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Kick the Carbon Habit

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CO_2 - KICK THE HABIT!

The Fourth Assessment report of the Intergovernmental Panel on Climate Change (IPCCAR4) concluded from direct observations of changes in temperature, sea level, and snow cover in the northern hemisphere during 1850 to the present, that the warming of the earth's climate system is unequivocal. The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 379 ppm in 2005. Multi- model averages show that the temperature increases during 2090-2099, may range from 1.1 to 6.4^{o}C and sea level rise from 0.18 to 0.59 meters. These could lead to impacts on freshwater availability, oceanic acidification, and food production, flooding of coastal areas and increased burden of vector borne and water borne diseases associated with extreme weather events (NAPCC, 2008).

I. Climate Change Impacts in India:

Climate Change is projected to impact tropical countries more negatively than temperate ones. India's 7500 km coastline will be particularly hard-hit by storm surges and sea-level rise displacing millions, flooding low-lying areas, and damage economic assets and infrastructure. For the 700 million people in rural India who are dependent on the most climate-sensitive sectors for their livelihoods-agriculture, forest and fisheries the future brings declining crop yields, degraded lands, water shortages and ill health.

The phenomena consistent with climate change projections for India can already be seen across the country. The Super Cyclone of 1999 wreaked havoc on coastal Orissa, knocking its development and killing more than30,000. Disease such as malaria and dengue have increased their geographical range. Rising temperature and retreating snow-line in Himachal have fatally affected its once-legendary apple industry and crippled local economy (Malini Mehra, 2007).

II. Impact on Forest and Biodiversity:

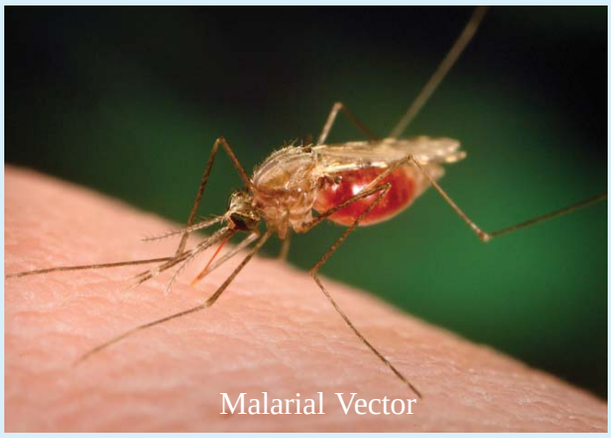
The Third Assessment Report of IPCC concluded that recent modeling studies indicate that forest ecosystems could be seriously impacted by future climate change. Even with Global warming of 1-2^{0}C, most ecosystems and landscapes will be impacted through changes in species composition, productivity and biodiversity. These have implications for the livelihoods of people who depend on forest resources for their livelihoods. The research study carried out in Himachal Pradesh and Western Ghats indicated moderate to large-scale shifts in vegetation types, with implications for forest dieback and biodiversity (Ravindranath, 2006). It is also estimated that up to 50% of the country's flora and fauna could be threatened, with at least a quarter of our biodiversity lost. For a country with such a long and mythic self – identification with our plant and wildlife, the loss of our natural heritage will carry both socio-cultural as well as significant livelihood implications (Malini Mehra, 2007).

III. Impact on Agriculture

In India, the Climate change will affect agricultural yield directly because of alterations in temperature and rainfall, and indirectly through changes in soil quality, pests, and diseases. In particular, the yield of cereals is expected to decline in India, as the temperature rises conditions will become more favorable for pests such as grasshoppers to complete a number of reproduction cycles thereby increasing their population. In the higher latitudes agriculture will benefit with the rise in temperature as the winter season will be shorter and the growing seasons longer. This will also mean that pests that will move towards the higher latitudes as the temperatures rise. Extreme weather conditions such as high temperature, heavy rainfall, floods, droughts, etc. will also affect crop production.

IV. Impact on Health

In India, the most endemic malarious regions emerge as the central and eastern Indian regions of the country covering Madhya Pradesh, Jharkhand, Chhatisgarh, Orissa, West Bengal and Assam in the current climate conditions. It is projected that malaria is likely to persist in Orissa, West Bengal and southern parts of Assam, bordering north of West Bengal, it may shift from the central Indian region to the south western coastal states of Maharashtra, Karnataka and Kerala. Also the northern states, including



Malarial Vector

Himachal Pradesh and Arunachal Pradesh, Nagaland, Manipur and Mizoram in the northeast may become malaria prone. The duration of the transmission windows is likely to widen in northern and western states and shorten in the southern states (Sumana Bhattacharya, 2006).

V. Impact on river basins

In India, there is a general overall reduction in the quantity of the available runoff under the GHG scenario. Luni with the west-flowing rivers Kutch and Saurastra which occupies about one fourth of the area of Gujarat and 60 per cent of the area of Rajasthan shall face acute water scarce conditions. River basins of Mahi, Pennar, Sabarmati and Tapi shall also face water shortage. River basins belonging to Cauvery, Ganga, Narmada and Krishna shall experience seasonal or regular water-stressed conditions. River basins belonging to Godavari, Brahmani and Mahanadi shall not have water shortages but are predicted to face severe flood conditions (Gosain, 2006). The rapid melting of the Himalayan glaciers is the source of our major river systems and they are the source of water for 40% of humanity. Countries like China, India, Bhutan and Burma all share these borders. If the rivers do run dry, a more serious cause of regional destabilization can scarcely be imagined.

Water deficient river basins

VI. Impact on Coastal environment

Among the coastal states of India, Tamil Nadu's 1,076 km of coast is the second longest. The state's coastal area is exposed to multiple hazards: coastal floods, tsunamis, storm surges, cyclones and Strong winds. Along with the states of Orissa and Andhra Pradesh, Tamil Nadu is most affected by cyclones. India's eastern coastal districts are more vulnerable to coastal disasters than districts on the west coast. According to the Asian Disaster Preparedness Centre, four times more cyclones are formed in the Bay of Bengal than in the Arabian Sea.

The mean Sea Level Rise (SLR) of 15 to 38 cm is projected along India's coast by the mid 21st century and of 46 to 59 cm by 2100. India's NATCOM assessed the vulnerability of coastal districts based on physical exposure to SLR, social exposure based on population affected, and economic impacts. In addition, a projected increase in the intensity of tropical cyclones poses a threat to the heavily populated coastal zones in the country (NATCOM, 2004).

The most vulnerable areas along the Indian coastline are the Kutch region of Gujarat, Mumbai and South Kerala, deltas of rivers Ganga (West Bengal), Cauvery (Tamilnadu), Krishna and Godawari (Andhra Pradesh) and Mahanadi (Orissa). In terms of population, West Bengal, Maharashtra and Tamilnadu would be worst affected because of their high population density. The research study indicates that 0.07 million hectares of Tamilnadu's total coastal area of 13 million hectares are likely to be inundated by sea-level rise. The inundation will affect over 1.62 million people (Janakarajan, 2007).

In coastal regions restrictions have been imposed in the area between 200m and 500m of the HTL to protect the sensitive coastal ecosystems and prevent their exploitation (NCPCC, 2008).

Cyclone

VII. India's Initiatives:

The National action Plan for Climate Change(NAPCC) responds to the decision of the PM's council, as well as updates India's National Programmes relevant to addressing climate change. In order to achieve a sustainable development path that simultaneously advances economic and environmental objectives, the National Action Plan for Climate Change guided by the following principles:

• Protecting the poor and vulnerable sections of society through an inclusive and sustainable development strategy, sensitive to climate change.
• Achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, leading to further mitigation of greenhouse gas emissions.
• Devising efficient and cost-effective strategies for end use Demand Side Management.
• Deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions extensively as well as at an accelerated pace.
• Engineering new and innovative forms of market regulatory and voluntary mechanisms to promote sustainable development.
• Effecting Implementation of programmes through unique linkages, including with civil society and local government institutions and through public- private-partnership.
• Welcoming international cooperation for research, development, sharing and transfer of technologies.

Eight National Missions

There are Eight National Missions which form the core of the National Action Plan, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. The eight national missions are National Solar Mission, National Mission for Enhanced Energy efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National mission for Green India, National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge for Climate Change.

VIII. Climate Change Initiatives in TN:

The Tamil Nadu Government has announced a one time grant of rupees one crore for spreading awareness and encouraging research on Climate Change in the department of environment budget for the year 2008-09 and also carrying out a detail study on the impact of Climate Change in Tamil Nadu and remedial strategies to compact Climate Change in collaboration with Anna University, Chennai. The TN Government is encouraging Clean Development Mechanism (CDM) which would generate additional revenue for the renewable energy projects.

ELECTRICITY WITHOUT CARBON

The Tamil Nadu Energy Development Agency (TEDA) is a Nodal Agency of the Ministry of New and Renewable Energy (MNRE), GoI for the promotion of Renewable Energy schemes in the State. Tamil Nadu has been in the forefront, in producing power from the Renewable Energy sources such as Wind, Biomass etc. and feeding to the Grid supplementing the conventional power. The installed capacity of power generation in Tamil Nadu from the Renewable Energy sources is 4115 MW (TEDA, 2008).

1. Wind Energy

Tamil Nadu rank first place in the wind energy production, the total installed capacity in India is 8757MW of which T.N has produced 3856MW. Tamil Nadu is endowed with three lengthy mountain ranges on the Western side with potential of producing 1650 MW of wind energy in Palghat pass, Coimbatore District, 1300 MW in Shengottai pass, Tirunelveli District and 2100 MW in Arelvaymozhi pass, Kanniyakumari District. There are 41 Wind potential sites in 8 Districts in the State, declared by MNRE, as suitable for Wind Power projects (TEDA, 2007).


Windmills at Aralvaimozhi

2. Solar Energy

Solar radiation sustains all forms of life on earth. According to estimates, sun radiates about 1.74 x 10^{17} W of power per hour to earth. The main features of solar radiation are its wide spread distribution, inexhaustible supply and pollution free source of energy. The electricity thus generated can be used for lighting or other electrical applications. TEDA has implemented the Electrification of remote unelectrified habitations in 12 districts by using Solar Photovoltaic lights and also with the assistance of MNRE, TN Government has implemented Solar PV street lights, Solar PV power plant and integrated Photovoltaic systems. Under the new schemes projects like solar street / public garden lights, illuminated hoardings, solar road studs, solar blinker, solar traffic signals, solar water pumps, solar fencing, solar traps are implemented (TEDA, 2008).

Solar heaters

3. Bagasse based Co-generation:

Generation of steam at high pressure for power generation in turbines and subsequent use of the same at lower pressure for process heating application is termed as cogeneration. Conventional combustion technology is used for producing steam by burning bagasse. Tamil Nadu stands first in the country in co-generation of power from sugar mills 3 co-operative and 16 private sugar mills have installed cogeneration plant, the total installed capacity under cogeneration in Tamil Nadu is 446.10 MW (TEDA, 2008).

4. Biomass Gasifiers:

Biomass Gasifiers are installed in various places in Tamil Nadu. Biomass gasification is basically conversion of solid biomass such as wood, wood waste, agricultural residues etc., into a combustible gas mixture normally called

Biomass Gasifier

producer gas. Energy can be produced from biomass through gasification as well as combustion route. In combustion route, biomass is burnt fully to produce steam which in turn is used for power generation through turbines. In gasification process, biomass is burnt partially and converted into producer gas which is used for thermal or electrical applications. The cumulative installed capacity of grid interactive biomass and biogases based Co-generation in Tamil Nadu is 474.60 MW (TEDA, 2008).

5. Power from Industrial Waste:

Biomethanation is the most preferred route for recovery of energy from Biomass wastes having higher moisture and organic content. Combustion technology is used for producing steam from Municipal solid wastes that contain high amount of organic non-bio degradable matter and low moisture content. The Chennai Metrowater is generating electricity through biogas from sewage sludge in four plants at Koyambedu, Nesapakkam, Kodungaiyur and Perungudi. The water agency would be presented 'carbon credits' for generating electricity from biogas to operate its Sewage Treatment Plants.

Biomethanation Plant at Koyambedu

6. Biogas:

Biogas is a flammable gas and is used as fuel. It is technically possible and economically feasible to generate biogas from cattle dung, poultry litter, agro waste, kitchen waste, sugar-cane, press mud etc. and also human waste. It is the most appropriate option for meeting the growing energy needs in rural areas. It is a clean and convenient fuel for cooking and lighting in households and also for power generation in KW scale (TEDA, 2008)

Biogas Tank

7. Biofuel:

All non-edible vegetable oils can be converted into biodiesel by a process called transesterification. Biodiesel in combination with HSD can be used in diesel vehicles. The species Jatropha curcas is a promising one with economic seed yield and oil recovery, the oil from Jatropha curcas can be used as biodiesel blend upto 20% . However, the refined oil is a qualified neat bio-diesel. The plant flowers a year after planting and the economic yield is obtained from 4th year onwards, and the yield stabilization 5th year onwards. GoI has identified Jatropha and pungam for cultivation in large scale for the production of biodiesel. In TN Bio oil is used for running tractors and pumpsets.

Jatropha Fruits

Methane a fuel for the Future

Methanogens are similar to bacteria; they are responsible for the vast majority of methane produced on earth by living things. They use carbon dioxide to make methane, so methanogens could be used to make a renewable, carbon neutral gas substitute. Methanogens produce about one billion tones of methane every year. They thrive in oxygen-free environments like the guts of cows, sheep, other ruminants and even termites. They live in swamps, bogs and lakes. Increased human activity causes methane emissions to rise because methanogens grow well in rice paddies, sewage processing plants and landfill sites, which are all made by humans. Methanogens could feed on waste from farms, food and even our homes to make biogas. Methane is a greenhouse gas that is 23 times more effective at trapping heat than carbon dioxide. By using methane produced by bacteria as a fuel source, we can reduce the amount released into the atmosphere and use up some carbon dioxide in the process (sciencedaily.com, 2007).

Events:

National seminar on Global Warming

The National Seminar on Global Warming and the ways to mitigate its impact was held at AJK College of Arts and Science, Navakarai, Coimbatore. Dr. R. Annamalai, I.F.S., Director, Dept. of Environment, Govt. of Tamil Nadu, inaugurated the seminar and delivered a lecture on Global Warming. Dr. S.R.Ramanan, Regional Meteorological Centre, Dr. R.S.Lal Mohan, Dr. P.Nammalwar and other scientists also delivered lectures on Global Warming. Dr. R. Annamalai, I.F.S., released the abstracts on Global Warming.

World Environment Day celebrations 2008

The World Environment Day (WED) slogan for 2008 is **CO_2Kick the Habit! Towards a Low Carbon Economy**. The WED Day highlighted resources and initiatives that promote low carbon economies and life-styles, such as improved energy efficiency, alternative energy sources, forest conservation and eco-friendly consumption. The WED day's agenda is to give a human face to environmental issues; empower people to become active agents of sustainable and equitable development; promote an understanding that communities are pivotal to changing attitudes towards environmental issues; and advocate partnership, which will ensure all nations and peoples enjoy a safer and more prosperous future.

The World Environment Day 2008 was celebrated by the Dept. of Environment by organizing a rally from the Birla Planetarium to the Guindy National Park. Dr. N.Sundaradevan, I.A.S., Secretary to the Government, Environment and Forests Department, flagged off the rally. Around 200 students from more than 10 schools participated in this event. Placards stressing on a carbon free environment were carried to highlight the World Environment Day theme for the year 2008 "CO_2-Kick the Habit". Eco club students planted tree saplings in the Guindy National Park.

Environmental Awards 2007-08

The Government of Tamil Nadu has instituted Environmental awards to recognize excellence in the different fields of environment. The awards are given to individuals who excel in the field of Environment Protection and Awareness, Environmental Protection and Environmental Management. The award ceremony of the Department of Environment was held on 11th June at Dindigul district. Thiru T.P.M. Mohideen Khan, Honourable Minister for Environment was the chief guest for the function and gave away the Environmental awards to the following winners.

I. Category "A"	**Environmental Education and Awareness**
1. Arignar Anna Virudhu	Thiru Karpagasolai P. Thangasami, Pudukottai
2. Sutru Suzhal Sudaroli Virudhu	Thiru S. Manoharan Samuvel, Virudhunagar
3. Sutru Suzhal Seyal Veerar Virudhu	Tmt C. Devika, Salem
II. Category "B"	**Environmental Protection**
1. Dr. Gurusamy Mudaliyar Virudhu	Thiru T.C.Pasupathi, Banrutti
2. Sutru Suzhal Kavalar Virudhu	Thiru G. Balasubramanian,Thanjavur
3. Sutru Suzhal Seyal Veerar Virudhu	Bharatiyar Makkal Nalavazhvu Sangam, Salem
II1. Category "C"	**Environmental Management**
1. Karma Veerar Kamarajar Virudhu	Dr. P. Rajendran, Madurai
2. Sutru Suzhal Puravalar Virudhu	Thiru S. A. Karthigeyan, Kumbagonam

Tips to reduce CO_2 towards low carbon Economy!

Energy Efficiency

- Changing used light bulb with CFL will save 500 pounds of CO_2/year.
- Turning of your computer, television will save 300 pounds of CO_2/year.
- Washing your cloths with cold water will save 500 pounds of CO_2/year.
- A clean filter in the air conditioners will save 175 pounds of CO_2/year.
- Energy efficient home appliances will save 3000 pounds of CO_2/year.

Travel efficiency

- Car pooling - 1 gallon of petrol reduced will save 20 pounds of CO_2
- A car giving 10 miles more per gallon will save 2500 pounds of CO_2/year.

Reduce, Reuse, Recycle

- Reduce your garbage by 25%, You will save upto 1000 pounds of CO_2/year.
- Recycle aluminum cans, plastics can save upto 850 pounds of CO_2/year.

Green belt development

- Each tree planted in tropics absorbs 50 pounds of CO_2/year
- Each tree will absorb 1 ton of CO_2 over its lifetime.

Message of the UN Secretary General for the World Environment Day 2008
"Kick the Carbon Habit"


Ban Ki-moon

Our dependence on carbon-based energy has caused a significant build-up of greenhouse gases in the atmosphere. We know that climate change is happening, and we know that carbon dioxide and other greenhouse gases that we emit are the cause. The cost will be borne by all. The poor will be hardest hit by weather-related disasters and by soaring price inflation for staple foods, but even the richest nations face the prospect of economic recession and a world in conflict over diminishing resources.Mitigating climate change, eradicating poverty and promoting economic and political stability all demand the same solution: we must kick the carbon habit.

Renewable Energy web links

1. World Environment Day	www.unep.org/wed/2008
2. TEDA	www.teda.gov.in
3. Ministry of power	www.powermin.nic.in
4. Centre for Wind Energy Technology	www.cwet.tn.nic.in
5. TERI, ENVIS	www.terienvis.nic.in

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