SOUVENIR

Souvenir

UGC SPONSORED STATE LEVEL SEMINAR ON

GLOBAL WARMING: A CRUEL APPROACH TO BIODIVERSITY

29th & 30th October, 2011

Organised by :

DEPARTMENT OF ZOOLOGY

B.B. COLLEGE

BAIGANBADIA, MAYURBHANJ, ODISHA

IN COLLABORATION WITH

SEEMANTA MAHAVIDYALAYA, JHARPOKHARIA, MAYURBHANJA

PROCEEDINGS OF THE STATE LEVEL SEMINAR

ON

"GLOBAL WARMING: A CRUEL APPROACH TO BIODIVERSITY"

29th- 30th, October, 2011

Organised by
DEPARTMENT OF ZOOLOGY,
B.B.COLLEGE, BAIGANABADIA,
MAYURBHANJA,ODISHA

Affiliated to
North Orissa University,
Takatpur, Baripada

In collaboration with
SEEMANTA MAHAVIDYALAYA, JHARPOKHARIA,
Mayurbhanja, Odisha

Published by
Department of Zoology
B.B.College, Baiganabadia, Mayurbhanj, Odisha

in collaboration with
Seemanta Mahavidyalaya, Jharpokharia, Mayurbhanja, Odisha

By The Principal
B.B.College, Baiganabadia

Under the Assistance of
University Grants Commission

Organising Secretary
Dr. Sanjukta Mohanty

Printed at
HITECH Printing
Satyasahi Square, Baripada,Mayurbhanj

B.B. COLLEGE, BAIGANABADIA

Mayurbhanj, Odisha,757105

Prof. Pradeep Kumar Rout
Principal

MESSAGE

I am extremely glad that the Department of Zoology, B.B. College, Baiganabadia Mayurbhanj, Odisha, 757105 is going to publish the Proceedings of the State level Seminar held on 29-30, October, 2011, on **"Global Warming: a Cruel Approach to Biodiversity"** in the form of a book which is a meaningful enterprise to discuss the latest trends and their applications in the frontier of knowledge. I hope, the research articles in the book will be helpful in future for research purpose.

I wish all the success.

(P. K. Rout)
PRINCIPAL

Acknowledgement

The Department of Zoology, B.B.College, Baiganbadia, Mayurbhanj is highly grateful to the Joint Secretary, UGC Eastern Regional Office, Kolkata for kind approval of the proposal and granting funds for organising the National Seminar on ***"GLOBAL WARMING:A CRUEL APPROACH TO BIODIVERSITY"*** on 29th and 30th October, 2011.

We express our deep sense of gratitude to esteemed Principal, Mr. Pradeep Kumar Rout for his valuable guidance. We are also grateful to the Principal and Staffs of Seemanta Mahavidyalaya, Jharpokharia for their collaboration in organising the Seminar.

We are thankful to our guestsProf.(Dr.) Prafulla Kumar Mohanty, Professor and Head, P.G. Departmant of Zoology,Utkal University; Dr.Nakulananda Mohanty, P.G. Department of Zoology, North Orissa University, Takatpur, Prof. Anil Kumar Kar, Principal, Seemanta Mahavidyalaya, Jharpokharia; Prof. Naba Kumar Tripathy, Reader in Zoology, Seemanta Mahavidyalaya, Prof. Subash Chandra Maharana,Reader in Zoology, Seemanta Mahavidyalaya, Jharpokharia; Mr Jajati Rout,Sericulture Inspector and Mr. Vivekananda Pattanayak.

Lastly, we are thankful to the Staffs, Colleagues, Students and well wishers in organising the Seminar and publishing the Proceedings most successfully.

Dr. Sanjukta Mohanty
HOD, Zoology,
Organising Secretary of the Seminar

Editorial......

Every living organism influences its environment and in turn gets influenced by it. The magnitude of such influences is automatically checked by nature. However due to immense scientific knowledge and ability, man is able to modify the environment to some extent. Due to over increasing population the self purifying and self cleansing capacity of the environment is now deteriorated, so the amount of GHG in the atmosphere has increased and causes Green House effects and global warming.

It upsets the balance of the ecosystem; as a result it affects the biodiversity of the nature. A number of species has already been extinct and some are at the verge of extinction. So it is the right time o think about the future of our earth and to formulate and evaluate new methods, materials and programmes to check the flow and to save the greenery of our earth.

Dr Sanjukta Mohanty

Organizing Secretaty

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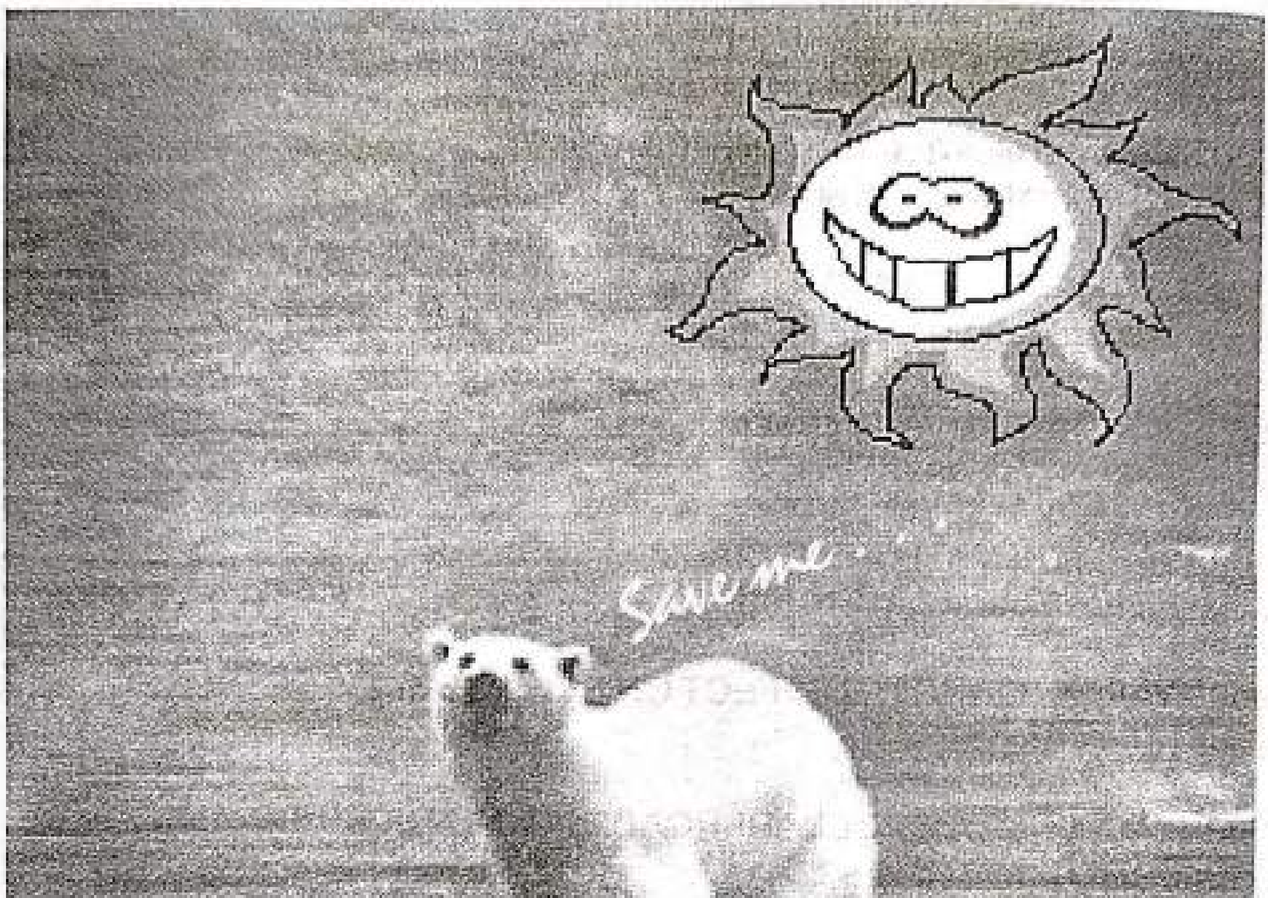
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GLOBAL WARNING FOR GLOBAL WARMING

Dr Prafulla Kumar Mohanty

WHAT IS A GLOBE ?

L. *globus*- a ball, a round body, a sphere, a sphere representing earth, the earth

WHAT IS WARMING ?

Gr. *Waren*-to refuse, to forbid

WHAT IS HEAT, TEMPERATURE AND WARMING?

1. Heat is a form of energy which excites the sensation of warmth especially in a high degree.
2. Temperature is the degree of hotness or the condition of determining heat between bodies.
3. Warm is having moderate heat or imparting heat or sensation of heat.

PROBLEMS OF THE EARTH

1. Why is warming happening?
2. Is it today's phenomenon or it was there earlier?
3. Who are the creators of this increased warming?
4. Why are people worried about the earth getting bit hotter?
5. What are the effects of this warming?
6. Can it be solved and if yes, what are the ways?

GREEN HOUSE

A green house is that body which allows the short wavelength incoming solar radiations to come in, but does not allow the long wavelength outgoing terrestrial infrared radiation to escape. The earth is said to be a "large green house". The term **GREEN HOUSE effect** was first coined by J. Fourier in 1827. The effect is also called as

1. ATMOSPHERIC EFFECT OR
2. CARBON DIOXIDE PROBLEM OR
3. GLOBAL WARMING

DEFINITION OF GREEN HOUSE EFFECT

Green house effect is simply "the phenomenon due to which the earth retains heat". It may also be defined as "progressive warming up of the earth's surface due to blanketing effect of man-made green house gases in the atmosphere".

GREEN HOUSE GASES

"Green house effect" is used to indicate a heat trapping process caused by green house gases. Green house gases are Carbon dioxide (CO_2), Water vapor, Methane (CH_4), Oxides of nitrogen i.e Nitrous oxide (N_2O), Oxides of sulphur i.e. Sulphur dioxide (SO_2) and Chlorofluorocarbons (CFCs).CO_2 is the most common and important green house gas. CH_4 and CFCs contribute about 18% and 14% respectively.

MAJOR SOURCES OF GREEN HOUSE GASES

1. CO_2 from burning of fossil fuel,fire woods and forest fire.
2. CH_4 from growing paddy and live stock release.
3. Aerosols as coolants in refrigerators and air-conditioning devices.
4. CFCs released to atmosphere from various sprays.
5. CFCs and halons are released to atmosphere during the operations and maintenance of appliances and equipments using these molecules as coolants and propellants.

HOW DOES WARMING OCCUR ?

These green house gases are transparent to incoming solar radiations but reemit the infrared radiations from the earth's surface. As a result of this, the effect helps to maintain the mean temperature at 15° C. The mean temperature would be unfavorable at 18° C. Thus, the green house effect is a blessing and not a curse. But this stands true as far as the green house gases remain at an optimal level.But today the concentration of green house gases is enormous leading to certain changes in climate. One such problem is warming.This whole process has been dubbed "the green house effect" because the glass roof of a green house lets sunlight in while blocking the passage of infrared out.

A green house stays warm because sunlight came through the transparent glass, but long wave like infrared radiations cannot be transmitted out because the glass is opaque to infrared radiations. The radiation trapped inside warms the interior surfaces of ground plants and other available materials.Warming arising due to green house effect is not globally uniform and may differ with latitudes, altitudes and seasons but the occurrence of more and more warm and drought years during eighties than the earlier decades is leading to global climate change.

PRESENT DAY SCENARIO

At present the contribution of CO_2 is 50% and the gases mentioned earlier are 1000 times to 10,000 times more effective than CO_2.This means the current rate of emission committed; global warming is expected to increase by 0.2° C to 0.5° C every decade. A sea-level rise of the order of 5 cm to 24 cm per decade can, therefore, be expected. Some amount of this effect has been observed in Puri and Gopalpur of Orissa. Incidentally the theme chosen for special attention during the World Environment Day in 1989 (June 05) is the impact on human societies of the prospect of a global warming of 1.5° C to 4.5° C accompanied by a sea-level rise of 20 cm to 140cm by 2050.

CONSEQUENCES OF GREEN HOUSE EFFECT

1. Evaporation of surface water leading to further increase in temperature.
2. Receding glaciers and melting of ice caps in polar region.
3. Disappearance of deposits of ice on the globe.
4. Submerging of islands, continents making land inhabitable for human and animals.
5. Occurrence of cyclones and hurricanes.
6. Incidence of more floods during monsoon.
7. Increase of the sea-level.
8. Reduction of grain yield and world food production.

SOLUTION TO POLLUTION

- Planting of trees in our own residential areas, schools, colleges, universities, offices and working place should be undertaken.
- Nature grown forest areas should not be disturbed or destroyed.
- In barren lands a forestation process should be accelerated.
- .Serious punishment should be executed in case of cutting down trees or deforestation without prior permission of the competent and concerned authorities.
- Single individual should not construct several houses or more than one house with concrete structures and wooden doors and windows.
- People should not use a good number of wooden beds, furniture's etc. which need to be discouraged.
- Festivals like car festival should not be observed by destroying several logs each year. There must be amendment in temple rules of Jagannath temple as regards the construction of chariots.
- Newsprint part needs to be restricted, i.e., several types of newspapers or printing papers should be minimized.
- People should prefer to use or read newspaper from common centers or offices or libraries. individual purchase of newspaper copies should be restricted.
- Writing paper should be properly used and both sides of paper must be utilized as far as predictable.
- Various household articles, dresses, utensils, vehicles (more than one or two) should be highly discouraged. The household articles retain the heat from the environment.
- Various types of chemicals, chemical products like mosquito repellants, house cleaners, toilet cleaners, detergents, hanky perfumes, naphthalene balls, pesticides etc. should be avoided as far as possible.
- Organic or natural food must be taken regularly instead of junk food or fast food.
- Human beings should practice exercise and walking instead of using motor bikes for a short or walkable distance. People working in the office should use office vehicles in common way or in shared manner to reduce fuel consumption and automobiles exhausts.
- Rampant industrialization, urbanization and regular massive mining activities should be restricted.
- Power or electricity consumption should be properly taken care of everywhere peferably in offices. Light may not be used for specific hours either everyday or every week or even a month.
- Burning of Dias, use of crackers in festival like Diwali or other ceremonies may be avoided.

Professor and Head
Post Graduate Department of Zoology
Utkal University
Vani Vihar, Bhubaneswar – 751 004

Telephone – 0674 – 2581483

ENVIRONMENTAL PROBLEMS OF MINING

N. Mohanty[1], D. G. Dey[2], G. C. Patra[1] and D. K. Singh[1]

India has a thriving mining industry and the mineral sector contribute approximately 4% of the gross domestic product (GDP). Since the demand for minerals has gone up due to expansion in industrial sector, mining activities has increased manifold. The value of mineral production was Rs. 56 crore in 1952 and at present it amount to more than Rs.30,000 crore. India mines about 80 minerals under three major heads, i.e., fuel minerals like coal accounting 88% of the total value, metallic minerals (iron, bauxite, nickel, chromites, manganese etc.) accounting 6% and non-metallic minerals (limestone, solomite, clay etc.) accounting 6% of the total value.

MINING ZONES OF ODISHA

In this context it can be said that Odisha has the above groups of minerals. The Nature has fitted Odisha with vast and extensive mineral resources like coal, iron ore, bauxite, chromite, dolomite, limestone, manganese, nickel etc. Odisha is one of the threshold of rapid industrial growth. It has already important industrial pockets like (i) Rourkela- Rajgangpur having steel, fertilizer, cement plants, (ii) Ib Valley-Jharsuguda – Sambalpur area with coal mining, thermal power plants, steel plants, aluminium smelter, paper mill, cement plants etc., (iii) Angul- Talcher having aluminium plants, thermal power plants, fertilizer plants, coal mining etc., (iv) Paradeep area with sea port, fertilizer, oil refineries, fish-prawn processing plants etc., (v) Keonjhar – Joda- Barbil area with intensive iron ore mining, sponge-iron plant, mineral beneficiation etc., (vi) Koraput area with paper mills, bauxite mining, aluminium smelter etc. and (vii) Jaipur – Dhenkanal – Keonjhar for chromite area. However, Baitarani river is known for its rich iron and manganese reserves. There are also pockets of bauxites, quartzite's and chromite deposits in the basin. But the fact is that the Angul –Talcner area has become one of the 15 most polluted industrial zones of India. The Ib valley area is developing very fast as an important industrial zone. The industrial policy of 1996 of the State shows that a number of steel plant projects, large power projects, alumina projects, oil refineries, large and small sea ports, software parks, agro and food based industries, automobiles, handloom and handicraft projects are in hand.

SOCIAL COST OF MINING

The social cost of pollution due to these mining and mining based industries is enormous. Concentration of mines, quantity of material excavated (overburden) and their transport etc. are responsible for environmental impact in the region. The mining activities create water pollution (due to run-off from over-burden), air pollution (due to dust or SPM) and noise pollution problems and loss of biodiversity. It also involves land area management, shifting and rehabilitation of people and socio-economic aspects and ever changing the living pattern of tribal people. Besides, certain places of historical importance are not included in the coveted heritage monument list due to environmental degradation. For example, Buddhist sites at Lalitagiri, Udayagiri and Ratnagiri are not accorded World Heritage site status due to large scale illegal quarrying while other Buddhist monasteries like ancient Buddhist sites of Sarnath in Uttar Pradesh, Buddhist monastery at Sanchi in Madhya Pradesh, Bodhgaya in Bihar and Buddhist caves of Ajanta and Ellora have all found a place in the Unesco world Heritage list.

REMEDY

◆Recommendation of Indian Bureau of Mines (IBM) for mining and closure of mines should be strictly followed.

◆The industry should have the obligation to provide with finance for the restoration activity, i.e., they should have eco-friendly attitude.

◆At the start of the mining activities, the top soil should be preserved. Later on it will be used as top soil to landfill/ dumps.

◆Vegetation is a natural sink for pollutants. Adequate forestation (plantation) should be done after landfill, so that it can capture SPM and reduce noise pollution. Plants of fast growing species as well as dust collectors is advisable in plantation for this purpose.

◆Construction of garland drains around mines can prevent surface runoff water entering mines to get polluted.

◆Proper care should be taken to stabilize overburden dumps.

◆Occupational health hazards and education need to be monitored.

◆Periodic assessment of the status of the mining area should be done by appropriate authority.

◆Well planned projects for reclamation and converting old abandoned mine and quarry areas into forest with water bodies and proper land use as per National Mineral Policy (1993), Government of India.

◆Legal documents against violation of Environmental Protection Act, 1986 should be strictly followed. Further, as there is no provision for reclamation of mined out areas in Water, Air and Environment Protection Acts, Government of India, the law should be framed for this.

◆Identification of local issues with regard to habitat loss, land degradation, pollution and rehabilitation of people and providing livelihood alternatives are the priority areas as rehabilitation becomes a big issue now-a-days.

◆Last though not least, people should be conscious of their rights and responsibilities, so that it will be easier to restore the balance if nature and environment. Community participation is a key to solve environmental pollutions.

CONCLUSION

Now-a-days development means "standard of living in terms of material growth". India is now following this path forgetting its previous concept as to enhance "standard of life" with minimum material needs. The Indian concept is that man respect or worship the nature. But the western concept is that man is the master of nature. This concept has brought more environmental degradation to such an extent that it is beyond the capacity of nature's own replenishment. It can be easy to understand from the following discussion based on the report of Global Footprint Network (an international think tank) published on 24.11.2009.

Humanity would need five earths to produce resources if everyone lived as profligately as Americans. As it is, humanity each year uses resources equivalent to nearly one and –a- half earths to meet his needs. We are demanding nature's services, using resources and creating CO_2 emissions, 44% faster than what nature can generate and reabsorb. That means it takes the Earth just under 18 months to produce the ecological services humanity needs in one year. And if humankind continues to use natural resources and produce waste at the current rate, "We will require the resources of two planets to meet our demands by the early 2030s", a gluttonous level of ecological spending that may cause major ecosystem collapse.

The think tank calculated the ecological footprint (amount of land and sea needed to produce resources a population consumes and absorb its carbon dioxide emissions) to know how many resources the planet has, how much humans use, and who is using what. The average American has an ecological footprint of nine global hectares or the equivalent of 17US football fields. The average Europian's footprint is half that size. At the other end of the scale are Malawi, Haiti, Nepal or Bangladesh, where footprints are around 1.25 acres – after not even enough to provide for basic food, shelter and sanitation.

Finally, the ecological degradation can be checked by sincere involvement of people. This is exemplified by the scrapping a hydel project in Kerala's Silent Valley, which would have submerged 240 Sq. Km. of evergreen forests to generate 120mw of power. What made the movement to save silent valley different was the intense involvement of people across the state in a sustained campaign that brought in science and techno-economic arguments, besides the emotional affinity of man with nature to counter the contractor – bureaucrat politician lobby. In fact, the silent valley represents some of the most pristine evergreen forests of the world, which mankind need to protect, to prevent loss of some animals, insects and plants that are not found anywhere else. Today environment regulation is more enlightened, but would prove toothless in the absence of similar popular vigilance (save silent valley) across India.

[1]*P.G. Department of Zoology, North Orissa University, Baripada-757003, Odisha*

[2]*Department of Zoology, Udala College, Udala, Mayurbhanj, Odisha*

GLOBAL WARMING – A CRUEL APPROACH TO BIODIVERSITY

Mr. N.K. Tripathy

Scientists believe that global warming represents one of the most important threats to our planet's bio-diversity. Plants and animals, even far from human habitation are now endangered due to global warming, resulting from increasing concentrations of carbon dioxide released into the atmosphere through different human activities.

Deforestation & Global Warming :

It was assumed that projected habitat changes were reached in 100 years, estimated rates of species extinctions associated with global warming in tropical hotspots in some cases exceeded those due to deforestation. These calculations rely on many assumptions but the results suggest that, under certain scenarios, global warming could be more serious threat to biodiversity than deforestation. It is estimated that by the end of this century, the extinction rates of terrestrial plant & animal species caused by global warming, in some cases would equal or even exceed those due to deforestation.

MAIN THREATS TO BIODIVERSITY :

Threats to biodiversity are numerous and human activities are responsible for most of them like :

- Habitat loss and degradation (86% birds, mammals & 88% amphibians).
- Introduction of Invasive alien species (include cats, rats, green crob, brown tree snake etc.).
- Over-exploitation of natural resources (like hunting, Fishing, Pets, medicine).
- Pollution and diseases (use of excessive fertilizers in soil).
- Human-induced climate change. (Altering migration patterns & coral bleaching)

FACTS OF BIODIVERSITY THREATENING

- 70% of coral reefs, providing food, jobs, recreation, storm protection for 500 million people world wide are threatened & destroyed.
- 19,265 species out of 59,507 are threatened with extinction.
- Out of 5,494 mammals, 78 are extinct, 191 endangered critically, 447 endangered and 496 vulnerable.
- Out of 6,312 amphibians, 1910 are in danger of extinction.
- Since 2000, six million hectors of Primary forest have been lost each year.

- In the Caribbean region, hard coral cover has declined from 50% to 10% in the last three decades.
- 35% of mangroves have been lost in just 20 years.
- Coral reefs are facing a very uncertain future. (Reef Check, an international monitoring programme found that in 1998 alone, 10% of world's coral reefs died from higher temperatures associated with global warming)
- Several Frog species have shown rapid declines which are believed to be linked to climate change.
- In the worst case scenario, the doubling of present CO_2 levels (as predicted by climatologists) and resulting temperature rises could potentially eliminate 56,000 plant and 3,700 endemic vertebrate species in 25 hotspot regions in South Africa, Indo-Burma, South-West Australia & Andaman.

ACTION PLAN BY IUCN

- Identification of the species and habitats most affected by climatic change.
- Identification and filling current information gap through monitoring and mapping at regional and global scales.
- Identification of funding sources for research and awareness campaigns.
- Increase awareness of impacts of climatic change.
- Include climate change implications for planning conservation, design protected area and assess species status.

CONCLUSION :

From time immemorial, nature has fed us, cured us and protected us. But today the roles have switched over, we need to feed nature, we need to cure it and protect it if we want to secure a healthy and prosperous future for our children.

Reader in Zoology,
Seemanta Mahavidyalaya, Jharpokharia

" GLOBAL WARMING" : A THREAT TO BIODIVERSITY

Dr. Sanjukta Mohanty

"Global Warming" is a global challenge for the people of 21st century. It refers to the slow gradual rise in the temperature of the earth due to emission of excess quantities of radiation trapping gases known as green house gases. It is the consequence of Green house effect due to excess anthropogenic activity such as indiscrimate cutting of trees, rapid industrialization, burning of fossil fuels. The concentration of GHG have increased in the upper atmosphere and causes global warming, which causing changes in the global climate. The changes in the climate has imposed a catastrophic effect on biodiversity.

BASIC MECHANISM :

Sun is the ultimate source of energy. Earth is the only planet to have life on it. The sun's energy is emitted as heat radiations. Some of the radiation from the sun reach the earth surface. Some of these are absorbed and retained by the earth's surface. Then again some of the absorbed heat is re radiated by the earth in to the atmosphere. There is an energy balance between the heat energy reaching the earth and heat energy that is reradiated to the space, which determines the earth's surface temperature to sustain life on earth, but unfortunately due to excess anthropogenic activity, the accumulation of GHG has increased in the troposphere which has disturbed the energy balance. They allow much of the short wave solar radiation to reach the earth surface but stop the long wave infrared rays escaping out as heat, and absorb these infrared radiation and reradiate most of them back to the earth surface causing heating effect. It has changed the regular pattern of weather condtion and affects the life forms on the earth.

IMPACT ON BIODIVERSITY :

Biodiversity or biological diversity encompasses all forms of life at all levels from genetic DNA to soil micro organism, from large vertebrates to large communities of deserts, forests and oceans. The earth's living systems have evolved over millions of years and continued to do so. Specialized organisms evolve in stable systems where they can operate without environmental changes. As energy flows from the sun to green plants and then to animals, biomass is created and used. Climate influences the process droughts slows down the process while moisture may accelerate it.

Each species of plant and animal occur within a specific range of temperature and in a definite climatic condition. Excess temperature or excess precipitation, drought condition will affects their habitat as well as life cycle too. The global warming will shift the temperature ranges which would affect the altitudinal and latitudinal distribution pattern of organism. Rapid rise of temperature may cause large scale death of many flora and fauna. Many species may disappear as they unable to migrate fast enough to track temperature change. It increases the risk of extinction of species that have a narrow geographic and climatic range and endemic and threatened species are most vulnerable. According to Red Data Books of the ICUN, about 245 species of animals and birds have already become extinct and about 600 more birds and animals are leading towards extinction. Maximum effect of global warming is felt at north pole, where meeting of glaciers and Green land ice sheet have already been started due to thermal expansion of ocean. The level of sea as been rising by 1 to 2 mm per year during 20th century. Several law island may be submerged. Many important birds and fishes in habiting in coastal salt marshes and estuaries will become extinct due to in undation of their breeding grounds. The meeting of ice and glaciers at a faster rate has created a serious threat to the lives of polar bears, penguins and seals.

High elevation ecosystems of Himalayan region are most vulnerable ecosystem of Himalayan region and considered to be the most serious threat to mountain forests. The impact will be more prominent on the already stressed ecosystems of the Eastern Himalayas. The ecological systems in Arunachal Pradesh due to its physiographic condition are more fragile, complex and vulnerable to global climate change. The climate change will not only affect the biodiversity of Arunacal Pradesh, but also affect the livelihood of local communities as they fully dependent on natural resources. As a part of eastern Himalayas, Arunachal Pradesh is rich in endangered endemic and threatened floral and founal species with restricted distribution and narrow habitat ranges.

The marine water ecosystem has affected a lot Ocean acts as a sink for CO_2 taking up much that would otherwise remain in the atmosphere leads to the ocean acidification decreasing the PH of oceans, thus the amount of O_2 dissolved in the oceans may decline and causes adverse effect for marine lives. It bleaches the coral reefs due to reduction of PH, damages the mangrove swamp coastal lagoons etc.

The climate change due to global warming is considered to be the greatest challenge for humanities with changing conditions, the ecosystem and habitats will change as well. The effect will be different for different vegetation zones. The tundra zone will most likely to shrink with increase temperature and aquatic algae that serves as the base of food web for much wild life may disappear as water temperature increases. Due to climate changes, about 12.5% of world's plant species are expected to become rare. The lizards are also threatened by climate changes and it has been estimated that climates change could wipe out 20% of world's total lizard species. Amphibians are particularly sensitive to changes in the environment. The number of fishes are expected to decline in the tropical regions of earth due to climate change. The migration of birds will be affected a lot. It has been estimated that the large species are more likely to be subjected towards extinction. Similarly, the alteration of habitat due to climate change may be lethal to any species.

STEPS & MEASURES TO STOP GLOBAL WARMING

1. Replace a regular incandescent light bulb with a compact fluorescent light bulb.
2. Clean or replace filters on your furnace and air conditioner.
3. Defrost old fridges and freezers regularly.
4. Plant a tree.
5. Switch to green power
6. Eat less meat.
7. Encourage the switch to renewable energy.
8. Protect and conserve forest world wide.
9. The Kyoto protocol adopted under FCCC (Frame work convention on climate change) should be strictly followed by the industrialized countries.

CONCLUSION :-

With this decline, biodiversity appears to be lost rapidly and with continue of this process the whole biome will be affected and life on the earth will become impossible.

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Lecturer in Zoology,

B.B.College, Baiganabadia,Mayurbhanj

TEN PERSONAL SOLUTIONS TO GLOBAL WARMING

Dr Prakash Mohapatra

Global warming and climate change refer to an increase in average global temperature. Natural events and human activities contribute to an increase in average global temperature caused primarily by increase in "greenhouse" gases such as Carbon Dioxide (CO_2). Temperature increases in troposphere, over land, sea and oceans and decreases happen in sea ice, glaciers and snow cover.

Green House Effect

- Energy from the sun drives the earth's weather and climate, and heats the earth's surface;
- In turn, the earth radiates energy back into space;
- Some atmospheric gases (water vapor, carbon dioxide and other gases) trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse;
- These gases are therefore known as greenhouse gases.
- The greenhouse effect is the rise in temperature on Earth as certain gases in the atmosphere trap energy.

Six main greenhouse gases are carbon dioxide (CO_2), methane (CH_4) (which is 20 times as potent a greenhouse gas as carbon dioxide), nitrous oxide (N_2O) and three fluorinated industrial gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Water vapor is also considered a greenhouse gas.

Many of these greenhouse gases are actually life-enabling, for without them, heat would escape back into space and the Earth's average temperature would be a lot colder. However, if the greenhouse effect becomes stronger, then more heat gets trapped than needed, and the Earth might become less habitable for humans, plants and animals. Carbon dioxide, though not the most potent of greenhouse gases, is the most significant one. Human activity has caused an imbalance in the natural cycle of the greenhouse effect and related processes.

Ten Personal Solutions to Global Warming

Individual choices can have an impact on global climate change. Reducing your family's heat-trapping emissions does not mean forgoing modern conveniences; it means making smart choices and using energy-efficient products, which may require an additional investment up front, but often pay you back in energy savings within a couple of years. Since Americans' per capita emissions of heat-trapping gases is 5.6 tons—more than double the amount of western Europeans—we can all make choices that will greatly reduce our families' global warming impact.

1. The car you drive: the most important personal climate decision:

When you buy your next car, look for the one with the best fuel economy in its class. Each gallon of gas you use is responsible for 25 pounds of heat-trapping gases in the atmosphere. Better gas mileage not only reduces global warming, but will also save you thousands of dollars at the pump over the life of the vehicle. Compare the fuel economy of the cars you're considering and look for new technologies like hybrid engines.

2. Choose clean power:

More than half the electricity in the country comes from polluting coal-fired power plants. And power plants are the single largest source of heat-trapping gas. None of us can live without electricity, but can switch to electricity that provides 50 to 100 percent renewable energy.

3.Look for Energy Star:

When it comes time to replace appliances, look for the Energy Star label on new appliances (refrigerators, freezers, furnaces, air conditioners, and water heaters use the most energy). These items may cost a bit more initially, but the energy savings will pay back the extra investment within a couple of years. Household energy savings really can make a difference: If each household in the US replaced its existing appliances with the most efficient models available, we would save $15 billion in energy costs and eliminate 175 million tons of heat-trapping gases.

4.Unplug a freezer:

One of the quickest ways to reduce your global warming impact is to unplug the extra refrigerator or freezer you rarely use (except when you need it for holidays and parties). This can reduce the typical family's carbon dioxide emissions by nearly 10 percent.

5. Get a home energy audit:

Take advantage of the free home energy audits offered by many utilities. Simple measures, such as installing a programmable thermostat to replace your old dial unit or sealing and insulating heating and cooling ducts, can each reduce a typical family's carbon dioxide emissions by about 5 percent.

6. Light bulbs matter:

If every household in the US replaced one regular light bulb with an energy-saving model, we could reduce global warming pollution by more than 90 billion pounds over the life of the bulbs; the same as taking 6.3 million cars off the road. So, replace your incandescent bulbs with more efficient compact fluorescents, which now come in all shapes and sizes. You'll be doing your share to cut back on heat-trapping pollution and you'll save money on your electric bills and light bulbs.

7. Think before you drive:

If you own more than one vehicle, use the less fuel-efficient one only when you can fill it with passengers. Driving a full minivan may be kinder to the environment than two midsize cars. Whenever possible, join a carpool or take mass transit.

8. Buy good wood;

When buying wood products, check for labels that indicate the source of the timber. Supporting forests that are managed in a sustainable fashion makes sense for biodiversity, and it may make sense for the climate too. Forests that are well managed are more likely to store carbon effectively because more trees are left standing and carbon-storing soils are less disturbed.

9. Plant a tree:

You can also make a difference in your own backyard. Get a group in your neighborhood together and contact your local arborist or urban forester about planting trees on private property and public land. In addition to storing carbon, trees planted in and around urban areas and residences can provide much-needed shade in the summer, reducing energy bills and fossil fuel use.

10. Let policymakers know you are concerned about global warming:

Our elected officials and business leaders need to hear from concerned citizens to ensure that policymakers get the timely, accurate information they need to make informed decisions about global warming solutions.

Scientist,
State Pollution Control Board, Odisha, Bhubaneswar

GLOBAL WARMING AND ITS HAZARDOUS EFFECTS ON THE ECONOMY

Shankarshan Nayak

The study of economics is not only confined within its old structural framework. It has certainly elongated its shadows outside its expertise boundary. Hence the study of economics has added colour to its feather particularly in the 21st century. With the growing economic parameters like population, industry, agriculture and service sector, the exploitation of natural resources has been resulted in some sort of evil consequences. The euphoria over the word like globalization can yield nothing unless equal attention is paid on the preservation of globe. Therefore environmental economics has been incorporated in the syllabi of higher study in economics. The National Income Accounting has been modified to Green Accounting to reflect the economic c growth in real sense of the term. Hence the days are gone and dead when income accounting procedure was exclusively done on the basis of goods and services produced within a year. Now it is time to calculate the National Income with an innovative conception and with new dimensions as advocated by the eminent economist namely Simon Kuznet .It is he, who made a pioneering attempt to modify the accounting system of a nation by incorporating the environmental hazards as a social cost to an economy and thereby ignited the concept of green accounting .He viewed that "for a sustainable economic development , the per capita income must be accounted by considering all negative aspect of the environment". Therefore at the time of counting Net National Product and Gross National Product, the method of counting GNP has been modified by taking the environmental hazards as a cost to the economy which mist be deleted from NNP while counting N.I. His method of calculating NNP is given below.

Green NNP = NNP - (P1- MC1) - "R- (P2-MC2)"R - V("S)

Where P=Price, MC=Marginal Cost, "NR=Change in non renewable resources, V=Cost of reduction, "S=Pollution stock, "R=Change in renewable resources

The above analysis in an elaborate form simply manifests the environmental inclusion in the economic analysis. In this context, the burning issue of global warming which has been the talk of the day con not be ignored even in the multifarious economic analysis. Thus it is pertinent to focus on the very meaning, causes, sources and evil consequences of global warming and its impact on the productivity , efficiency, and yielding capacity of an economy and finally the suggestive ways and means are to be summed up for its remedy.

WHAT GLOBAL WARMING IS ?

Under normal condition and concentrations of CO2, the temperature of the earth surface is maintained by the energy balance of the sun rays that strike the planet and heat that is radiated back into the outer space. However when the concentration of CO2 in the atmosphere increases, the thick envelope of this gas prevents the heat from being re-radiated out. The heated earth can re-radiated this absorbed energy as the radiation of longer wavelength,. Thus this thick CO2 layer acts like the glass panels of a green house or the window glass of a closed car allowing the sun rays to filter through but preventing the heat from being escaping the outer space, thereby warming the troposphere of atmosphere. This sort of phenomena is popularly designated as global warming.

According to D.B.Botkin and E.A.Keller(1982), in a green house visible light passes through the glass and heats up the soil warming the plants. The warm soil emits the radiation in longer wavelengths particularly in the infrared .Because glass is opaque to longer wavelength of infrared radiation, it partly reflects and partly absorbs infrared radiation . This mechanism of green house is almost similar to global warming .Hence the term Green house Effect as coined by J. Fourier in 1827 is also called as "Atmospheric Effect", Global Warming or Carbon dioxide Problem. This Green House Effect may therefore , be defined as "Progressive Warming on earth's surface due to blanketing effect of man made CO2 in the atmosphere. It mean the excessive presence of those gases blocked in the infrared radiation from earth's surface to atmosphere leading to an increase in temperature, which in turn would make life difficult on earth to forth coming future generations .

CAUSES OF GLOBAL WARMING

The four major green house gases which cause adverse effects are Carbandioxie CO2, Methane CH4,.Nitrous Oxide N2O and chlorofluorocarbons CFCs. Among these CO2 is the most common and important green house gas. Here it is worth noted that ozone and dSO2 also acts as serious pollutants in causing global worming. The other green house gases like methane and chlorofluoro contribute about 18% and 14% respectively.

SOURCES OF GLOBAL WAERMING

Global warming is phenomenon associated with the principle of infrared absorption characteristics of gases. Higher the concentration of CO2, greater will be the thermal radiations which meant the more infrared radiation is trapped and re-emitted back to earth 's surface, resulting in a heat trap increasing global temperature. A number of industrial as well as agricultural operations generate and emit waste gases into atmosphere. For instance, burning of fossils fuels emit CO2, growing paddy releases methane, the use f aerosols as coolants in refrigerators and conditioning devices or sprays release chlorofluorocarbons into the atmosphere. These gases create a canopy in the atmosphere and trap the solar radiation reflected back from the earth's surface, leading to atmospheric and climatic changes.

IMPACT OF GLOBAL WARMING

The gradual increase in green house effect will lead to serious consequences as further

warming of the earth will result in to thermal expansion of oceans and melting of glaciers and polar ice-caps . This will cause rise in ocean level submerged islands, coastal regions and deltas in the next century if present trend continues . Due to this dreadful happenings the world population will be badly affected .The working ability of the labour force will be curtailed., the availability of land resources which is supposed to be the prime factors of production will squeezed, the agricultural production will be hampered and the biotic factor of the soil will be deteriorated and the organic matter of the world will be smashed.

Secondly, the growth of industrialization and urbanization, coupled with drastic decrease in forest cover,. will create a layer of impenetrable gases on the surface of the earth atmosphere converting the planet earth into a hot blast furnace.

Thirdly, in colder regions, the winter will be shorter and warmer but the summer will be larger and hotter which will create a warmer climate leading low efficiency of worker and shortens the working hour of the labour force. The lobour force would prefer leisure to work more. As a result, the national output and income will be certainly curtailed .

Fourthly, there will be an enormous increase in rain fall but the problem of desertification, drought and soil erosion will further worsen.

Fifthly, the social cost of producing any thing will be greater than before by which socially optimal output will be reduced and the government of a welfare state is likely to incurre huge expenditure to eliminate the evil consequences of global warming which could have been invested for the betterment of the people in a most predictive way.

Sixthly, the negative externalities of the nature will reduce the welfare of the economy and economies' of scale is to be surrendered.

CONTROLLING MEASURES OF GLOBAL WARMING

The measures may be undertaken to lover come the evils of global warming

1.The aim is achieved to some extent by reducing the consumption of fossil fuels like coal and petroleum. by utilizing more non-convention al renewable resources of energy like solar, wind, tide, biogas, and nuclear energy.

2. Disposing of the green house gases as they are formed elsewhere than in atmosphere.

3.By recovering green house gases already present in atmosphere and disposing them off elsewhere.

4.Global cooperation is necessary to take attempts for reducing the green house gases.

4.Global cooperation is necessary to take attempts for reducing the green house gases.

CONCLUSION

The current pattern of development and consumption around the globe pose serious threat to the planet ecosystem. The so called developed countries have only 24% of the world's population but consume 50% to 90% of the world's commodities causing global environmental stress. Even in the basic needs like milk, meat,, cereals , clothes and space etc, developed countries consume 48% to I72%. They use 60% of the total fertilizer produced in the world. , 81% of paper, 60% of iron and steel, 86% of copper and aluminum, 85% of chemicals and 97% of the vehicle. Their share of the total energy consumption is 75% who are mainly responsible for 70% of the global CO2 emission. The first three nations having highest rate of CO2per capita emission are USA,USSR, and China.

In Jeneva Environmentalists conference(1990) it was suggested that only the advance countries should take responsibilities to decrease the global warming . because highly industrialized countries consume about 50% of the total world consumption of mineral oil. While they contain only10% of the world oil reserv3e. Developed nations cursing some heavily population density bearing countries like India, china and brazil for global warming but in Brazil CO2 emission is 10.5% , in china CO2 and CFCs percentage is 6.6% while in India the combined CO2 and CFCs percentage is onloy3.9%.Therefore only the developed nations will go for immediate reduction in their use of fossil fuel.

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Lect. in Economics
B.B.College, Balganbadia,Mayurbhanj

ROLE OF TASAR CULTURE IN THE CONSERVATION OF FOREST AND PREVENTION OF GLOBAL WARMING

Jeeban Kumar Pandit

The air is a mixture of some gases, moisture, dust particles and ions of various compounds. It is mainly composed of 78% Nitrogen, 21% Oxygen, 0.03% Carbon dioxide and the rest of other gases. Due to rapid urbanization, industrial revolution, population explosion and large scale deforestation, the natural composition of the air is being changed day by day. The unwanted gases like carbon dioxide, carbon monoxide, sulphur dioxide, hydrogen sulphide, oxides of nitrogen etc. are deposited to the atmospheric content as the pollutants. Carbon dioxide gas even though toxic to animal life, provides a natural cover of the earth to keep the conditions favourable for continuance of life and responsible for greening of earth. Without carbon dioxide, the earth would have frozen surface. However, the atmosphere contains 0.03% of carbon dioxide as normal constituent. The green plants absorb the carbon dioxide during photosynthesis and release oxygen, thereby acting as a natural cleaner of our atmosphere. But due to large scale release of carbon dioxide from the industrial sectors and automobiles, the concentration of carbon dioxide and other gases are increasing day by day. They absorb the infrared light of solar radiation. It result the increase of atmospheric temperature which called green house effect.

The reckless human activities has led to the excess accumulation of green house gases in the earth's atmosphere and that is responsible for the sharp rise in the earth's temperature. It has been calculated that the earth's temperature would rise by 0.5°C by the year 2020. By the year 2050 it would rise 2 to 5°C. This phenomenon of temperature rise is called global warming. A rise of temperature by 4°C would lead to the total melting of glaciers and polar ice caps. This may lead to the rise of sea level by 2 to 4 feet. A rise in water level would lead to coastal flooding and disappearance of some major cities from the world map.Besides it the global warming leads to irregular rainfall, deforestation, decrease of crop production and extinction of several plant and animal species from earth. So the protection ofour natural environment is quite essential for the survival of human being in earth.

IMPACT OF FOREST DEGRADATION;

As discussed earlier, the plants are the natural cleaner of our environment because they absorb carbon dioxide from the environment and release oxygen. Thus they play major role in preventing the increase of green house gases and global warming as a whole. Association of various plants in a particular area with thick canopy is called forest. To maintain our environment healthy, at least 33% of our land area should be covered by forest. But in the name of economic development, we establish new industries in those areas which are naturally covered by forest. In addition to that making of water reservoir, national highway, railway track, mining activities etc. also boost the deforestation process. The shifting cultivation by the tribals, collection of fire wood & population explosion have made the situation worst.

In Odisha, we have 33% are covered with forest of which 12% are open canopied forest among them 40% are the degraded forest type. The process of degradation is gradually eating away the closed canopied forest converting most of the natural forest to waste land. So in these areas, neither there will be forest nor there will be soil. A situation of Ethiopean type that has already surfaced in some parts of Kalahandi & Bolangir districts. This particular problem needs proper attention in terms of plantation. Unfortunately, there have been growing incidence of planting Eucalyptus and other exotic species which are misfit into our natural forest. Wasteland resulted due to deforestation in our state needs proper foresting with the help of natural succession, so that they will be converted to original forest community. Unfortunately, we are totally ignorant about such aspects of wasteland management.

In the context of conservation and management issue of forest ecosystem, people play vital role. They are the endemic indigenous ethnic tribal people, who manage themselves within the ecosystem. They live as a part of eco-system, try to adjust with it without damaging it. They have their indigenous ethno-knowledge of deriving benefits from forest. They are considered as a part of forest. Very often our plan of forest exploitation as well as so called management strategy make these people as ecological refugee. Conservation of forest does not merely speaks against exploitation. Rather it speaks in favour of rational exploitation. We have enough statistics only confined to our files in our official racks. But proper scientific approaches are yet to be done. We still mis-understand that planting trees makes forest. But our so called illiterate tribals teach us, "Live in tune with nature".

We are a rural populated nation. Our rural population have a biomass based sustenance unlike energy based in western countries. Forest being a source of huge biomass, should therefore be properly conserved and managed to take care of the need of crores of our rural natives. All of our developmental projects instead of solving problems are creating problems of unsolvable dimension. Those who claim that by planting trees can create a forest, are not only ignorant of the fact that a community evolves following a long path of succession over the period of hundreds of years. So it is easy to conserve forest rather than creation of forest. In this process the wild tasar culture and the involvement of tribals play significant role.

ROLE OF TASAR CULTURE:

Silk is an animal protein fibre secreted by the larva of silkworm for the spinning of cocoon. The technology relating to cultivation of silk worm for the production of silk is known as sericulture. It includes both agriculture and industrial activities. The silkworm are of mulberry and non-mulberry categories. Tasar silkworm belongs to non-melberry which obtained as wild and semidomesticated form. India has a long tradition of Tasar culture by the tribal. At present about 3.89 lakh tribal family are engaged in tasar cultivation producing 750MT of silk per annum. Presently wild silkmoth farming has its importance on socio-economic and ecological front. It includes the creation of employment opportunity for the tribals as well as the conservation of forest, bio-diversity and environment.

The wild tasar silkworm are grown in our natural forest. Their primary food plants are *Tarminalia arjuna, Tarminalia tamentosa* and *Shorea robusta*. These are also the dominant plant species of our deciduous forest. The tribals who live in the forest cultivate this wild silkworm at in-situ condition, thereby play important role in the conservation of forest. Thus tasar culture has a lot of ecological, social and economic importance towards sustainable development.

Ø **Conservation of flora and forest ecosystem:** Wild silkworm depends upon those wild plants which naturally found in Indian Forest. So tasar culture not only conserve the tasar food plants but also maintains the forest ecosystem.

Ø **Conservation of wild fauna:** Tasar culture also helps in the conservation of wild fauna in the forest. These protected plants offer a natural abode for a number of animals including reptiles, aves and mammals.

Ø **Regulation of precipitation:** Conservation of forest ecosystem helps in the precipitation pattern in that region due to high transpiration. It increase rainfall and controls the temperature as well as humidity. Thus it may be a major steps against global warming.

Ø **Purification of Air and Prevention of Air pollution:** As the tasar silkworm is associated with the conservation of tropical, semi-ever green forest, it not only purify the air but also prevent air pollution.

Ø **Sustainable Forest Management:** The commercial rearing of tasar in forest will help the sustainable development of forest ecosystem as well as its conservation.

Ø **Improvement of Socio-Economic Status of Tribals:** Tasar culture is a forest based agro-industry of tribal people with minimum investment and high return. It provides an additional source of income for them which lead to their socio-economic development.

Ø **Supply of Fire-Wood:** Cutting of branches of tasar food plants during rearing of silkworm yields good source of fire wood for those people who cut trees for domestic cooking.

Ø **Prevention of Soil Erosion:** Tasar culture promotes plantation and maintenance of host plant which minimize the soil erosion in forest land.

Lecturer in Zoology,
Betnoti College, Betnoti, Mayurbhanj

EFFECT OF CLIMATE CHANGE ON FISHERIES AND AQUACULTURE

Dr Jitendra Kumar Sundaray

Climate change is a change in the statistical distribution of weather over periods of time that range from decades to millions of years. Climate change may be limited to a specific region, or may occur across the whole Earth. Climate change may be qualified as anthropogenic climate change, more known as "global warming" or "anthropogenic global warming"(Brander, 2005). Climate change has both direct and indirect impacts on fish stocks which are exploited commercially. Direct effects act on physiology and behavior and alter growth, reproductive capacity, mortality and distribution. Indirect effects alter the productivity, structure and composition of the marine ecosystems on which fish depend for food. Climate change impacts such as more frequent and severe floods and droughts will effect the food and water security of many people. The impact of climate change on aquatic ecosystems, fisheries and aquaculture, however, is not as well-known.

The build-up of carbon dioxide and other greenhouse gases in the atmosphere is changing several of the features of the Earth's climate, oceans, coasts and freshwater ecosystems that affect fisheries and aquaculture - air and sea surface temperatures, rainfall, sea level, acidity of the ocean, wind patterns, and the intensity of tropical cyclones (Cochrane, et al 2009). Climate change is modifying the distribution and productivity of marine and freshwater species and is already affecting biological processes and altering food webs. The consequences for sustainability of aquatic ecosystems, fisheries and aquaculture, and the people that depend on them, are uncertain.

The fisheries are even more dependent than agriculture on climatic conditions. While agriculture does up to a point compensate for the shortcomings of nature (through irrigation and fertilization), the fisheries, which essentially are an advanced form of hunting, are dependent on what nature will or will not provide. The effects of climate change on fisheries are likely, therefore, to be more severe than on agriculture. The effects of global warming on fish stocks and their migrations are extremely difficult to predict. There are two main uncertainties in the causal chain from global warming to the fisheries. First, the impact on ocean temperature and currents is uncertain, not just in magnitude but possibly also with respect to direction. Second, even if we knew the change in temperature and ocean currents, we would not necessarily know the effect on abundance and migrations of fish stocks. It appears that little research has been done on the possible consequences of climate change for fisheries.

Of most concern in these anthropogenic factors is the increase in CO2 levels due to emissions from fossil fuel combustion, followed by aerosols (particulate matter in the atmosphere) and cement manufacture. Other factors, including land use, ozone depletion, animal agriculture and deforestation, are also of concern in the roles they play – both separately and in conjunction with other factors in affecting climate, microclimate, and measures of climate variables. Understanding the way in which climate change may affect decadal and shorter time scale variability is therefore essential in predicting future climate impacts on marine ecosystems and fisheries.

Marine ecosystems are not in a steady state, but instead are in a constant state of change that varies on many spatial and temporal scales. Fish populations respond to this variability in different ways. For example, during short-term weather changes such as storms, fish may take refuge from rough conditions through minor changes in distribution. Inter-annual changes in the ocean environment, on the other hand, may result in changes in the distribution patterns of migratory fishes and affect reproduction and recruitment in other species. Longer-scale variations may have other impacts, including cyclic changes in the production level of marine ecosystems that may favor one species or group over another.

Long-term records of the abundance for most species are limited to historical commercial and recreational landings. These records are often influenced by economic factors such as the relative price paid for different types of fish, and changes in fishing methods or fishing effort. These non-climatic factors often obscure climate-related trends in fish abundance.Impacts on aquaculture could be positive or negative, arising from direct and indirect impacts . As fisheries provide significant feed and seed inputs, the impacts of climate change on them will also, in turn, affect the productivity and profitability of aquaculture systems.Climatic changes could increase physiological stress on cultured stock. This would not only affect productivity but also increase vulnerability to diseases and, in turn, impose higher risks and reduce returns to farmers. Interactions of fisheries and aquaculture subsectors could create other impacts. For example, extreme weather events could result in escapes of farmed stock and contribute to reductions in genetic diversity of the wild stock, affecting biodiversity more widely (FAO 2008).

These impacts will be combined with other aspects affecting adaptive capabilities, such as the increased pressure oncoastal populations place on resources; any political, institutional and management rigidity that negatively impacts on communities' adaptive strategies; deficiencies in monitoring and early-warning systems or in emergency and risk planning; as well as other non-climate factors such as poverty, inequality, food insecurity, conflict and disease.However, new opportunities and positive impacts emerging from such areas as changes in species and new markets also could be part of future changes. So far, these opportunities are not well understood but, nevertheless, are possible. A community's ability to benefit also will depend on its adaptive capacity.

Changes in fish distribution and abundance

For fishes, climate change may strongly influence distribution and abundance through changes in growth, survival, reproduction, or responses to changes at other trophic levels. Changing seawater temperature and current flows will likely bring increases, decreases and shifts in the distribution of marine fish stocks, with some areas benefiting while others lose. These changes may have impacts on the nature and value of commercial fisheries. Species-specific responses are likely to vary according to rates of population turnover. Fish species with more rapid turnover of generations may show the most rapid demographic responses to temperature changes, resulting in stronger distributional responses to warming.

North Sea

The North Sea demersal fish assemblage composed of more than 90 species with varied biogeographical origins and distribution patterns. No species range was entirely confined to the North Sea. The North Sea waters have warmed by an average of 0.6°C in 40 years between 1962 and 2001. Water temperatures become colder with increasing latitude in the southern North Sea, but become slightly warmer with increasing latitudes in the north. This temperature pattern explains the movement of the Norway pout (*Trisopterus esmarkii*). Its distribution was centered in the northern North Sea, and its southern movement brought it into cooler waters. Most species that showed climate-related latitudinal changes also shifted in depth, because the North Sea depths are positively correlated with latitude. The cuckoo ray (*Leucoraja naeus*), moved deeper with warming but did not change latitude, suggesting that they may respond to climatic variation through local movements into pockets of deeper waters. The boundaries of fishes also moved significantly with warming. Boundaries moved over distances ranging from 119 to 816 km. In the case of bib (*Trisopterus luscus*), the northern boundary shifted by 342 km from 1978 to 2001. Shifting species have faster life histories than do non-shifting species, with significantly smaller body sizes, faster maturation, and smaller sizes at maturity.

High-latitude fisheries

Many scientists feel the most radical changes will occur in high-latitude regions. For example, the Arctic Climate Impact Assessment Report concludes that the Arctic climate is changing almost twice as fast as the rate of climatic change at lower latitudes. Similarly, the Center for Global Change and Arctic System Research, University of Alaska, states: "The Arctic is characterized by one of the most extreme environments on the planet, with limited sunlight, extreme temperatures, and a short growing season. Sea ice, snow cover, glaciers, tundra, permafrost, boreal forests, and peat lands are all sensitive indicators of change, susceptible to subtle variations in sunlight, surface temperature, ocean heat transport, air and ocean. Global climate models indicate that global warming induced by the greenhouse effect will be most acute in polar regions, most likely resulting in changes in the extent of sea ice, increased thawing of permafrost, and melting of polar ice masses, with profound societal impacts around the globe".

Indian Seas

In the Indian Seas, similar trend has been noticed on the distribution of the oil sardine *Sardinella longiceps* and the Indian mackerel *Rastrelliger kanagurta* as a consequence of seawater warming. These small pelagics, which were predominant along the southwest coast of India, have extended (not shifted) their northern boundary up to Gujarat in the northwest coast and West Bengal in the northeast coast. The Indian mackerel is noticed to descend to depths to avoid higher sea surface temperatures. These are a few strategies adopted by fishes to mitigate seawater warming (Vivekanandan and Jayasankar 2008).

Climatic sensitivity of migratory species

Tuna, in general, are fast swimming top predator species whose high metabolic requirements must be supported by ready access to rich food sources. Their migratory patterns are closely governed by ocean processes that create a conjunction between suitable physical habitat (in terms of temperatures and adequate oxygen) and adequate food sources. The tunas are constantly swimming in search of food—in some circumstances needing to consume as much as 15% of their body weight per day. As a result, the areas of tuna concentration are by no means casual, and migration takes place according to hydrological routes: in which each species finds the optimum environment for survival in every stage of its existence. As they are so energy-consuming, they are dependent on ocean processes and features which promote the aggregation of the prey resources which they must find within finite time periods, or die. These are the fronts, thermoclines and productive shoal regions of the ocean. Climate plays a large role in determining short-term, seasonal and multi-year patterns of variability in the location and productivity of these optimal tuna habitat zones.

Climate change and international agreements

Since the late 1970s, much of the ocean has been divided into Exclusive Economic Zones where fishing is at the discretion of the country that controls the zone. Many fish stocks migrate between the zones of two or more countries, or into the high seas where no single state has jurisdiction. The management of such shared stocks necessarily involves cooperation between the countries. Changing migrations of fish stocks are likely to put existing agreements under stress and perhaps to lead to their total breakdown. We do have one good example of an international sharing treaty on fish that has broken down as a result of changes in fish migrations due to climate change, the sharing between Canada and the United States of America as salmon returning to their home rivers on the Pacific side of the North American continent. In the late 1970s there occurred a regime shift in the Northeast Pacific. The returning salmon began to take a more northerly route, and much of the fish heading for rivers in Canada could be intercepted by Alaska. Similarly, the salmon heading for the Fraser River in Canada began to take a northerly, all- Canadian route, instead of passing in part through US waters. This led to a breakdown of the US–Canadian agreement.

Harmful algal blooms

Harmful algal blooms have caused considerable mortality of fish in Norwegian waters. Especially, farmed fish are vulnerable since they cannot escape, but also wild fish mortality has been observed. In Norwegian waters the most important harmful algae belong to the genera *Gyrodinium*, *Chatonella*, *Chrysochromulina* and *Prymnesium*.

Temperature increase in freshwater bodies

Higher inland water temperatures may reduce the availability of wild fish stocks by harming water quality, worsening dry season mortality, bringing new predators and pathogens, and changing the abundance of food available to fishery species. In Lake Tanganyika, which supplies 25-90% of animal protein for the countries that surround it, warmer temperatures reduced the mixing of surface and deep-water layers in the last century, limiting the nutrients available to plankton and thereby cutting, by an estimated 30%, the yield in fish that feed on them. Identifying and promoting aquaculture species and techniques suitable to changing environments and resources will enable aquaculturists to adapt to changes and may reveal new uses for land that has become unsuitable for livelihoods strategies. Also noteworthy is that, in cooler zones in particular, aquaculture may benefit as rising temperatures bring faster growth rates and longer growing seasons.

Changes in precipitation and water availability

Changes in precipitation averages and potential increases in seasonal and annual variability and extremes are likely to be the most significant drivers of change in inland aquaculture and fisheries. Bangladesh relies on fisheries for around 80% of national animal protein intake. In the theoretical scenario of 2-6°C warming, precipitation is forecast to decline in Bangladesh during the dry season and increase during the wet season, expanding flood-prone areas by 23 to 39%.

The need for further research, adaptive capacity and coping strategies

Information on the likely impacts of climate change for fisheries is very limited. Moreover, the inherent unpredictability of climate change and its mechanisms of impacts on fishery are complex. Efforts should be made to increase the understanding of how and why climate change may affect aquaculture and fisheries. These efforts should emphasize developing strategies by which fisheries, and perhaps more significantly aquaculture, can play a part in our wider adaptation to the challenges of climate change. One reason why adjusting to climate change might be more difficult now than it was in the past is that the fisheries in many parts of the world have become more regulated. While the need for regulation is not in doubt it often comes at the cost of flexibility, making it more difficult to enter another fishery if one collapses.

Conclusion:

In most cases and for most climate change-related impacts, improved management and better aquaculture practices would be the best and most immediate form of adaptation, providing a sound basis for production that could accommodate possible impacts. An ecosystem approach to aquaculture (EAA) management would be a most effective thematic adaptation measure. As with capture fisheries, responses range from public to private sector and can be reactive or anticipatory. The aquaculture of extractive species – using nutrients and carbon directly from the environment such as bivalves and macroalgae – may deserve further attention for its positive ecosystem characteristics and potential food security benefits. Integrating aquaculture with other practices, including agro-aquaculture, multitrophic aquaculture and culture-based fisheries, also offers the possibility of recycling nutrients and using energy and water much more efficiently. These could include fisheries and assist coastal communities in general. Short-cycle aquaculture may also be valuable, using new species or strains and new technologies or management practices to fit into seasonal opportunities. Aquaculture could be a useful adaptation option for other sectors, such as coastal agriculture under salinization threats, and could also have a role in biofuel production, through use of algal biomass or discards and by-products of fish processing. For feed-based aquaculture, dependence of capture fisheries on fish meal and oil, and growing competition for terrestrial raw materials is most important. Feeding materials and formulation strategies will be particularly important in maintaining and expanding output while containing costs and energy inputs, and improving resilience to climate change. Adaptations include changing to less carnivorous species, genetic improvements, feed source diversification, better formulation, quality control and management.

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Principal Scientist & Officer in Charge
Kakdwip Reaserch Centre,
CIBA,ICAR
Ministry of Agriculture, Govt of India
24,Pragana(South)WB-743347

FORECASTING THE EFFECTS OF GLOBAL WARMING ON BIODIVERSITY

Kalpana Manjari Patra

Now it is widely accepted that global warming is happening, there is a growing demand for accurate forecasts of its effects, and much concern about its effects on biological diversity. Specialists know that theoretical models of these effects are limited—although useful in certain contexts when all the provisions, preconditions, and limitations of a given model are understood—and should not be taken literally. It is no wonder that policymakers and the general public are confused.The purpose of an environmental forecast is either to support a decision process or to test a scientific hypothesis. To support a decision process, it must be clear which decisions the forecast expects to improve. To mitigate the effects of global warming on biodiversity, two distinct kinds of actions are needed: long-term actions, such as reducing emissions of greenhouse gases, and short-term ones, such as designing an appropriate nature reserve. Fossil evidence and recent ecological and genetic research, along with specific problems with present forecasting methods, lead us to believe that current projections of extinction rates are overestimates. Previous work has failed to adequately take into account mechanisms of persistence. We note a Quaternary conundrum: While current empirical and theoretical ecological forecasts suggest that many species could be at risk from global warming, during the recent ice ages few extinctions are documented. The potential resolution of this conundrum gives insights into the requirements for more accurate and reliable forecasting.

Eight ways to improve biodiversity forecasting

Reliable ways to forecast rates of extinction, both in relation to global warming and in general, still elude us. In the face of growing demand for accurate, timely forecasts, we consider how these forecasts can be improved, and make eight primary suggestions.

(1) Select a specific definition of biodiversity.

Most of the existing literature on forecasting the effects of global warming on biodiversity seems to assume that "biodiversity" has some universally accepted meaning, and that readers alreadyknow what this is. However, biodiversity is a complex concept,and its meanings are becoming both more complex and more quantitative as greater emphasis is placed on DNA analysis as a determinant of genetically distinct units. As if distinctions among different levels of organization of biodiversity (genes, species, ecosystems, etc.) were not already complex, there are even more fundamental distinctions between different ways of valuing biodiversity: intrinsic value (species' value independent of human use and needs) and usevalue (the human use of diversity, ranging from the desire to harvest one species to the ability to see and appreciate complex ecosystems).

(2)Evaluate models before using them.

Models that forecast the impacts of climate change on biodiversity are difficult to validate, and it may be many years before anyone can conclude whether a given forecast of the effects of global warming on biodiversity was nearly right or not. However, scientists can and should evaluate a prospective forecasting method before using it to generate forecasts, and there are well-known methods, applied widely in other disciplines, for doing so. The evaluation should include the accuracy of the method (e.g., its ability to reproduce past situations) and sensitivity analyses. For example, if small changes in one parameter in a model lea to large changes in results, one must ask whether the model is sufficiently robust to be used.

(3)Account for multiple causes of changes in biodiversity.

Climate change is only one way in which the environment and human activities are affecting biodiversity. Forecasts must integrate other human impacts as well, but generally they do not. Biodiversity is also under pressure from humans' conversion of natural and seminatural habitats, wildlife trade, war, pollution, physical infrastructure (e.g., roads), and introduction of invasive exotic species (including disease organisms), as well as from natural environmental change, including catastrophes. Forecasts should disentangle the effects of climate change from these other sources of change, or at least account for the climate component and its interaction with the other components (e.g., how current landscape fragmentation could affect species migrations, compared with past migrations in more continuous landscapes).

(4)Obtain good information and make better use of it.

The data that scientists and policymakers need most are usually inadequately available—sometimes no data exist or, more commonly, the available data are sparse, poorly collected, statistically insufficient, and biased. These include basic information on the abundance and geographic patterns of most species, as well as the data necessary to estimate the probability of extinction for a species. For example, scientists have no knowledge at all about the status of more than 40% of marine fauna (every taxonomically identified species ever recorded) within the Swedish parts of Skagerak, Kattegat, and the Baltic Sea, even though these areas are among the most intensively studied marine areas in the world

(5)Use the Quaternary fossil record to understand mechanisms that preserve biodiversity, and use these in forecasting models.

Current forecasting methods suggest that global warming will cause many extinctions, but the fossil record indicates that, in most regions, surprisingly few species went extinct during the Quaternary (from approximately 2.5 million years BCE to the present)—in North America, for example, only one tree species is known to have gone extinct (Bush and Hooghiemstra 2005). Large extinctions were reported mainly for tree species in northern Europe (68% loss of tree genera; Svenning and Skov 2004) and for large mammals (> 44 kg) in the Northern Hemisphere (MacPhee 1999). We refer to this contrast between the implications of modern forecasts and the observed fossil record as the "Quaternary conundrum." Theresolution of this conundrum is key to improving forecasts of climate-change effects on biodiversity. Among the possible explanations are that climate change during the Quaternary was greatly different from climate change forecasted for the future; that genetic and ecological mechanisms, not accounted for in formal forecasting methods, allow the persistence of many species even under rapid climate change; and that factors in addition to climate change could decrease rates of extinction.

(6)Improve widely used modeling methods.

Theoretical models are essential to quantitative forecasts of effects of global warming on biodiversity. Four methods are in use today for these forecasts:

(i) modeling individuals

(ii) using groups of species as the units of interest in a model

(iii) integrating biodiversity within general circulation models (GCMs); and

(iv) using species–area models, that is, modeling based on theories of total biodiversity.

Clearly, since there are 1.5 million named species and many more that are as yet undocumented but believed to exist, methods that require specific information on all species for forecasting overall biodiversity are not practical. At the heart of the choice about which method to use is the question of appropriate spatial and temporal scales, a problem common to many disciplines. The larger the scale of the primary units of a model, the simpler it is to estimate effects over large areas and times, but also the cruder the approximation is and the more likely that undesirable assumptions will prevail. The smaller the scale, the greater the detail that can be considered, but the more detailed the information, the greater the number of calculations that must be made. The question boils down to whether it is better to know a lot of detail about fewer points or much less information about much greater areas. At present, it is not clear which approach is more useful for forecasting the effects of global warming on biodiversity, and one of the results is that research is being carried out at multiple scales.

(7)Improve ecological principles embedded in general atmosphere–ocean–biotic coupled circulation models.

Niche theory modeling has been used both by ecologists and by those involved with coupling the biosphere to ocean–atmosphere GCMs. Curiously, these two activities have gone on relatively independently, with the GCMs historically using a simpler and more static kind of niche theory than the models applied directly by ecologists. In part this independence is the result of different goals. Climate modelers have primarily been interested in the influence of vegetation on climate through albedo, surface roughness, water evaporation, and exchange of greenhouse gases and aerosols.

(8)Develop better models for forecasting total biodiversity.

One of the simplest and most straightforward methods of forecasting the effects of global warming on total biodiversity is based on the species–area curve. In simplest terms, the number of species is correlated with area. There are many species–area curves, but most commonly such curves are given by the two-parameter curve with the formula S = cAz, where S is the number of species, A is the area, c is the number of species on one unit of area, and z is the rate at which log S increases with log A.

Recommendations

In this article we point out eight ways to improve forecasts of the effects of global warming on biodiversity. We have considered four kinds of models used to forecast the effects of global warming on biodiversity. Three share a foundation in ecological niche theory. The first group of models, represented by JABOWA-type vegetation models, makes forecasts for individuals and species and has the flexibility to involve non-steady-state relationships between a species and its environment, but requires species-specific data that are not always available. The second group, ecological niche-theory models, makes forecasts based on the environmental conditions that are possible for a set of species or a single species. Traditionally, these have been applied primarily with climate change taken into account as a driver, but some recent studies expand this approach to include other habitat characteristics. Also traditionally, these models assume equilibrium relationships between species and the environment, and among environmental variables, which limits their utility. Recent advances are making these models more flexible, with the result that this kind of model has broad appeal among scientists and is likely to remain an important and useful approach. The third group, used by climatologists, consists of bioclimatic-envelope models in even simpler forms than those in use by ecologists. These models have necessarily been simple because of the complexity of all climate models. Although advances have been made, they remain crude from a biological point of view, and static (especially in the relationship between climate and vegetation). They are used to model the feedback between climate and vegetation. The fourth group comprises models based on species–area theory. These models are appealing in the abstract because theydo not require detailed knowledge of species or habitats, but they have often been applied inappropriately for forecasts of the effects of global warming on biodiversity. One promising approach is to focus on links between the species–area curve and models of habitat heterogeneity. Such models build on a combination of available habitat and species data as surrogate information for overall biodiversity patterns. The effectiveness of these four useful classes of models will depend on the extent to which our recommendations are adopted, especially with respect to obtaining necessary data. Curiously, although three of the approaches—JABOWAbased models, niche-theory models, and models used by climatologists—make use of similar niche-theory ideas about the relationship between a species and its environment, scientists using each of those approaches tend not to communicate with each other or read each other's literature. We suggest that there is now much scope for an integrated framework for forecasting the impacts of global change on biodiversity. Such a framework could integrate models for species persistence and consider multiple causes of biodiversity change. This emerging framework awaits more of the important evaluation steps, including case studies.

Lecturer in Zoology,
Nilamani Mahavidyalaya, Rupsa, Balasore

SAVE THE PLANET FROM GLOBAL WARMING

Mr. Prafulla Chandra Rout

The year2008 was a land mark year in the history of Environmental movements in the World. The Nobel Committee have recognized that Global warming is a matter of serious concern for the mankind and we have to sincerely act to save our planet for our existence and continuance by awarding the prestigious prize to Mr. Al Gore for championing the cause and to U.N.O.'s International Panel for Climate Change for providing conclusive scientific evidence that human activities are interfering in Nature's functioning and aiding significantly in causing global warming. Dr. R.P. Pachauri, being the Chairman of IPCC will be honored with the Prize along with Mr. Gore. The Indian proverb says! Only when the last tree has died and the last river been poisoned, the last fish been caught, we will realize we cannot eat money! This proverb is important in the present context of environmental degradation around the world and the civilization has not done enough as it should do. This is the time, although late better than never, to act and act with commitment.

The Age of Our Planet:

Based on scientific facts and analysis, Scientists tell us that Earth was born some 4.6 to 4.5 billion years ago and will continue to exist for few billion years more. But whether it will be suitable in future for the habitation of biodiversity including mankind depends upon our action. Human civilization has caused so much damage during the last few hundred years that earth is sending strong signals for us to rectify the error and to act fast.

Milankovitch Cycles: Milankovitch, a Mathematician by his study in 1930 opined that three basic variations in Earth's movement affect global climate. These variations are:

(i) variations in earth!s orbit around the sun follow one lakh year cycle;

(ii) the tilt of earth!s axis takes 41000 years to complete a cycle;

(iii) a 23000 year cycle is created by a top-like wobble of the earth!s axis. These cycles combinedly affect the planet!s climate. As per these cycles meteorologists and physical scientists tell us that the planet should have been in a period of cooling. But this is not happening.

(iv) We know that although the planet Mercury is nearest to Sun but Venus is three times hotter than mercury. The scientific reason is that venus is full of Carbon dioxide, which traps solar energy and the temperature of venus is around 867 F(Earth has an average temperature of 59F).In view of this scientists look for reasons for increase in temperature of the earth!s atmosphere during the last two centuries and the unprecedented increase happening in last 50 to 100 years.

GLOBAL WARMING :

Planet's climate system is influenced by innumerable interacting variables and these are summarized below:

Solar input: The Suns rays travel 93 million miles to hit the upper atmosphere of Earth at about 100 watt or higher power per sq.metre. One third of this energy is reflected back to space and the rest of the solar energy warms our planet and drives the weather cycles. The average surface temperature has remained around 14.5C for many hundred years because of the atmosphere, which consists of gases in a delicate balance. The gases which keep the earth warm are water vapour, carbon dioxide, methane, nitrous oxide and some other gases. The Ozone layer in Stratosphere absorbs the UV light to a large extent. Oceans which cover almost 70% of earth's surface are the chief source of water vapour in the atmosphere. Higher atmospheric temperature mean increased water evaporation, melting of accumulated ice on earth's surface. .Evaporation leads to cloud formation, which reflect incoming solar radiation and absorb heat radiated from earth's surface. In recent times this balance is broken.

Land use: brings major effects on heat balance and climate. A closed forest (more than 40% canopy cover) will absorb significant amount of CO2 where as an open or degraded forest will not absorb much CO_2 but because of human use, it may generate methane. Landfills, ranching, crop farming especially paddy generate CH_4.Earth's atmospheric temperature shows increasing trend and the change in climate is popularly understood to mean the effect of global warming. The following gases (Table 2) are scientifically considered as green house gases responsible for global warming.

GREEN HOUSE GASES

1. **Carbon Dioxide:**
2. **Methane:**
3. **Nitrous Oxides:**
4. **CFCs and perfluorocarbons (Which endanger ozone layer)**
5. **Water Vapour :**

ENERGY USE :

For the first hundred of thousands of years of life on the earth, man depended on muscle power to gather food mainly from hunting and collecting from the forests. Discovery of fire helped to improve the living conditions but its true potential could be utilised much later. Water is utilized as the most important resource for survival since the dawn of civilization but as a source of energy it was utilized much later. The major transition in energy use came with acquiring knowledge of Agriculture and animal husbandry. But man started to interfere with nature!s functioning as he cleared forests in favour of agricultural land and creating crop storage facility by constructing store houses using wood. Water use was intensified due to irrigation. The fuelwood base metal working technology helped man to develop tools to use animals to plough the land and to develop axes, saws, swords and so on for other uses. The next energy use transition came after learning the use of coal and other fossil fuels leading to establishment of industrial revolution in Europe. The pressure on the natural resources of the planet increased many fold and with population growth and technological revolution, man interfered with nature!s functioning very significantly. Taking the late 17th century as base year, scientists tell us that the carbon dioxide level was around 280ppm and during the last100 years or so, it has increased to 383ppm and at this rate of increase it will reach about 550ppm by 2050 and 700 ppm by 2100AD.

THE POSITION OF GLACIERS AND ICE-SHEETS

In 40 to 50 years in perennial mountains streams, river, water flow will be drastically reduced if the glaciers continue to sink. It is estimated that the following effects may also be found:

1. Worldwide flooding
2. Desertification of Africa and some other parts
3. Food crisis
4. Monsoon season will be affected
5. Drastic climate change
6. Hydro energy crisis
7. Island nations will submerge and some other nations like Bangladesh, Coastal areas, Maldives etc. will be seriously affected. Diseases like Dengue, Chikngunya etc. will occur.

SITUATION IN INDIAN SUBCONTINENT

"Down to Earth" – December, 2006 issue of the magazine report that "Rain is a stranger in a cold desert spread across spiti in Himanchal Pradesh and Ladakh in Jammu & Kashmir". The Tibetan plateau, however, falls in rain shadow area beyond the Himalaya range. The Tibetan plateau does not receive the monsoon. The annual precipitation is about 100 mm, mostly snow. However, in 2006 monsoon season, this region witnessed heavy rains and floods in August. However, Kashmir valley witnessed severe summer in the past 30 years during this period. At the same time part of Bihar was under flood and another part suffered from drought. Assam witnessed drought and Barmer district of the Thar desert in Rajsthan was flooded. Monsoon often exhibits fickle behaviour. In the 1990s, India used to receive 12 monsoon depression but it dropped to four in 2000. However in 2006, the monsoon depressions were many in Orissa, which also witnessed a super cyclone in 1999.

All these climate flip-flop may be the consequences of global warming. The Indian National Climate Centre in Pune are of the opinion that one of the most significant consequences of global warming would be increase in frequency of extreme precipitation, which would largely be due to increased evaporation for warmer temperatures. However, the meteorological Department maintains that there is no evidence of the effect of global warming in India. The variations in rainfall and other climatologically parameters are within the range of interannual and inter seasonal changes. However, the climate changes are happening more frequently in some states like Orissa and hence many are inclined to believe that this is effect of global warming

Impact of global warming around the world

In the winter of 1997, Japan experienced a high erratic snowfall and eight tropical cyclones ripped through the islands of central pacific. In 1998 New York was 4.4°C lower than usual temperature in January. Guadala Jara in Mexico experienced snowfall for the first time since 1881. Indonesia experienced worst drought in 150 years and forest fire destroyed 4 lakh hectares of forest. India, abnormally high rains swept over Tamilnadu & Orissa experienced a supercyclone in 1999. These impacts may be due to phenomenon called El-Niho & global warming.

WHAT IS EL-NINO ?

It is periodic warming of the Pacific Ocean waters that bring extremes in weather. Meteorological scientist is of the opinion high pressure in the eastern pacific sends trade winds blowing to the west. These winds push ocean water before them and the surface water level in and around of Australia and Indonesia rise about a half meter than it does off the coast of Peru. The trade winds slacken after pressure drops & then the sea water pushes back down hill to the east and this eastward flow key to understanding the phenomenon called **El-Nino**. The backward flow of sea water causes high waves. These waves push down the thermo cline layer in ocean. Thermo cline is a layer of cooler water that normally mingles with the warmer water at sea surface.

As the thermo cline sinks down to greater depths, the mixing of cool and warm water stops and thus the sea surface water temperature rises and this onsets the phenomenon called El-Nino, warming of the Pacific Ocean. This phenomenon occurs in a cycle of 4-7 years. There waves can be thousands of kilometers long and travel some 30 meter below the sea surface. Satellites pick up the subtle undulations in sea level as ripples pass through. The waves first hit the South American Coast and some reflect back. These reflected waves reach Asia & rebound again. This double bouncing waves lift up cool water and cool the surface water bringing a sea temperature drop in eastern pacific and this decrease is called **La Nina.** This phenomenon was discovered by Peruvian fishermen about a century ago. In 1982-83 El-Nino caused worldwide destruction and the Food and Agriculture Organization (FAO) has observed these weather charging patterns in Asia. El-Nino may affect Monsoon season in South East Asia, especially India. But it is still scientifically not determined the linking of El-Nino with monsoon. Some of these aspects are discussed in Chapter – four (Environment – in – Action).

THE INTERNATIONAL RESPONSE:

Realising the urgent need, The World Climate Conference was held in 1979 under auspicious of UNO and the conference led to develop United Nations Framework Convention on climate change(UNFCCC) in 1992 followed by Kyoto Protocal in 1997.The International Panel for Climate Change was formed in 1992 and on the basis of scientific facts, they have been able to develop series of reports in1992, 1995,2001 establishing the green house gas increasing causes and their effects and brought world wide awareness. The world is divided on phasing out the source of reduction. The senate of USA has not yet ratified the declaration and is of the opinion that the ratification will come after the key developing countries like Argentina, Brazil, China, India and some other large countries adopt meaningful actions on this matter.

The Kyoto Protocol includes explicit targets or 'assigned amounts' for developed countries which are expected jointly to reduce their emissions of six green house gases (among them hydro fluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5 percent below 1990 levels (and in some cases 1995 levels) in the period 2008-12. Individually, these countries have separate commitments. The European Union countries are expected to reduce their emissions by 8 per cent, the USA by 7 per cent and Japan by 6 per cent. Australia, Iceland, and Norway are allowed to increase their The North-North differences refer to the internal problems that the developed countries were themselves experiencing in articulating definitions, targets, measures, and co-operative mechanisms. For example, while the EU pushed for a 15 per cent reduction target, the USA was only willing to go as far as stabilization of emissions in 2008-12. Despite the divergence of starting points and the inflexibility of negotiating positions, an agreement was reached with legally binding targets. The serious North-South conflict in relation to the so-called voluntary commitments of developing countries was partially resolved through the inclusion of the CDM emissions. The remaining countries are allowed varying levels of reduction.

Eligible Climate Change Mitigation Activities :

- Fuel system Actions
- Conventional Power Generation system actions.
- Transmission system actions.
- Distribution system action.
- End Use Energy Efficency & demand side management actions.
- Renewable Energy actions. (Reforestation, Solar Energy, Wind Energy, Nuclear energy, Bio-Gas Energy etc.
- Offset Actions and Emissions Trading Actions (Carbon Treading)

SUMMARY

Clarification and growing scientific acceptance of the view that modest temperature increases would likely produce a mix of beneficial and detrimental changes. Harmful effects would be concentrated in the already warm tropics and subtropics, but warming beyond a few degrees would likely produce negative impacts across the board. It may be some positive effects on Agriculture Productivity in higher latitudes. But occurrence of new diseases is expected.

Ecosystems, with their specific flora and fauna, are especially vulnerable to negative impact from *global warming.* Already, human interventions have imposed such extensive disruptions and fragmentations on them that they have lost many of their original adaptive mechanisms, such as long-term, large-scale migration of animal and plant species, or local shifting of the species balance.

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Lecturer in Zoology
Govt.Sc. College, Malkangiri.

CLIMATE CHANGE AFFECTS ON BIODIVERSITY

Pramod Kumar Kar

Climate change is already having an impact on biodiversity, and is projected to become a progressively more significant threat in the coming decades. Ecosystems are already showing negative impacts under current levels of climate change, which is modest compared to future projected changes. In addition to warming temperatures, more frequent extreme weather and changing patterns of rainfall and drought can be expected to have significant impacts on biodiversity. Some species may benefit from climate change but most species will not find it as beneficial as most will not be able to adapt.

Affects on biodiversity:

a-Climate change impacts on biodiversity in the Arctic

In the Arctic, it is not just a reduction in the extent of sea ice, but its thickness and age. Less ice means less reflective surface meaning more rapid melting. The rapid reduction exceeds even scientific forecasts. In terms of biodiversity, "the prospect of ice-free summers in the Arctic Ocean implies the loss of an entire biome". In addition, "Whole species assemblages are adapted to life on top of or under ice - from the algae that grow on the underside of multi-year ice, forming up to 25% of the Arctic Ocean's primary production, to the invertebrates, birds, fish and marine mammals further up the food chain." The iconic polar bear at the top of that food chain is therefore get more media attention.The ice in the Arctic does thaw and refreeze each year, but it is that pattern which has changed a lot in recent years as shown by this graph:

b-Climate change means ocean change

When talking about the impacts of climate change, we mostly hear about changes to land and the planet's surface or atmosphere. However, most of the warming is going into the oceans where a lot of ecosystem changes are also occurring. Just as it takes time for a cup of coffee to release heat into the air, so as it takes time for the ocean to release its heat into the atmosphere."

Rapidly rising greenhouse gas concentrations are driving ocean systems toward conditions not seen for millions of years, with an associated risk of fundamental and irreversible ecological transformation. Changes in biological function in the ocean caused by anthropogenic climate change go far beyond death, extinctions and habitat loss: fundamental processes are being altered, community assemblages are being reorganized and ecological surprises are likely.

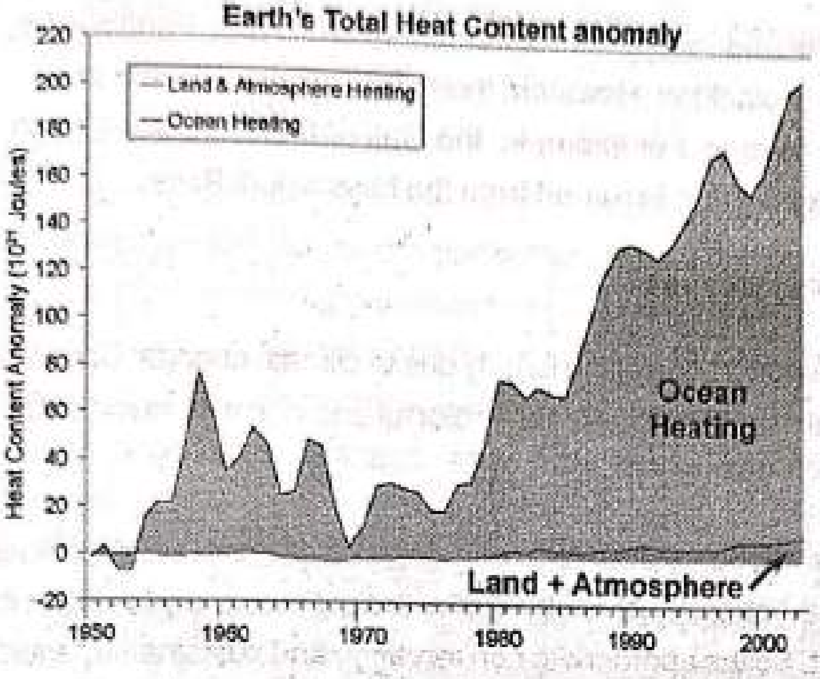

Fig. - 3 Heat content in ocean.

C-Increasing ocean acidification

Although it has gained less mainstream media attention, the effects of increasing carbon dioxide - on the oceans may well be significant.These are the 3 main concepts:

1. More CO_2 in the atmosphere means more CO_2 in the ocean;
2. Atmospheric CO_2 is dissolved in the ocean, so it becomes more acidic; and
3. The resulting changes in the chemistry of the oceans disrupt the ability of plants and animals in the sea to make shells.

Scientists have found that oceans are able to absorb some of the excess CO_2 released by human activity. This keeps the planet cooler. However, the additional excess CO_2 being absorbed is also resulting in the acidification of the oceans.

d-Increasing ocean stratification

As climate change warms the oceans, this affects tiny drifting marine organisms known as phytoplankton. Though small, Phytoplankton is a critical part of our planetary life support system. They produce half of the oxygen we breathe, draw down surface CO_2, and ultimately support all of our fisheries. The phytoplankton can only live in the top 100 or 200 meters of water but if it is getting warmer, they eventually run out of nutrients to feed on unless the cold, deeper water. So it is a direct correlation between rising sea surface temperature and the decline in phytoplankton growth around the world.

e-Increasing oceanic dead zones

Aquatic dead zones often occur near high human population density. Fertilizer and sewage run-off cause huge growth of plankton. However, these then quickly die and are consumed by bacteria that deplete oxygen. For example, the Gulf of Mexico has a 22,000 square kilometer dead zone every spring due to run-off from the Mississippi River.

f-Coral reefs threatened by climate change

Around the world, coral reefs have been dying largely due to climate change. Coral bleaching results in white, dead-looking, coral. Healthy coral is very colorful and rich with marine life.

CONCLUSION

At least 40 % of the world's economy and 80 % of the needs of the poor are derived from biological resources, in addition, the richer the diversity of life, the greater opportunity for medical discoveries, economic development. So the appropriate conservation and sustainable development strategies should be taken.

Lecturer in Botany,

B.B. College, Rangamatia, Mayurbhanj

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CLIMATE CHANGE IMPACTS ON BIODIVERSITY

Dr Bidyut Kumar Patra

There is growing consensus in the scientific community that climate change is occurring. Research summarized in the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report indicates that global average surface temperatures are increasing, and that snow cover and ice extent are decreasing in the higher latitudes of the Northern Hemisphere (IPCC 2001a). While the absolute magnitude of predicted changes such as these are uncertain, there is a high degree of confidence in the direction of changes, and in the recognition that climate change effects will persist for many centuries. The United Nations Intergovernmental Panel on Climate Change (IPCC) has concluded that the global atmosphere is warming, noting that the average global surface temperature has increased by nearly 1 °C over the past century and is likely to rise by another 1.4 to 5.8 °C over the next century (IPCC, 2001a). Such simple statements however mask the highly variable, site-specific and complex interactions among climate change effects.

Atmospheric warming affects the pressure and composition of the atmosphere; the temperature of surface air, land, water, and ice; the water content of air, clouds, snow and ice; wind and ocean currents; ocean temperature, density, and salinity; and physical processes such as precipitation and evaporation. The Pacific Decadal Oscillation is a natural cycling of warm and cool phases in the sea surface temperature over a 50-60 year cycle. The El Niño Southern Oscillation is a shifting of tropical air pressure patterns along the west coast over a few-year cycle. These two cycles together and large size, make the task of predicting climate and weather. Despite these climate change assessment challenges and major uncertainties, certain conclusions are emerging. Of particular relevance the conclusion that climate change effects are expected to occur faster and be more pronounced than the global average over the mid and high latitudes of the Northern Hemisphere continents (IPCC, 2001a). The potential for climate change to impact biodiversity has long been noted by the IPCC, other bodies (UNEP/IES, 1998), and by research biologists (e.g., Peters and Lovejoy, 1992).These changes in climate can impact biodiversity either directly or indirectly through many different impact mechanisms. Range and abundance shifts, changes in phenology/physiology/behaviour, and evolutionary change are the most often cited species-level responses. At the ecosystem level, changes in structure, function, patterns of disturbance, and the increased dominance of invasive species is a noted concern.

Synergistic Effects

Climate change has synergistic effects with many of the biggest existing impacts to biodiversity.

1. Habitat loss and fragmentation

With sea level rise, coastal marshes, wetlands, and mudflats may migrate further inland. However, this process will be constrained by built environments such as the extensive dike systems of the river & estuaries (Beckmann, 1997). Here, habitat fragmentation, in the form of dikes, could act synergistically with climate change, reducing and potentially eliminating wetlands and mudflats in the river floodplain.

2.Invasive species

Increasing lake and river temperatures make for more suitable habitat for invasive warm-water fish species such as yellow perch and walleye (Chu et al 2005). These species have the potential to outcompete native cold-water species, which are less suited to warmer water temperatures. In this example, warming acts synergistically with invasive species to pose a threat to native fish species. Similarly, warmer, dryer temperatures in Kootenay national park resulting from climate change are less suitable for native plants, and more suitable for invasives such as Russian thistle and Knapweed (Scott and Suffling, 2000). In this case also, invasive species and climate change act synergistically, threatening native plants.

3.Species exploitation

Synergistic action between commercial harvesting and climate change has already been observed to reduce Thompson River Coho stocks by up to 90% (Bradford and Irvine, 1999). Increases in river and lake water temperatures are expected to have detrimental impacts on Fraser River sockeye stocks, which are also heavily harvested (Morrison, 2002).

4.Environmental contamination

Nutrient enrichment from agricultural runoff could act synergistically with warming water temperatures due to climate change to enhance eutrophication in freshwater systems.

5.Aquatic habitat

In rainfall driven streams, extended summer low flow periods are expected. This will further increase water temperature, favouring warm water species, and altering community structure and functioning. Conversely, in snowmelt driven and glacier fed streams, the magnitude and duration of summer floods is expected to increase. In either case, significant impacts on aquatic habitats should be expected.

7.Wetlands

Wet lands are particularly vulnerable to climate change. As physiographically limited systems they are unable to migrate, and hence, vulnerable to changes in hydrology, nutrient inputs, etc.

8.Coastal ecosystems

The sea is rising. Coastal ecosystems – including tidal zones, estuaries and coastal wetlands – and the species that utilize them will all experience impacts. Specific challenges to be faced include: salt water intrusion causing changes in local soil chemistry and subsequent extirpation of freshwater plants; habitat loss for migrating shorebirds; the destructive force of storm surges; and alteration of food web dynamics for seabirds and other animals.

9.Alpine ecosystems

Due to their restricted geographic area and narrow elevation range, alpine ecosystems are particularly vulnerable to climate change. Climate and vegetation change rapidly with altitude over relatively short distances in mountainous terrain. As a result, alpine ecosystems are particularly vulnerable to encroachment by lower elevation ecosystems.

10.Forest and grassland ecosystems

Ongoing concerns are the increased potential for major widespread wildfires, and the subsequent potential for transformations in disturbed ecosystems, such as colonization by invasive species and resultant new species assemblages. Grassland ecosystems face threats in terms of lost species diversity.

Ecosystem representation in protected areas

Protected areas are widely acknowledged as one of the most important management instruments for biodiversity conservation. The protected areas strategy in the 1990's set out to improve the protection of representative ecosystems using both bio-geoclimatic and eco-regional classification systems. The potential for major, long term ecosystem shifts under a changing climate suggests a need to re-evaluate the protection of representative ecosystems with a stronger focus on the ecoregional system as it is based on broad topographical features that do not shift with climate change.

Biodiversity Management under a Changing Climate

Globally, two broad policy responses to address climate change have been identified. The first is "mitigation", which refers to actions aimed at slowing down climate change by reducing net greenhouse gases (GHG) emissions. The second is "adaptation", which refers to actions taken in response to, or in anticipation of, projected or actual changes in climate. The actions are grouped into five main categories:

- **Sustainable Energy Production and Efficient Use** – enhancing energy conservation and efficiency in industry, small business.
- **Efficient Infrastructure:** Transportation, Buildings and Communities –increasing efficiency and promoting opportunities for innovation.
- **Sustainable Forest and Carbon Sink Management** – managing forest and agricultural lands to increase carbon sequestration and decrease impacts.
- **Government Leadership and Outreach** – reducing emissions from government operations, increasing capacity to adapt, increasing public outreach on mitigation and adaptation.
- **Water Management** – supporting research geared towards developing water resource management tools, and supporting integrated watershed management to address issues such as drought and flooding.

MITIGATION

Global reductions in GHG concentrations are expected to slow the rate and magnitude of climate change over the long term. To do this, both sources and sinks for greenhouse gases must be managed. Examples are using fossil fuels more efficiently and expanding forests to sequester greater amounts of carbon dioxide from the atmosphere. Broadly speaking, any efforts to reduce the rate or magnitude of climate change by reducing atmospheric GHG concentrations can be viewed as a long-term activity toward mitigating impacts on biodiversity at all levels.

GHG management is a global issue, and mitigation efforts can rightfully be placed in this context. For example, the World Business Council for Sustainable Development (WBCSD, 2005) indicates that North Americans in general have the highest per capita GHG emissions, and face considerable challenges in achieving improved energy efficiency. As a vivid local example, a recent discussion paper for the Greater Vancouver Regional District (GVRD, 2006) indicates that in order to meet Kyoto targets in the region would require GHG emission reductions equivalent to 90% of all automobile emissions. What this discussion clearly highlights is that additional mitigation efforts are possible, but implementing them will require difficult societal trade-offs.

ADAPTATION

There are two broad types of adaptation actions. First, **capacity-building actions** aim to increase the capacity of institutions, governments, businesses, and the public to prepare for climate change. Capacity-building actions include research and assessment, monitoring, extension and training, changes in policies, etc. The second type, **implementation actions,** conveys actual adaptation benefits 'on the ground'. Implementation actions most often aim to eliminate a projected climate change impact, however in some cases implementation actions can be aimed at exploiting a climate change opportunity.

The Government's plan described above contains a number of specific actions to increase provincial capacity to adapt. Examples includes:

(1) Addressing climate change and extreme weather in government planning and operations;
(2) Implementing effective monitoring and reporting procedures for climate change and its impacts;
(3) Developing climate models and other tools for addressing climate change risks and adaptation options;
(4) Supporting applied climate change research that meets the needs of decision-makers; and
(5) Developing capacity to respond to extreme weather and climate change.

Each identified action is categorized according to both the type of adaptation activity, and the biodiversity impact target as follows:

1. **Capacity-building** – broken down into three categories: i)research, monitoring and assessment, ii) education and extension, iii) plans and policies.
2. **Implementation** – direct, on-the-ground action aimed at addressing a current or projected climate change impact.
3. **Biodiversity Impact Target Environmental System** – terrestrial, freshwater, or marine-linked
4. **Biodiversity Level** – ecosystem, species or genetic
5. **Impact Range** – local or widespread

Conclusion

To a large degree the types of climate change impacts and potential management actions identified at the global scale are evident. It is becoming clear that major transformations in biodiversity across all systems (terrestrial, freshwater, marine-linked) and all levels (genetic, species, ecosystems) under a changing climate. From a management perspective this may require a reality check. What are the realistic goals for biodiversity management in a time of rapid climate change? To what extent should managers pursue aggressive adaptation actions (e.g., species translocations, captive breeding)? Such questions imply that it will become increasingly important to identify clear management objectives to guide management priorities.

The literature suggests that maintaining ecosystem resilience, focusing on the underlying structure, functions, and processes of ecosystems should be a priority. As noted by many authors, implementing "good current conservation practice", such as creating protected areas and biodiversity networks, minimizing habitat fragmentation and managing invasive species, is the obvious starting point for biodiversity management in response to climate change. In this sense, the vast majority of "options" for managing biodiversity with climate change in mind are already well known. In short, we know in principle what to do, what is not well known is where, when and how to do it. The management emphasis to date has been on capacity building rather than implementation. This is understandable given the current level of uncertainty of potential climate change impacts. However, as societal understanding of the issues increases, we can expect a parallel rise in the call for more implementation action. While many of the implementation challenges associated with biodiversity conservation are the same for climate change impacts as from other types of impacts, there are a few that are unique and require special attention. It is a management risk to immediately assume that the greatest biodiversity impact should be the greatest focus of management effort. In some cases it may be necessary to accept losses and preserve scarce resources for investments in other achievable biodiversity conservation improvements.

Director,
Centre for Envotech and Management Consultancy Pvt. Ltd.
Plot No. N/5-205, IRC Village, Nayapalli, Bhubaneswar.

WHY ARE WE CONCERNED ABOUT GLOBAL WARMING ?

Dr. Annapurna Dhal

Many people consider that Global Warming is the greatest environmental threat of the 21st Century.However, during the 80s and early 90s scientists argued about the causes and effects of global warming. In the late 1990s scientists reached a conclusion that global warming was a cause for concern.**Our Earth is becoming unbearably hot. Why?** The reason is **GLOBAL WARMING.** So, why should we be concerned about global warming? **What is it? How does it happen?**

Our body normal temperature is 98.6°F. When it is higher, then it means our body is not well. Similarly when the temperature of our planet increases it means our planet is not well. The increase temperature in our body is called fever & in case of the planet is called global warming.When the sun's rays reach Earth a group of gases called green house gases trap a part of heat & keep our planet warm. Absence of green house gases would mean that Earth would be 30° colder. If the levels of these gases in the atmosphere increase, they will absorb more heat & make Earth hot. Pollution, overgrazing, burning fossil fuels like coal & petrol, increase the level of green house gases in the atmosphere & this cause global warming.

GLOBAL WARMING

A combination of light & heat energy from the sun reaches Earth & warms the land, oceans & air. When the Earth's surface warms up, it radiates heat which rises towards the sky. Since 1880,large scale burning of fossil fuels & the other human activity led to an increase in the level of green house gases in the atmosphere. As a result, Earth has warmed by 0.8 degree centigrade.A few gases in the atmosphere called the green house gases absorb the heat & prevent it from escaping to the space thus warming the Earth.

Greenhouse Gases

Greenhouse gases are efficient in ***absorbing IR light.*** The most important greenhouse gases are given below:

1. Carbon Dioxide: Source (i) Automobiles, (ii) Industrials, (iii) Anthropogenic

2.Methane: Source (i) Organic Matter decay under anaerobic conditions, (ii) Agriculture fields

3.Nitrous Oxides: Source (i) Automobiles, (ii) Industres

4. CFCs, perfluorocarbons (PFCS)&Sulphur Hexa Floride(SF_6)
Source (i) Refrigerants, (ii) Foam, (iii) Fire extinguishers, (iv) Aerosol products

5.Water Vapour : Source (i) Evaporation, (ii) Transpiration

IMPACT OF GLOBAL WARMING

Since 1980, Earth has experienced 19 of its 20 hottest year on record. The sea levels are rising faster, threatening to flood coasts, wetlands & many low-lying islands. Increase intensities, frequencies and unpredictability of natural calamities like flood, drought etc.On an average, rainfall & snowfall patterns have changed across the globe. Around the world, glaciers and ice caps are melting rapidly.Disruption of stabilized ecosystem.Raised temperature has also triggered the extinction of many animal & plant species.The Himalayan glaciers are the source of some of Asia's biggest rivers. These glaciers are receding faster than glaciers anywhere else in the world. According to the Intergovernmental Panel on Climate Change (IPCC) the melting of glaciers caused by climate change could seriously affect half a billion people in the Himalaya-Hindu-Kush region. Warmer temperature also increase air & water pollution.

Biodiversity refers to variety of life on Earth. Climate change causes habitat fragmentation due to Colonization, logging, agriculture and mining etc. As the earth heats, 25% of Earth's species could vanish by 2050.

- Pollination may be disrupted. Higher temperature and earlier snowmelt may trigger earlier flowering.
- The Arctic summers might become ice free by 2040. This could prove dangerous to polar bears that rely on ice.
- According to a report, 2/3rd of the polar bear population will be extinct by 2050.
- Coral reef mortality may increase and erosion may be accelerated.
- Acc. to WHO (World Health Organization), climate change cause five million illness each year. Malaria, Dengu, Encephalities will increase.
- Temperature rise may prevent normal, healthy growth of fish.
- Igloos are no longer keeping the Eskimo warm! Rising temperatures in the Arctic are causing igloo walls to melt and re-freeze, thereby losing their heating properties!
- Greenland is melting at a rate of 52 cubic miles per year. If Greenland's entire 2.5 million cubic kilometers of ice were to melt, it would lead to a global sea level rise of 7.2 meters, or more than 23 feet!
- One hundred ton of ancient plant life is required to create just 3.8 liters of petrol.
- Because of warming oceans sharks coming closer to the shores.
- Whale population may decrease
- Global warming has upset the natural rhythm of our planet from the North pole to the South pole & from the West to the East.
- One part of the world experiences a deluge, while another part suffers from a shortage of water.
- High temperature in India & USA has been responsible for the drought of 2002. Europe suffered from very low precipitation throughout the spring & summer of 2003. Extreme heat damaged most crops in the United Kingdom & France in the same year.
- Global warming will result in unexpected & increased rainfall, floods, storms, heatwaves &

droughts.Spain & France will become very hot & therefore inhabitable. In India within the next three decades, rapid melting of the Himalayan glaciers will cause increased flooding.

- Changes in precipitation patterns will affect agricultural output all over the world.

THE DIFFERENCE WE CAN MAKE

- An air conditioner (2.5 tone) used for an hour generates 3 kg of carbon dioxide. If we go without air conditioning for an hour a day, the release of 3×365=1095 kg of CO_2 into the atmosphere per year, can be prevented.
- Using a microwave oven for an hour generates 1.3 kg of CO_2. If we don't use microwave just for an week, we can stop the release of 1.3×52(number of weeks in a year)=67.6 kg of CO_2 into the atmosphere.
- Using a geyser for an hour generates 3.3 kg of CO_2. If the geyser is not use just for one hour a day, we can stop the release of 3.33×365=1204.5 kg of CO_2 into the atmosphere.
- One dripping tap in a house wastes 13 liters of water in a single day. Therefore the wastage of water in a year =13×365=4745 liters of water.
- On an average a person who lets the tap run while brushing teeth wastes about 7 litres of water. If 1.13 billion Indians (population as on March,2008) change this habit, we could save 1.13 billion×7 litres =7.91 billion litres of water, in just a day.
- If you avoid eating meat once a week for a year you could save up to 32 kg of grain & 151600 litres of water in a year. Deforestation means more CO_2 in the atmosphere. Transportation requires burning of fossil fuels.
- Compact fluroscent lamps or CFLs use one-third the electricity used by regular bulbs. Energy used for our daily needs of electricity comes from burning fossil fuels. Using less power means lower emission of greenhouse gases into the atmosphere.
- Recycling paper uses 90% less water & 50% less energy than to manufacture new paper. It also produces 36% less CO_2.
- Using one litre petrol (octane) produces about one kg of water vapour & 2.17 kg of CO_2. Walking, carpooling or using public transport, will save at least two litres of petrol a week. This will stop the release of 2.17×2×52=225.68 kg of CO_2 into the atmosphere annually.
- The estimated population of India on March 2008 was 1.13 billion. If each person plants just one tree in a life time, we can eliminate 1.13 billion ton of CO_2 from the atmosphere. One tree absorbs one ton of CO_2 during its lifetime.

At last Environment is everything we see around us. The more natural it is, the better this is for the society of living being. Man causes its dilution, realizes later and attempts at bringing it back to normalcy. Man "**do**" everything and later try to "**undo**" it , if found not suitable. So let us "**undo**" global worming.

Lecturer in Zoology,
B.B.College, Baiganabadia, Mayurbhanj

GLOBAL WARMING & ASSOCIATED PROBLEMS

Mamata Pradhan

The earth is the only planet in the Universe which is capable of supporting life and this is possible due to it's unique atmosphere. Science without humanity is a curse. Mostly due to human activities and interference this unique atmosphere have lost it's quality and going to unfavorable for living beings. Environmental pollution and human efforts for the betterment of living standards are the two sides of the same coin. In the wake of industrialization, consequent urbanization and ever increasing population, the basic amenities of life i,e air, water and land are being polluted continuously.

During the past two centuries, the level of CO_2 has increased considerably in the atmosphere. Human activities of pollution are modifying the natural process of green house effect. In recent years urbanization has resulted in creation of metropolitan areas. Forests and agricultural areas are converted to concrete buildings. The advent of the industrial revolution in the 1700s boosted up the activities of burning of fossil fuels like coal, oil and natural gas which released lots of heat absorbing gases into atmosphere. These heat absorbing gases are CO_2, methane, nitrous oxide, Trifluromethyl sulphur Pentafluoride and hydro Chloroflurocarbons. These are Serious heat trapping gases causing urban heat have converted large cities into heat is lands. These heat trapping gases acts like a blanket, that prevent the solar heat being radiated from earth surface into space. As a result the temperature of the atmosphere increases. This process is known as green house effect, because it reminds some observers of the heat trapping effect of the glass walls in a horticultural green house. Thus the temperature of the atmosphere rises gradually causing an unnatural heating effect which is called as the "GLOBAL WARMING".

Scientists are worried because it is estimated that global temperature would rise by 5^0c by 2050AD. Higher global temperature will cause glaciers to melt. This will lead to expansion of water. If the level of co_2 and other GHGS double, then the sea level will rise by 06.metre or 2feet.The coastal areas and some islands will be submerged. At least one billion people (1/4th of the world population) will be affected due to global warming.All these green house gases are incensing at a rapid rate. It is expected that in a period of about 20 years the non co_2 effects are going to be one and halftimes larger than those of co_2 itself. Scientific discoveries reveal that the world experienced warmest atmosphere during last 50 years out of the period of 100 years. The global mean temperature increased by about 0.5 to 1^0celcius, with-in a period of last 100 years.

Temperature has significant role in the regulation of water cycle in the environment. Hence, rise in global temperature can change the pattern of water cycle. On the other hand increased temperature can cause most of the ice melt down. The increased evaporation of water due to high temperature may alter the pattern of cloud formation and rains at different places. The physical features of the earth also play important roles in causing temperature variations that finally result into variations in air pressures, these variations disastrous condition like storms, cyclones, tornadoes and hurricanes etc.

POSSIBLE IMPACTS OF GLOBAL WARMING:-

Regional climate changes as the ecosystem changes. Overall climate change is likely to be beneficial due to dominance of C_3 crops. Such as barley, wheat, rice and soybeans. The C_3 annual crop yield may increase up to 30% of double concentrations of CO_2.

Forests are highly sensitive to climate change. In the warming world it is a great challenge to conserve forest habitat particularly in the places, where ecosystems are fragmented, polluted or under development pressure. Problems of water availability are likely to be more serious and perhaps more expansive to solve. In future warmer world may have water crisis in some parts. Besides agriculture pattern and precipitation may be impredictable.

Temperature-change may have an important impact on several major categories of diseases. Diseases like malaria, amoebiasis and other worm infections may spread. In Australia mosquito-borne disease may pose considerable threats to health which may probably increase due to green house effect.

PRECAUTIONS:-

In order to have future environmental security against global warming certain precautions should be taken:-

- Main routes of surviving green house gases be detected and controlled.
- Use of renewable energy.
- Production of CFC and other green house gases be controlled.
- Stopping deforestation and adopting a forestation.
- Non-CFC dependent technology should be adopted in the industries.
- Rapid plantation should be done for removal of CO_2 form the atmosphere.

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Dept. of Botany
R.D.S DegreeMahavidyalaya,
Kundabai, Mayurbhanj

GLOBAL WARMING – A THREAT TO OUR PLANET

Mr. Fakir Charan Behera

On a cold winter night, one blanket, you would feel comfortably warm, but with a frozen blankets, you will feel very hot. If you have experienced this, you will certainly understand global warming.The earth is surrounded by a mixture of gases. A few of these called the green house gases have the ability to trap heat. These green house gases make the earth warm. Without this warmth, the earth would be too cold for us to live in. when too much of green house gases are in the atmosphere, the earth becomes too hot. This overheating of the earth due to excess of green house gases is called **Global Warming.**Climate is the average weather of an area. It is the general weather conditions, seasonal variations & extremes of weather in a region. The Intergovernmental Panel on Climate Change(IPCC) in 1990&1992 published the best available evidence about past climate changes, the "Green House Effect" & recent changes in Global temperature. It is observed that earth's temperature has changed considerably during the Geological times. Today, anthropogenic (men-made) activities are upsetting the delicate balance between various components of the environment.

"Global Warming" is an increase in the Earth's temperature due to use of fossil fuels & other industrial processes leading to built-up of **"Green House gases"** in the atmosphere. Due to anthropogenic activities there is an containing heat thereby increasing the average global temperature. This may upset the hydrological cycle, result in floods & droughts in different regions of the world, cause sea-level rise, changes in agriculture productivity, famines 7 death of humans as well as livestock.

An increase in temperature by 1.5-4.5 degree Celsius may disrupt the earth's heat balance causing catastrophic consequences. According to one projection, changes will be the least in the Tropics & be the most at the poles. So Greenland, Iceland, Norway, Sweden, Finland, Siberia, Alaska etc. will be most affected. The Polar ice caps would melt. A rise in temperature would raise the sea-level within a few decades, threatening all the densely populated coastal cities from Shanghai to San Francisco. It is suggested that North America would be warmer & drier. The U.S would produce fewer grains. On the other hand North & East Africa, India, West Australia & Mexico would be warmer & wetter enabling them to produce more grains. According to U.S. scientist George Woodwell, India's annual monsoon rains may cease altogether.

PHENOMENON OF GLOBAL WARMING:-

Carbon dioxide is a natural constituent of the atmosphere but its increased concentration in the air is detrimental. Unfortunately the concentration of carbon dioxide is increasing in the air with an alarming rate, which produces adverse physiological effects.Under normal conditions sun-rays reach the earth & heat is radiated back in the space. But when carbon dioxide concentration increases in the atmosphere, it forms a thick cover & it prevents the heat from being radiated out.

Consequently the atmosphere gets heated & temperature increases. This carbon dioxide layer function like the glass panels of a green house or like the glass windows of a motor car allowing the sunlight to filter through but preventing the heat from being re-radiated in to outer space. This process is called "Green House Effect".

The Green House Effect is a natural process in which certain gases trap heat that radiates from the earth's surface & thus regulate the radiant energy balance of earth making it habitable. The green house gases act as thermal blanket surrounding the earth. The lowermost layer of the atmosphere, the Troposphere traps heat by a natural process due to the presence of green house gases. The amount of heat trapped in the atmosphere depends mostly on the concentration of "heat trapping" or "green house" gases. Besides carbon dioxide the other major green house gases are Ozone, Methane, Nitrus oxide, Chlorofluorocarbon (CFC)& water vapours.

The process by which green house effect is caused may be depicted as follows:-

1."Light energy penetrated earth's atmosphere as short-wave radiation.

"2.This energy is absorbed by earth's surface & changed in to heat energy.

"3.The heat energy is radiated back in to earth's atmosphere as long-wage radiation.

"4.Green house gases absorb the heat radiation the strikes them on its way back to outer space.

"5.The green house gases release the captured heat energy in to the Troposphere.

"6.Thus there is an increase in the earth's temperature, the phenomenon so called "Global Warming".

POSSIBLE IMPACTS OF GLOBAL WARMING:-

The consequent global warming phenomenon has a number of effects on earth's climate, ecosystems & biosphere processes. There may be regional climate change, rise in crop yield in some areas. Warmer world due to global warming may have water crises. Global warming has resulted frequent hurricanes, droughts, change in rainfall patterns & the extinction of many animal & plant species.Due to global warming, many things will change:-

(i) The ice on many mountain peaks will melt as the temperature rises. Melting snow will turn the scenic snow-capped mountains in to bare, rocky & steep hills. The Himalayas will be reduced to rubble of rocks! There will not be any more vacations in hill stations & no more fun in the snow.

(ii) The dense Amazon rainforest will became a dry Savannah.

(iii) As oceans become hot, marine life will be affected, the coral reefs that are extremely sensitive to slightest changes in water temperature, have already started to bleach due to global warming.

(iv) Changing climate & the resulting habitat loss is driving many animals & bird species to extinction, with the penguins, polar bears, reindeer & hundreds of other animals dying earth will certainly look different.

The other possible impacts of global warming are:-

(a)Sea- level change:- As consequences of global warming, four major changes take place which result in sea-level rise. These are:-(i) Thermal expansion, (ii) Mountain glacier melting, (iii) Greenland ice sheet melting and (iv) Antarctic ice sheet melting. The direct effects of sea-level rise are:-(i) Recession of shorelines & low lying coastal zones, wetlands & islands,(ii) Increased tidal range &estuarine salt-front intrusion,(iii) Threat to mangrove ecosystems,(iv) An increase in salt water contamination of coastal areas and (v) Life of millions of people will affected who have built homes in the low lying coastal areas.

(b) Crop yield:- There are different views regarding the effect of global warming on Agriculture. It may show positive or negative effects on various types of crops in different regions of the world, which are as follows:-

(i) Increase in temperature & humidity will increase pest growth like the growth of vectors for various diseases.

(ii) In Tropical & Subtropical regions the soil moisture will decrease & evapo-transpiration will increase, which may drastically effect wheat & maize production.

(iii) Due to rise of carbon dioxide concentration, the crop yield is expected to rise by 50-60% in some areas.

(iv) Overall climate change is likely to the beneficial due to dominance of crops such as Barley, wheat, Rice & Soya beans etc.

(c) Impact on Forests:- Due to global warming the forests are highly affected as they are highly sensitive to climate change. Rapidly rising emissions of carbon dioxide & other green house gases have dramatic impact on climate in raising average temperature & in increasing extreme events such as droughts, floods & storms etc.

(d) Water balance:-

(i) Problems of water availability are likely to be more serious.

(ii) In future warmer world may have water crisis in some parts.

(iii) The global warming will lead to changes in the rainfall pattern in many areas.

(e) Effects on Human health :-

(i) Higher temperature & humidity will increase respiratory, cardiovascular cerebro-vascular & skin diseases.

(ii) The changes in the rainfall pattern in some areas affect the distribution of vector-borne diseases like Malaria, Filariasis, and Amoebiasis etc.

(iii) Warmer temperature & more water stagnation would favour the breeding of mosquitoes, snails & some insects which are the vectors of various diseases. The mosquito-borne diseases may pose considerable threats to health.

PRECAUTIONARY MEASURES:-

In order to have future environmental security against global warming following precautionary measures be taken.

1. Main routes of surviving green house gases be detected & controlled.
2. Current rate of use of CFCs & fossil fuels be cut down.
3. Use of renewable energy.
4. Nuclear power plants for electricity production be increased.
5. Sustainable agriculture be adopted.
6. Population growth be stabilized.
7. Stopping deforestation & adopting aforestation.
8. Massive tree plantation be done for removal of atmospheric carbon dioxide.
9. Non-CFC dependent technology in the industry be utilized.

CONCLUSION:-

Today Global warming is the most threatening environmental issue. If unchecked, it could alter temperatures, rainfall & sea-levels of the earth. The UNEP has appropriately chosen the slogan "Global Warming" to alert the people the cost of defense on world environment day (5th June 1989). The cost of defense should be in the reduction of gas emissions & the plan of coastal defense. To anthropogenic activities should be checked to control global warming. Global warming is a serious threat of today. However, a change in our life-style can tackle this problem. We can choose to walk instead of driving to a nearby place or buy a solar heater instead of a geyser. Our choice will help as carbon dioxide is not released in to the atmosphere & we can change our world for the better. If each of us can do our bit, we can save & preserve the only planet we live on.

Lecturer in-Botany
Seemanta Mahavidyalaya, Jharpokharia.

TRADITIONAL MEDICINE & BIODIVERSITY

Sri Subhash Chandra Maharana

The Environment is defined as 'whole outer physical and biological system in which man and other organism live".According to Oosting (1948)- The Environment is a complex of variable "factors" or "cause" which includes: (i)Substances- Soil & Water (ii) Conditions- Temp & Light (iii) Forces- Wind & Gravity (iv) Organism- Plants & Animals (v) Time. A perfect environment includes the equity or balance amongst the above factors. At present this equity is lost, which need to be regained. The recent trend is more concerned with conservation of Bio-diversity as it has great role for food, medicines and climate.

EVOLUTION OF SCIENCE:-

Science is on progressive evolution. It has passed through different steps & struggle from time immemorial for the benefit of mankind & yet to struggle more to achieve the goal.

Dark age of science:- Due to strong opposition of catholic; progress in arts & science remain obstructed during 200-1200 AD. Hence this is called Dark age.

Revival period:- period after 12ooAD is considered as revival period when new era of progress in scientific field stared.

MEDICINAL APPROACH TO BIODIVERSITY:-

We know that Hippocrates (460-375BC) is regarded as "Father of Medicines" But in India & the Oriental Countries medicinal approach is as old as the human Civilization ***Charak, Sushruta*** were the pioneers of "***Ayurveda Sastra***". In this modern age of science no doubt we have developed our technology in all field. But when emphasizing the field of medicines, if it is analysed, we can found maximum similarities of ancient & modern medicines in Ayurveda, which is nothing but a plant science.

The scientists are at great venture for molecular treatment through Genetic Engineering. it requires a mass level research with sound financial strategy. If we turn our eyes towards the medicine produced from plants & animals in referring to Ayurveda & Homeopathy, then we may get an easy solution. In this context we must not forget ***Dr. Samuel Hahneman*** (April 1755 to July 1843), who is regarded as "Father of Homeopathy".His basic principle is "***Similia Similibus Curantor***" i.e. ***Kantakenayaba Kantakam***. He has described how a disease only can be diagnosed & treated according to symptoms. The traditional treatment by the old school, was in a crude manner but with full efficacy. So the Traditional practice of medicines can't be ignored at all.

TRADITIONAL MEDICINE (TUTUKA) AYURVEDA- HOMEOPATHY

In Homeopathy the medicines are categories into two group: ***(i) Organic Medicines***
(ii) Inorganic Medicines.

(I) Organic medicines may be of:-(a) Plants Products, (b) Animal Products, (c) Hormones and (d) Nosodes

(II) Inorganic medicines may be of:(a) Minerals, (b) Salts, (c) Metals

The medicines coming from plants & animals used in Homeopathy & Ayurveda develop consciousness in keeping the environment undisturbed. It may be better understood by the following examples:

(A) DISEASED CURED BY PLANT PRODUCT IN A TRADITIONAL MANNER:-

(1) Stomach Pain:- Village people have the general practice of burning a ***marker Nut*** (Bhalia) & putting it on the belly, to cure stomach pain. In homeopathy " ***Anacardium"*** is used as a medicines for stomach pain in patentized way. This Anacardium medicine is the botanical name of Marker nut.

(2) Teeth problem:-, The problems of teeth decay and hum infections are treated by exposing the teeth to smoke of ***Solanum virginianum*** (Bhegi baigan). It is used in Homeopathy in the name *Solanum.*

(3) Neuralgia & Spasm:- The person suffering from Nerve disorders associated with pain & Spasm is advised to take "***Mushrooms***" sufficiently. It is a fungus called "***Agaricus***" for the treatment of Nerve disorders.

(B) DISEASES CURED BY ANIMAL PRODUCTS:-

(1) Epilepsy:- It is a nerve-based disease generally seen in children and few adults. The symptoms expressed are fits, convulsion, eye fixing, protrusion of tongue etc. and may also be associated with fever. In traditional method, grinding a piece of tongue of Toad with little water treats it by allowing the patient to take orally. Within a short period, the patient becomes normal. The extract of tongue of Toad in the name "***Bufo***" is widely used in Homeopathy for the treatment of Epilepsy.

(2) Ear Problem:- Traditional method cures ear problems like ear eche, pus in ear tec. By rubbing a piece of Unio shell with water & applying to the ear. The medicines like Sepia_Sulph are used for ear problem in homeopathy. Sepia is the Zoological name of Unio.

(C)DISEASE CURED BY HORMONE TREATMENT:-

The endocrine extract of Mammals are used for treatment of different disease as follow:

(a) Lodium – for Goiter.
(b) Thyrodinum – for stunted growth, Hypothyroidism.
(c) Insulin- for Diabetes.

(D) DISEASE CURED BY NOSODES:-

(1) Carcinoma:-It can be cured by the ***nosode carcinosin*** derived from carcinoma cell.

(2) Chicken pox:-The nosode of chicken pox is ***Variollinum,*** which is used for the treatment for

Chicken pox.

(E) INORGANIC MEDICINES:-

The **"Toe Ulcer"** of cattle is treated traditionally by allowing them to walk in sands and the method also helps in healing the ulcer due to presence of silica in sand. The Silica of sand has great healing capacity of wounds. The Sodium phosphate or Magnesium Phosphate or Calcium Hydroxide can cure Acidity.

CONCLUSION:-

(1)Conservation of Medicinal plants & Animal helps in maintaining Biodiversity as well as Ecosystem.

(2) The Medicinal value of plants & animals create consciousness amongst the public not to destroy the Biodiversity.

(3) The Biotic Medicines have little side effect relating to health hazards.

(4) One should opt these biotic products of medicines, so that the environment will be saved.

(5) If the biodiversity is saved, the proportion of atmospheric gases will be balanced & global warming or natural calamites may be prevented.

Reader in Zoology
Seemanta Mahavidyalaya, Jharpokharia

IDEA ON METHANE: A GREEN HOUSE GAS

Dr. Sarat kumar Mohanty

In 21st Century Global Warming is a potential headache for all, because it has direct effect on glacier melting, season change, pollution and biodiversity etc. so various researches, seminars, workshops and debates are going on national and international basis in order to control this effect. In general Global warming means that the temperature of earth atmosphere increases due to various factors like vast population growth, deforestion, urbanization, industrialisation, artificial cooling effect, etc. The green house gases like carbon dioxide, Methane, water vapours, nitrous oxide are responsible to trap the heat from infra red component of sunray and hike the atmospheric temperature. All the world is hawling about the higher percentage green house gas carbon dioxide, but no one is thinking about Methane. On analytical study it is proved that Methane concentration increases about 1% in every year as well as this is relatively active traces gas with about 25 to 30 times more infra red absorption capacity per molecule than carbon dioxide.

Due to inflammable nature of Methane (CH_4), on burning it give higher percentage of carbon dioxide as a bi-product to atmosphere with falling its own concentration in Earth. So it is no doubt that this gas must be a important one for greenhouse effect.

PROUDCTION:

(i)Biological route:

Natural occurring methane is mainly produced by the process of methanogenesis . this multistep process is used by microorganisms as an energy source $CO_2 + 8H^{+1} + 8e^- —— CH_4 + 2H_2O$

The final step of the process is catalysed by coenzyme.Methanogenesis is a form of anaerobic respiration used by organism that occupy landfill, ruminates and gutes of termites.

(ii) Industrial route:

Natural gas is a so abundant that the intentional production of methane would be unusual. Methane can be produced by hydrogenation of Carbon dioxide through Sabatier process. It is also the side product of the Hydrogenation of Carbon monoxide in Fisher Tropsch process. This technology is practiced on a large scale to produce long chain molecule than Methane.

(iii)Occurrence:

(a) Geological deposit:

It is a major component of natural gas, about 87% by volume. The major source of methane is extraction from geological deposits known as natural gas fields, with coal steam gas extraction becoming a major source (coal bad methane extraction) while enhanced coal bed methane recovery is a method of recovering methane from an non-minable coal.

(b) Organic matter:

The gas at low pressure forms by anaerobic decay of organic matter and reworked methane from deep under the earth surface.

(c) Rice field:

Rice field generate huge amount of Methane during plant growth. On that ground major south east developing countries of Asia continent are effected by more deposit of CH_4 in green house gases of the earth atmosphere.

(d) Land fill:

Usually excess Methane gas are emitted from land filling area of municipal solid waste, bio-medical waste; present day most of the developed countries use this technology to generali Methane gas as a important fuel from cooking and electricity generation. In India some part of Gujurat, Rajastan and Maharastra have also followed the same trend.

(e) Gobar gas plant and human excreta plant:

Gobar gas plant project have spread rapidly in almost rural belt of Asia, Europe, and South Africa Continents. The Agriculture based rural habitats not only get the methane gas from gobar gas plant, but also utilized the by-product manure after releasing the gas.The vast populated country like chine never depend upon fossil fuel. From human excreta plant of each field the emitted methane is sufficient for cooking and generating electricity for residential purposes.

(f) Live stock production:

Live stock production is one of the major cause of world's most pressing environmental problem, including global warming, land degradation water pollution and loss of bio-diversity. It has been estimated that livestock are responsible for 18% greenhouse gas emission, a bigger share than that of transport. It finds that expanding population and incomes worldwide along with food preference, are stimulating a rapid increase in demand of meat, milk and egg. production of meat is a major source of generating methane.Comparision Effect with Carbon dioxide.

This means that a methane emission will have 25 times the effect of Carbon dioxide emission of the following 100 years. Methane has a large effect for a brief period (life time 8.4 Year). Where as CO_2 has a small effect for a long period about 100 Years. Because of this difference in effect ad time period, the Global warming potential of Methane over 20Years time period is 72. It has been estimated that the methane concentration has increased about 150% since 1750, and it accounts for 20% of the total radiative forcing from all of the long-lived and globally mixed green house gases.

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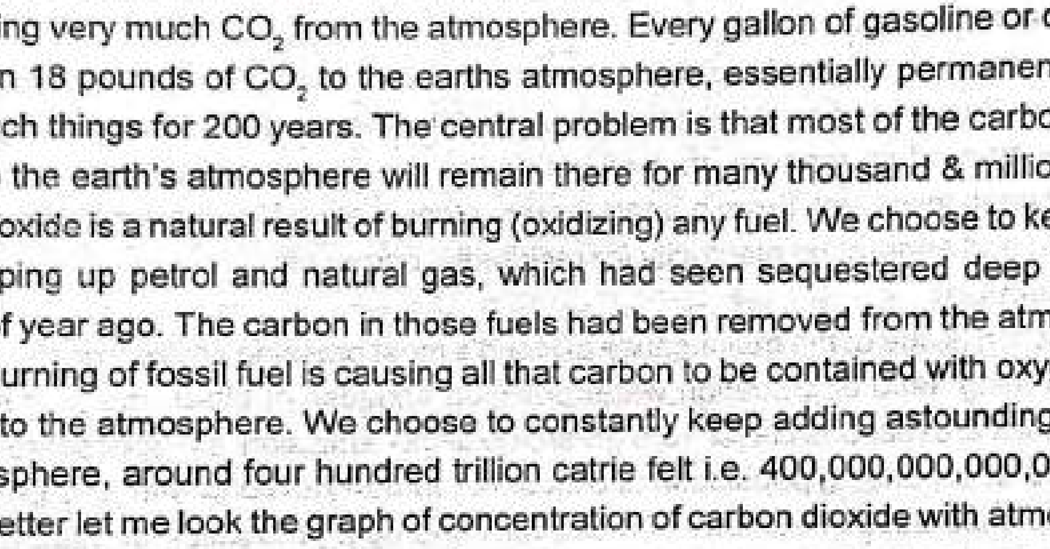
Lecturer in Chemistry
B.B.College,Baiganabadia,Mayurbhanj

PHYSICS OF GLOBAL WARMING

Mr. Bijay Kumar Mohanta

Earth's atmosphere contains 3,068,829,585,409 tons of carbon dioxide and amazingly fast in charge due to burning of fossil fuel by us. CO_2 in the atmosphere absorbs outgoing heat from the earth and therefore acts as a blanket allow the earth to warm up. Once the earth heats up enough plants which provide our food will no longer be able to raise sufficient water from the soil to keep from drying out and dying which will eliminate all food supplies. We do not have any practical way of removing very much CO_2 from the atmosphere. Every gallon of gasoline or diesel burned adds more than 18 pounds of CO_2 to the earths atmosphere, essentially permanently. We have been doing much things for 200 years. The central problem is that most of the carbon dioxide we keep adding to the earth's atmosphere will remain there for many thousand & millions years. And that carbon dioxide is a natural result of burning (oxidizing) any fuel. We choose to keep digging up coal and pumping up petrol and natural gas, which had seen sequestered deep in the earth many millions of year ago. The carbon in those fuels had been removed from the atmosphere long ago, and our burning of fossil fuel is causing all that carbon to be contained with oxygen (oxidized) and released to the atmosphere. We choose to constantly keep adding astounding amount of CO_2 to the atmosphere, around four hundred trillion catrie felt i.e. 400,000,000,000,000. To understand thus all better let me look the graph of concentration of carbon dioxide with atmosphere during the past thousands years.


Atmospheric Concentrations of Carbon Dioxide, 1000-2004

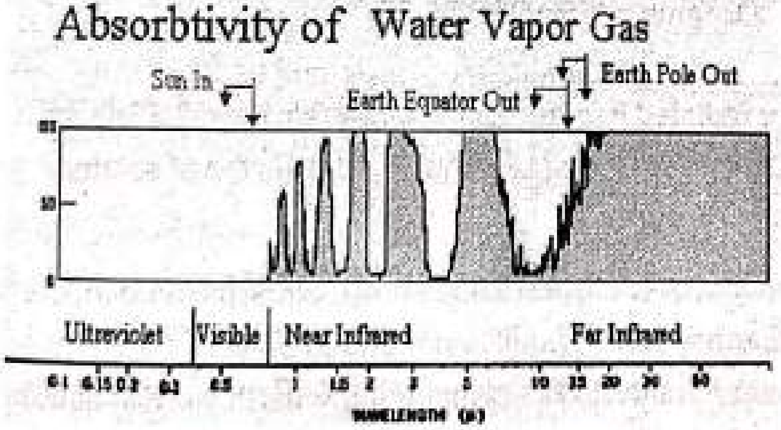
1800 – Industrial revolution began

Before the industrial revolution began the concentration of CO_2 with atmosphere was fairly constant. Prior to 1965, there was extremely little awareness that CO_2 even had any significant green house effect. In the middle of 1996 no one then seemed yet even aware that CO_2 hand such an extreme effect on it has regarding "being a blanket" in keeping the earth's radiated heat from being able to normally escape to outer space. At that time "green house effect" blamed water vapor, ozone, oxygen, nitrogen and artificial pollutants. So, even the best hopes that world leader express, still lead to total disaster our self created extermination of mankind and all animals on Earth, and in a terrifying short time.

Blanketing effect (Green house effect):-

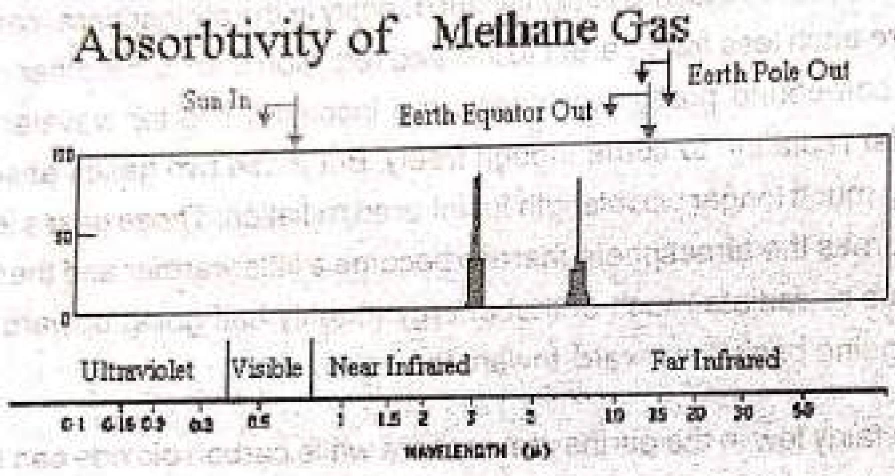
There are two specific compounds that are in significant quantity in the atmosphere, carbon dioxide and water vapor which are each less transparent to infrared radiation than to the other color of light. As a result, these two compound pretty much allow the incoming shorter wavelength, mostly visible and ultraviolet solar radiation to come though freely. But those two gases absorbs significant fraction of the outgoing much longer wavelength for infrared radiation. Those gases in the atmosphere absorbs heat that comes the atmosphere there to become a little warmer and then the extra heated warmer gasses thus re-radiate much of that energy roughly half going upward and outward space and roughly half going back downward toward the earth.

Water vapor tends to be fairly low in the earths atmosphere while carbon dioxide can be in much more of the thickness of out atmosphere. This effect tends to make carbon dioxide have a greater effect then it might otherwise be expected to have. About half of the radiation which the earth sent up to get absorbed in the atmosphere, then gets re-radiated back down towards the surface of the earth therefore provides on additional heat source for the earth's surface, keeping it warmer than would otherwise be true, an effect generally called the "green house effect".


Absorbtivity of Water Vapor Gas

Water vapor is generally very low in the atmosphere, the bottom 5kms * so, being involved with our weather system. You might have seen that jet airlines heamly along fly above all colors at their 10 kms attitude. Its concentration in the atmosphere generally depends on evaporation from the oceans, and its average effects and therefore relatively constant over extended period of time, although locally there are regularly great variation.

Absorbtiontory of methane Gas:-There is an amortmant of other gases in the atmosphere which also absorbs some infrared, such as methane , but the total amount of methane in the atmosphere is very small when compared to CO_2. Where the concentration of carbon dioxide is now with 390 ppm range only about 2 ppm of the atmophse is methane gas. That only it consently of relatively gas important regarding global warming.



PHYSICS OF GLOBAL WARMING

The temperature of the earth is governed by physics, namely the Stefan-Boltzmann law which states that the amount of energy radiated is proportional to the fourth power of its temperature.

$$\mathrm{ERad} = \mathrm{SB} * \mathrm{Temp}^4.$$

$$\text{Or } \mathrm{Temp} = (\mathrm{ERad}/\mathrm{SB})^{0.25}$$

Where: ERad is the amount of energy radiated to outer space in watts/meter^2 SB is the Stefan-Boltzmann constant is 5.670 x 10-8 Watt/ meter^2 Kelvin^2 Temp is the absolute temperature (kelvin) at which the radiation is emitted.

For Earth at equilibrium, the amount of energy radiated should equal the amount of energy received from the sun. However, the Earth is **not** at equilibrium and is actually receiving slightly more energy that it is emitting. This is why the earth is warming. If the earth were in equilibrium, then the amount of energy being radiated would equal the amount received from the sun. That is ERad would be a constant and a function of average Total Solar Irradiance (TSI) and albedo (a).

$$\mathrm{ERad} = \mathrm{TSI}*(1-a)/4$$

Where:

TSI is 1365.5 Watts/meter^2

a is albedo which is 0.3 for Earth

So, ERad is approximately 237 Watts/meter^2.

Putting this altogether yields an Earth Temperature of 254°K (-18°C or -1°F). This temperature corresponds to the atmospheres temperature at about 5 kilometers above the surface (16,000ft). It is at this elevation where the earth's atmosphere can radiate to outer space approximately the same amount of energy it receives from the sun. Temperatures at lower elevations are generally much warmer due to the greenhouse effect, which makes it difficult for the atmosphere to radiate infrared energy at lower elevations.

Greenhouse gases inhibit radiation to such an extent, that convection of heat is the dominate mechanism for transporting energy from the surface to elevations where it can be effectively radiated to outer space. The earth radiates primarily in the infrared which is the predominate wavelength at 254°K and infrared is invisible to humans.

If there were no greenhouse gases, then earths surface temperature would become so cold that the oceans would freeze. This in turn would raise the earths albedo and reflect more energy directly to outer space. In turn the Stefan-Boltzmann law would drive the temperature even colder and we would end up living on a giant snowball. However, the earths atmosphere does have greenhouse gases. In particular CO_2 which warms the atmosphere enough so that water can exist as a vapor. Since water vapor is also a greenhouse gas, together these greenhouse gases have warmed earths surface to about 287°K (14°C or 57°F).

While CO_2 may comprise just a small fraction of the atmosphere, it behaves like a dye in that it absorbs infrared energy very well. Finally, the earths temperature is not in equilibrium. The earth is absorbing about 1.5 watt/meter$^{\wedge 2}$ more energy than it is emitting. This in turn is warming the atmosphere, oceans, land, snow and ice. By far, most of the extra heat is going into the oceans. The oceans have a tremendous capacity for storing heat and it will take a long time before they reach equilibrium. When equilibrium is eventually reached, there will be more evaporation of water and the atmosphere will become thicker from increased amount of water vapor. This will result in warmer surface temperatures and a higher elevation at which the earth can radiate to outer space.

H.O.D., Physics, BB College,
Email – mohantabijan115@gmail.com

GLOBAL WARMING WITH REMEDIAL MEASURES

J. Mohanta, G. C. Patra

Global warming refers to the rising average temperature of Earth's atmosphere and oceans and its related effects. In the last 100 years, Earth's average surface temperature increased by about 0.8 °C (1.4 °F) with about two thirds of the increase occurring over just the last three decades. Warming of the climate system is unequivocal, and scientists are more than 90% certain most of it is caused by increasing concentrations of greenhouse gases produced by human activities such as deforestation and burning fossil fuel. These findings are recognized by the national science academies of all the major industrialized countries.

ETYMOLOGY

The term *global warming* was probably first used in its modern sense on 8 August 1975 in a science paper by Wally Broecker in the journal *Science* called "Are we on the brink of a pronounced global warming?". Broecker's choice of words was new and represented a significant recognition that the climate was warming. The National Academy of Sciences first used *global warming* in a 1979 paper called the Charney Report, it said: "if carbon dioxide continues to increase, no reason to doubt that climate changes will result and no reason to believe that these changes will be negligible." The report made a distinction between referring to surface temperature changes as *global warming*, while referring to other changes caused by increased CO_2 as *climate change*.

Global warming became more widely popular after 1988 when NASA climate scientist James Hansen used the term in a testimony to Congress. He said: "global warming has reached a level such that we can ascribe with a high degree of confidence a cause and effect relationship between the greenhouse effect and the observed warming." His testimony was widely reported and afterward *global warming* was commonly used by the press and in public discourse.

OBSERVED TEMPERATURE CHANGES

Evidence for warming of the climate system includes observed increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. The Earth's average surface temperature, expressed as a linear trend, rose by 0.74 ± 0.18 °C over the period 1906–2005. The rate of warming over the last half of that period was almost doubles that for the period as a whole (0.13 ± 0.03 °C per decade, versus 0.07 °C ± 0.02 °C per decade). The urban heat island effect is estimated to account for about 0.002 °C of warming per decade since 1900. Temperatures in the lower troposphere have increased between 0.13 and 0.22 °C (0.22 and 0.4 °F) per decade since 1979, according to satellite temperature measurements. Climate proxies show the temperature to have been relatively stable over the one or two thousand years before 1850, with regionally varying fluctuations such as the Medieval Warm Period and the Little Ice Age.

Recent estimates by NASA's Goddard Institute for Space Studies (GISS) and the National Climatic Data Center show that 2005 and 2010 tied for the planet's warmest year since reliable, widespread instrumental measurements became available in the late 19th century, exceeding 1998 by a few hundredths of a degree. Current estimates by the Climatic Research Unit (CRU) show 2005 as the second warmest year, behind 1998 with 2003 and 2010 tied for third warmest year, however, "the error estimate for individual years is at least ten times larger than the differences between these three years."

GREENHOUSE GASES

The greenhouse effect is the process by which absorption and emission of infrared radiation by gases in the atmosphere warm a planet's lower atmosphere and surface. It was proposed by Joseph Fourier in 1824 and was first investigated quantitatively by Svante Arrhenius in 1896.

Naturally occurring amounts of greenhouse gases have a mean warming effect of about 33 °C (59 °F). The major greenhouse gases are water vapor, which causes about 36–70 percent of the greenhouse effect; carbon dioxide (CO_2), which causes 9–26 percent; methane (CH_4), which causes 4–9 percent; and ozone (O_3), which causes 3–7 percent. Clouds also affect the radiation balance through cloud forcings similar to greenhouse gases.

PARTICULATES AND SOOT

Sulfates act as cloud condensation nuclei and thus lead to clouds that have more and smaller cloud droplets. These clouds reflect solar radiation more efficiently than clouds with fewer and larger droplets, known as the Twomey effect. This effect also causes droplets to be of more uniform size, which reduces growth of raindrops and makes the cloud more reflective to incoming sunlight. Soot may cool or warm the surface, depending on whether it is airborne or deposited. Atmospheric soot directly absorbs solar radiation, which heats the atmosphere and cools the surface. In isolated areas with high soot production, such as rural India, as much as 50% of surface warming due to greenhouse gases may be masked by atmospheric brown clouds. When deposited, especially on glaciers or on ice in arctic regions, the lower surface albedo can also directly heat the surface. The influences of particulates, including black carbon, are most pronounced in the tropics and sub-tropics, particularly in Asia, while the effects of greenhouse gases are dominant in the extra tropics and southern hemisphere.

SOLAR VARIATION

Variations in solar output have been the cause of past climate changes. The effect of changes in solar forcing in recent decades is uncertain, but small, with some studies showing a slight cooling effect, while others studies suggest a slight warming effect. Greenhouse gases and solar forcing affect temperatures in different ways. While both increased solar activity and increased greenhouse gases are expected to warm the troposphere, an increase in solar activity should warm the stratosphere while an increase in greenhouse gases should cool the stratosphere.

GLOBAL WARMING CONTROVERSY

The global warming controversy refers to a variety of disputes, significantly more pronounced in the popular media than in the scientific literature, regarding the nature, causes, and consequences of global warming. The disputed issues include the causes of increased global average air temperature, especially since the mid-20th century, whether this warming trend is unprecedented or within normal climatic variations, whether humankind has contributed significantly to it, and whether the increase is wholly or partially an artifact of poor measurements. Additional disputes concern estimates of climate sensitivity, predictions of additional warming, and what the consequences of global warming will be.

In the scientific literature, there is a strong consensus that global surface temperatures have increased in recent decades and that the trend is caused mainly by human-induced emissions of greenhouse gases. No scientific body of national or international standing disagrees with this view, though a few organisations hold non-committal positions.

REMEDIAL ACTION

It is generally agreed that remedial action will involve energy conservation and efficiency, the saving and extension of the forest, and the promotion of alternatives to fossil fuels.

CONSERVATION AND EFFICIENCY

The chief danger at present, as regards global warming, is considered to be the build up in the atmosphere of carbon dioxide from the burning of fossil fuels and the destruction of the tropical forests.Fossil fuels are a non-renewable resource, yet much of them are wasted in inefficient practices and apparatus. Moreover, they are often used in the manufacture of unnecessary products that also uses up other precious resources. It must also be remembered that fossil fuel burning releases pollutants that damage life.

The effects of checking waste and pollution in the industrially developed world could be nullified by industrial development in the Third World. We must stop encouraging and funding unnecessary industrial development. Non-renewable resources must be used only to meet genuine need, not to manufacture luxuries and trivialities, and not in unnecessary travel. We must give a lead in simplifying lifestyles, and demonstrate that such simplification does not mean deprivation but more creative and fulfilling living.

SAVING AND EXTENDING THE FORESTS

Tragically, at present great areas of tropical forests are being destroyed by fire, bulldozing and chainsaws. Temperate forests are also being damaged, by industrial pollution. In the process of photosynthesis, green plants take in CO_2, use the carbon for energy and to build up their bodies, and give out the oxygen. Trees especially store large quantities of carbon in their woody tissues. The idea of growing trees with the express purpose of thus dealing with the excess CO_2 is being seriously considered and implemented. Gregg Marland of the Oak Ridge Laboratory in the USA has estimated that 7 million square kilometres of new forests could absorb all the present releases of

CO_2 from the burning of fossil fuels. His work is being taken up by the US Department of Energy, and an American power company has agreed to plant 52 million trees in Guatemala to absorb the amount of CO_2 that will enter the atmosphere from the new power station that it is building.

MULTI-PURPOSE TREES

Apart from their ability to check CO_2 build up in the atmosphere, forests are vital for a sustainable future. Carefully selected multi-purpose trees can supply nearly everything that humans need: maximum food per acre, timber for many constructive purposes, pulp for paper, fibre for textiles, material for synthetics, drugs, dyes, resins and fuel. They are a renewable resource that can be grown in most habitable regions.

TREES, WATER, SOIL

Trees help to keep water available for their own needs and for those of other plants, for humans and other animals. The roots of the great forest trees penetrate deeply into the earth and draw up great quantities of water which pass through the trees and out through the pores of the leaves to create "oceans of the air". Thus water that might sink beyond reach is kept available for rain, and to keep the water table up and thus replenish wells. Sinking wells where there are no tree belts to maintain the water table can constitute a dangerous "living off of capital". It is said that there is a lake as big as France below the Sahara, which was formed after the Romans felled the trees to grow grain.

When rain falls on forest canopies, its force is broken by the leaves and branches as it seeps gently through the forest debris to replenish the water tables below. Water running off deforested hillsides carries away the soil, not only depriving the uplands but also silting up dams and reservoirs and causing rivers to swell and flood.In other areas, wind is the chief agent of erosion once the protective cover of trees is gone - fine particles of soil simply blows away. Anything which damages soil structure, such as artificial fertilisers, heavy machinery, constant ploughing for arable crops, the hooves of grazing animals, accelerates soil erosion which is increasing to devastating degree in many areas of the world.

LAND AVAILABILITY

If forests are to be established to check, even reverse, global warming and to meet needs for energy, food and other materials for the increased world population, the land areas required will be enormous, BUT probably not larger than those cleared of trees through the millennia for grazing animals and cereal crops. It could be made available if livestock farming were phased out and agroforestry systems established and the deserts reclaimed.

Of the earth's 130 million square kilometres, over 31 million are used as permanent pastures for animals bred unnecessarily for food. Such animals are also given a large proportion of the crops grown on the 15 million square kilometres of cropland. Animals yield nothing, not even fertiliser, that cannot be grow more economically. They compete with the humans for water, plant foods and other resources as well as land. They breathe out CO_2, and cattle and other ruminants belch out large amounts of methane.Methane is the gas judged to be responsible for 12 - 18% of global warming, as compared with CO_2's 50%. Molecule for methane is 20 - 25 times more potent as a greenhouse gas and is building up more rapidly. The bacteria in ruminating animals are one of its chief sources. Some scientists are saying that *"methane is a precursor to reactions that destroy ozone in the* *stratosphere"*. The above facts make up a convincing case for phasing out animal farming and giving the land released to trees.

REMEDIAL STEPS

1. All levels of government must act to eliminate the combustion of fossil fuels.
2. All new buildings and new electricity generation plants should be designed to operate without fossil fuels.
3. In order to encourage the development of non-fossil fuel electricity generation the price of electricity must be increased.
4. The price of electricity must be based on the cost per kWh of non-fossil fuel electricity. As long as fossil fuels are used to minimize the end user cost of electricity it is impossible to attract sufficient private investment in non-fossil fuel generation to replace existing and future fossil fuel electricity generation.
5. The government should implement a fossil carbon tax that is sufficiently high.
6. Implementation of a fossil carbon tax requires political will. In democratic countries every voter must be taught the carbon dioxide related problems and the available solutions.
7. The governments must promote a culture of fossil carbon consumption reduction by removing all government financial subsidies and incentives relating to fossil carbon extraction and distribution.
8. The governments must support development in the nuclear industry.
9. Sufficient non-fossil fuel electricity must be generated to completely displace existing fossil fuelled electricity generation, fossil fuelled transportation and liquid fossil fuelled general purpose heating.
10. Micro Fusion can be used to provide the heat required for concentrating ethanol, butanol and other liquid biofuels.
11. The Power Authority should do all necessary steps to extricate itself from long term commitments for purchase of electricity generated by combustion of fossil fuels. The entire electricity load should be met from non fossil fuel electricity sources to the greatest extent possible at the earliest possible date.
12. A fossil carbon tax should be applied to electricity imports from other jurisdictions.
13. Engineers must convince their clients that fossil fuels are no longer viable.
14. Governments must implement effective measures to stabilize population. The population must be reduced about tenfold to bring carbon dioxide emissions down to an acceptable level.

P.G. Department of Zoology,
North Orissa University, Baripada-757003, Odisha

GLOBAL WARMING AND ITS EFFECT ON BIODIVERSITY

Santanu Kumar Panda

Global warming

The world is heating up. The average temperature of the Earth's surface increased by an estimated 0.6°C in the 20th century and, according to the most recent projections of the Intergovernmental Panel on Climate Change, could rise 1.4 to 5.8°C above the 1990 average by 2100. Much of this predicted increase is attributed by scientists to increasing concentrations of greenhouse gases such as carbon dioxide (CO_2) in the atmosphere.

The effects of such a temperature increase might include:

- more frequent extreme high maximum temperatures and less frequent extreme low minimum temperatures;
- a decrease in snow cover: satellite observations suggest that the area of the planet covered by snow has already declined by 10 per cent since the 1960s;
- an increase in the variability of climate, with changes in both the frequency and severity of extreme weather events;
- alterations to the distribution of certain infectious diseases; and
- rising sea levels.

Biodiversity

The variety of life on Earth is commonly referred to as biodiversity. The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse are coming under this.Does it really matter if many species go extinct? The world would certainly be a less interesting place with less biodiversity, but would it affect us?

A diversity of species increases the ability of ecosystems to do things like hold soils together, maintain soil fertility, deliver clean water to streams and rivers, cycle nutrients, pollinate plants (including crops), and buffer against pests and diseases – these are sometimes called 'ecosystem functions' or 'ecosystem services'. A loss of species could reduce this ability, particularly if environmental conditions are changing rapidly at the same time. It is therefore possible that as the climate changes and as species are eliminated from an area we will see a change in some ecosystem functions; this could mean more land degradation, changes in agricultural productivity and a reduction in the quality of water delivered to human populations.

Adapting to change

Scientists agree that human-induced global warming is happening, and that the world will continue to warm for some time even if greenhouse gas emissions are somehow curbed. Some species, particularly insects, might be able to adapt to changing conditions or evolve in response to global warming. But for many, especially those that is already rare and has limited climatic envelopes, global warming could pose an challenge.

Some of the impacts of global warming may be sudden, but in many cases societies will have some years to adapt their management of biodiversity as conditions change. Increasing our understanding of the effects of climate change on biodiversity, and developing practical ways of mitigating such effects, are critical to limit the damage.The threats to some particularly vulnerable species are described below.

Shifts in climatic envelopes

To estimate the effect of climate change on species, scientists use what they call a climatic envelope (sometimes also referred to as a bioclimatic envelope), which is the range of temperatures, rainfall and other climate-related parameters in which a species currently exists. As the climate warms, the geographic location of climatic envelopes will shift significantly, possibly even to the extent that species can no longer survive in their current locations. Such species will need to follow their climatic envelopes by migrating to cooler and moister environments, usually uphill or southwards in the southern hemisphere. There is some evidence that plants and animals are already responding to warmer temperatures. The treeline (above which there are no trees) near Mount Hotham in the Victorian Alps has reportedly moved up in altitude by 40 metres in recent years.

In many cases, however, such migration might not be possible because of unsuitable soils and other unfavourable environmental parameters, geographical or human-made barriers and competition from species already in an area. As human activities, particularly agriculture but also settlement and industrial development, have expanded over the last few centuries, natural vegetation – such as forests, and grasslands has been cleared. Once-extensive plant communities have been reduced in size and broken into smaller patches. This habitat reduction and fragmentation poses a problem because it limits the ability of many species to migrate to favourable conditions. Species on mountain-tops, islands and peninsulas will have a similar problem.

In general, those species with restricted climatic envelopes, small populations and limited ability to migrate are most likely to suffer in the face of rapid climate change. An estimated 25 per cent of Australian eucalypts, for example, have distributions that span less than 1°C of mean annual temperature, which is the average temperature for the entire year at a location. Even a relatively small increase in average temperature will shift the climatic envelopes of such species outside their current distribution.

Coral bleaching

Warmer sea surface temperatures are blamed for coral bleaching, which is a whitening of coral caused when the coral expels a single-celled, symbiotic alga called zooxanthellae. This algae usually lives within the tissues of the corals and, among other things, gives them its spectacular range of colours. Zooxanthellae are expelled when the coral is under stress from environmental factors such as abnormally high water temperatures or pollution. Since the zooxanthellae help coral in nutrient production, their loss can affect coral growth and make coral more vulnerable to disease. Major bleaching events took place on the Great Barrier Reef in 1998 and 2002, causing a significant die-off of corals in some locations.

Increases in extreme events

Predicted changes in the intensity, frequency and extent of disturbances such as cyclone, drought and flood will place existing vegetation under stress.

Rises in concentrations of carbon dioxide

The basic ingredients of photosynthesis are carbon dioxide and water. Increased carbon dioxide in the atmosphere causes increased growth rates in many plant species. This is good news for farmers, but only if this carbon dioxide 'fertilisation' effect is matched by adequate soil moisture and other nutrients. Leaf-eating animals like koalas may not be so lucky: increased concentrations of carbon dioxide could diminish the nutritional value of foliage. Rising levels of atmospheric carbon dioxide could also decrease the calcification rates of corals.

Sea-level rise

In most climate-change models, sea levels are predicted to rise by 9 to 88 centimetres by 2100, due to the thermal expansion of the oceans and the melting of polar ice-caps. Coupled with the effects of storm surges, which are expected to be of a greater magnitude in a warmer world, Coastal ecosystems, such as mangrove forests and low-lying freshwater wetlands, could be severely affected.

Lect. In Botany
Anchalika Mahavidyalaya, Gadia

GLOBAL WARMING : A CRUEL APPROACH TO BIO-DIVERSITY

Arati Bala Sahu

We know that the five great life sustaining factors- the "Pancha Mohabhuta " are the basic ingredients which are responsible to sustain life support system on the earth. Those are Khiti (earth or soil),Apa (water),Teja(fire),Marut(air), and Vyoma (space). All these constituents are now showing signs of over-use, strains and exhaustion in varying degrees. These are warnings enough that every thing is not so well with our surrounding-the Environment.

Due to rapid population growth there is need of industrial revolution to mentions such a huge population. As a result of industrialization there is emission of huge amount of green house gasses to our atmosphere. The presence of such green house gasses in the atmosphere keeps the earth warm. The average temperature of the earth would be rising gradually making it uninhabitable. This is called global warming.

After industrial revolution there is rapid increase of two important green house gasses carbon dioxide and Methane. Such increase in green house gasses increases the temperature of atmosphere and land. As a result of which the climatic condition of earth is changing. Now it is a warning sign to the living organisms of the earth.

There is a direct relationship of climatic change with the bio-diversity . The agriculture is worstly effected. According to the reports of sinnha and swaminathan in 1991, 2^0 C increase in temperature of the atmosphere decreases the total yield of rice 0.75 ton per hectare. Similarly yield of wheat decreases 0.45 ton per hectare. The duration of winter days decreases. So the winter crops are being effected.

Due to increases in temperature the ground water level also decreasing day by day. It is a very serious problem in agriculture and availability of drinking water. Due to global warming we have to face disasters like drought to deluge, struggle with the uncertain monsoon, hailstorm at the time of flowering of the crop, sudden fall in temperature at the time of germination of the seed, acute shortage of fuel wood ,fodder, agricultural small timber and timber for house construction etc. There is extinction of many species of plants and animals which disturbs the bio-diversity of different places. Different plants and animals are being effected by many new diseases and most of them are dying.

To maintain the balance of nature and conservation of bio-diversity there is need of control of population, a forestation, limited use of natural resources, conservation of forest and animals, use of solar energy, tidal energy or wind energy, limited use of vehicles , use of new technologies in industry to check pollution, use of bio-fertilizers and bio-pesticides instead of chemical fertilizers and pesticides, conservation of rain water and ultimately public awareness. So that we can check and control the emission of green house gasses in some extent.

Now it is a serious problem of the earth. So different heads of nations are making discussion and taking different measures to check global warming and to conserve bio-diversity. But it will be not effective if we do not leave our selfishness. Our Indian culture say that "AHIMSA PARAMO DHARMAH" or 'Non-violence is the highest duty'. To harm any one is to harm yourself. Not to injure any one, not to harm any one, not to hurt any one, is the supreme good , supreme law and there fore our prayer is "Sarvesham swatstirbhavatu"(May all beings be happy).

Lect. In Zoology
I.G.M.Maha vidyalaya
Udala,Mayurbhanj

IMPACT OF CLIMATE CHANGE ON AGRICULTURE

Mr. Asish Kumar Behera

The air is mainly composed of 78% Nitrogen, 21% Oxygen, 0.03% Carbon dioxide and the rest of other gases. Due to rapid urbanization, Industrial revolution, population explosion and large scale deforestation, the natural composition of the air is being changed day by day. The unwanted gases like carbon dioxide, carbon monoxide, sulphur dioxide, hydrogen sulphide, oxides of nitrogen etc. are deposited to the atmospheric content as the pollutants. Carbon dioxide gas even though toxic to animal life provides a natural cover of the earth to keep the conditions favourable for continuance of life and responsible for greening of earth. Without carbon dioxide, the earth would have frozen surface. However, the atmosphere contains 0.03% of carbon dioxide as normal constituent. The green plants absorb the carbon dioxide during photosynthesis and release oxygen, thereby acting as a natural cleaner of our atmosphere. But due to large scale release of carbon dioxide from the industrial sectors and automobiles, the concentration of carbon dioxide and other gases are increasing day by day. They absorb the infrared light of solar radiation which normally would be reflected back from earth surface. It result the increase of atmospheric temperature which called **green house effect.**

CLIMATE CHANGE

There is a strong evidence to suggest that change in global climate has been occurring during the past 100 years. The mean global temperature has increased by 0.6 °c during the above period and warmest summers was observed in the last decade of the past century and again during 2002 and 2003 especially in Asian subcontinent and Europe. This is mainly attributed to the increased concentration levels of greenhouse gases viz, CO_2, CH_4, N_2O . If the emission of green house gases is continued at the current rate, the average global surface temperature would rise from 0.6 °C to 2.5 °C in the next fifty years and between 1.4 °c to 5.8 °c by the end of century.Climate models based solely on the green house gases predicted an increase in the tropical regions. A slight warming trend of 4 °c over the last 100 years has been noticed over Indian sub continent and the changes were found to be more significant during winter. The spatial variability of air temperatures over the country indicated warming trend in peninsular region while north-west India has exhibited cooling trend and the warming trend prominent from 1950 onwards. On the rainfall variability over the country, the data did not show any significant trend over historical period.

IMPACT OF GLOBAL WARMING ON AGRICULTURE

However, increase in frequency and intensity of extreme weather events such as drought, floods or unseasonal rainfall which are extremely important for agriculture and national economy are noticed. Sub-divisional rainfall trends during the recent decades when compared with long term trend indicated decreasing rainfall trends in south-western parts and central parts while increasing trends are noticed in Punjab and western Rajasthan, Gangetic west Bengal and Sub-Himalayan west Bengal. These shifts in rainfall can considerably affect the cropping pattern across the regions. Extended periods of extremely high temperatures during summer are expected to be more frequent in the coming years. Also the aerial extent of such events is increasing the extreme heat wave conditions in May 2003 in the southern peninsula is an example where day temperatures at many places touched 48 °C and above. Projected scenarios for the Indian sub continent indicated a warming to the extent of 3.5 - 5.5°C over the region by the 2080 and more warming is expected in winter than in summer season. Similarly, a marginal increase in rainfall of 7-10 percent is predicted over the sub continent by 2080.

Short term or long term fluctuation in weather parameters and climate variability associated with climate change influences the crop yields. Experiments on growing crops under increased levels of CO_2 accelerated the seeding growth rate in ground nut, green gram, sorghum and sun flower. The excepted increase in yield could be in the range of 15-20 percent. The impact of increased the decrease in yield in northern India is by about 17 percent. To nullify the effect of increase in temperature, the concentrations of CO_2 value should be increased. Higher temperature is lily to alter the fertility status of soils significantly. Additional application of fertilizers perhaps may be needed to counteract the adverse process. In most tropical and sub-tropical regions, the potential yields are projected to decrease for increase in temperature. However, in mid latitudes warming by few degrees associated with increased levels of CO_2 may lead to generally positive responses. Condition will be more favorable for the proliferation of insect pests in warmer climates and crop damages are likely to increase.

The extended rise in sea level may range from 0.1-0.5 mt by 2050 and may pose a serious threat to agriculture in low lying coastal areas. The climate change is expected to increase both evaporation and precipitation in some regions and soil becomes dry faster if evaporation exceeds precipitation. Fall in water table and increased use of energy to pump water makes the practice of irrigation more expensive. Researchers forecast a substantial shift in fish habitats and this may disrupt pattern of aquatic plant and animal distribution. The impact of global warming on agriculture front differs among the countries. In India, the coastal regions of Gujarat and Maharashtra are worst affected due to inundations on saline waters. In African countries increased droughts could seriously reduced the good production and millet yields may decline by 63 -79 percent. In the cooler parts of Asia and china, the rice, wheat and maize yield will probably decline in coming days.

CONCLUSION

As the world food security is at stake due to various aspects of climate change and its associated impacts, a good amount of research on breeding agricultural crops tolerant to higher temperatures, quantitative assessments of crop responses to enhanced level of green house gases, UV- radiation and rainfall; and knowledge on occurrence of weather extremes, its probabilities and their impacts on plant growth is called for. Global modeling projections of such impacts on regional and national scale are essential for each country to face the challenges that are likely to occur due to climatic change.

Lecture in Botany
B.B.College,Baiganabadia,mayurbhanj

ALTERNATIVE SOURCE OF ENERGY: ONLY SOLUTION TO GLOBAL WARMING

Mr. Subrat Kumar Dash

Global warming is the increase of average world temperatures as a result of greenhouse effect. Certain gases in the atmosphere act like glass in a greenhouse, allowing sunlight through to heat the earth's surface. As the greenhouse gases build up in the atmosphere, the Earth gets hotter. One of the main greenhouse gases is carbon dioxide (CO_2). As trees grow they take in CO_2 from the air. When the wood dies the CO_2 is returned to the air. Forest clearance and wood burning (such as happens in tropical rain forests) is increasing the latter half of the process, adding to the CO_2 in the atmosphere. Deforestation is now out of control. For example in 1987 an area of the Amazon rain forest the size of Britain was burned, adding 500 million tonnes of CO2 to the atmosphere. The loss of the forests also means that there are fewer trees to absorb CO_2.

However, as large a contribution as deforestation makes, it causes less than half the yearly total of CO_2, the rest comes from the burning of coal, oil and other fossil fuels. These fossil fuels are burned in cars, power stations and factories of the wealthier nations such as the USA, Western Europe and the USSR.Televisions, lights and computers use electricity that is created mainly from burning coal. Every time we switch on a light we are adding to the greenhouse effect. Cars are also major sources of CO_2. The average European is responsible for nearly 2.5 times as much atmospheric carbon as a Latin American. The concentration of CO_2 has increased 25% since the industrial revolution, half of this rise has been in the last 30 years. It is expected to double within decades.

Other Greenhouse gases

CO_2 contributes about 50% to the greenhouse effect. The other greenhouse gases are methane, chlorofluorocarbons (CFCs) and nitrous oxide (N_2O)

Methane - is released during coal-mining activities, oil exploration and when vegetation is burnt during land clearance. The main source of methane though is agricultural activity, it is released from wetlands such as rice paddies and from animals, particularly cud-chewing species like cows. The problem with methane is that as the world population increases, agricultural activity must increase and so emissions of methane will also increase. Since the 1960s the amount of methane in the air has increased by 1% per year - twice as fast as the build up of CO_2.

Nitrous oxide - comes from both natural and man-made processes. Man influenced sources, which represent about 45% of output to the atmosphere, are mainly: fossil fuel combustion, as in power stations; use of nitrogenous fertilisers; burning rain forests and human and animal waste. N2O contributes about 6% to the greenhouse effect at the moment.

CFCs - found in fridges, air conditioners, aerosols etc. are extremely effective greenhouse gases. Although there are lower concentrations of CFCs in the atmosphere than CO2 they trap more heat. A CFC molecule is 10,000 times more effective in trapping heat than a CO2 molecule, methane is about 30 times more effective. Methane molecules survive for 10 years in the atmosphere and CFCs for 110 years. It is this that causes people to want to ban them completely.

Feedback Process

CO2 - about half the CO2 released by burning fossil fuels is absorbed by the oceans. It is taken up by tiny sea creatures or dragged to the ocean depths by the circulation of water. Recent research suggests that as the earth heats up, the oceans will be less efficient in absorbing CO2 , leaving more in the atmosphere and so adding further to global warming.

Methane - as global temperatures become greater, so large quantities of methane stored in the frozen tundra of the north may be released. Also methane trapped in the sea bed may be freed by temperature rises.As the world warms it causes feedback processes. Increases in temperature cause the liberation of CO2 and methane which then cause further warming. Another feedback mechanism arises through higher air temperatures evaporating more water and so providing more cloud which both traps heat from below and reflects back sunlight from above. As the world warms, the effect of clouds could become more and more significant.

EFFECTS

If no action is taken the greenhouse effect could lead to a rise in average global temperatures of between 1.5-4.5 degrees Celcius as early as the year 2030. These rises will be greater towards the poles and less at the tropics. There will also be more warming in winter than summer. Such increases will make the world hotter than it has been for more than 100,000years. The rise will also be faster than ever before; a rise of 3 degrees Celcius after the last ice age took thousands of years. By the end of next century temperatures could have reached those of the time of the dinosaurs and it is doubtful if humans could survive. The effects are already showing - the ten hottest years since the 1860's have been in the last 15 years.

Storms - storms and hurricanes will become more frequent and stronger as oceans heat up causing more water to evaporate. Evidence is building up at an alarming rate. In September 1991 Japan was hit by Typhoon Mireille, its worst for 30 years. Then in September 1993 it was hit by Typhoon Yancy -the 13th that year, and the worst for 50 years. In January 1993 barometric pressure around Shetland dropped to its lowest recorded level, 915 millibars. The oil tanker Braer broke up in the resulting storm. In March 1993 the 'Storm of the Century' hit America, causing $1.6 billion in damage from Canada to Cuba. In December 1993 hurricane-force storms caused Britain its worst flooding for 40 years.

Droughts - continental heartlands will dry out more in summer. In 1988 the US suffered its worst heat wave and drought for 50 years. It cannot be proved that this was due to the greenhouse effect but it does give us some idea of what to expect in the future.

Floods - sea levels are already rising at a rate of 1 to 2mm each year due to expansion of the top layer of the oceans as they warm and the melting of the polar ice caps. The predicted rise by 2050 is between 20 and 50cm. This will cause increased flooding in coastal areas and river estuaries such as Bangladesh and the Nile Delta. London and many other British coastal cities will be threatened also. It is now a priority to strengthen Britain's sea defences.

What can be done?

It is important to slow the warming as much as possible. This means using less fossil fuel, eliminating CFCs altogether, and slowing down deforestation. This can be achieved best through **energy conservation**, including better use of public transport and cleaner, more efficient cars; and **energy efficiency** by greater use of gas which produces less CO_2 than coal and oil, and throughrenewable energy such as solar power. We need to stop destroying rain forests (**deforestation**) and start replanting trees (**afforestation**) to soak up carbon dioxide.A United Nations panel has estimated that we need to reduce global fuel use by 60% immediately in order to stabilise the climate. Current commitments by those governments participating in CO_2 reduction will only lower global CO_2 by 4 - 6%. Although the developed industrialised nations still produce most CO_2, the rapidly developing nations of South America and Asia are increasing their CO_2 production at a much higher rate, and by 2010 they will overtake the West as the main producers of CO_2. The developing countries are reluctant to participate in any CO_2 emission reduction plans, arguing that they did not create global warming and that it is the responsibility of developed countries to cut their own emissions or to support developing countries with financial aid. Oil producing countries including a significant lobby - in the US - are also reluctant to have their sales reduced and have protested against action on climate change.

Nuclear Power - does not produce CO2 so could replace other forms of energy. It is necessary though, to find an effective means of safely disposing of the radioactive waste that can remain dangerous for hundreds to thousands of years.

Alternative Energy - more funding is required for research and development of alternative pollution-free energy sources such as solar, wave and wind energy.As the dangers attendant on the use of fossil fuels become obvious, there is a growing interest in alternative sources of energy. The nuclear lobby is trying to take advantage of this, but hopefully the pollution, the risks, the waste disposal and decommissioning problems and costs are becoming too obvious for them to succeed (but some scientists are even more concerned about the dangers of global warming). Wind, tidal, solar, biomass, geothermal, hydro sources all has their advantages and disadvantages.

Wind farms in barren, exposed, isolated areas can make a valuable contribution to the national grid, and, in suitable locations, windmills can be used as local power sources as they were in the pre-industrial age. However, surely no one would wish to see large areas of countryside overtaken by wind farms. Pylons are unsightly enough. There is such a nuisance as visual pollution. The noise from large wind farms can also make them unacceptable.

Solar energy contrivances offer excellent alternatives to fossil fuel use, especially in the tropics, but, as Schumacher wrote, *"A most marvellous contrivance already exists, more wonderful than anything that Man can make - the TREE".*

Fuel wood is still the energy source of most of the world's people, but, in many areas, the forests are not being replanted and demands are outstripping natural regeneration. Wood should be burned in stoves designed for maximum economy and minimum pollution. Their use is now spreading, but not quickly enough. Only wood not suitable for other purposes should be burned or processed into gas, electricity and liquid fuel. Plants, especially trees, will be the only source of the latter when fossil fuels are all use up. Wood gives off no more CO_2 than the trees took in.

Lecture in Physics

B.B.College,Baiganabadia,mayurbhanj

REMEDIAL MEASURES OF GLOBAL WARMING AND ITS EFFECT ON BIO-DIVERSITY

A.K. Jha[1], D.S. Hota[2]

Atmosphere is an insulating blanket around earth, which maintains a narrow difference of day and night temperature, acts as a shield against lethal ultra-violet radiations. Without atmosphere there would be no lightening, no wind, no cloud, no rain, no snow or no fire. Atmosphere has the following layers :

(i) **Troposhere**-is about 20 km above earth's surface (on poles up to 8 km). Cloud formation, thunder strom take place in this layer. Air temperature in this zone gradually decreases with height at the rate 6.5 C per km. Towards upper part of this layer temperature decreases upto - 60 C. the layer merges into tropopause.

(ii) **Stratosphere** - is about 30 km., where temperatureshows an increase up to 90 C. Temperature increase in this zone is due to ozone formation by UV component of sunlight. Upper layer of stratosphere forms stratopause.

(iii) **Mesosphere** - is about 45 to 80 km, showa temperature decrease upto- 80 C. the upper limit of this is called mesopause. This lies between stratosphere and thermosphere.

(iv)**Thermosphere** - is the zone where the temperature increase with height. Density of the layer is extremely low, its lower part mostly consisting of nitrogen and oxygen in molecular form but above 200 km atomic oxygen predominates. The high temperatures 1200 C are due to the ability of atomic oxygen to absorb ultra violet radiations of wavelength less than 0.2 micron.

In atmosphere, about 95% of the total air is present up to the height of about 20 km and with increasing height above sea level, the atmospheric pressure decreases gradually. Green house gases are increasing every day gradually and continuously.Carbon dioxide (CO_2) is important among them.Carbon dioxide is released to the atmosphere by burning of fossil fuel (coal, oil etc.).Carbon dioxide level, 100 years ago was 275 ppm, today is 350 ppm and by 2035 - 40 it would be 450 ppm. Higher concentration of CO_2 acts like a glass panel of a green house. It allows sunlight to filter through but prevents the heat from being reradiated in the outer space. This is called "green house effect". CO_2 thus increases the earth's temperature by 50 %. Mars with little CO_2 in its atmosphere, is frozen and but Venus with too much CO_2 is a dry furnace.

CONSEQUENCES OF GLOBAL WARMING

Worldwide economic growth has accelerated the level of green house gas emission in the atmosphere. The green house gas causes dangerous climate change. Glaciers are shrinking, according to Wilfried Haeberli, Director of the Swiss based World Glacial Monitoring Service Coordinating body. It is due to temperature increase, between 0.15 to 0.6^{0}C per decade. Himalayan glaciers provide waters for Asia's nine largest rivers vital for the 1.3 billion people who live down stream. The rate of melting of glaciers eventually floods the down area and water scarcity in Himalayan region.In a news by Reuter it has been stated that the Artic sea ice has melted to its lowest level - " a biggest drop from previous year record and it is really quite astonishing" said Walt meier, a scientist at US National Snow and Ice Data Center in Colorado.

Global warming is expected to cause oceans to rise by one meter. Rising water will lap at the foundation of Wall Street and Silicon Valley. Achim Steiner, Executive Director, U.N. Environment Programme remark said,"If you want to know what are the consequence of global warming? Look at what tsunami did in a few seconds and you get an idea of what destruction will arise from sea level rise". In this tsunami nearly 226,000 people were killed and damaged 10% of the Maldive's inhabited islands. Martin Abbugao, 2005 reports that Mr. Maumoon Abdul Gayoom apprehended in his book "Paradise Drowing" - as under " it evokes an image fraught with great danger" and " most clearly encapsulates the threat of climate change and sea level rise to my people'.He said " Maldives could be the biggest victim of global warming".

Climate change is accelerating the spread of dengue fever through out the American and in Tropical regions because of more rainfall and warmer temperature provided optimal conditions for mosquitoes (*Aedes aegypti*). The UN Intergovernmental Panel on climate change(IPCC) reported that by 2085 climate change would put an estimated 3.5 billion people at risk of dengue fever. AFP report from Sydney says that " climate change is bound to increase infectious and respiratory diseases, heat stress, otherheat related illness events (affecting heart, blood vessels and lungs), truma from extreme weather events and more allergic diseases. Dr. Gralme Horton (Sydney) is reported to have said, " Climate change is already a reality in our health system near the coming decade. He further added " Clearly climate change will place our health system under increasing stess - and as always the elderly, children and the vulnerable will be hardest hit".

Global warming is occuring five times faster in the Antarctic peninsula than the rest of the World and threatening the survival of the emperor, gentoo, chinstrap and Adelie penguins that breed on the continent. Melting sea ice is destroying precious nesting grounds where the penguins raise their young ones. Emily Lewis - UK said, " As the ice melts, these icons of the Antartic will have to face an extremely tough battles to survive. Biodiversity is seriously threatened by the impact of global warming and climate change: for example 30% of mammals,12% of birds are under threat of extinction while one in 10 of the world's large rivers run every year before it reaches the sea, 60% of word's biodiversity has been impacted by enviornmental degradation.

According to Philip Mote (University of Washington) "Wet places will get wetter and dry places will get dryer. He furthersaid,"There has been and exponential increase in water needs".This could turn into vicious circle the scientists feared. Water consumption is expected to increase because of increased temperatures while at the same time resources were dwindling because of the warmer climate, which was likely to decrease precipitation and increase in evaporation. Weather scientist said "normally Ranchi used to receive and average of 23 mm pre-monsoon rainfall in March and April. However for the last few years, there has been both steep rise in temperature and absence of rainfall for longer periods". He mentioned the major factors as stated by Mr. Nitish Priyadarshi responsible for climate change, are deforestation, ground water depletion, rise in air and water pollution and disappearance of surface water resources. "Deforestation and disappearance of ponds have dealt a heavy blow to hydrological cycle and has disturbed even the schedule of seasons" he said. Theysuggested for the ban of construction work, digging of ponds, roof top rain water harvesting and reduction in industrial and vehicular pollution.

REMEDIAL MEASURES :

The following measures are suggested to reduce the green house gases.

(i) Close all Thermal power plants run on coal in a phased manner, till then tax has to be imposed on plants emitting green house gases.

(ii) Thermal power plants must have to develop purification of such emission before these pollute the atmosphere 'stop signal' has to be imposed insuch industries/plants. It is to be noted that 90% fossil fuel are in use even today for the purpose of fuel. The Government must discourage such practices.

(iii) Nuclear Energy can be second pillar providing a secure energy supply in future,said Sylvester et al, 1988. Disposal of radioactive waste needs a careful planning - Sahay et al, 2007.

(iv) Awareness : Environmental conservation needs realization of the situation by everyone (literate and illiterate, policians, planners, thinkers individuals etc.)

(v) Certification : Power stations, heating plants and industrial furnaces should not be given permit beyond 1000 MW unless these are fitted with gas filters, Sahay et al, 2007.

(iv) Less manufacture of cars and trucks, pooling of vehicles for attending work place will automatically reduce exhaust from individual cars. Alternative of petrol and diesel run unit could be an effort like the use of batteries / hydrogen gas, would be another alternative. Fitting of catalytic converters will also help reducing exhaust from vechicles.

(v) Saving ozone layer : Concrete measures and projects have to be developed to protect ozone layer to slow down the 'green house effect'.

(vi) An environmentally positive producer of electricity is the solar cell. Special chemicals required for solar cell and their proper disposal needs special attention. - Sahay *et.al*,2007

(vii) Solar collectors are made up of black surfaces, which catch the sun's energy and transform it into heat, which converts water into steam. The steam drives a turbine and produces electricity in the generators, which is converted to it- Sahay et al,2007.

(viii) Use of Renewable Energy Sources (solar heating, sunlight, water power, biomass and wind power).

Sahay Sahay et al, 2007 remarked, " unless immediate steps are taken to stop the environmental assault and check the population, by 2030 the world would see disaster for our planet and the universe, and by 2040 the global mean temperature would rise by 1 - 5° C than the green belt of U.S. would dry up, the Sahara would creep up to the Mediterranean, melting of Greenland and polar ice would raise thelevel, rapid depletion of oxygen in water, decomposition of detergents, chemicals and methane would increase the sludge formation atthe bottom of rivers and reservoirsand theworld would face and eminent ecological collapse and if the worst come to the worse, extinotion of life.

[1]Lecturer in Botany,
[2]Lecturer in Chemestry,
Meghasan College, Nudadiha.

SALEI PUJA (MULUUK MANE MANHA): A PIOUS TRADITION

Bijaya Kumar Panda

During Phalguna (February-March) this Salei Puja is celebrated in Santal villages for worshiping Marang Buru and Jahir Ayo with Mane ko Turui ko. It is believed that God will bless the trees with gregarious flowering and massive production of Sal seed and Mahul flowers. Majhi Halam with other village heads sit in a meeting and decide on date of Salei puja. The unmarried boys clean and thatch the Puja sthal. In the evening boys and girls organize bath of Nayake and dance all through out the night (DAHAR- e –NACHA). Salei Puja is celebrated in Jahira where each household contributes live Goat, Chicken, Rice, Salt, etc through Dakua. The village heads like Majhi Halam, Joga, Paranik, Kuddam Nayake, Goddeth and five unmarried girls and two unmarried boys bring water from bathing places and bath the Nayake. Five unmarried girls spread cow-dung slurry and make the puja sthal sacred. Two unmarried boys collect raw rice and puja materials and the unmarried girls collect Methi, Cowdung, Tulsi leaf, Sindur, etc. which are then washed by boys and girls. Then the villagers bring Nayake in a procession from his house to Jahira and the procession is called DAHAR- e –NACHA. Then Nayake do the puja. During puja some of the devotees get ecstatic and move with weapons of Marang Buru i.e. Trishul, Farsa, Bow and arrows and hunt a domesticated animal like goat / chicken / wild animal like rabbit / squirrel. It is believed that Marang Buru (Supreme God) has thrown Trishul which fell near the base of Sal tree. The Marang Buru directed for his worship near base of Sal tree. It is believed that Trishul, Farsa, Bows and Arrows are the weapons of Supreme God. Then the villagers enjoy a mass feast out of Prasad and dance with Sal flower on the head. In the afternoon the procession goes back to leave Nayake to his house. The Nayake Era (wife of Nayake) worships the ecstatic devotees and beg blessings for higher production of sal seed, mohua flower and other fruits available in forests. She also prays God through these ecstatic devotees and beg blessings for safety from wild animal while moving within forest. After Salei puja all the members are permitted to pluck flowers / fruits / leaves from any tree.

Presently it is perceived that hunting of wild animal in this pious religious function is going against the Wildlife (conservation) Act.Indian constitution has prescribed that conservation of wildlife is the duty of all citizens of India. Therefore we should carefully modify our tradition, so that innocent villagers are not harassed. We can hunt wild animals outside Schedule-I, II, III & IV like Rats, Bats, Crow, Mice, Pigs, Chickens, Pigeon, etc. When we celebrate our cultural functions within the preview of law of the land, we can really celebrate and spread our culture which brings discipline among new generation.

D.F.O., Baripada Forest Division

GLOBAL WARMING: A CRUEL REALITY

Subhendu Das

Gobal warming is the increase in the average temperature of Earth's near- surface air and oceans. According to the 2007 Fourth Assessment Report by the Intergovermental panel on climate change (IPCC), gobal surface temperature increasd 0.74- 0.18 c (1.33 + 0.32 F) during the 20th century. Most of the observed temperature increase since the middle of the 20th century has been caused by increasing concentrations of greenhouse gases, which result from human activity such as the burning of fossil fuel and deforestation.

BASIC MECHANISISM OF GREEN HOUSE EFFECT:-

The Earth recives energy from the sun in the form of visible light. This light is obsorbed at the Earth's surface, and re-radiated as thermal radiation. Some of this thermal radiation is absorbed by the atmosphere, and re-radiated both upwards and downwords; that radiated downwards is absorbed by the Earth's surface. Thus the presence of the atmosphere results in the surface receiving more radiation. Green house gases by their percentage of contribution, are water vapor (36-70%), Carbon dioxide(9-26%), methane(4-9%), ozone(3-7%).

CAUSES

1. carbon Dioxide From power plants

One of the largest contributors to global warming is said to be pollution from power plants. According to recent studies, approximately 40% of all carbon dioxide emission comes from power plants. Natural gas, coal, and oil are the 3 types of polluting power plants. Coal is the biggest contributor out of the 3 because it releases more carbon than the rest of them. Some believe that the levels of carbon are completely normal.Despite what others say, many people have created solutions for the pollution caused by power plants. For example, products that help to reduce the green house emission have emerged. Filters that improve the quality of the air released into the atmosphere have been created to solve this problem. In addition, government regulations have been placed to force owners of large industrial buildings to improve the quality of the air produced by their bildings. Finally, hydrogen power has also become a way of reducing carbon. According to Tom simonite using carbon is better than using water to generate power, and it is completely environmentally friendly.

2. Pollution Emitted from Cars

Driving to work in the morning is one example of this.There are approximately, 3 billion vechiles being used today. Cars emit millions of tons of pollutants into the air. In some dense cities, this cause some of the smog and ozone problems.1,500 cases of cancer are reported each year from pollution according to www, nsc.org. Many ask, " what can I do". One thing that can be done is a switch to more environmentally friend vechiles. Some countries are even using cars that run on hydrogen. In the near future, ethanol to replace gasoline in cars seems to be a promising change.

3. Pollution from Trucks

Trucks, although less in volume, make up for a large portion of the earth's pollution with each truck's individual output of pollutants. The difference between cars and trucks is the type of fuel used to run them. Disel, the standard for trucks and other vehicles used for carrying large loads, is known to be less clean than gasonline. Trucks roaring down streets can be seen from a mile away with a tiny smoke stack blowing out.

4. Pollution from Airplanes

Airplanes are indispensable to today's society. Businessmen fly across the country on a daily basis to meet the demand of industry. In less than 24 hours, you can fly across the circumference of the planet travelling from the US to Chaina. 10% of the green house gas emissions come from airplanes. You might be going to a vacation or to a business meeting but those airplanes you travel on are releasing their pollution directly into the air they fly in.

5. Methane stored in water and Ice

Methane is aproximately 60 times stronger than carbon dioxide as a green house gas. According to scientists, in the past, a rapid release of methane has led to immense heating of the earth. Methane is stored in the earths oceans and is released when the temperature increase and pressure reduces. Also, methane can be found in ice. When ice melts, methane stored in the ice released.

6. Industrialization

Gobal warming is a major issue due to the industrialization and progress by human kind since the past few years.Scientists are of the opinion that industrialization releases various gases like carbon-dioxide and methane which are known to contribute to global warming.

7. Solar variation

Solar variation is said to be another reason of global warming. The changes in the amount of radiant energy emitted by the sun are known as solar variation. This solar variation has been correlated with the changes in the earth's climate and temperature.

9. Deforestation

The deforestation is also said to increase global warming. trees contain a high level of carbon, and therefore their cutting creates an increase of carbon in the atmosphere.

EFFECT OF GLOBAL WARMING -:

The effects of climate change may be physical, ecological, social or economic. Evidence of observed climate change includes the instrumental temperature record, rising sea levels, and decreased snow cover in the Northern Hemisphere.

1. EFFECTS ON WEATHER -:

Due to global warming many areas will be affected by drought.There will be increase intense tropical cyclone activity. A tropical cyclone is a storm system characterized by a large low-pressure centre and numerous thunder storms that produce strong winds and heavy rain. Tropical cyclones strengthen when water evaporated from the ocean is released as the saturated air rises, resulting in condensation of water vapor contained in the moist air. There will be increased incidences of extreme high sea level (excluding tsunamis).

2. INCREASED FRESHWATER FLOW

Research based on satellite observations, published in october, 2010, shows an increase in the flow of freshwater into the world's oceans,partly from melting ice and partly from increased precipitation driven by an increase in global ocean evaporation.

3. LOCAL CLIMATE CHANGE

There are three major ways in which global warming will make changes to regional climate : melting or forming ice, changing the hydrological cycle (of evaporation and precipitaton) and changing currents in the oceans and air flow in the atmosphere. The coast can also be considered a region, and will suffer severe impacts from sea level rise.

4. OCEANS

The role of the oceans in global warming is a complex one. The oceans serve as a sink for carbon dioxide, taking up much that would otherwise remain in the atmosphere, but increased levels of co2 have led to **Ocean acidification**. Furthermore, as the temperature of the Oceans increases, they become less able to absorb excess CO_2. On going effects include rising sea levels due to thermal expansion and melting of glaciers and ice sheets, and warming of the Ocean surface, leading to increased temperature stratification, decrease in the pH of the earth's ocean. Ocean pH is estimated to have decreased from approximately 8.179 to 8.104.

5.OTHER EFFECTS

Earlier leaf production by trees. Ealier greening of vegetation.Changed timing of egg-laying and hatching. Changes in migration patterns of birds, fish and other animals.Reductions and re-distributions in populations of algae and plankton; this threatens the existence of fish and other animals that rely on algae and plankton for food.

Lecturer in Chemistry
B.B.College, Baiganabadia

ORGANISING COMMITTEE

1.	Accommodation, Vehicle and Guest Reception	Mr. S. Das
		Mr. A.K. Sharma
2.	Reception of the Delegates	Mrs. A. Bhuyan
		Mr. K.C. Parida
		Dr. A. Dhal
3.	Registration of the Delegates	Dr. S.K. Mohanty
		Mr. R. Mohanta
4.	Certificates writing	Mr. S. Samal
		Mr. S.K. Pathi
5.	Refreshment & Tea,	Mr. B.K. Mohanta
		Mr. A.K. Behera
		Mr. S.K. Bode
		Mr. D. Kar
6.	Meeting Arrangement,	Dr. J.N.S.D. Saehan
	Photo and	Mr. A.K. Sharma
	Pubicity (News)	Mr. S.K. Patra
7.	Lunch	Mr. S.K. Sahu
		Mr. S. Das
		Mr. S.S. Nayak
		Mr. D. Sau

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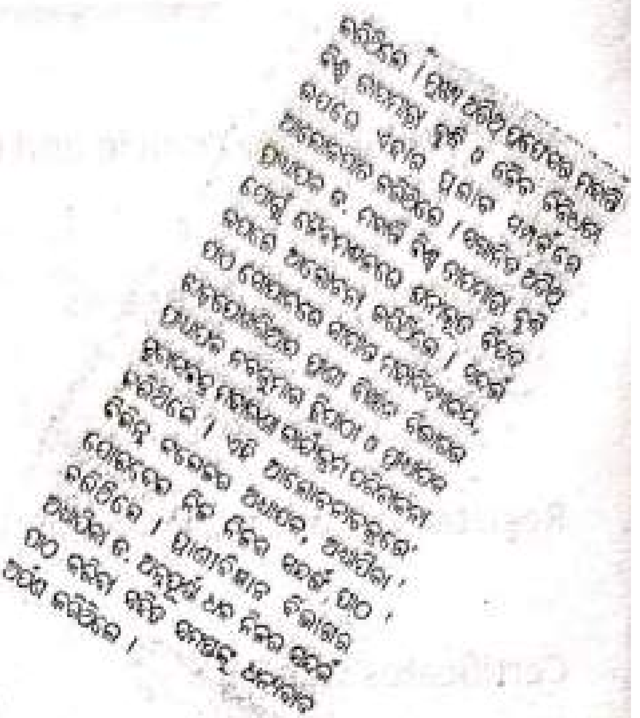
ବି.ବି. କଲେଜରେ ଜାତୀୟ ଆଲୋଚନାଚକ୍ର



ସମ୍ବାଦ ଉତ୍ତର ଓଡ଼ିଶା

ବି.ବି କଲେଜରେ ରାଜ୍ୟସ୍ତରୀୟ ଆଲୋଚନା ଚକ୍ର

କୁଳିଅଣା, ୩୦/୧୦(ଇମିସ) : ଏହି ବ୍ଲକର ବି.ବି କଲେଜ ବାଇଗଣବାଡିଆ ସଭା କକ୍ଷରେ ବିଶ୍ୱବିଦ୍ୟାଳୟ ଅନୁଦାନ ଆୟୋଗ ପ୍ରାୟୋଜିତ ଓ ସୀମାନ୍ତ ମହାବିଦ୍ୟାଳୟ ଝାରପୋଖରିଆର ମିଳିତ ସହଯୋଗରେ ଏକ ରାଜ୍ୟସ୍ତରୀୟ ଆଲୋଚନାଚକ୍ର ଅନୁଷ୍ଠିତ ହୋଇଛି । ବିଶ୍ୱତାପମାତ୍ରା ବୃଦ୍ଧି, ଜୈବ ବିବିଧତା ପ୍ରତି ବିପଦ ଶୀର୍ଷକ ରାଜ୍ୟସ୍ତରୀୟ ଆଲୋଚନାଚକ୍ରକୁ ମୁଖ୍ୟଅତିଥି ଭାବେ ଉତ୍କଳବିଶ୍ୱବିଦ୍ୟାଳୟର ପ୍ରାଣୀବିଜ୍ଞାନ ବିଭାଗର ମୁଖ୍ୟ ପ୍ରଫେସର ପ୍ରଫୁଲ୍ଲ କୁମାର ମହାନ୍ତି ଉଦ୍‌ଘାଟନ କରିଥିଲେ । ସୀମାନ୍ତ ମହାବିଦ୍ୟାଳୟର ଅଧ୍ୟକ୍ଷ ଅନିଲ କୁମାର ଜେନାଙ୍କ ସଭାପତିତ୍ୱରେ ଅନୁଷ୍ଠିତ ସଭାରେ ବି.ବି କଲେଜ ଉପାଧ୍ୟକ୍ଷ ପ୍ରଦୀପ କୁମାର ପାତ୍ର । ଅତିଥିମାନଙ୍କ ପରିଚୟ ଦେଇଥିଲେ । ସମ୍ମାନୀତ ଅତିଥିଭାବେ ଉତ୍ତର ଓଡ଼ିଶା ବିଶ୍ୱବିଦ୍ୟାଳୟର ପ୍ରାଣୀ ବିଜ୍ଞାନ ବିଭାଗର ଅଧ୍ୟାପକ ଡ. ନକୁଳାନନ୍ଦ ମହାନ୍ତି ଯୋଗ ଦେଇଥିଲେ । ପ୍ରାଣୀ ବିଜ୍ଞାନର ମୁଖ୍ୟ ଡ. ସଂଯୁକ୍ତା ମହାନ୍ତି ବିଷୟବସ୍ତୁ ଉପରେ ବିସ୍ତାରିତ ଭାବେ ଆଲୋକପାତ କରିଥିଲେ । ସନ୍ଦର୍ଭ ପାଠ ସୋପାନରେ ସୀମାନ୍ତ ମହାବିଦ୍ୟାଳୟ ପ୍ରାଣୀ ବିଜ୍ଞାନ ବିଭାଗ ପ୍ରାଧ୍ୟାପକ ନବ କୁମାର ତ୍ରିପାଠୀ, ପ୍ରାଧ୍ୟାପକ ସୁଭାଷ ଚନ୍ଦ୍ର ମହାରଣା କାର୍ଯ୍ୟକ୍ରମ ପରିଚାଳନା କରିଥିଲେ । ପ୍ରାଣୀ ବିଜ୍ଞାନର ଅଧ୍ୟାପିକା ଡ. ଅନ୍ନପୂର୍ଣ୍ଣା ଧଳ ନିଜର ସନ୍ଦର୍ଭ ପାଠ କରିବା ସହିତ ଧନ୍ୟବାଦ ଦେଇଥିଲେ ।

Design : HITECH Master