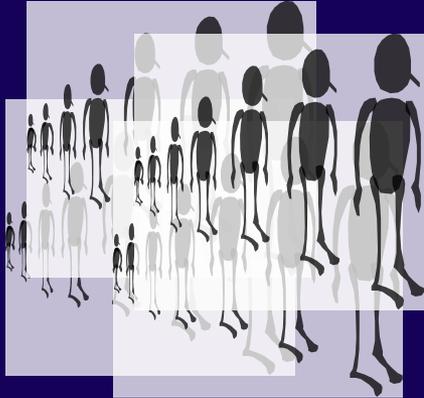
Sea level rise



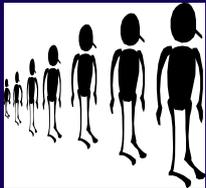
Sunderbans

The obliteration of Lohachara island, in India's part of the Sundarbans where the Ganges and the Brahmaputra rivers empty into the Bay of Bengal, marks the moment when one of the most apocalyptic predictions of environmentalists and climate scientists has started coming true.

Pune since 1960



Population ↑ 4 times



Road ↑ 5 times



Motorized vehicles ↑ 87 times



Use of public transport decreased by 60%

IS THIS WHAT WE DESERVE?????



Industries



Transportation



- 27% of all manmade CO_2 emissions are transportation related.
- 750 million cars worldwide emit a total of approximately 2.25 billion tons of CO_2 each year.

Deforestation



Increasing Forest fires



Combating Climate Change



Solutions to the Problem

- Institutional Efforts/
Governmental Efforts
- Individual Efforts

Institutional Efforts/ Governmental Efforts

- Sectors like Industry, Energy, Private, Household and Traffic
- Actions at Political and Business Level
- Policies

Individual Efforts

- Reduce fossil fuel
- Reduce consumption of electricity
 - Segregate garbage - vermicompost wet waste
 - Plant trees
 - Spread the message

WHAT WE NEED TO DO

- PLEDGE you will not use your vehicle at least once a week
- Share a bike
- Try to monitor least use of vehicle
- See if you have a convenient bus
- Walking/cycling can do you good

Tell others -

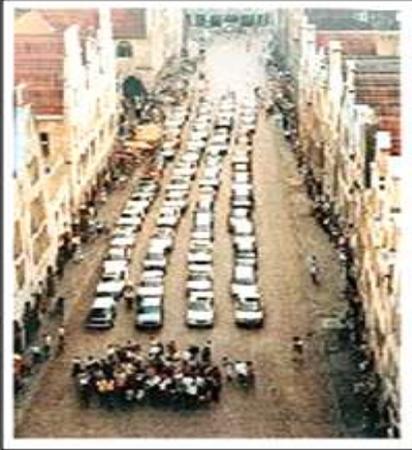


To check
the tires
regularly

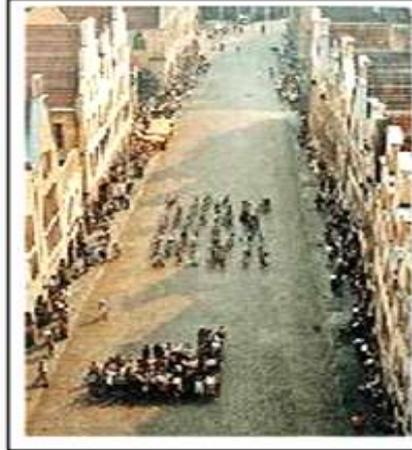


Walk don't
drive

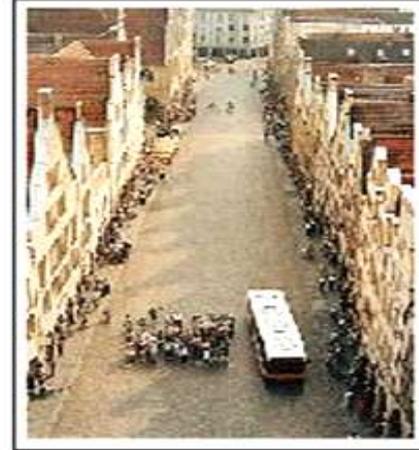
USE PUBLIC TRANSPORT



Cars



Bicycles



A Bus

REDUCE AIR TRAVEL



Rapid efficient public transport



CONSUME LESS

CONSUME LESS - No! we are not expecting you to turn into a yogi but there is no need to go to the other extreme either. When you are about to buy something, ask yourself whether you really need it?



Indian Scenario

- Power generation units adds more CO_2 than any other source.
- Electricity use per person has increased to over 430 kilowatt-hours (kWh) per year, up from 90 kWh in 1972.
- The power sector now represents 40 percent of total primary energy use in India, including nearly 70 percent of all coal use.

What We Can Do

- Evidence shows that CO₂ emissions from fossil fuels used in vehicles and dirty power plants are warming the earth.
- The good news is that we can cool it by **saving energy and using more renewable energy**.
- We can all take action to reduce the amount of CO₂ that we generate. See how quickly and easily we can reduce emissions and save money too.
- You can cut your CO₂ emissions by about 20,000 pounds with these easy actions.

Consume less
electricity

CHANGE YOUR BULBS



They use only one quarter of the electricity
and last longer

SWITCH OFF THE LIGHTS

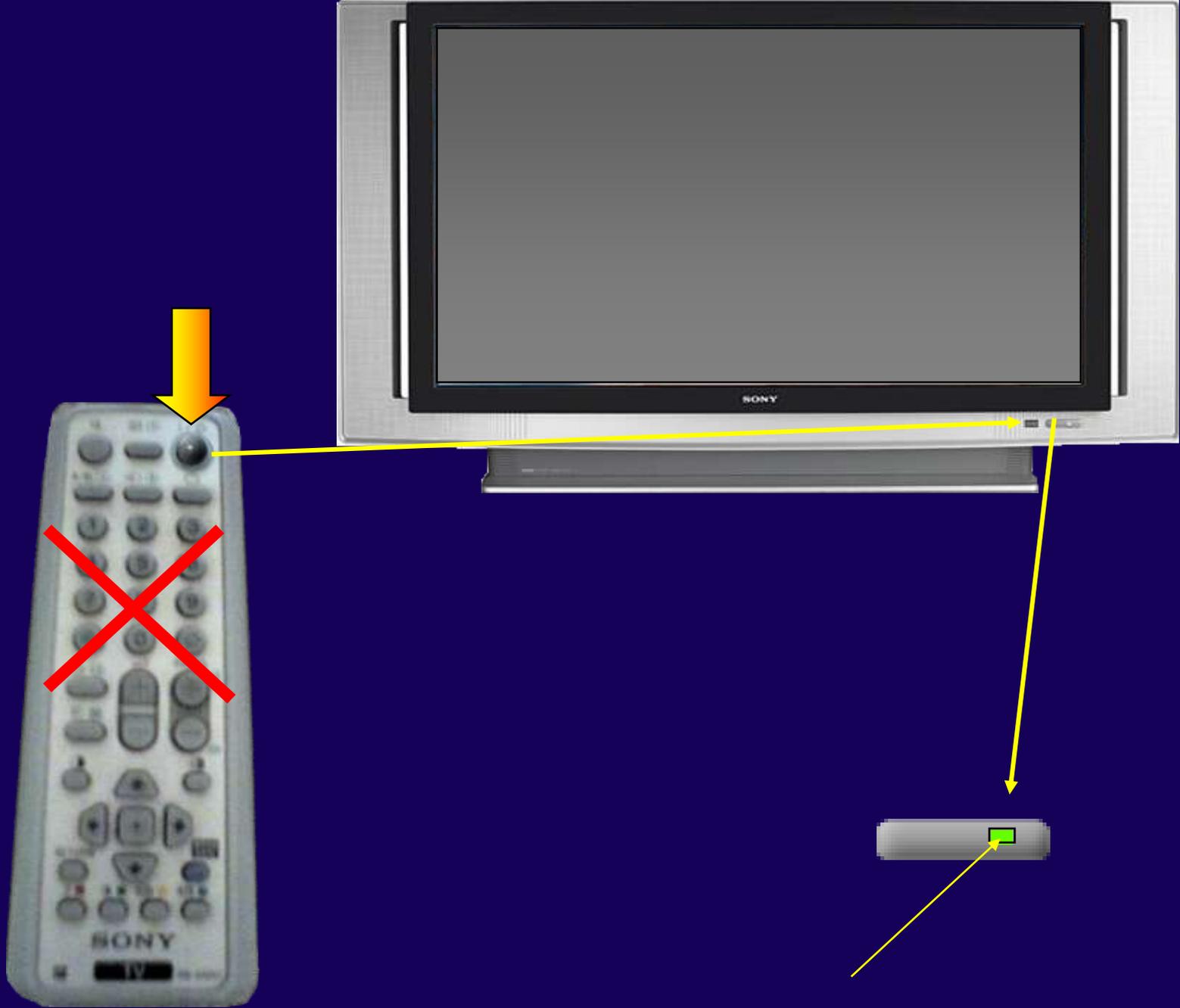
SWITCH OFF THE LIGHTS while sleeping or when office shuts down. You will be surprised by the amount of energy you save.



Do not use remote control

to switch off electrical devices





There is still power in the circuit

TURN COMPUTERS OFF

TURN COMPUTERS OFF when not in use.
They consume as much electricity as
three 60 watt bulbs,
so avoid the standby mode.



BUY ENERGY-EFFICIENT APPLIANCES

BUY ENERGY-EFFICIENT APPLIANCES Next time you buy an iron, an oven, a refrigerators or even an air-conditioner, opt for models by manufacturers whose moto is energy efficiency. It will cut your electricity bills and India's emission levels.



TURN THE GEYSER OFF

TURN THE GEYSER OFF after a bath so that water is heated only when you need it. Also, good quality shower heads ensure the flow of water is low but efficient, thereby conserving energy.



USE SOLAR DEVICES

USE SOLAR DEVICES to heat water for bathing - such heaters have got better over the years.



CONSERVE WATER

TURN THE TAP OFF

TURN THE TAP OFF while soaping your face or shaving. Don't let the water flow unnecessarily. Water is going to be a scarce commodity if you don't learn to conserve it now.



PLANT TREES



GROW MORE TREES



SAVE PAPER



TELL OTHERS

LET OTHERS KNOW

LET OTHERS KNOW



You may be conserving the natural resources but if your neighbour isn't then you are still far away from your moral duty.



Educate others.



A satellite view of Earth showing the African continent and surrounding oceans. The image is a high-resolution photograph of the planet, with the African continent prominently displayed in the center. The landmasses are shown in various shades of green, yellow, and brown, indicating different vegetation and terrain types. The surrounding oceans are a deep blue, with white clouds scattered across the surface. The overall image is set against a black background, emphasizing the curvature and details of the Earth.

We have only ONE Earth



When we heal the earth, we heal ourselves
~ David Orr

Make Change Now



The World Can't Wait

THANK YOU

Dr. V. R. NAGARALE
Reader & Head
Department of Geography
S.N.D.T. Women's University,
P.G.S.R., Karve Road Pune -38
vr_nagarale@yahoo.co.in

Bibliography

ALERT Pune