



# ENVIS NEWSLETTER

CENTRE FOR ENVIRONMENTAL STUDIES  
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From L-R, Shri Bhagirathi Behera, Director, Environment-cum-Spl. Secy. to Govt.;  
Prof. M.C. Dash, Ex-Chairman, Orissa State Pollution Control Board;  
Prof. Swadhin Pattanaik, Director, Institute of Mathematics & Application and  
Dr. C.R. Das, Chairman, State Environment Impact Assessment Authority, Orissa  
releasing ENVIS Newsletter on 30th March during a workshop on Climate Change.

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## Envis Editorial Team

Shri Bhagirathi Behera, IFS, Director  
Pravat Mohan Dash, Programme Officer  
Prashanta Ku. Nayak, Programmer

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## **From the Director's Desk...**

We have published various issues of environment of the State earlier. This newsletter focuses on a hot issue "Climate Change, Its effects & mitigation". The objective of this publication is to share the information of various authors among the readers. This is a compilation of some of the abstracts those have been published on the occasion of Celebration of World Environment Day 2009 in the State.

I thank all the members of ENVIS Centres in bringing out this newsletter.



Shri Bhagirathi Behera, IFS  
Director, Env.-cum-Spl. Secy. & Director  
Centre for Environmental Studies  
Forest & Env. Dept., Govt. of Orissa

### **CLEAN DEVELOPMENT MECHANISM (CDM) IN THE CONTEXT OF CLIMATE CHANGE THREATENING GLOBAL ECONOMY AND SECURITY**

**Professor (Dr) Madhab Chandra Dash,**  
Orissa Environment Appellate Authority

**Dr. A.S.P. Mishra,**  
Hindalco Industries, Hirakud

#### **ABSTRACT**

The age old saying "Every body talks about climate and no body does any thing about it" was proved to be wrong after the Nobel committee awarded the prestigious Nobel prize to Mr. Al Gore of USA and Dr. R.K. Pachauri, Chairman of IPCC of India in 2007 for gathering scientific proof on climate change and popularizing the matter and bringing to the forefront of human thinking. In early 80's, scientific evidence showed that global climate change processes had set in, which were attributed predominantly to emission of greenhouse gases (GHG). While CO<sub>2</sub> was contributing to almost 80% of the global warming, there were other six gases namely Methane, Nitrous Oxide, Hydrofluorocarbon, Perfluorocarbons (CF<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>) and SF<sub>6</sub>.

In the last century the CO<sub>2</sub> emissions have increased from 280 to 383 ppm and the global temperature has gone up by 1°C. Due to this various global and regional effects have been seen. Major reasons for this change were attributed to increase in the consumption of fossil fuels, emission of above global warming gases and uncontrolled deforestation across the continents. While on the one hand global population has been rising at a rapid rate, on the other hand demand for material and energy resources is also increasing due to improvement in the quality of life. Global GHG reduction can be achieved at much lower cost without affecting the development of human race through Clean Development Mechanism.

Though in India green house gas emission reduction through CDM is a voluntary initiative (India emits about 1485 million tons of CO<sub>2</sub> per year- 2000 estimate with about 4% annual increase) still then for sustainable development and contribution to prevent climate change, it should be encouraged addressing the call of the earth. The GHG emissions from the industries of Orissa have been estimated to be about 7 % of India's emissions (2008-2009). The alternative energy source should get top priority (solar, wind, biomass-gasification etc).

## **GLOBAL WARMING AND CLIMATE CHANGE: IMPACT AND MITIGATION**

**Prof. Manmohan Mohanti**

Orissa State Coastal Zone Management Authority

E-mail : mmohanti@yahoo.co.in

### **ABSTRACT**

Climate Change due to Global Warming, driven principally by anthropogenic activities causing enhanced CO<sub>2</sub>, other greenhouse gas and aerosol accumulations in the atmosphere is posing a major threat to global population, resources and environment at present. The temperature rise in the atmosphere may vary from 1.1<sup>0</sup> C to 6.4<sup>0</sup> C by the end of 21st century as per the assessment report of the Intergovernmental Panel on Climate Change (IPCC). Rapid industrial growth, urbanization and changes in the life styles of globally mounting population have been the main factors for accelerated gas emissions and transmission of aerosol particles to the atmosphere. Climate Change may alter the distribution and quality of natural resources of India which will adversely affect the economy, socio-economic structure and livelihood of people. Sectors sensitive to Climate Change like agriculture, water resources both surface run-off and ground water, forests and coastal setting may be endangered because of projected Climate Change. Global Warming shall cause sea-level rise. It shall affect the hydrological cycle which would result in further intensification of temporal and spatial variations in precipitation, cause melting of snow / ice in mountain glaciers and polar regions, cause monsoonal irregularities / uncertainties in resulting water stress for the people. Extreme climate-driven episodic events may occur like coastal storms / cyclones, flood and drought. Water stress will acutely affect mankind and degrade environments in addition to increased anthropogenic activities under a warming-up climate scenario. Mitigation measures like Carbon sequestration, Geosequestration and other measures may be paid serious attention to combat Climate Change. Awareness for adaptation to Climate Change should be generated at all levels. India needs a national strategy to adapt to Climate Change and enhance ecological sustainability in its developmental programmes.

### **STUDY OF HEAT WAVES IN ORISSA-OPERATIONAL ASPECT**

**Dr. S.C. Sahu**

Meteorological Centre, Bhubaneswar

### **ABSTRACT**

Orissa is located in the eastern coast of India between latitudes 17<sup>0</sup>49'N and 22<sup>0</sup>36'N and longitudes 81<sup>0</sup>36'E and 87<sup>0</sup>18'E . There are three climatic controls which affect the synoptic conditions of the state and these controls are the topography, the urban morphology and the proximity to the sea.

In the last thirty years , population in the city areas have been increased due to overall industrialization and shifting of population. The climate of the state is characterized by hot summer and cold winter in the interior and climate of the coastal region near by Bay of Bengal is moist and equable. Low temperature is experienced during the period from December to February over the state except coastal belt. March to May is considered as hot weather season and weather is dry and uncomfortable in the interior while due to low temperatures, the plateau regions are comparatively less uncomfortable. Weather tends to be oppressive during July due to high humidity and high temperature. The rest of the period of the monsoon is fairly comfortable due to reduced day temperatures although humidity continues to be high.

The most important meteorological parameter, which affects all living beings on earth, is the atmospheric temperature with all its variability. Meteorological observatories measure temperatures at 1.2 m above the ground level, the thermometers being exposed to free atmosphere flow but shielded from the direct radiation effects of the sun and the earth. The maximum temperature is normally reached around 3 P.M. on cloudy free afternoon but an hour or two earlier when there is afternoon cloudiness. During March to June (i.e. till onset of monsoon), normal temperatures over most parts of the state are very high. May is the hottest month. During May, the mean daily maximum temperature ranges from 32.3°C to 43.2°C over the state Orissa, the values increase northwards. Any further increase leads to disastrous consequences. In each season we may expect two to three hot spells with temperatures much above the normal. In summer, the whole country except Tamilnadu experiences severe heat waves at some time or the other. June is the month of highest frequency of heat waves when large parts of the country come under their grip. Widespread heat waves normally occupy about 10 percent of the Indian land mass. Generally they develop over North-West India and North Pakistan and expand towards east and south. During summer months, north India is dominated by dry north-westerly to westerly wind regime with practically clear skies. With progressive north-ward movement of the sun, the land becomes excessively hot resulting in the development of heat waves. Their speed is controlled by the low wind circulation.

The temperature records indicate a somewhat confusing picture as to the climatological trends since some of the period show increasing trend and there is also decreasing trend during some of the years. The rise of temperature during summer is mainly due to absence of sea breeze during day time, clear sky condition as well as NW-ly dry hot wind blowing over the state. The mean temperature and mean maximum temperatures show different behaviour patterns than the minimum temperatures. It can be explained by the fact that the growth of the city and the human activities connected with it, have produced a well defined local microclimate.

If onset of monsoon is delayed, the long spell of heat wave is observed over the state. During the year 2005, more number of heat-wave days are observed in June. In addition to synoptic situation, heat island effect also causes for rise of temperature.

## **CAUSES, IMPACT OF GLOBAL WARMING - CLEAN TECHNOLOGIES ADOPTED IN INDUSTRIES OF ORISSA FOR MITIGATION**

**Dr. Akhila Kumar Swar and Dr. Bikash Patra**  
State Pollution Control Board, Orissa, Bhubaneswar

### **ABSTRACT**

The increasing trend of green house gases (GHG) in the earth's atmosphere due to man made activities including industrialization resulted in global warming. The impact of global warming has threatened the existence of life on earth, which caused panic among mankind. Industries are required to optimize energy consumption, utilize waste heat, recycle/ reuse wastes, adopt clean technologies and develop green belt/ massive plantation to minimize the emission of GHG to the atmosphere. Government has a role of framing policy decisions and make efforts towards mitigation of global warming through industries and the society as a whole. The causes and impact of global warming, efforts made by the government agencies/ statutory bodies have been discussed in this paper.

Key words: GHG; global warming; impact, industry; trend; clean technologies; waste heat recovery.

## **CLIMATE CHANGE AND MITIGATION; A SHARED RESPONSIBILITY**

**Dr. A.K. Pattnaik**  
Nandankanan Biological Park

### **ABSTRACT**

Ever since the earth came into being there has been a climate system. The climate of a place is the average weather that it experiences over a period of time. The factors that determine the climate at a location are the rainfall, sunshine, wind, humidity, and temperature. Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external force, or due to persistent anthropogenic activities. While changes in the weather may occur suddenly and noticeably, changes in the climate take a long time to settle in and are therefore less obvious. Throughout the earth's history there have been changes in the climate. However over the last few decades the impact of climate change has been more apparent. Human activities are said to be responsible for the speed at which this change has occurred and it is now a global concern.

## **WETLANDS AND CLIMATE CHANGE ADAPTATION**

**Dr. Sudarsan Panda**  
Chilika Development Authority

### **ABSTRACT**

The wetlands are unique ecosystem which provide hydrological, biological and ecological services. The Ramsar Convention defines wetlands as areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six meters. India has 25 Ramsar sites covering an area of 6,77,131 ha out of which two important Ramsar wetlands (Chilika & Bhitarkanika) are located in Orissa. The 10<sup>th</sup> meeting of the conference of the Parties to the Convention on Wetlands (Ramsar, Iran, 1971) held at Changwon, Republic of Korea from 28<sup>th</sup> Oct - 4<sup>th</sup> November, 2008 emphasized the significant role of wetlands in adaptation to climate change. The adverse effects of climate change on wetlands can lead to loss of species diversity, migration & production of fishery resources, increase in salinity in coastal wetlands, change of migratory season for birds and severe effect on distribution & reproduction on cetacean species. Climate change also has the potential to increase pathogen development and survival rate, disease transmission and host susceptibility.

The wetlands have specific roles for adaptation and mitigation of effects of climate change; such as mitigation of floods, adaptation for increased frequency of droughts, sea level rise/coastal inundation, adaptation for increased frequency of storms. It is clear that change in our climate are already occurring and will continue to occur in the future even under the most optimistic predictions for emission reduction. It is therefore essential and critically important that climate change considerations be incorporated into all conservation and development plans and every responsible citizen of the society must embrace the responsibility of taking decisive actions to conserve the wetlands for adaptation to mitigate the adverse effects of climate change.

## **REPLACEMENT OF FOSSIL FUEL BY BIOFUEL A MAJOR STEP TO COMBAT CLIMATE CHANGES**

**Debendra Kumar Sahu**

C.V.Raman College of Engineering, Bhubaneswar  
E-mail: drdksahu62@rediffmail.com

### **ABSTRACT**

Climate changes are mainly attributed to the global warming caused by the rise in green house gaseous composition. Research activity is given to produce and utilize biofuel such as bio-ethanol, biodiesel, biogas, bio-CN, etc. R & D Centre for Renewable Energy of CVRCE, Bhubaneswar has taken up program of implementing number of such activities. All India Council for Technical Education (AICTE), New Delhi has sanctioned and funded one of the schemes to produce biodiesel from vegetable oil. A process technology has been developed in the centre to produce biodiesel at reduced operating parameters in compare to the available classical process which would enable the fuel cost effective. Application has been filed in the Indian Patent Office Kolkata to claim the patent right of the developed process. Under the program of "Commercialization of innovative products" of Technology Development Board, department of science & technology, it is proposed to set up a demonstration cum commercial biodiesel plant in the CVRCE premises on the basis of our patented process.

The centre is taking up other similar program to produce biogas by the anaerobic digestion of oil seed residue and other biomass. Through a sponsored research with IIT, Delhi, the centre is taking up a sponsored research program to purify the biogas for the enrichment of methane and finally going for bottling to produce bio-CNG gas to run automobiles.

Key words: climate, global warming, troposphere, fossil fuel, biofuel, biodiesel

## **UNDERSTANDING SOME CAUSES OF CLIMATE CHANGE- AN ANALYSIS IN THE CONTEXT OF ORISSA STATE THROUGH SATELLITE REMOTE SENSING.**

**P. MISHRA, B. TRIPATHY & A.K. MOHAPATRA**  
Orissa Remote Sensing Application Centre (ORSAC)

### **ABSTRACT**

Mitigating climate change requires urgent policies and measures with special attention to land use, Land use change, forestry, agriculture, livestock, and transportation, urban and industrial sectors. For more than a decade now, the state has been experiencing contrasting extreme weather conditions from heat waves to cyclones from droughts to floods. The current satellite remote sensing pictures of Orissa indicate the existence of 29 percent of forest cover, 04 percent of water bodies, and 1.28 percent of shifting cultivation areas. Nearly 11.40 percent of total geographical area of the state is under scrub cover, which can now be converted to Forest plantations. The wastelands occurring in 21.5 percent of the total geographical area of the state need proper conservation measures to increase the surface water and vegetation content of the state.

## **THERMAL POWER AND CLIMATE CHANGE**

**Mayadhar Swain**

Mecon Limited, Ranchi, Jharkhand  
E-mail: mayadhar2002@yahoo.co.in

### **ABSTRACT**

Global warming is due to the emission of green house gases to the atmosphere after industrial evolution. Among green house gases, carbon dioxide is the major culprit. Prior to industrial evolution

its level in the atmosphere was only 280 ppm where as it has now reached to a level of 381 ppm . In the world thermal power caters to 68% of electricity demand and thermal power plants are mostly responsible for emission of carbon dioxide to the atmosphere. Global energy-related carbon dioxide emissions are projected to rise from 28 gigatonnes in 2006 to 41 gigatonnes in 2030, an increase of 45%. Three-quarters of projected increase arises in China, India and the Middle East. Due to many advantages we are not able to avoid thermal power completely. Engineers have tried and succeeded in finding ways to reduce the emissions of carbon dioxide to the atmosphere from the thermal power plants. One such method is carbon capture and storage. Use of alternate sources of renewable energy such as solar, wind, hydro power and bio energy etc will help in mitigating climate change to some extent.

## **CLIMATE CHANGE - AN OVERVIEW**

**Sri Bhagirathi Behera**

Forest & Environment Deptt., Govt. of Orissa

### **ABSTRACT**

Forest & Environment Department Climate change is evident from the observations of increase in global average air and ocean temperatures, change in the amount and pattern of precipitation, widespread melting of snow and ice, and rising global mean sea level etc. This threat emanates from accumulated greenhouse gas emissions in the atmosphere; anthropogenically generated through long term and intensive industrial growth and high consumption lifestyles in developed countries. As a result, the global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 379 ppm in 2005. Our planet is going through its warmest phase in history; the average temperature has increased by about 0.7°C over the last 100 years. Global sea level rose at an average rate of 1.8 mm/yr over 1961-2003. Almost 67% of the glaciers in the Himalayan mountain ranges have retreated in the past decades.

## **FOREST IN CLIMATE CHANGE REGIME**

**Bharati Chakra**

Vasundhara, Saheed Nagar, Bhubaneswar, Orissa.

Email: bharatichakra@gmail.com

### **ABSTRACT**

Forest in general and Community Forest Management (CFM) in particular, mostly in developing countries has become an important topic in the global discourse on climate change. Though deforestation has largely been ignored in Kyoto Protocol, lately the international community recognized that deforestation, mostly in tropical forests, largely contributes global GHG emissions ranging up to 18%. This realization has been clearly reflected at Bali (2007) with the introduction of Reducing Emission from Deforestation and forest Degradation (REDD) that is dragging the forestry regime into Carbon Trading options which creates both opportunities and threats for Forests and forest dwelling communities. This paper tries to briefly present the impacts of climate change and provides a background to carbon financing involving forestry with focus on REDD, focusing on community forestry and analyses the impacts there of.



CES conducting a workshop



Celebration of Earth Day



Chief Minister in an exhibition

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**Centre for Environmental Studies,**  
 Forest & Environment Department, Government of Orissa  
 N-1/247, IRC Village, Nayapalli, Bhubaneswar-751015  
 Tel. No.- 0674 - 2551853; Fax- 0674 - 2553182  
 e-mail: ori@envis.nic.in & cesorissa@rediffmail.com  
 URL - www.orienvis.nic.in & www.envisorissa.org

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