



Climate Change: Impacts, & Actions Needed

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Environment Care Association



Environment Care Association

- **Registered:** December 2006
- **Vision:** A clean and sound environment and a good way of life for the present and future generation of Mauritians.
- **Mission:** To sensitise all our fellow citizens to protect the environment, to use natural resources efficiently and to show how each of us can contribute to combat climate change.



Projects undertaken so far

- **“Sensitisation on Environment Protection With Emphasis On Climate Change”**: 340 talks (on Power Point) have been delivered to various target groups of the Mauritian population (28,000)especially primary school children and college students; 2008-2010,**project completed**;
- **“Tsunami Awareness Programme”**; **85** talks have been delivered to various target groups especially in the coastal areas; 2009-2010,**project completed**;
- **Waste Segregation in Schools** :to sensitise school children on the importance of sorting out waste for recycling and composting; project started Aug 2010 & on going;



Outline

- **Environment Care Association;**
- **How the climate is changing?**
- **The Biosphere & the Earth's atmosphere;**
- **What is greenhouse effect & why is it increasing?**
- **How are the main greenhouse gases (GHG) produced by man?**
- **What impacts have been observed at present & what are the forecast for the future?**
- **Economic cost of climate change,**
- **The need for concrete and rapid international actions.**
- **Measures to tackle climate change**



How is climate changing?

- **Warming of climate is now unequivocal,**
- **Numerous observations of increasing air & ocean temperatures, widespread melting of ice , snow & glaziers, rising sea levels,**
- **11 of last 12 years (1995-2006) rank among 12 warmest years ever recorded,**
- **Temp. increased by 0.74°C over last 100 years,**
- **Sea level risen by 17 cm during 20th century,**
- **Changes in droughts, precipitations, frequency of heat waves, intensity of cyclones, migration of birds, flowering of plants.**



The biosphere





The Biosphere I

- **All life exists in the small space on the surface of our planet known as the biosphere.**
- **The biosphere extends from the deepest ocean trenches, about 8 km below the Earth's surface to an average of 12 km above.**
- **Life on Earth is not evenly distributed;**
- **Best estimate of plant & animal species: 10 million, but only 1.7 million recorded so far,**
- **All species form part of a complex interacting and interdependent system.**



The Biosphere II

- **There are about 6.7 billion people on Earth now. This figure will probably reach 9 billion by 2050,**
- **All these populations will need food, energy and work; all of which have implications for the future of climate change.**
- **Unequal use of resources: If everyone in the world used the same amount of resources as people in Europe, we would need three Planet Earths to provide these resources and manage all our waste.**
- **The consumption of scarce resources is in itself contributing to global warming.**

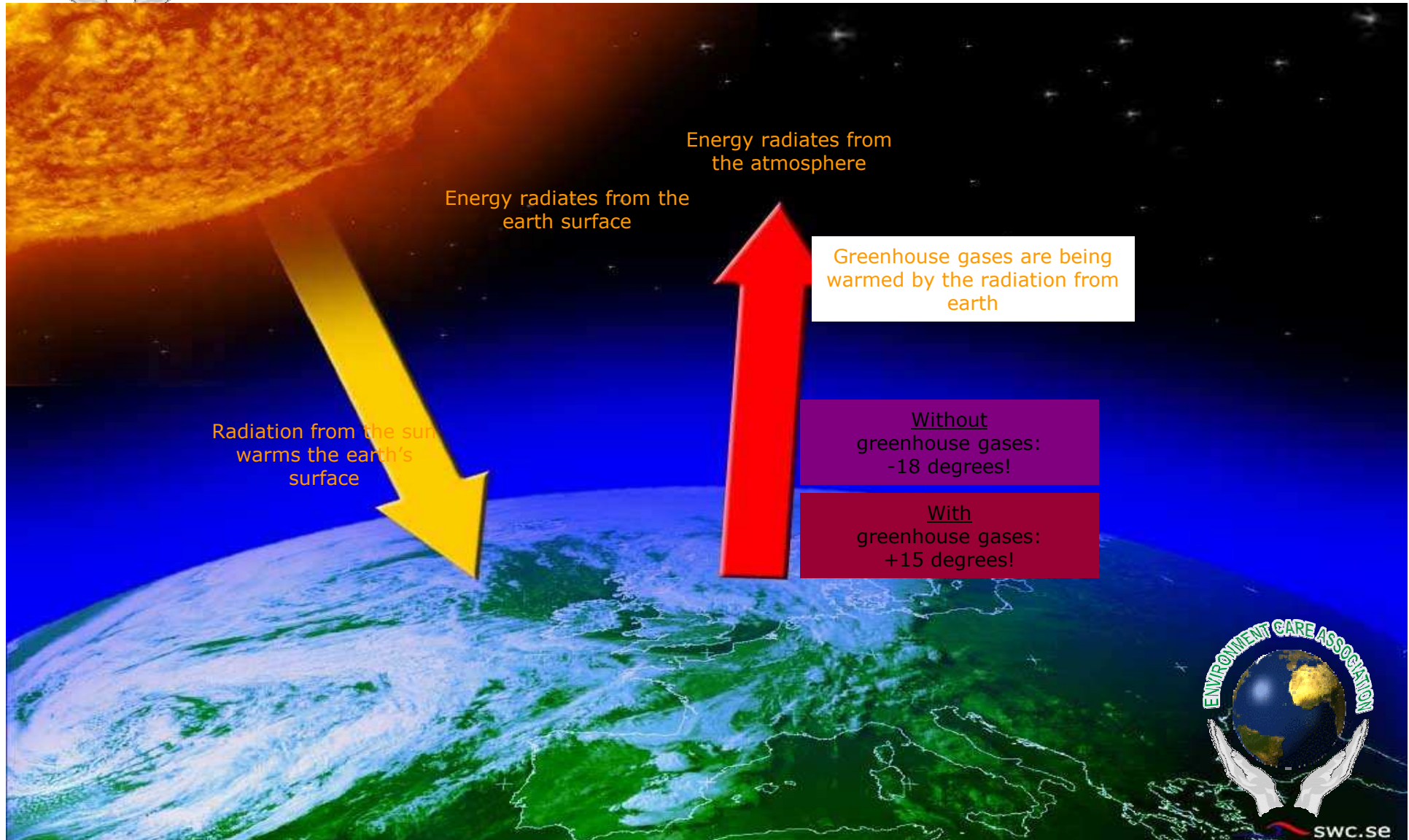


Earth's atmosphere

- **The atmosphere is the thin envelope of gases that (i) protects us from ultraviolet radiation from the sun and (ii) regulates the global temperature through the greenhouse effect.**
- **Without the protection of the atmosphere, life on Earth would cease to exist.**
- **The densest, innermost part of the atmosphere, the troposphere, is just 17 km thick at the equator and 7 km thick at the poles.**
- **The Earth is 12,700 km in diameter - and the atmosphere could be compared to a single layer of varnish on an ordinary classroom globe.**



What is greenhouse effect?





What is greenhouse effect?

- **It is a natural phenomenon indispensable to life on Earth,**
- **Earth receives all its energy from the sun,**
- **Part of the reflected energy (I.R.) is trapped by natural greenhouse gases(carbon dioxide, methane, nitrous oxide) present in the atmosphere & thus the earth is warmed,**
- **With the greenhouse effect, the Earth's average temperature is 15°C instead of -18°C.**



Why is the greenhouse effect increasing?

- **Human activities are emitting more and more greenhouse gases (GHG) in the atmosphere,**
- **Some GHG even in small amount are very effective in trapping energy,**
- **The surplus GHG are enhancing the warming of the climate,**
- **Greenhouse effect is increasing due to human activities since two centuries.**

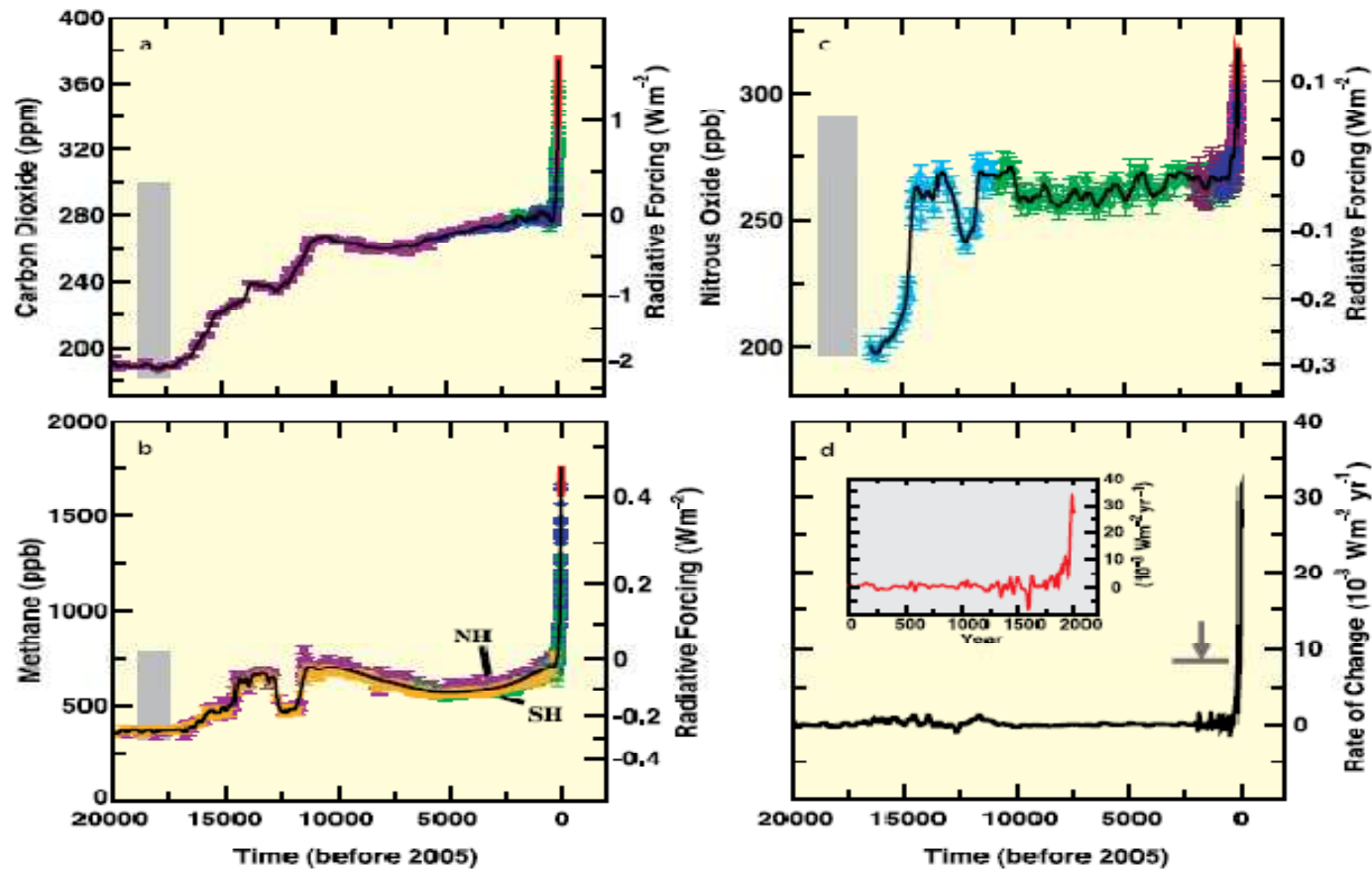


Figure TS.2. The concentrations and radiative forcing by (a) carbon dioxide (CO_2), (b) methane (CH_4), (c) nitrous oxide (N_2O) and (d) the rate of change in their combined radiative forcing over the last 20,000 years reconstructed from antarctic and Greenland ice and firn data (symbols) and direct atmospheric measurements (panels a,b,c, red lines). The grey bars show the reconstructed ranges of natural variability for the past 650,000 years. The rate of change in radiative forcing (panel d, black line) has been computed from spline fits to the concentration data. The width of the age spread in the ice data varies from about 20 years for sites with a high accumulation of snow such as Law Dome, Antarctica, to about 200 years for low-accumulation sites such as Dome C, Antarctica. The arrow shows the peak in the rate of change in radiative forcing that would result if the anthropogenic signals of CO_2 , CH_4 , and N_2O had been smoothed corresponding to conditions at the low-accumulation Dome C site. The negative rate of change in forcing around 1600 shown in the higher-resolution inset in panel d results from a CO_2 decrease of about 10 ppm in the Law Dome record. (Figure 6.4)



How are the main GHG produced by man?

- **Carbon dioxide is produced by burning of fossil fuels (coal, petrol, natural gases) in energy production, industries, transport, building sectors, by deforestation and burning of wood,**
- **Methane is produced in agriculture (paddy), livestock production, and in landfills,**
- **Nitrous oxide is emitted from fertilizers & chemical processes,**
- **Fluorinated gases (CFC & HFC) are produced in industries.**



Human activities produce greenhouse gases



energy production, industry: **carbon dioxide(CO₂)**



waste landfill: **Methane (CH₄)**



An. husbandry: **methane(CH₄)**



freezer, aerosol spray: **chlorofluorocarbons(CFCs)**



vehicle exhaust : **Carbon Dioxide**



Methane from paddy fields





What are the World Climate experts saying?

Fourth IPCC report (2007) specifies:

- **Warming due to human activities with 90% certainty,**
- **Average surface warming during last century was 0.74°C,**
- **Temperature could increase by 1.1- 6.4°C by 2100,**
- **GHG have increased greatly since pre-industrialization period, (70% increase between 1970 and 2004),**



Impacts observed at present & forecast for the future

Climate change impacts being felt in 5 main sectors:

- **Extreme climatic events** (cyclones, floods, droughts, heat waves);
- **Disruptions in many ecosystems** (extinction of 20-30% of species, bleaching of corals),
- **Crisis in food resources:** in Asia, Africa, tropics, food production will fall provoking conflicts & migrations,
- **Sanitary problems:** the increase and spreading of disease vectors to new areas,
- **Migration of human population:** sea level rise (90-150 cm by 2100) will cause flooding of coastal zones & disappearance of entire islands (Maldives, Tuvalu).



Weather and climate extremes



(Source: US National Oceanic Atmospheric Administration)

Global warming leads to increase in occurrence of heat wave, drought and flooding events, and the increase in tropical cyclone intensity



Landslide and flooding



(Source: Geotechnical Engineering Office)



(Source: Apple Daily)



Bleaching of corals





Mountain practically free of snow





Acidification of oceans: Dissolving sea shells & corals



Some effects of global warming on agriculture

Loss of biodiversity in fragile environments/
tropical forests

Loss of fertile coastal lands caused by rising sea levels

Increased frequency of weather extremes
(storms/floods/droughts)

Longer growing seasons in cool areas

More unpredictable farming conditions in tropical areas

Increase in incidence of pests and vector-borne diseases

Dramatic changes in distribution and quantities of fish and sea foods

Long-term fluctuations in weather patterns could have extreme impacts on agricultural production, slashing crop yields and forcing farmers to adopt new agricultural practices in response to altered conditions.



Climate change affects human health



More mosquitoes, easier to transmit dengue fever and malaria



More ticks, easier to transmit some infectious diseases



The need for concrete and rapid international actions

- **UNFCCC stipulates: the GHG concentrations in the atmosphere should be stabilized at a level which prevent any disruption in the climatic system.**
- **Kyoto Protocol sets binding targets for 37 Industrialized countries to reduce their GHG emissions by 5% against 1990 levels.**
- **Copenhagen Conference (2009): there was great hope for a new viable treaty to be negotiated & rapid actions started in all countries but result was unsatisfactory.**
- **It is high time that countries pursue their economic development in a sustainable manner so as to stabilize GHG concentrations in the atmosphere.**



Main points of the agreement at Cancun 2010

All countries to cut emissions:

- **Payments for countries who avoid deforestation and conserve nature**
- **Finance deal to provide \$30bn for developing countries to adapt to climate change now, and potentially up to \$100bn later.**
- **A new UN climate fund to be run mostly by developing countries**
- **Easier transfer of low carbon technology and expertise to poor countries**
- **China, the US and other major emitters to have their economies inspected**
- **Scientific review of progress after five years**



How to tackle climate change? I

Mitigation: Reduce greenhouse gas emissions,

- **Burning fossil fuels (coals & oils) more efficiently, (improved motors, generators)**
- **Switching to renewable energy (solar, wind, biomass),**
- **Developing new technology for industry & transport,**
- **Expanding forest.**



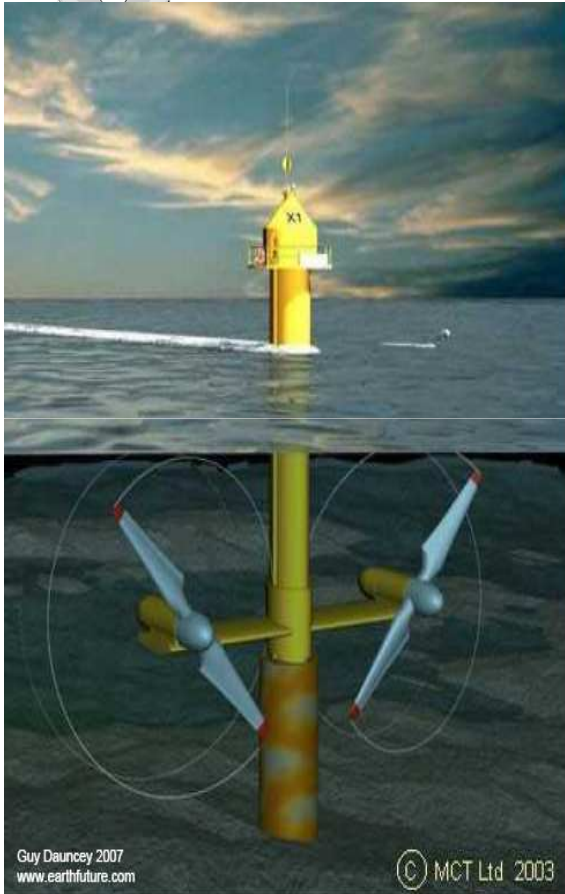
How to tackle climate change? II

Adaptation: Make adjustments & changes at all level,

- **Changes in behaviour & lifestyle- consumption pattern, water use, agriculture,**
- **Structural changes-bridges, roads,**
- **Policy based responses-risk management,**
- **Technological responses-sea defenses, forest plantation,**
- **Management responses- improved forests management & biodiversity conservation.**



Tidal & wave energy



Tidal energy

BC's potential:
2,500 MW

Guy Dauncey 2007
www.earthfuture.com

© MCT Ltd 2003

Wave energy

9 cents kWh



500 kW Limpet, Islay, Scotland



Pelamis, off Portugal



Use of biomass & biogas



Biomass power
5-12 cents/kWh



Biogas

16 million household digesters
13 - 18 cents kWh

Anaerobic digestion and co-generation creates
electricity, heat, and fertilizer



Measures that could be taken individually

- **Conservation of energy: use energy efficient electric appliances; use natural daylight, energy saving bulbs - (CEB);**
- **Refrigerator: do not open door longer than necessary, cool food before storing, cover liquid food;**
- **Air conditioners: adjust temp. to 5° below ambient, close doors/windows, clean filters;**
- **Washing Machines: use to full load, 80% electricity for heating water, use cold cycle programme,**



Measures that could be taken individually

- **Apparatus on standby: cellular phone, printer, scanner, tv –Switch off when not in use;**
- **Use renewable energy: solar, wind, hydro;**
- **Use solar water heater: free, non polluting energy available all year round ;**
- **Recycling: paper, glass, plastics (PET bottles), water;**
- **Composting: kitchen waste >50% organic,**
- **Transport: walk, cycle, public transport, car pooling, small & fuel efficient car;**



Measures that could be taken individually

- **Consumption: buy eco-labeled products, locally produced & seasonal food products, prefer to eat vegetable products instead of meat products;**
- **Paper: use both sides, use email instead of letters;**
- **Plant trees: numerous benefits, absorb CO₂;**



Renewable energy & conservation of energy





Human responsibility

- **Humans have a responsibility to care for Planet Earth, to save other species from extinction, to preserve threatened ecosystems, and try to reverse the harm that human activities have caused.**
- **We need to reduce our consumption of the Earth's resources to a sustainable level, stop our reliance on fossil fuels, and reduce the emissions of greenhouse gases to stop global warming.**



**Thank you
for your attention**