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EDITORIAL

The effects of climate change on biodiversity are far-reaching and operate at different levels – from individual to ecosystem. It has been reviewed from relevant published studies of biological systems that 20 to 30 percent of species assessed may be at risk of extinction due to climate change within this century if global mean temperature exceeds 2-3 °C (3.6-5.4 °F) relative to pre-industrial levels. Besides this the adverse effects of climate change can also be seen on all aspects of human lines such as agriculture, important resources such as water and forests, livelihood of people etc.

Observations of ecosystem impacts are difficult to use in future projections because of the complexities involved in human/nature interactions (e.g., land use change). Nevertheless, the observed changes are compelling examples of how rising temperatures can affect the natural world and raise questions as to how vulnerable populations will adapt to direct and indirect effects associated with climate change.

During the course of this century the resilience of many ecosystems is likely to be exceeded by an unprecedented combination of change in climate and in other global change drivers (especially land use change and overexploitation), if greenhouse gas emissions and other changes continue at or above current rates. By 2100 ecosystems will be exposed to atmospheric CO₂ levels substantially higher than in the past 650,000 years, and global temperatures at least among the highest as those experienced in the past 740,000 years. This will alter the structure, reduce biodiversity and perturb functioning of most ecosystems, and compromise the services they currently provide if mitigation measures are not taken.

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Climate Change and its Impact on Biodiversity – A critical Review*



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Planet earth is changing physically, chemically and biologically due to the effect of anthropogenic activities. The major global impact of human interference in ecosystem functioning is manifested in the form of climate change. The gradually accumulating evidence of the indirect effect of this change on biodiversity is causing worldwide concern. Intensive industrial growth and other anthropogenic-based activities have led to escalating emissions of the green house gases (GHGs) in the atmosphere. This is mainly responsible for causing a drastic change in the climate. The resulting environmental stress and its impact on ecosystems and biodiversity are becoming evident at the global level. Tropical countries, including India, faces the challenges of sustaining rapid economic growth while dealing with the global threat of climate change.

Recent scientific data indicates that the 2⁰C rise in average global temperature cannot be stopped but action can be taken to avoid further increase by taking mitigation measures. The adverse effects of climate change on agriculture, important resources, such as water and forests and even on the livelihood of people, are looming in the horizon. Solutions should be real and sustainable. All, including scientists, corporate sectors, policy makers, general public have to work together. This is essential so as to understand the biological and economic implications on one hand and to implement the mitigation, adaptation, and policy decisions on the other hand. India has already developed a national strategy, firstly to adapt to climate change and secondly to further enhance the ecological sustainability of the country's path to development.

In the present communication, an effort is made to assess and discuss the direct impact of climate change on ecosystems particularly on marine habitats and glaciers. The indirect impact on biodiversity, including terrestrial and marine plants, animals and microorganisms as well as on human health are further appraised. Few measures have also been proposed to deal with the situation through mitigation and adaptation. 'National Action Plan on Climate Change' having an eight-point agenda viz. National Missions, to promote efficient and alternative energy use and to gradually reduce the country's reliance on fossil fuels is also discussed.

Keywords. Global warming; greenhouse gases; marine biodiversity; aquatic biodiversity; mitigation; adaptation

1. Introduction

The findings of the Intergovernmental Panel on Climate Change (IPCC) Working Group-I, Fourth Assessment Report (1850 to 2005) indicating that human activities are almost certainly and unequivocally causing the planet to become warm, are irrefutable. This has not occurred all of a sudden. The point of time implicated in the rapid rise in green house gases (GHGs) goes back to the start of the industrial revolution, more than 150 years ago (IPCC 2007; Steffen 2004). IPCC has predicted that global temperatures will rise between 0.15⁰C and 0.3⁰C per decade, average rate of warming being 0.2⁰C per decade (Giles 2007). Eleven of the last 12 years (1995-2006) rank among the 12 warmest years. Average global temperature has increased by about 0.6⁰C during 1901-2000 and global mean sea level rose by 12 to 22 cm during the last century. GHG emissions due to human activities have increased by 70 % between 1974 and 2004.

Atmospheric CO₂ alone has increased by 26% during the past 150 years (Houghton *et al.*, 1990) but by 80 % during 1970-2004 alone. The burning of fossil fuels and deforestation are the two main factors contributing to about 65% and 35% CO₂ increase, respectively. The main cause for climate change is attributed to noxious emissions from human activities, especially excess amount of CO₂ are released due to burning of fossil fuels. It has been estimated that CO₂ emission has increased from 277 ppm since the industrial revolution to 384 ppm by 2007. If the present rate of emission of GHG continues, the atmospheric CO₂ concentration is predicted to double by the year 2010 and triple by 2100 (Houghton *et al.*, 1990). These changes are beginning to affect the entire world, from low-lying islands in the tropics to the Polar Regions (Walker 2007). As of now,

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more than 8 billion tons of carbon is released into the atmosphere, out of which, 4.9 billion tons is absorbed by the oceans. The ability of the oceans and land to absorb CO₂ is expected to decrease over time, if emission continues at the same rate. Two billion tons increase in atmospheric concentration is equivalent to 1 ppm. This means we are increasing the concentration of CO₂ yearly by more than 2 ppm. The tipping point for a 2^oC rise in average global temperature rise is considered to be 450 ppm CO₂ equivalent. We are fast approaching this danger mark. Climate change will be catastrophic even at 2^oC raise. Even if no more carbon dioxide is put into the atmosphere, average warming of 0.6^oC can still be expected over the rest of the century.

IPCC has also predicted that temperature will rise by 1.4-5.8^oC by 2100, with a predicted 2.7-4.3^oC increase over India itself, by 2080. The panel also predicted an increase in rainfall over the sub-continent by 6-8 % changes in precipitation patterns, sea level rise up to 88 cm and increase in vector borne diseases, such as malaria and dengue by 2100, due to increase in average temperature. Billions of world's poorest people may have to bear the brunt of global warming, in the form of increasing incidences of vector-borne diseases, drought, diminished agricultural productivity and extreme weather conditions (Hopkin, 2007a).

However, recently biomass burning has been implicated in formation of the dense Asian Atmospheric Brown Cloud (ABC) which emanates from Southern Asia and persists over much of the Indian continent and the Indian Ocean during the winter (Gustafsson 2009). Its cooling effect may balance or even surpass the warming effect of greenhouse gases.

2. Global climate change: general

In the atmosphere, greenhouse gases, such as water vapour, carbon dioxide, ozone, methane, nitrous oxide and fluorinated gases, act like the glass roof of a greenhouse by trapping heat and warming the planet. The natural levels of these gases are increasing in the atmosphere day by day and are supplemented by emissions resulting from human activities such as burning of fossil fuels, farming activities and land use changes. Earth's surface and lower atmosphere are warming and this rise in temperature is leading to many other environmental changes.

World coal consumption in 2006 reached a record 3090 million tones of oil equivalent (Mtoe), an increase of 4.5 % over 2005, and accounted for 25 % of world primary energy supply and 32 % of fossil fuel energy. According to Worldwatch (March-April, 2008), China, United States, European Union and India have used 38 %, 18 %, 10 % and 8 % coal respectively. Meeting any climate stabilization target will require control of emissions and Carbon Capture and Sequestration (CCS) as a way to reconcile coal consumption as an energy resource with its role as a major contributor of CO₂ emissions.

3. Impact of climate change on the environment

3.1 Melting of the glaciers

Arctic, Antarctic and Himalayan ice-caps, land and ocean, not only play an important role in the climate dynamics of the entire planet but are also highly vulnerable to global change (Anonymous 2006). Melting of glaciers in the Himalayas, Greenland and Antarctic is one of the most convincing evidence of the impact of climate change. This will threaten the livelihoods of millions of people (Allen *et al* 2008; Cyranoski 2005). The Arctic ice is melting at an alarming rate and it is also predicted that it may completely melt by 2040 (Goswami 2008). Himalayan glaciers are also predicted to vanish in the next 40 years (Pimparkhedkar 2008). Antarctic and Greenland glaciers would also melt. Melting of glaciers would be akin to unplugging the refrigerator in the north (Himalaya) and far north (arctic). Everything preserved would start rotting. The soils of northern areas would get crammed with organic matter. Rising temperatures would cause glacial lakes to swell up to the bursting point. In fact, vanishing glaciers and declining water supplies have already been reported (Ding *et al* 2005). Billions of people rely on water that ultimately comes from the Himalayas. Hydrological models suggest that the effects of climate change would be far reaching.

3.1.1 Environmental impact due to rise in sea level

The rate of sea-level rise is proportional to the global rise in temperature and it is predicted that sea levels would rise up to 1.4 meters by 2100 (Hopkin 2007b). As sea ice and glacier retreat, permafrost melting, carbon fluxes, vegetation changes would have tremendous impact on biodiversity (Walker 2007). A study of permafrost trees by counting the asymmetrical tree rings revealed drastic changes in the trees due to global warming since 1970. Moreover, it is also predicted that no permafrost tree would be left by the end of the century i.e. 2100. Rising sea levels would threaten agricultural land, coastal mangroves and wetland systems and increase the flood risk faced by the quarter of India's population that lives in the coastal region. It may also contaminate fresh water supplies affecting drinking water and irrigation. Increase in salinity and then inundation would ultimately affect biodiversity. Production of wheat and rice in India and China will be affected due to reduction of water in the rivers and depletion of ground water in future (Brown 2008).

3.2 *Environmental impact due to weather changes*

Global warming will tend to make wet places wetter and dry places drier. Lack of water already impedes development in many areas of the world and further drying will magnify the impact (Broecker and Kunzig 2008; Caldeira 2008). More frequent heat waves have been predicted due to increasing GHG concentrations in Europe (Seneviratne 2006). Europe has already experienced warmer winters and other such extremes in the recent past when the continent was struck by an unprecedented heat wave and serious drought during 2003. Heavy precipitations and droughts have also been reported during 2002. Britain has also witnessed catastrophic extreme rainfall events in June-July, 2007. Changing rainfall patterns will directly affect food security. Extreme events like drought, torrential rain, flash floods, cyclones and forest fires would be more common.

4. Impact of climate change on biodiversity

According to the Millennium Ecosystem Assessment Report, ample evidence is available indicating that climate change affects biodiversity. Climate change is already forcing biodiversity to adapt either through shifting habitat, changing life cycles or development of new physical traits. Global loss of biodiversity and accelerated rates of extinction have been reported which have direct effects on the functioning of ecosystems (Cardinale *et al* 2006). It has also been predicted that many of the plant and animal species will vanish if temperature continues to rise (Pounds and Puschendorf 2004) at the same rate. It is anticipated that many species will not be able to keep up with the rapidly changing climate. Basic structure of a wide variety of ecosystems would be disrupted. It is predicted that 15-37 % species will become extinct by 2050 (Thomas *et al* 2004). Most susceptible species will be those with restricted ranges, bounded distribution, poor dispersal abilities, specialized habitat requirements, or small populations. Size of extinction will be directly related to the degree of global warming. A rise in 2^oC in the next century will lead to numerous extinctions. Current conservation status and population growth rate associated with past changes in agriculture have been used to assess the impact on biodiversity. Since biodiversity and ecosystem function are inextricably linked, biodiversity loss across all terrestrial ecosystems is suggested to be closely associated with intensification of agriculture (Butler 2007). The resilience of ecosystems can be enhanced and risk of damage to human and natural ecosystems reduced through the adoption of biodiversity based adaptive and mitigative strategies.

4.1 *Impact on aquatic biodiversity*

The world's oceans are changing physically, chemically and biologically due to the stress of climate change. In 1800, CO₂ concentration in the atmosphere was 280 ppm and pH averaged 8.16. Today, CO₂ in the atmosphere is about 380 ppm and pH average is about 8.05. Estimates suggest that pH may drop still further to 7.9, by the end of the century. Each step change on the pH scale indicates a ten-fold change in acidity (Ruttiman 2006). Experiments on sea urchins and snails indicate mortality effects on long term (a year or more) exposure to high levels of CO₂. This indicates that animals cannot adapt very rapidly to large scale changes in CO₂ concentrations. It has also been observed that deep-sea animals are much more sensitive to changes than animals found in shallow water.

Microscopic animal populations living in sea floor sediments declined after being exposed to a pH drop of just 0.1, for one month. Recently, Hill (1995) has reported rise in ocean water temperature in the coastlines of California. During the same period (in the last 40 years), population of zooplanktons i.e. tiny shrimps, larvae and other drifting animals in the Californian current have declined by 80%, apparently because of the warming effect. Photosynthesis in phytoplanktons provides O₂ and reduction mean less O₂ availability in the oceans and further respiratory function problems for the ocean animals. Oceans remove CO₂ from the atmosphere and lock it away in the calcium carbonate of the shells and skeleton of marine organisms. Higher levels of atmospheric CO₂ from different sources including combustion of fossil fuels, thermal power plants, cement plants etc. will make the sea levels more acidic by dissolving CO₂ in water to produce carbonic acid and slow down the rate of calcification, ultimately reducing the ocean's ability to absorb more CO₂ (Ruttimann 2006; Schiermeier 2007).

All the deep-sea cold water corals are more vulnerable to acidification since reefs (which act like cities) are built out of aragonite which dissolves in acidic water more quickly (Ruttimann 2006). Acidic seas destroy spikes of sea urchins and erode the carbonate shells of shelled marine animals. Shelled petropods (marine snails) are important source of food for salmon, mackerel, herring and cod. If calcifying animals like corals, petropods, clams, oysters, lobsters and planktons are unable to sustain their population; many other species dependent on them will be affected with consequent drastic impact on the marine food web. If deep sea corals are in trouble, many important fish species which rely on them for shelter will also be affected. Fishes e.g. anchovy, sardine, mackerel and squid have declined by 35% since 1950. New emerging evidence suggests that larval and juvenile fishes are also susceptible to changes in ocean pH levels.

Marine ecosystems provide a wide variety of goods and services, including vital food resources for million of peoples. Biodiversity loss in oceans as well as estuaries, coral reefs, coastal and oceanic fish communities are increasing. Loss of populations, species or entire functional groups has been reported. Recent findings have suggested that the elimination of locally adapted populations and species not only impairs the

ability of marine ecosystem to feed a growing human population but also destroys their stability and recovery potential (Worm *et al* 2006).

Gaseous emissions from various industries cause acidification and eutrophication of the fresh water ecosystems like lakes and streams due to pollution. These kind of human impacts generally alter the structure and function of the ecosystems by changing the species composition of communities and effecting nutrient cycle and ultimate threaten the balance of planet's biosphere (Rastogi and Rastogi 2000).

4.2 *Impact on terrestrial biodiversity*

Analysis of the impact of habitat loss and habitat fragmentation on biodiversity reveals that habitat fragmentation has confined many species to relatively small areas within their previous ranges resulting in reduction in genetic variability (Rastogi and Rastogi 1998). Warming beyond the normal temperature range will stress ecosystems and floral and faunal biodiversity, leading to extinctions exceeding the normal background level. Warmer temperatures and the resultant reduction in water availability have contributed to slow death of conifer forests of western United States. Recent reports reveal that mortality rates in conifer forests have doubled in the past several decades (van Mantgem 2009). Amphibian decline in Costa Rica has been reported due to change in weather conditions (Pounds and Puschendorf 2004). Many species of amphibians are declining fast due to climate change. In Arctic Tundra, dramatic losses in the breeding habitat of water birds are reported (Anonymous, 2006). Birds being mobile will be impacted most and threat to bird biodiversity is growing in both scale and scope. It is predicted that 30 % of land-bird species will become extinct by 2050. A 40% decline in sea birds of the coast of Southern California is also reported. One zooplankton eating bird species i.e. Cassin's auklet has suffered a 60% population decline since the late 1970's.

A 2^oC increase in temperature since 1880 is recorded in far northern climate in the green belt of forests stretching across Canada, Alaska and Siberia as confirmed by the tree ring records (Taube 1995). These forests are suffering from the moisture stress due to evapo-transpirations caused by the warm climate and are not showing any sign of exuberant growth. The impacts of global warming on silviculture and decline in population of spruce and pines has already been reported (Overpeck *et al.*, 1991). More frequent insect attacks are also reported due to warming. Several outbreaks of bark beetles have been reported in Southern Alaskan forests since 1970s, devastating several million acres of forests. Actually, warmer temperature conditions shorten the reproductive cycle of bark beetles from two years to one year resulting in dramatic population increase. Thus, insect survival benefits from warmer temperature. Therefore, beetle infestation is the direct consequence of global warming (Hill 1995).

It is predicted that global warming will also affect wildlife diversity. It is anticipated that during a period of gradual climate change, grazing animals would evolve along with shifting vegetation accompanied by the carnivores, but with the rapid climate change, there is no hope of such gradual adjustments. The warmer and wetter climate will cause faster reproduction and greater survival of disease causing viruses, bacteria and parasites. The incidence of hookworm, schistosomiasis, polio, hepatitis B and other afflictions will tend to increase. Thus, an increase in temperature will affect people, plants and wildlife directly or indirectly (Gambhir 2008).

5. Approach and Policy of the Government of India for mitigation and adaptation to climate change

About one-third of India's population lives below the poverty line, earning less than one US \$ in a day. Therefore, India's development strategy mainly focuses on strengthening the economy and alleviating poverty, aiming to increase Gross Domestic Product (GDP) and per capita income. Our sustainable development must address issues of food, nutrition and energy deficit. India has registered strong economic growth (8-9%) in recent years supported by an energy growth rate of less than 4 % (Anonymous, 2007) and contributes to 4 % of global GHG emissions. Since India is trying to develop its economy, rising industrialization and urbanization will rapidly increase GHG emissions and contribute to global climate change. It is predicted that if GHG emissions continue as at present, between 5-20 % of the global GDP can be wiped off by the beginning of the next century (Giles 2006). It has been calculated that four-fold increase in the country's GDP will require 2.8 fold increase in carbon dioxide emissions, 1.3 times more methane and 2.6 times more nitrous oxide emissions unless proper action is taken. A 30 % reduction in CO₂ emissions will raise the number of poor by 17.5 %. Therefore, our country's economists and scientists have to find the ways to cut emission incrementally over several years while not slowing down development and economic growth.

The U.N. data indicates that India's per capita emission of CO₂ is at 1.2 tons/annum (in 2004) as compared to the world average of 4 tons/annum. This is still way behind the record value of 20.6 tons for the United States, for the same year. As a developing nation, India is not yet required to cut the emissions under the Kyoto Protocol despite mounting pressure from environmental groups and industrialized nations. It has also been kept in mind that despite the development imperatives, per capita GHG emissions will not exceed the per capita GHG emissions of the developed countries. Many representatives from developed countries want that

developing countries should make a firm commitment towards emission reduction targets. It is to be mentioned here that developed nations have the obligation to rectify this, since they have contributed to this pollution over the years, particularly in the past centuries.

Kyoto introduced Clean Development Mechanism (CDM) to make an average 5 % reduction (relative to 1990 levels) of green house gas emissions by 2012. Only developed countries were required to make cuts. Brazil, India and China were not included in the list of countries required to make such cuts. Kyoto gives credits to industrialized countries for helping poor countries to reduce or lock away emissions. The system forces rich countries to implement real carbon reductions.

The approach and policy directions have also been spelt out in “India: Addressing Energy Security and Climate Change” released in October, 2007 (Anonymous, 2007). The National Council on Climate Change headed by our Hon’ble Prime Minister has prepared a ‘National Action Plan on Climate Change’ and has set an eight-point agenda to not only promote efficient and alternative energy use, but also to gradually reduce the country’s reliance on fossil fuels (Anonymous, 2008). Following eight National Missions are the core of the National Action Plan to achieve the key goals:

1. **National Solar Mission:** To increase the use of solar and other renewable and non-fossil sources of energy including nuclear, wind and biomass energy.
2. **National Mission for Enhanced Energy Efficiency:** Schemes and programmes initiated through Energy Conservation Act, 2001 and Bureau of Energy Efficiency will save 10,000 MW by the end of 2012.
3. **National Mission on Sustainable Habitat:** Sustainable habitat will be achieved through improvements in energy efficiency in buildings, management of solid waste including power from waste and model shift to public transport.
4. **National Water Mission:** To ensure integrated water resource management to conserve water, minimize wastage and ensure more equitable distribution both across and within the States, use of ocean water, optimize efficiency of existing irrigation system.
5. **National Mission for Sustaining the Himalayan Ecosystem:** To sustain and safeguard the Himalayan glaciers and mountain ecosystem, prevent erosion and land degradation and to ensure stability of this fragile ecosystem.
6. **National Mission for a Green India:** Achieve 33 % forest cover against existing 23 % tree cover through Joint Forest Management (JFM) and Compensatory Afforestation Management and Planning Authority (CAMPA).
7. **National Mission for Sustainable Agriculture:** Identify and develop new varieties of crops, especially thermal resistant crops and alternate cropping pattern capable of withstanding extremes of weather, long dry spells, flooding etc.
8. **National Mission on Strategic Knowledge for Climate Change:** To identify challenges of and responses to climate change by ensuring funding to high quality and focused research into various aspects of climate change. Establishment of dedicated climate related academic units in the universities and scientific research institutions which will be networked. Climate Research Fund will be created to support research and disseminate knowledge.

These National Missions will enable the country to adapt to climate change along with taking the economy on a path that will progressively and substantially result in mitigation through avoided emissions.

Although India signed the U.N. Nation Framework Convention on Climate Change (UNFCCC) in June, 1992, it has no binding commitment to reduce green house gas emissions because it is a developing country. But India is concerned about potential climate change since it may affect agriculture, the backbone of India’s economy. Wind and solar energy are too costly and unreliable. Nuclear power cannot surmount the problem of nuclear proliferation, waste disposal and public acceptance. These factors force us to make continued reliance on fossil fuels. Capture of CO₂ from the major industries like thermal power plants, cement plants, steel plants, fertilizer plants etc. and disposal to the underground, seems to be another option. Other major sources of CO₂ emissions are the automobile exhaust and jet engines but the problem is how to capture CO₂ from these sources. Electric and Hydrogen cars will also help in substituting CO₂ emissions.

India has realized that mitigation and adaptations are the only immediate and necessary options in this direction. Mitigation is described as a human intervention to reduce GHG at source or enhance carbon sequestration, while adaptation to climate change refers to adjustments in natural or human systems in response to climate stimuli or their effects, which moderates harm or exploits beneficial opportunities. If we fail to do either of them now, we will have further problems. Time is running out. While mitigation can reduce the effects, it cannot halt the change. Therefore, New Delhi Declaration of eighth Conference of Parties to the UNFCCC, urged countries to include adaptation in their development strategies. People who are the poorest and least equipped to be able to adapt to the consequences of climate change will be affected the most. Therefore,

African communities are also adapting to climate change for millennia (Giles 2007). India has already put some national mitigation measures and strategies in place targeting the coal, transport, petroleum, steel, cement and agriculture sectors by promoting energy conservation, alternative fuels, renewable energy technologies and afforestation. In 2001, India was the first capital city to introduce a public transport system based on an alternative fuel (compressed natural gas) to reduce polluting gases.

6. Future Programmes

Keeping the predictions of the IPCC in view, India has already taken many initiatives towards mitigation and adaptation to climate change.

It is also recognized, that biodiversity itself has a role to play in climate adaptation and mitigation. Policies and programmes for the conservation and sustainable use of biological diversity have been described (Rastogi 2002). For example, the conservation of habitats can reduce the amount of CO₂ released into the atmosphere. Currently, deforestation is estimated to be responsible for 20 % of human-induced CO₂ emissions. Conserving mangroves and drought-resistant crops, for example, can reduce the disastrous impacts of climate change such as flooding and famine. In addition, for a given ecosystem, functionally diverse communities are more like to adapt to climate change and climate variability than impoverished ones. However, nature and magnitude of genetic and species diversity on certain ecosystem is still poorly known. Enormous information is available on the biodiversity but its linkage with the climate change is yet to be established. Given the inter-linkages that exist between climate change and biodiversity, there is an urgent need to:

1. Identify and conserve biodiversity components that are especially sensitive to climate change.
2. Preserve intact habitats so as to facilitate the long-term adaptation of the biodiversity.
3. Improve the understanding of the climate change – biodiversity linkages, and
4. Fully integrate biodiversity considerations into climate change mitigation and adaptation.

Mitigation of or adaptation to climate change should include:

1. Maintaining and restoring native ecosystems
2. Protecting and enhancing ecosystem services
3. Managing habitats for endangered species
4. Creating refuges and buffer zones and
5. Establishing networks of terrestrial, freshwater and marine protected areas that take into account projected changes in climate.

7. Discussion

Anthropogenic global warming of the planet earth is now a well-established fact. Its impacts are predicted to be severe, particularly for tropical countries, such as India. Impact of pollution on the biodiversity is already established (Rastogi and Rastogi 2000; Derraik 2002; Trevors 2003). Novel mitigation approaches such as utilization of reflectivity of crop surfaces (Stephenson 2009) are being advocated. In the current context, research in the Universities/Institutions in India should be directed towards investigation of the adverse impact of climate change on the flora and fauna, plant-animal-microbe associations; natural and man-made ecosystems like coral reefs, mangroves, forest, protected areas etc. Vulnerable species particularly fishes, birds, amphibians need to be targeted for research studies. Also, impact of ocean acidification on coral reefs and other marine calcifiers and long-term vulnerabilities of sensitive marine organisms to climate changes, should be examined. The effect of sea level rise and consequent predicted submergence of coastal lands and small islands, are also important areas of study.

Adaptation measures at local, regional and national level should be formulated. Technologies of controlling/reducing CO₂ emissions from the automobile exhaust and jet engines need to be developed. Large scale field experiments by oceanographers, chemists and biologists for the quantification of CO₂, acidification level, its impact on biota and the cap-and-trade system to reduce CO₂ emissions from diversified industries, are some future areas of investigations.

It is still possible to avert the worst consequences of climate changes while expanding our energy supplies and meeting other developmental changes. Indian industry has adopted an approach towards low carbon growth path. Besides, Indian companies are acquiring the best climate-friendly technologies and adopting processes and practices that would bring down the dependence on fossil fuels. Steady growth over 8 % has been accompanied by a less than 4 % growth in energy consumption. Climate change mitigation strategies involve promotion of Renewable Energy Technologies (RETs), energy efficiency in industries and power plants. Attention is also given to transport and aviation sector, green buildings, greening of consumer choices by adopting appliances and equipment standards, free and open energy and carbon markets, a thrust on cleaner conventional energy technologies for the future as well as R & D for the development of new climate-friendly technologies.

The country has already achieved installation of 15,000 MW of renewable based electric capacity. Energy efficiency in the Indian Industry has increased steadily. In the major energy-consuming industrial sectors such as cement, ceramics, glass, pulp and paper, co-generation, steam and condensation systems, sugar, textile, foundry, iron and steel, aluminium, fertilizers etc., average energy consumption has been declining because of energy conservation in existing units and due to new capacity addition with state-of-the-art technology. A CII study estimated that these industries have potential to save up to 20% - 30 % of total energy consumption. Main emphasis is given to coal based power plants which presently account for 1, 35,000 MW and have to be increased to 2, 00,000 MW to meet the basic needs of bridging gap between demand and supply. The present power shortage in the country is about 8 %. Some new plants are adopting the more efficient super-critical and ultra super-critical power plants, Integrated Gasification Combined Cycle (IGCC) and Underground Coal Gasification (UCG) technology for power generation. Efforts are on to bridge the gap with the help of energy conservation. Govt. is taking active initiatives such as designating industries, making energy audits mandatory, promoting building energy efficiency codes, capacity utilization, fine tuning and technology upgradation etc. (Kembhavi 2008). Other initiatives to deal with climate change include energy audits, energy efficient and low carbon transport systems and vehicles. A planned transition to a low-carbon economy by deploying Renewable Energy (RE) will reduce emissions. Ministry of New and Renewable Energy, Govt. of India has promoted the deployment of 9 solar energy plants in 6 States during 2007-08 in Maharashtra, Jammu & Kashmir, Chhattisgarh, Haryana, Orissa and West Bengal. Indian industry is also actively participating in CDM projects. So far 392 projects registered by the CDM Executive Board, have already issued 58 million tones of certified CO₂ emission reductions, for Indian projects. Energy Conservation Act serves to provide regulatory impetus to energy efficiency activities and an institutional frame work through the Bureau of Energy Efficiency (BEE).

Many developing countries are undergoing rapid economic growth and urgently need access to clean technologies to make their development environment friendly. Role of clean technologies in the abatement of pollution is already emphasized (Rastogi 2001). Developing countries have to reduce GHG emission provided steady, predictable and reliable financial and technological support is provided as agreed upon at a UN Conference in Bali in December, 2007. Transfer of environmentally sound technologies and know-how to other countries has also been discussed from time to time. Use of clean energy technologies should be encouraged to avoid further increase in temperature. These include the use of bio fuels, wind power, hydro power, waste to energy, solar photo-voltaics, hydrogen fuel cells, electric cars, sustainable green cities, geothermal power etc. (Anonymous, 2008; Kharul 2008).

Global warming predictions for the 2050s, indicate that extinction of species will sharply increase. Only effects of warmer climate are considered. However, other changes may magnify the impacts. In a given ecosystem, functionally diverse communities are more likely to adapt to climate change and climate variability than impoverished ones. However, nature and magnitude of genetic and species diversity in certain ecosystems is still poorly known. A new approach to manage and respond to climate change is required. Setting ambitious targets and to achieve them through strengthening the institutional frame work is required. Efforts should be made to stabilize the climate, generate enormous economic growth and save the planet.

The problem of climate change has been created by the developed countries but the severest impacts will be felt by those who did not create the problem i.e. the developing world. Therefore, the blame game of developed countries and using it as an excuse or rationale to avoid taking proactive actions for mitigation and adaptation by developing countries including CO₂ emission cuts was discussed at Poznan Conference, Poland recently in December, 2008 and is suicidal. The world's addiction to fossil fuel is increasing and, therefore, use of Carbon Capture and Storage (CCS) technologies to bury CO₂ emissions from power plants underground in developing countries is emphasized without assigning any reason for not building more CCS plants by the developed countries when the CCS technology is so great to reduce CO₂ emissions.

Reduction in CO₂ emissions is the need of the hour. The use of renewable energy resources and improvement in energy efficiency has to go hand-and-hand to reduce GHG emissions. Stabilization of GHG concentrations in the atmosphere within a time frame at a level that will prevent dangerous anthropogenic interference with the climate system requires immediate attention. This will allow ecosystems to adapt naturally to climate change to ensure that food production is not threatened. This will permit economic development in a sustainable manner. Our policies and programmes should be for the conservation and sustainable use of biological diversity (Rastogi and Rastogi 2002).

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Comments on Draft Mines and Minerals (Scientific Development & Regulation) Act, 2009

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We are aware that Government of India constituted Anwar-ul HODA Committee to suggest changes to the National Mineral Policy keeping in view the low GDP in mineral sector when compared to the average GDP of all the sectors in India. After thorough debate on the subject with various stakeholders as well as respective State Governments, Anwar-ul HODA Committee submitted its Recommendations and consequently National Mineral Policy 2008 has been announced by the GoI. Now GoI has come out with the draft Mines and Minerals (Scientific Development & Regulation) Act, 2009 and is placed in the website at: <http://mines.gov.policy/MMSDRACT.pdf>

The new Act is intended to decentralize the powers and cut short the delays in granting mineral concessions for the development of mineral sector in the Country. In fact, the purpose of appointing Anwar-ul HODA Committee is to suggest new mineral Policy keeping in view the bottlenecks in the existing policy for the development of mineral sector. But, as could be seen from the proposed new Act, some of the powers are again centralized, though in some areas the proposals are very good. Therefore, it is time to appropriately react so that the Government may take the views positively and modify whenever the proposals contribute for the development of the mineral sector. With a view to focus attention on the issues, some of these issues are highlighted in the present topic.

(I) Maximum and Minimum extents for grant of Mineral Concessions:

Hitherto, the maximum extents for grant of RP, PL and ML were 10,000 Sq.Kms, 25 Sq.Kms and 1 Sq.Km respectively. These are enhanced to 10,000 Sq.Kms, 5000 Sq.Kms, 500 Sq.kms and 100 Kilometers in respect of RPs, Large Area Prospecting Licences, Prospecting Licences and Mining Leases respectively by introducing one more tier in between RP and prospecting licence in the name of Large Area Prospecting Licence (5000 Sq.Kms). Grant of such huge extent amounts to blocking of areas by a few entrepreneurs and the new entrepreneurs may have to suffer a lot for want of areas. This needs to be debated upon. It would have been idealistic to enhance the present limits by one time with the provision for GOI to relax on case to case basis.

(II) Minimum Extents:

Similarly, minimum extent proposed for PL is 1 Sq.Km (1000 hectares) and for ML it is 10 hectares. Here also, the small entrepreneurs get adversely affected since there are many small deposits which are available in less than 10 hectares area. If this system is introduced the deposits available within 10 hectares cannot be exploited. Many small deposits of minerals like quartz, feldspar, dolomite, limestone etc., are available in small leaseholds and if such deposits are prohibited it amounts to untapping valuable minerals. Hence, present minimum limits of 4 hectares in case of bedded deposits and one hectare in case of vein type deposits may better be continued.

(III) Powers to IBM:

Under the new Act, the IBM is getting powers to even stop mining operations by following the same powers as are there with the Mines Safety Department, to prohibit mining if considered dangerous, merely on the basis that mining operations are a threat to conservation and environment. This will result in undue hardship to the entrepreneurs. This may also be debated upon.

(IV) Bidding Process :

Another area causing concern is about a stipulation that the mineral rights are to be disposed of by way of bidding. If this is introduced only some of the few rich entrepreneurs will block the areas by taking rights in the bidding and the small entrepreneurs cannot think of entering the field of mining. The concept of bidding will lead to total collapses of the system and would help develop capitalism in the country. Therefore, this is a serious issue to be debated upon.

(V) Reservation for Public Sector:

Another area where the new proposals brought out by Government of India is taking a way the enabling provisions for reservation of mineral bearing areas in favour of Public Sector undertakings. This results in complete closure of public sector undertakings in future. When very important strategic minerals are available the same need to be exploited by PSUs for the benefit of the Nation. Under new Policy this may not be possible.

(VI) Constitution of State and Central Tribunals:

The Government of India is contemplating to constitute Central Tribunals to settle issues relating to non-disposal of mineral concession applications by the State Governments with in the stipulated time limit. It is good

if such powers are vested with the State Level Tribunals instead of Central Tribunals to avoid carrying on litigations to National Headquarters. Moreover, the litigations from the Central Tribunals go to the High Courts situated in the National Headquarters. By this process the mining entrepreneurs may have to go round the National Headquarters for each and every issue. When the concept of the New Act is to decentralize - will it not amount to centralize the process, and thus defeat the purpose of new Mineral Policy?

(VII) Creation of National Mineral Fund & State Mineral Fund:

Though this is an admirable move instead of National Mineral Fund, it is better to confine to State Mineral Fund for effective implementation.

(VIII) Restrictions on Transfer of Reconnaissance Licence and Prospecting Licence:

Transfer of lease involves large scale speculation. GOI is contemplating to introduce a very liberal transfer policy. This also needs to be debated.

(IX) Restrictions on Allocation of Mineral Bearing Areas:

One more area the GOI would have touched is "Mineral Exclusive Areas" to be reserved just as the Reserve Forests. But unfortunately this was not taken up.

(X) Grant for Leases in Forest Areas:

In the new policy it is now envisaged that only after taking forest clearances areas must be notified for grant. This may lead to non-clearances for forest areas and the scope of granting leases in forest areas may considerably get reduced. Instead of stipulating a time limit of say one year in-principle the applications for grant of leases in forest areas may be considered and final grants can be extended after getting forest clearances under F.C. Act'1980 by the applicants.

XI. Approval of Mining Plans:

The new act envisages delegation of powers for approval of mine plans only to IBM. Hitherto the State Directorates are approving the plans for selected group of minerals. This amounts to only centralization of powers.

Conclusion:

It is time that all the stakeholders concerned with mining shall go through the draft Mines and Minerals (Scientific Development & Regulation) Act, 2009 and give their suggestions wherever they feel such amendments come in the way for the development and growth of mining sector, since the purpose of any change is only to achieve maximum growth in mining sector.

Let us be proactive and air our views to the Policy Makers for their reconsideration.

Abstract of some Research Papers

The Potential Importance of Mine Sites for Biodiversity - Lesley C. Batty

Mine Water and the Environment (2005) 24: 101-103

Abstract - Abandoned mine sites are typically viewed as environmental problems due to their negative impacts on local ecosystems. This paper presents an alternative viewpoint providing evidence of the potential importance of mine sites for supporting rare and threatened species from many of the major taxonomic orders. The potential importance of these species in remediation of polluted environments is also highlighted.

Biodiversity of Rocky Intertidal Benthic Communities Associated with Copper Mine Tailing Discharges in Northern Chile - M. Medina, S. Andrade, S. Faugeron, N. Lagos, D. Mella and J.A. Correa

Marine Pollution Bulletin 50 (2005) 396-409.

Abstract - Copper mine tailings have been discharged around the city of Chan~ aral, in northern Chile, for more than 60years. This report summarizes a 17-month long monitoring study of species richness and biodiversity at five intertidal sites around the point of the tailing discharge. Total dissolved copper in sites close to the point of discharge varied between 8.72lg/l and 34.15lg/l, showing that there has not been a significant reduction since 1994. However, species richness has increased, suggesting a possible recovery of the system. While diversity of sessile organisms correlates negatively with dissolved copper, diversity of mobile invertebrates did not correlate with the metal concentration. To explain the observed results we discuss the role of algal turf interference on the distribution of mobile invertebrates at reference sites, a top-down effect caused by the absence of carnivores at impacted sites, and an avoidance strategy by some species to reduce their contact with contaminated seawater.

Effect of Fertilization on N and P Resorption Efficiency of Selected Leguminous and Nonleguminous Tropical Trees Planted on Coal Mine Spoil - Arvind Singh

J. Indian Inst. Sci., Sept.–Oct. 2004, 84, 173–182

Abstract - Influence of NPK fertilization on N and P resorption efficiency was studied in nine native tropical tree species planted on coal mine spoil. Of these, *Acacia catechu*, *Albizia lebbeck*, *Dalbergia sissoo* and *Pongamia pinnata* were legumes, while *Azadirachta indica*, *Gmelina arborea*, *Phyllanthus emblica*, *Tectona grandis* and *Terminalia bellirica* were nonlegumes. The N and P resorption efficiencies dropped in fertilized plots in all the species. Nonleguminous tree species had exhibited greater efficiency for N resorption than leguminous species. However, no such trend emerged for P resorption between both the groups, as the two nonlegumes *A. indica* and *G. arborea* had resorbed P in the range of leguminous tree species. The study indicates that nutrient enrichment reduces internal cycling of nutrients thus facilitating greater amount of nutrient return to soil which in turn would enhance the reclamation process by allowing the colonization of more species due to increased habitat fertility.

Herbaceous Biomass Yield on an Age Series of Naturally Revegetated Mine Spoils in a dry Tropical Environment - Arvind Singh

J. Indian Inst. Sci., Jan.–Apr. 2004, 84, 53–56

Abstract- The influence of mine spoils age on herbaceous biomass yield was studied in a dry tropical environment. Naturally revegetated mine spoils selected were 1-, 5-, 10-, 15- and 20-year-old. The biomass yield increased with increasing age of the spoils. The root, shoot and total biomass were significantly greater on 5-, 10-, 15- and 20-year-old spoils compared to 1-year-old young spoil. A stabilizing trend in biomass yield started after 10 years, reaching almost a stage of saturation on 20-year-old spoil. Spoil age had affected root/shoot ratio also. However, the root/shoot ratio exhibited a decreasing trend with advance in the age of the spoil.

Environmental Degradation of the Obra-Renukoot-Singrauli Area, India, and its Impact on Natural and Derived Ecosystems - J.S. Singh, K.P. Singh and Madhoolika Agrawal

The Environmentalist, Volume 11, Number 3, 171-180 (1991)

Abstract - Vast stretches of the Obra-Renukoot-Singrauli region were once covered with natural forests. The tribal dwellings were small and interspersed. However, there has been rapid industrialisation in recent years. Quarrying for limestone, the establishment of a cement factory, thermal power stations and the construction of the G.B. Pant Sagar reservoir have resulted in a rapid build up of human population, the displacement of the original population, deforestation and conversion of natural forest ecosystems into savanna and marginal croplands. The converted ecosystems are under immense biotic stresses such as lopping, grazing, etc. The rainfall is meagre and erratic, the soils are highly weathered and impoverished, consequently the natural forests, as well as the derived ecosystems, are fragile. Signs of desertification are widespread. A rapid depletion in the wildlife has occurred. The establishment of thermal power stations and chemical and cement factories has also resulted in large scale gaseous air pollution, particularly of SO₂ and HF, pollution due to particulate matter through fly ash and cement dust, and that due to liquid effluents. Surface coal mining has caused extensive damage to the natural ecosystems with growing dumps of overburden. The latter needs to be stabilised. This integrated research project on environmental degradation and its impact on air, soil, water and vegetation was divided into five sub-projects, each supervised by a principal investigator. These sub-projects were: (i) Industrial air pollutants and their effects on ecosystem structure and function; (ii) Analysis of structure and functioning of forest ecosystems; (iii) Analysis of structure and functioning of savanna and agroecosystems; (iv) analysis of structure and functioning of watershed and water-bodies; and (v) Impact of land-use system, socio-economic-demographic conditions, and environmental perception and behavioural management. In these studies dynamics of plant biomass, productivity and nutrients, and biochemical-physiological responses of plants to pollution were emphasised. Environmental perceptions of the native and displaced populations were also studied. The paper outlines a range of recommendations which should help to improve the environmental quality of the region.

Atmospheric Depositions around a Heavily Industrialized Area in a Seasonally Dry Tropical Environment of India - Raj Kumar Singh and Madhoolika Agrawal

Environmental Pollution, Volume 138, Issue 1, November 2005, Pages 142-152

Abstract - Clear and throughfall bulk depositions were collected in the downwind of a highly industrialized region in Sonbhadra district of India to estimate the influence of anthropogenic activities on chemical composition of depositions. Significant spatial and temporal variations in depositions of cations and anions were observed. Depositions were higher near the thermal power stations and coalmines as compared to distantly

situated site. Seasonally summer samples showed maximum cation and anion depositions followed by winter and minimum in rainy season. The mean pH of the depositions indicates that rainfall in the area is alkaline. Among the anions, maximum deposition was recorded for SO_4^{2-} followed by NO_3^- and minimum for Cl^- . Among the cations, Ca_2^+ deposition was maximum followed by NH_4^+ , Na^+ , K^+ and Mg_2^+ deposition rates showed more or less similar values. The depositions of cations and anions as well as pH were higher in throughfall than clearfall samples. Results of the present study suggest that atmospheric depositions are strongly modified due to thermal power stations and coal mines in the area. Atmospheric abundance of cations have neutralized the acidity of depositions around a heavily industrialized area in India. Atmospheric abundance of anions have neutralized the acidity of depositions around a heavily industrialized area in India.

Prediction of Plant Species Diversity by Log-linear and Power Function Models along the East Coast of India - A.T. Surendra, Anshumali and Gurdeep Singh

International Society for Tropical Ecology 50(1): 103-109, 2009

Abstract: We examined the fitness and predictability of two non-asymptotic models viz., Log-Linear and Power Function for 'species-area curve', and the effect of sample location and scale on their regression derived coefficients (c and z) for estimating the tree species diversity in a dry tropical forest of India. The study area is located in Angul-Talcher-Meramundali region along the east coast of Orissa state. Among all the tree species, *Shorea robusta* was most abundant. This species had high values of frequency, density, basal area and Important Value Index (IVI). The results revealed that for six out of eight sites, which were examined, the Power Function Model relatively better fits the data set and yields better prediction of number of species (based on 1 ha data). The suitability of the model to fit the data was strongly influenced by the site, plot size and degree of disturbances.

Current News

CME Develops Geo-Environmental Rationale for Clusterization of Coal Mines for Environmental Clearance: A Case Study of Jharia Coalfields, BCCL Lease Hold Areas

There are more than 100 coal mines of BCCL in Jharia Coalfields (JCF). All of these were inherited and amalgamated from more than 400 private leaseholders during nationalization of coal mines during 1971-73. After the expiry of lease period there was a requirement of renewal as well as environmental clearance of these mines. All these mines are adjacent to each other as well as in the same coalfield. Most of these mines were facing similar type of environmental problems such as land degradation, fire, air pollution, ground water depletion and subsidence with issues like rehabilitation and resettlement due to high population density. The Ministry of Environment & Forests suggested for a cluster approach for environmental clearance of such a large number of mines belonging to the same owner, due to following benefits:

1. Non - duplicity in generation of Baseline data.
2. Comprehensive study of entire coalfield/clusters for preparation of EMPs.
3. Identification of a group of mines having similar workings and environmental features.
4. Consideration of several adjacent/contiguous mines for Environmental Impact Assessment where core zone of one mine lies in the buffer zone of the other mines.
5. Effective environmental management implementation in individual cluster.
6. Addressing problems of fire and instability including Resettlement & Rehabilitation (R&R) problems of adjacent/contiguous mines.
7. Reclamation of old mines, closed and non-producing mines (degraded land of pre-nationalization times).
8. Encourage collective responsibility for addressing environmental problems

Centre of Mining Environment, Indian School of Mines, Dhanbad was approached for in depth study of this work.

Several geo-environmental parameters were considered while classifying all the mines within the lease hold of BCCL into various clusters. Primary parameters of clusterization were based upon the exclusive geological formation and the intrinsic drainage pattern of the Jharia coalfield. The drainage (i.e., river, streams, jores/nallahs) provides a firm cluster boundary which should left undisturbed and geological formation of coal mines determines the method of mining, cost, time and productivity. Mines falling between two major drainages were initially clubbed followed by the mines falling within similar geological formation or group of mines separated by geological discontinuity due to structural disposition/ disturbance.

After the primary considerations of geological formations and drainage pattern, a number of other environmental parameters were also considered as the basis of the formation of clusters. The major environmental considerations are-

1. Similar type of land degradation problems prevailing in a group of mines.
2. Mines with coal seams having distinct coking and non-coking property.
3. Number of unstable locations and number of fire areas.
4. Common roads/ railway lines for transportation of coal and common coal and overburden storage areas.
5. Proposed rapid transportation systems (3 No's) by BCCL
6. Overall greenbelt development along the cluster boundary and Environmental Management Plan
7. Water resource conservation/utilization
8. Rehabilitation & Resettlement of people affected by fires and subsidence as suggested in the Jharia Action Plan (JAP) approved by Union Cabinet, Govt. of India on July 30, 2009 and Gazette Notification issued on 12th August 2009 regarding the same.

Report was presented on August 25, 2009 to EAC (Thermal & Coal) where lots of deliberations took place and the clearance is expected on the basis of concept developed by Centre of Mining Environment.

India has Climate Targets for 2030

Mandatory fuel emission standards among measures on the car

Twenty years from now, India's per capita greenhouse gas emissions will be below the 2005 global average of 4.22 tonnes CO₂-equivalent. The estimate is the result of five studies carried out by various research bodies including The Energy and Resources Institute, a Delhi based non-profit. The Union ministry of environment and forests released the report on September 2. Ministry officials said the report would be used in the climate change talks in Copenhagen in December. Minister of state for environment and forests Jairam Ramesh said the finding does not mean "a do-nothing strategy". "The government is trying to find ways to increase energy efficiency—there will be mandatory fuel efficiency standards for the transport sector by 2012."

UK's secretary of state for energy and climate change, Ed Miliband, who met Ramesh during his recent whirlwind tour of India and Bangladesh, said India's commitment to fighting climate change is impressive. He said the UK would contribute US\$ 1 billion a year for mitigation of and adaptation to the effects of climate change in developing countries. Talking to the media, Miliband said he and his colleague Douglas Alexander, secretary for international development, were visiting India to listen to the viewpoints of Indian ministers and negotiators. Asked about rumours that their trip to Bangladesh was meant to strike a separate deal on climate talks and wean the country from other developing countries (G77 plus China), Alexander said the trip was combined because of the geographical proximity between the two countries. Miliband said the UK has pledged to reduce emissions by 34 per cent by 2020 and is willing to "go further as part of a global deal in Copenhagen."

(Source: Down to Earth, Sept. 16-30, 2009)

Meghalaya Erupts over Mining Lease

UCIL gets to mine 13,500 tonnes of uranium

On August 24, the Meghalaya government decided to hand over a large parcel of land in West Khasi Hills to the Uranium Corporation of India Limited. Citizens' groups have opposed the decision to lease 422 hectares (ha) of land for uranium mining saying it will affect people's health. Chief Minister D D Lapang claimed the government took the decision after consulting the local people. "The landowners have allowed us to go ahead with the pre-project development works," said Lapang. "The government is now concentrating on development," said deputy chief minister Bindo Lanong who holds the mining portfolio. UCIL plans to spend Rs 209 crore on healthcare facilities, power plant, drinking water, road development and educational institutions, he said. UCIL had tried to mine uranium in the area in 1990 but had to abandon plans due to violent protests.

Citizens' groups called the development works a bribe. "The Centre should realize that development work will not mitigate the health hazards caused by uranium mining," said Samuel Jyrwa, president of the influential Khasi Students' Union. H S Lyngdoh, president of the Hill State People's Democratic Party, said: "We'll oppose the project as there is no proof showing that radiation effects can be contained." The state government's decision follows the Union environment ministry's clearance to UCIL's proposed mines and processing plant in 2007. Meghalaya has the third richest uranium reserves in the country (13,500 tonnes) after Jharkhand and Andhra Pradesh.

(Source: Down to Earth, Sept. 16-30, 2009)

Mines to be Closed

Goa's environment ministry has ordered six mines operating close to the wildlife sanctuaries of Goa close operations. The list of mines to be closed includes an iron ore mine owned by Sesa Goa. Two mines are owned by Shantilal Khushaldas Brothers at Rivona; these mines were operating without the requisite clearances from the forest department. A mine owned by Damodar Mangalji is on land that has rock carvings said to date back 9,000 years. This mine is not on the list of mines to be closed. The move to close the mines follows an assurance

by the state environment minister Aleixo Sequeira in the state assembly that mining would not be permitted near wildlife sanctuaries, especially the Netravali and Bhagwan Mahaveer reserves. The chief conservator of forests for Goa, Shashi Kumar, had submitted a report saying many of these mines did not even have basic clearances.

(Source: Down to Earth, Sept. 1-15, 2009)

Goa Continues to Mine Illegally

A government inspection of 48 mines in Goa found 35 of them operating without a lease. Some of them did not have mandatory clearances. A committee chaired by the state's chief conservator of forests in a recent report highlighted the extent of illegalities in the state's Rs 6,000-crore mining industry. The opposition BJP alleged the committee did not take action despite chief minister Digambar Kamat's directive to stop illegal mining on the spot.

The report blew the lid off companies that work without requisite clearances or renewals. These include heavy weight mining companies such as Sesa Goa Ltd, Salgaonkar and Brothers, and V S Dempo. Sesa Goa's lease at Advalpale in Bicholim expired in 2007, the report said. The other two mining giants' leases at Quella in North Goa and Sanguem also expired in 2007. The companies, however, continued to extract ore.

Mining 60 metres from the Netravali Wildlife Sanctuary in South Goa also serves as an example. The forest department had refused licence renewal in 1991 in "the interest of wildlife management". But work was on in full swing on about 75 hectares of the mining area, the report said. "Fresh excavations for...development work to open up mine were observed in the portion of a hillock. A number of trees were also found to have been logged." Shashi Kumar, chair of the investigating committee, recommended a notice to the owner, Kunda Gharse of Anvalimola Conserapeda Mines, for mining illegally and chopping trees without the government's approval. Several mines, the report added, operate near the Bhagwan Mahaveer Wildlife Sanctuary in South Goa.

Why no action taken

Leader of opposition Manohar Parrikar said the report would make little difference. "The chief conservator of forests heads the forest department. In several cases, the mines do not have clearances from the department itself and yet the conservator has recommended cases to the department," Parrikar said. "He should have acted against illegal miners on the spot. The report is a façade." The director of mines, on the committee panel, could have acted immediately, he added. "One department will pass the buck to the other and illegal mining will continue." But the chief minister said the report made it clear the state government was committed to end illegal mining in Goa. "We are not giving new mining leases in the entire Western Ghats," Kamat said.

The committee was formed in the face of sustained pressure from non-profits and the opposition. They accused the Congress-led alliance of shielding illegal mining. Currently, about 100 mining tracts are leased for extraction of manganese, iron and bauxite ore, which is exported mostly to China and Japan. Illegal mining generates 18 per cent of the revenue.

(Source: Down to Earth, August 31, 2009)

Mercury in Air, Water

Cheap coal and easy availability of water may have spurred rapid industrial growth in Sonebhadra district of Uttar Pradesh. But the nine coal-fired power plants, clustered along the Renu river, are poisoning the air and water in the district with mercury, a neurotoxin. A recent study by research scientists with the non-profit People's Science Institute in Dehradun found mercury levels in the air near these power plants ranged from 94 ng/m³ to 1,291 ng/m³. This is far above the (yet-to-be-notified) permissible limit for the toxin proposed by the Central Pollution Control Board—15ng/m³. The toxin is in the flyash (residue from burnt coal) that escapes into the air through the chimneys or gets discharged as effluent into the Renu, a tributary of the Sone river, said lead researcher Anil Gautam. The study was conducted between February and April this year.

Mercury is in the flyash

210,000 tonne coal is burnt per day by the 9 thermal power plants (TPP)

30- 40 per cent of the coal is emitted as flyash

0.2-0.4 ppm is the mercury content in the flyash

"A boost in coal production and use of coal with higher mercury content are the main reasons for increase in toxin levels in the air and water," said Ramesh Tripathy, Gautam's co-researcher. The effluents from these plants have killed all aquatic life in the river, he added. Besides brain damage, mercury causes skin allergies, kidney and lung diseases and cancer. But its effect on the health of over five lakh people living near the power plants has not been studied in the last decade. Lucknow's Indian Institute of Toxicology Research gave some indications in 1998-99. It found that mercury in the hair and blood samples of people living close to the thermal plants was 300 times higher than in people living 300 km away in Patna. Their IQ levels were also below average, said Brahmajeet Singh of non-profit Vanvasi Seva Ashram.

The thermal plants in Sonebhadra together generate 14,150 MW of electricity (10 per cent of total power generated in India). The emissions from the plants are far above the figures projected 20 years ago by a consultancy firm asked to assess the carrying capacity of the region. Five more thermal plants are in the offing. They will increase the power generation capacity of the region to 24,350 MW. A visit near the state-owned Obra thermal plant in Chopan block showed flyash from the plant is directly discharged into the river. The precipitators in the chimneys that filter the flyash are also out of order, increasing toxins in the air, said Tripathy.

The response of D N Bajpai, the chief general manager of the Obra plant, was “why bother about pollution as long as you get electricity”. Bajpai, however, added things would be set right in the next three years. The Renu river, passing by the Obra plant, has a thick silt of grey settled along the banks. The Rihand reservoir downstream is equally polluted which means flyash is directly dumped into the river or leaches into it from the flyash ponds, said Brahmajeet Singh. The study also found high levels of mercury in industrial effluents. The wastewater in the Dongiya drain that flows by the Kanoria Chemicals (caustic soda manufacturing unit), for instance, had 15.3 µg/l mercury against the permissible limit of 10µg/litre. The drain discharges effluents directly into the Renu river.

Drinking water a problem

The pollution is affecting the people nearby. Villagers of Tharpathar, located behind Hindalco plant owned by the Birla Group in Renukoot, said 100 heads of cattle have died in the past two years after drinking wastewater from the aluminium plant. The wastewater flows through a drain into Renu river. Ram Subhag, 35-year-old labourer, said his family of five have sores all over their skin. Many children in the village could be seen with skin sores and spots. They fetch drinking water from downstream where the river is a little less polluted; they cannot drink the groundwater as it has flourides.

(Source: Down to Earth, August 15, 2009)

Buffer Zones around Sanctuaries not needed: Goa Govt.

Panaji, August 31, 2009: The Goa Government’s report to the National Wildlife Board recommending against any eco-fragile zones near wildlife sanctuaries in the State has effectively allowed mining of iron ore around sanctuaries in some cases. The report said buffer zones in three wildlife sanctuaries — Netravali, Bhagwan Mahavir and Mhadei— should be removed. The report which assumes significance considering the controversies surrounding illegal mining in the State has reasoned that there are several settlements around the sanctuaries and many villagers have ownership rights up to the boundaries of the sanctuaries. The report was prepared at the instance of the Centre. The State Government approved the report submitted by a high level committee. Meanwhile, activists in Goa have raised objections to the report. “We have sent our objections to the Centre. The only purpose of this report is to facilitate mining in protected forests,” NGO Goa Foundation director Claude Alvares said. However, the forest department has asked the Centre to expedite a decision on the report, Chief Conservator of Forests Shashi Kumar said. The State Government has already begun acting on the document by granting extensions to three mine leases. Since this report was approved by the state government, we have begun taking decision on its basis, Kumar said.

(Source: <http://dailypioneer.com>)

Goa talks to Centre on Illegal Mining, Environmental Okays

Panjim, Aug 18, 2009: Besides raising the CRZ issue, Goa today took up matters of illegal mining and environmental clearances with the Centre. A strong demand was also made with the Union Minister for Environment and Forest Jairam Ramesh for consulting the Goa State Pollution Control Board before environmental clearances are given by the central government. Leading the high-level delegation, Chief Minister Digambar Kamat presented a strong case before Jairam Ramesh in New Delhi on Tuesday that Goa’s coastal inhabitants particularly the traditional fishermen need a special protection. He impressed upon the union minister to see that a best possible solution is found to protect their residential structures.

It may be recalled that 2000-odd structures are affected by the court order for CRZ violation in the 0-200 metres – No Development Zone. Mr Ramesh told the delegation that he would try to visit Goa on 28th August to get a feel of the CRZ situation in the state and accordingly take a decision. It is however, not confirmed whether he would defer his visit by a few days in view of Ganesh Chaturti which will be celebrated in Goa next week. The Chief Minister also brought to the notice of the union minister how the state particularly its hinterland is suffering from environmental damage due to illegal mining.

The chief minister was accompanied by Minister for Environment & Power Aleixo Sequeira, Minister for Water Resources & Forest Filipe Neri Rodrigues, Chairman of Goa State Pollution Control Board, Dr Simon de Souza and Director of Science, Technology & Environment and OSD to CM Michael D’Souza.

ENVIRONMENTAL CLEARANCES: The Goa team also brought to the notice of the union minister how the central government has been bypassing the recommendations of Goa State Pollution Control Board on environmental matters. It may be recalled that even after adverse remarks are put by the Board, on mining and others matters, the ministry of forest & environment has on several occasions given environmental clearances without even studying the situation at Ground Zero.

Mining being a central subject, the promoters have been objecting to every move of the state government to control and monitor mining activities and the pollution caused by them. The union minister was urged that the Pollution Control Board should be given more powers on granting environmental clearances. From the time Dr Simon has taken over as the chairman, the Board, in its pro-active mode, has been trying hard to attend to complaints of environmental pollution and degradation.

Source: Herald (Panjim)

Goa Draft Mineral Policy Allows Mining near Sanctuaries

Panaji, Aug 14, 2009: The Goa environment ministry ordered the closure of 12 mines last week for their proximity to wildlife sanctuaries, but the government's new draft mineral policy allows mining in close vicinity of the protected areas. The draft mining policy, which was tabled during the budget session of the Goa legislative assembly, clearly advocates mining near the state's wildlife sanctuaries, which are a part of the ecologically sensitive Western Ghats.

"Mining leases/prospecting licences within close proximity from already declared wildlife sanctuaries would be considered provided they adhere to additional safeguards and guidelines whilst operating so as to reduce any adverse effect on the environment," the draft mining policy states. On Aug 6, Environment Minister Aleixo Sequeira had ordered the closure of 12 mines, including one leased to mining giant Sesa Goa for their alleged proximity to wildlife sanctuaries.

The draft policy, however, does not permit mining within wildlife sanctuaries and national parks "for the time being". "The state government is also of the view that while it is necessary to earmark mining areas, presently no prospecting leases should be allotted in wildlife sanctuaries and national parks. Similarly, no prospecting leases on wetlands should be allowed for the time being," the document states. The draft policy also aims to evolve a mechanism to end dormant non-operational mining leases issued by the Portuguese government, which ruled Goa before the state was liberated in 1961.

"A number of mining concessions are being kept idle for speculative purposes and future mining... The state government is also concerned with issues of conservation of minerals as well as sustainable development and as such would discourage opening existing dormant leases uniformly," the draft policy states, adding that no such dormant leases would be permitted to work without an environmental clearance and forest clearance, wherever required. While the state government's draft mining policy clearly advocates mining in close proximity of wildlife sanctuaries, it also speaks of maintaining the ecological balance in the state.

The draft mining policy is the brainchild of Chief Minister Digambar Kamat, who is also the minister for mining. "It would be the endeavour of the state government to ensure that mining activities do not create an adverse impact to the environment and ecology," the policy states. There are more than a 100 mining leases in Goa's hinterland, which export nearly 30 million tonnes of iron ore annually.

(Source: Deccan Herald)

Goa to Close all Iron Ore Mines near Wildlife Sanctuaries

Gurgaon - 10 August, 2009: It is reported that Goa Government has taken a decision to close all mines located in less than a kilometer from wildlife sanctuaries. The said decision is likely to affect nearly one third of Goa's 163 licensed mines that are located near sanctuaries and is expected to have an adverse impact on state's iron ore trade with China. Recently, the state government has guaranteed to close down all mining companies that continue excavation even after their permits lapsed.

Speaking at the budget session of the Goa legislative assembly, Mr Sequeira said that his ministry had received several complaints from the forest department, which said that there were several mines functioning within one kilometer of a wildlife sanctuary. Mr Sequeira told the house that "The Goa State Pollution Control Board has received letters from the forest department mentioning certain mines located within a kilometer of wildlife sanctuaries," The minister however did not specify the exact number of mines in the vicinity of the wildlife sanctuaries. But he said that "I assure the house, that within seven days, air and water consent given to these mines will be withdrawn and they will be directed to stop." Moreover, the state government is planning to set a joint committee headed by the state forest commissioner to closely monitor environment conditions before granting any permission.

(Source: Steel Trade Today)

Goa to Close Mines near Wildlife Sanctuaries

Panaji, August 6, 2009: *All mines located near wildlife sanctuaries in Goa will be closed within seven days, Goa Environment Minister Aleixo Sequeira said here Thursday.*

Speaking at the budget session of the Goa legislative assembly, Sequeira said that his ministry had received several complaints from the forest department, which said that there were several mines functioning within one kilometre of a wildlife sanctuary. "The Goa State Pollution Control Board (GSPCB) has received letters from the forest department mentioning certain mines located within a kilometre of wildlife sanctuaries," Sequeira told the house. The minister however did not specify the exact number of mines in the vicinity of the wildlife sanctuaries. "I assure the house, that within seven days, air and water consent given to these mines will be withdrawn and they will be directed to stop," he said. Sequeira further said that the reconstitution of the GSPCB

would help crack down on illegal mining. "Each department was playing football with such complaints earlier. Now in the reconstituted GSPCB, all the heads of departments (related to mining) have been accommodated. I hope this will mean a coordinated team effort from now on. And these types of lapses will not happen," he said. Leader of the opposition Manohar Parrikar alleged that nearly 18 percent of Goa's 33 million crore mining exports were fed by illegal mining.

(Source: <http://www.deccanherald.com>)

Panel flays 3 Depts for Illegal Mining in State

Panjim, August 23, 2009: The ad-hoc committee on mines has flayed the three departments — Directorate of Mines, Forest Department and Goa State Pollution Control Board for the illegal mining in the State. The committee, which has tabled its first report claimed that "these departments have been passing the buck when it came to illegal mining."

"The State of Goa would not have faced this problem of illegal mines and pollution if these departments had to perform their duties responsibly," the report says. Further, report says, it is well taken that the Directorate of Mines looks after the enforcement of the provisions of the Mines and Minerals (Development and Regulation Act, 1957), the Mineral Concession Rules 1960, both of which are Central Legislations.

"...But the Directorate could have very well suggested necessary amendments to MoEF and other Ministries concerned. It should have been the responsibility and duty of Directorate of Mines to check that the mining activity is not done without environmental clearance and other required permissions," the committee says. The report also says action should have been taken against mining operations that continue without environmental clearance and other NOCs.

"It was the moral responsibility of the department to close down or cancel licences/lease of mines, whenever the mining rejects and other mining wastes posed threat/caused damage to paddy fields, fruit bearing crops, drinking water sources and other water bodies within the vicinity of mines," the committee says. The fact that the deemed clause is being misused by many in the mining sector is known to all the departments. Yet none of the above departments came forward to put an end to this. This could be because those who could stop this were hand in glove with the mining lobby, the members of the committee observed. The Committee feels that the Government should try to make up for its failure to control the illegal mining activities by passing strictures, amending the existing State and Central legislations pertaining to mining and related issues. The Committee feels that all mining operations in the State, with or without valid mining lease concession, should be stopped.

(Source: *Herald (Panjim)*)

Panna Diamond Mines Reopen after Four Years

New Delhi - 22 August, 2009: State-run NMDC will invest Rs 20 crore to mine one lakh carats of diamonds from Panna mines in Madhya Pradesh in the next fiscal. The mines were reopened today after four years following the Supreme Court's conditional clearance for starting mining operations. The NMDC started trial runs in June 2009 after paying about Rs 11 crore to the state government. Re-dedicating the mines to the nation, steel minister Virbhadra Singh said NMDC would also try to explore areas adjoining Panna to find more diamond reserves. "The PSU is already making intense efforts in locating diamond reserves in Chattarpur district and coal deposits in Shahdol and Umaria districts of the state," Singh said.

Pledging to make Panna a diamond-making hub, the minister asked the Madhya Pradesh government to come forward to facilitate mining giant NMDC in exploring more iron ore, coal, sandstone and diamond reserves in Madhya Pradesh through more prospecting licences.

The minister, however, made it clear that making a particular place a diamond hub was not easy unless the volume of production is such that it could attract the entrepreneurs from diamond cutting and polishing industries to set up units here. The company will produce 35,000 carats of diamonds in the current fiscal. "Till October we will be able to do a meagre 5,000 carats. In the remaining period of the current fiscal, we will mine about 30,000 carats of diamond," he said. The Panna mines have estimated reserves of 12 lakh carats of diamond. The mines currently employ about 240 people. More jobs in the region could be created with the resumption of mining activities. The reopening of Panna mines is one of the major achievements for the UP A government in its first 100 days.

(Source: *The Indian Express*)

J'khand Objects Reckless Mining by PSUs

New Delhi - 21 August, 2009: Jharkhand has asked the Centre to rein in public sector units (PSUs) from carrying out "reckless" mining that causing environmental degradation in the state and demanded setting up of a team to monitor their functioning. "Performance of PSUs like Central Coalfields Ltd and Bharat Coking, Coal Ltd. is far from satisfactory.

The status of reclamation of their mined area is extremely dismal," a senior official from Jharkhand told PTI. "We have brought the issue to the notice of environment minister Jairam Ramesh who has promised to look into the matter," the official added. Further elaborating on the issue, they claimed that reclamation is not taken up on the ground that minings are not complete. "They keep on opening virgin areas without exhausting the ore in opened up areas. Abandoned mines, and not reclaimed ones, are the major source of illegal mining."

(Source: The Financial Express)

Environmental Clearances New Licence Raj,-says Manmohan

New Delhi - 19 August, 2009: In a clear confirmation of the widespread allegations of environmentalists, Prime Minister Manmohan Singh on Tuesday minced no words in saying that "environmental clearances have become a new form of Licence Raj and a source of corruption". "It is a matter that needs to be addressed. There are trade-offs that have to be made while balancing developmental and environmental concerns. But the procedures must be fair, transparent and hassle-free. Decisions, must be taken within specified time. I am told that sometimes there are discrepancies in the Environmental Impact Assessment reports," the PM said while addressing the National Conference of State Environment and Forests Ministers, organised by the Ministry of Environment and Forests (MoEF).

Singh's admission only confirmed Environment Minister Jairam Ramesh's assertion about how his Ministry, prior to his assuming charge in the UPA-II Government, had been having an "unnaturally high rate (98 per cent) of acceptance for clearances". The PM's admission came even as State Governments demanded that they should be consulted for setting up the National Environment Protection Authority (NEPA). "We demanded to be consulted, to which the Centre has agreed, to avoid any conflict of interest between the new body and the existing State Pollution Control Boards," a State Environment Minister who attended the conference told *The Pioneer*.

"The States also demanded a joint task force for settling the issue of non-reclamation of mined areas of PSUs like CIL; allocation of coal blocks by the Coal Ministry in consultation with the MoEF; a team to study man-animal conflict; improvement of the elephant corridor and assistance for modernisation of forest departments (the Centre would set up a National Board to assist State Governments in modernising their forest departments)," the Minister said.

In fact, a few States even questioned the rationale behind signing tripartite MoUs, with one of the signatories being the Field Director (State's own employee). Some others pointed to the lack of technical expertise for setting up clean development mechanisms in their regions. The issue of Naxalism (raised by a State), however, was brushed aside.

Ramesh later told mediapersons that there has been a broad approval for NEP A, the concept note for which would be finalised by September 15. He also said the forestry expenditure in 2009-10 was expected to be Rs 83,000 crore, up from 36,000 crore in 2008-09. The Prime Minister maintained that India not only fully recognised how important the issue of climate change was to the country, but also that it was its own obligation to address it. He asked the States to create their own action plans consistent with the National Action Plan on Climate Change that was unveiled last year. He also dwelt on river conservation and the tribal rights Act even as he suggested that the authorities of Andaman & Nicobar and Laskhadweep Islands work in close coordination with the Centre to evolve an integrated approach on coastal management.

The Chief Ministers of Delhi, Goa, Haryana and Karnataka attended the conference along with the Environment Ministers of other States. On the issue of Maharashtra Agriculture Minister Balasaheb Thorat entering a tiger's cage at the Maharajbagh Zoo in Nagpur, Union Environment Minister Jairam Ramesh said "We have asked the Central Zoo Authority (CZA) to investigate the matter and submit a report within two days. If the Minister is found guilty, law will takes its course. The violation of CZA rules causing trauma to the animal will attract a punishment of six months' jail term or a fine of Rs 2,000 or both."

(Source: The Pioneer)

Coal India Plans Subsidiary in Mozambique

Bhubaneswar August 18, 2009: Coal India Ltd (CIL), which was awarded two exploratory coal blocks in Mozambique in March this year, has decided to set up a wholly-owned subsidiary in that country to expedite the exploration process.

"CIL will form a separate company for carrying out coal mining activities in Mozambique. This company will be a fully-owned subsidiary of CIL and will forge a joint venture (JV) with a state run mining firm in Mozambique," a top CIL official told *Business Standard*.

The CIL subsidiary will have an 85 per cent stake in the JV, while the remaining 15 per cent will be held by the Mozambique-based mining company. The modalities of the JV Company were yet to be decided, but a breakthrough was expected during the upcoming visit of a high-level Indian delegation to Mozambique. The delegation, which includes the Union coal ministry officials as well as the top brass of CIL, is expected to take up the issue of the proposed JV Company to start exploration of the coal blocks.

In March this year, CIL was awarded two exploratory coal blocks — A1 and A2 — in Tete province of Mozambique, having an estimated reserve of one billion tonnes. While the exploration of these two coal blocks, spread over 224 sq km, was set to commence within a few months, the mining activities were expected to begin after three and a half years.

Prior to carrying out mining operations in Mozambique, the Navratna coal company was to distribute artificial limbs in that war-ravaged nation. CIL has also announced the setting up of a premier mining institute in Mozambique, on the lines of the Indian School of Mines, Dhanbad.

Apart from Mozambique, CIL had also stepped up its efforts to acquire stakes in coking and thermal coal assets in Australia. CIL has called for Expressions of Interest (EoIs) from mining firms in Australia in this connection by the end of August. The coal major was keen on entering into a strategic partnership with Australian mining firms having proven expertise in mining for developing the coal assets.

(Source: Business Standard)

Forest Ministry Likely to Relax Norms for Pilot Coal-Mining Projects

New Delhi - 15 August, 2009: Coal India Ltd may finally expect some headway in prospecting coal reserves in forest areas. The Union Ministry of Environment and Forests (MoEF), following an inter-ministerial meeting, has decided to relax the existing norms for pilot projects. The MoEF, it is learnt, may go for suitable policy changes in this regard based on detailed impact assessment of the pilot projects. It recently appointed a nodal officer to deal with CIL's application for pilot drilling in three such blocks in Madhya Pradesh, Chhattisgarh and Orissa. According to sources in Coal India, the company had planned a four-fold increase in its drilling activity beginning this year.

Accordingly CIL's R&D arm, Central Mine Planning & Design Institute Ltd (CMPDIL), appointed Mineral Exploration Corporation Ltd (MECL) to undertake drilling of 7.5 lakh exploratory wells. However, the existing MoEF guidelines on drilling in forest land proved to be the stumbling block for MECL keen on prospecting coal in at least 8-10 blocks mostly located in prime coal bearing zones. "The existing guidelines allow drilling of 1-1.5 bore holes in every square km of forest land. However, the standard reserve assessment norms require drilling of 8-10 such wells a square km," Mr A. K. Singh, Chairman and Managing Director of CMPDIL, told Business Line.

CIL, however, argues that coal prospecting requires a mere 15 metre X 15 metre strip per well to position the truck mounted rigs. "Naturally, as per our assessment, drilling of 8-10 wells per square km is unlikely to cause any major adverse environmental impact on the forest," Mr Singh added. The issue was discussed threadbare at a meeting between the Union Coal Minister, Mr Sriprakash Jaiswal, and the Union Minister for Environment and Forests, Mr Jairam Ramesh, in June.

The meeting identified three blocks (including Bijul in Madhya Pradesh, Chira North in Chhattisgarh and Baitarani-East at Talcher in Orissa) where environmental norms might be relaxed for underking drilling on a pilot basis. It was suggested that long-term policy decision in this regard would be taken after a detailed environmental impact study on these blocks.

(Source: Business Line)

Coal Ministry Seeks Mine-friendly Sops

New Delhi - 8 August, 2009: The coal ministry, which is pursuing a coal production target of 600 million tonne by the end of the 11th Plan, has called upon the ministry of environment and forests to determine the impact of aggregate coal production, rather than individual projects, on the environment. The coal ministry argued that an environment clearance be provided for the entire coalfield, taking into account the capacity of production and action against officials in the field should not be initiated for such acts. Besides, the coal ministry has reiterated the need for a model term of reference for opencast and underground coal projects in order to avoid delays. Coal ministry sources told FE that it usually becomes imperative that one meets the deficit in coal production in a particular project by increasing the production from other projects.

The strict enforcement of environment clearance conditions would imply that projects in which production has been higher than approved capacities are violating such norms. "Thus environment clearance can be provided for the entire coalfield, taking into account the capacity of production, the duration during which aggregate coal production from a coalfield is not exceeding the aggregate coal production permissible under environment clearances of individual projects and pollution loads within permissible limits."

The coal ministry has also suggested that coal-bearing forest areas be delineated into 'go' and 'no-go' areas so that areas identified 'no-go' can totally be excluded from exploration and reclassification of coal resources falling under these areas, keeping in mind the country's energy requirement. Further, the validity of environment and forest clearances should be provided for the entire lifetime of mines. "This is essential because more than 30 years have already elapsed after nationalisation.

Mining leases issued earlier have expired and until they are renewed, continuing the production from these mines would be in violation of the Environment (Protection) Act. However, production cannot be stopped from these mines keeping in mind the compelling demand for coal," the sources said. Moreover, the coal ministry has argued that environmental clearances for small mines be given on a cluster basis. During nationalisation, a number of small mines were taken over. Such mines are still continuing production and no project reports are available for such mines. Further production from these mines is gradually decreasing and there is no chance of any additional pollution load.

(Source: The Financial Express)

Self Sufficiency in Uranium by 2013

Bhubaneswar, August, 2009: India is expected to achieve self-sufficiency in Uranium production by 2013, to feed its existing plants and proposed units. With the Jaduguda Uranium mill in Jharkhand expansion and the

proposed Turamdih mill expected to be commissioned over next year, uranium production would go up. Besides, exploration of uranium' is underway at Tummalapalle in AP and its is expected to be on stream by 2013, according to Mr. Anil Kakddkar, Chairman Atomic Energy commission. He had also told about the exploration work at Gogi in Gulbarga to explore uranium.

(Source: The Indian Mining & Engineering Journal)

Private Sector may get Consent for Coal Mining

The Coal Nationalisation (Amendment) Bill 2000, introduced in the Rajya Sabha by the NDA regim, may now get a fresh lease of life. The government may allow commercial coal mining by private companies as it looks to plug the demand supply gap in the sector considered crucial to India's long-term energy security. President Pratibha Patil has already indicated that the government wants to carry forward reforms in the coal sector. Allowing private sector in commercial coal mining is the only major reform initiative that remains to be completed.

(Source: IME Journal, Vol.48, No.09, Sept. 2009)

After NALCO attack, Ministry Moots 'Explosive Free' Mining.

Armed forces may not be required to prevent Naxals from attacking mining sites of explosives, the Union Ministry of Mines believes, The minister has asked all major Government and private mining agencies to explore ways of ' explosive free' mining so that large catches of mining explosives, are not required to be stored at the sites. The Minister has directed Nalco to ensure that all the security infrastructural requirements of Central Industrial Security Force are met on priority.

(Source: IME Journal, Vol.48, No.09, Sept. 2009)

Historic Reform in Ontario Mining Law

As per Mining Journal report, Ministry of Northern Development and Mines of Ontario said that its proposed changes to the province's Mining Act would see significant strides in aboriginal consultation as well as provide clear rules for industry and reduce the impact of mineral exploration on the environment. The changes have been hailed as a historic act by Ontario government and conservation groups, and mark the first major reform to Canadian Mining Laws in more than 100 years. Larry Innes, Executive Director of the Canadian Boreal Initiative said, "This is an important step towards reconciling longstanding conflicts between the interests of aboriginal communities, conservations and the mining sector."

(Source: IME Journal, Vol.48, No.09, Sept. 2009)

Important Parliamentary Questions

3361. SHRI HANSRAJ G. AHIR

Will the Minister of MINES be pleased to state:

- (a) whether sufficient reserve of iron ore is available in the country; (b) if so, the details thereof, State-wise;
- (c) the period upto which the iron ore reserves is likely to last to meet the domestic requirement;
- (d) whether the Government proposes to put restrictions on granting mining lease to foreign companies; and
- (e) if so, the action taken/being taken in this regard?

ANSWER

THE MINISTER OF MINES AND MINISTER OF DEVELOPMENT OF NORTH EASTERN REGION (SHRI B.K. HANDIQUE)

(a) & (b): As per available information, the total iron ore reserves in the country is 7.06 billion tonnes and the total resources of iron ore are estimated at 25.25 billion tonnes as on 01.04.2005. State-wise information on reserves/ resources of iron ore is given the Indian Minerals Year Book, published by the Indian Bureau of Mines, a copy of which is supplied to the Parliament Library on regular basis.

(c): The reserves are a function of detailed exploration of resources and are dynamic in nature. The level of steel production and the grade of iron ore, taken for purposes of calculating the resources, are important parameters for determining how many years the iron ore deposits will last. The estimated figures can be between 150 to over 200 years depending on the assumptions made.

(d) & (e):As per the Mines and Minerals(Development and Regulation)Act,1957 mining lease can be granted to any person who is an Indian citizen or a company as defined in Section 3(1) of Companies Act, 1956. There is no proposal to change this provision.

(Source: Business Information Bureau, New Delhi - 18 August, 2009)

2415. SHRIMOTILAL VORA: SHRI SATYAVRAT CHATURVEDI

Will the Minister of STEEL be pleased to state:

- (a) the quantity of iron-ore in metric tonnes required for domestic steel industries yearly in the country;
- (b) whether steel plants established in Public Sector Undertaking are facing shortage of iron-ore frequently;
- (c) the reasons for export of iron-ore in large quantity to other countries without considering requirements in our country;
- (d) whether Bhilai Steel Plant situated in Chhattisgarh has a deposit of iron ore only for next five years in Dalli Rajhara mines; and
- (e) whether Government is considering to impose ban on export of iron-ore?

ANSWER

THE MINISTER OF STATE IN THE MINISTRY OF STEEL (SHRI A. SA! PRATHAP)

- (a) The quantity of iron ore consumed by domestic iron & steel industries during the last three years in given below:

(Quantity in Million Tonnes)

Year	Quantity of iron ore consumed
2006-07	68.5
2007-08	85#
2008-09	87#

Estimated by Ministry of Steel

- (b) SAIL and RINL are two steel plants established in the public sector. SAIL operates 9 captive iron ore mines situated in the states of Jharkhand, Orissa & Chhattisgarh to meet its iron ore requirement. RINL has no captive iron ore mine and its requirement of iron ore is mainly fulfilled by NMDC, a mining PSU under Ministry of Steel. NMDC is giving due priority to RINL in supply of iron ore. Ministry of Steel has also given instructions to NMDC to given priority to RINL in supply of iron ore.

- (c) The production of iron ore in the country is more than double its domestic consumption and therefore, iron ore is exported from the country. The production, export and domestic consumption of iron ore during last three years is given below:

(Quantity in Million Tonne)

Year	Production	Export	Domestic Consumption
2006-07	180.92	93.79	68.5
2007-08	206.45	104.27	85#
2008-09	227.64	105.86	87#

Source: For Production & Consumption - IBM, Ministry of Mines

For Export - MMTC, Department of Commerce

Estimated by Ministry of Steel

- (d) Yes, Sir. The balance reserve in existing iron ore mines located at Dalli-Rajhara can meet requirements of Bhilai Steel Plants (BSP) for next 5-6 years only. In order to meet iron ore requirements of BSP, a new mine at Rowghat is planned to be developed as replacement of existing mines and various statutory clearances for opening the Rowghat mine are being taken.

- (e) No, Sir.

(Source: Business Information Bureau, New Delhi -18 August, 2009)

Persons in the News



Sri B.P. Singh (55 yrs), Director (Projects), is a Graduate in Mining Engineering. He has rich and varied experience both in coal as well as power sector. He started his career in 1974 in coal mining sector firstly with Indian Iron & Steel Company and subsequently joined Bharat Coking Coal Ltd. He joined NTPC Ltd. in 1981 and worked in various capacities, at Corporate Centre and Power Projects, in the areas of Fuel Management, Coal Mining & Coal Washery. He was elevated as Executive Director (Coal Mining & Coal Washeries) in 2004.

He played the pivotal role in formulation of NTPC's overall strategy for fuel security. He has been instrumental in acquisition and development of fuel assets i.e. one Oil & Gas Exploration block under NELP V in Arunachal Pradesh, six coal mining blocks across various coalfields in the country besides two more blocks for joint operation through a 50:50 JV with CIL. He is also the Chairman of NTPC-SCCL Global Ventures Private Ltd. He joined the Board of the Company as Director (Projects) in Aug, 2009. Besides representing NTPC in various committees set up by Govt. of India on Integrated Coal Policy, fuels for Power Generation, Pricing of Coal, Techno-economics of using washed coal, etc. he has also been part of various Govt. teams & missions like U.K. Trade Mission, Indo-Australia Joint Working Group on Energy & Minerals, etc. He is also a 'Senate Member' of Dr. BR Ambedkar National Institute of Technology, Jalandhar, Expert Member' on Research Council of "Central Institute of Mining & Fuel Research (CIMFR)" and represents NTPC as 'Member' in MGMI.

(Source: IME Journal, Vol.48, No.09, Sept. 2009)

National/International Events

- 6 to 8 July 2009**, The IASTED International Conference on Environmental Management and Engineering EME 2009, Banff, Alberta, Canada, Website: <http://www.iasted.org/conferences/home-650.html>, Contact : IASTED Secretariat – EME 2009
- 23 September 2009**, ICESE 2009 - International Conference on Environmental Sciences and Engineering, Toronto, Canada Website: <http://www.waset.org/wcset09/toronto/icese/>
- 23 September 2009**, ICESE 2009 - International Conference on Environmental Sciences and Engineering, Amsterdam, Netherlands, Website: <http://www.waset.org/wcset09/amsterdam/icese/>
- 30 September 2009 to 2 October 2009**, ENVIROMINE 2009 - I International Seminar on Environmental Issues in the Mining Industry, Santiago, Chile, Website: <http://www.enviromine2009.com>, Contact : Olga Cherepanova
- 19 to 21 October 2009**, International Conference on Emerging Technologies in Environmental Science an Engineering, Aligarh, India, Website: <http://www.amu.ac.in/shared/linkimages/toledo.pdf>, Contact : Dr. Izharul Haq Farooqi
- 20-22 October 2009**: China Mining Congress & Expo 2009, Binhai International Convention and Exhibition Center, <http://www.china-mining.com/>
- 26-30 October 2009**: International Conference on 'Sustainable Development - SD09' at Adelaide Convention Centre, South Australia. For further details please contact: Prof. Sarah Leavitt, Event Manager, Ph: +61 2 6233 0643, email: events@minerals.org.au.
- 28-30 October 2009**: International Seminar on Mineral Processing Technology (MPT-2009) at Institute of Minerals and Metals Technology (IMMT), Bhubaneswar, Contact: Shri P.S.R.Reddy, Convener, MPT-2009, IMMT, Bhubaneswar-751 013, Tel: +91 674 2581635/638/639; Fax: 0674-2581160/2581637, email: pssreddy@immt.res.in.
- 28-31 October 2009**: WXXVII International Mining Congress & Exhibit, World Trade Center, Veracruz, MEXICO, <http://www.expominmexico.com.mx/>
- 30 October 2009 to 1 November 2009**, 4th International Congress of Chemistry and Environment ICCE 2009, Tianjin, China, Website: <http://www.chemenviron.org>, Contact : Dr.Shankar Gargh and Dr.Shirong Tang
- 10-13 November 2009**: Ninth International Mine Ventilation Congress, at Hotel Crown Plaza, New Delhi. Organised by Department of Mining Engineering, Indian School of Mines University, Dhanbad – 826 004. For further details please contact: Prof. D.C.Panigrahi, Convener & Head, Deptt. of Mining Engg., Indian School of Mines University, Dhanbad; email: dc_panigrahi@yahoo.co.in, web: www.9thimvc.org.
- 12 to 13 November 2009**: 14th PA Drilling & Blasting Conference, The Penn Stater Conference Centre State College, PA USA.
- 14-17 November 2009**: Metals Minerals Manufacturing Expo 2009, Science City Complex, Kolkata, jointly organised by the Indian Institute of Metals & TAFCON Group, Contact TAFCON, C-60, Nizamuddin East, New Delhi-110003, India, Telephone: +91-11-46198000/24352141, Fax: +91-11-24355215/46198031, email: metallurgy@tafcon.com, web:www.metals2009.com.
- 16-19 November 2009**: MEPS-2009 – 18th International Symposium on "Mine Planning & Equipment Selections" at Banff Alberta, Canada, Contact: Dr. Raj K. Singhal, P.O. Box 68002, Crow foot Postal Outlet, 28 Crowfoot Terrdce NW, Calgary, Alberta, T3G 1Y0, Canada, Fax: (403)-241-9460, email: singhal@shaw.ca; website: <http://www.mpes-cami-swemp.com>.
- 25 November 2009**: ICEET 2009 - International Conference on Environmental Engineering and Technology, Sydney, Australia, Website: <http://www.waset.org/wcset09/sydney/iceet/>.
- 2-3 December, 2009**: All India Seminar on Impact of New Mineral Policy-2008 on Investment in Mining & Steel Sector of India by 2020 AD & on Infrastructure Development, Constraints & Remedical Measures, Bhubaneswar, Contact Shri G. S. Khuntia, Convener, Institution of Engineers (India), Orissa State Centre, Bhubaneswar Unit-4, Sachivalaya Marg, Bhubaneswar-751001, Phone/Fax: 0674/2390630; email: ieioscbb@sify.com/gskhuntia@gmail.com.
- 15-17 January, 2010**: International Conference on Iron Ore Future – The Next Decade, Hotel Oberoi Grand, Kolkata organised by Journal of Mines, Metals & Fuels. Contact: A.K.Ghose, Journal of Mines, Metals & Fuels, 6/2 Madan Street, Kolkata 700 072, Tel: 033-22126526; Fax: 033-22126348; email: ghose.ajoy@gmail.com.
- 22-25 January 2010**: 3rd Asian Mining Congress Conference & Exhibition, Venue: Netaji Indoor Stadium, Kolkata; Organised by: The Mining, Geological & Metallurgical Institute of India (MGMI). For details contact: The Mining, Geological & Metallurgical Institute of India, GN-38/4, Salt Lake, Sector V, Kolkata-700 091, India, Tel: +91 33 2357 3482/ 2357 3987 Fax: +91 33 2357 3482; e-mail: mgmi@cal2vsnl.net.in, website: www.mgmiindia.com.
- 7-10 February 2010**, ISEE's 36th Annual Conference on Explosives & Blasting Technique, Disney's Coronado Springs Resort, Orlando, FL USA Lynn Mangol, mangol@isee.org.
- 11-12 February 2010**: 10th Coal Operators' Conference 2010, University of Wollongong, NSW, Contact: University of Wollongong, Conference website: <http://www.uow.edu.au/conferences/2010.html>.
- 7-8 May 2010**: Bhubaneswar, IndiaMine Tech'10 Seminar on Mining Technology- Extraction, Beneficiation for Safe & Sustainable Development. Chairman of the Organising Committee Prof. Y.V.Rao, Director, NIT (Warangal) & Emiretus Council Member, The IM&EJ Convener Prof. S. Jayanthu, Head, Deptt. Of Mining Engg., NIT, Rourkela & Principal Consulting Editor, The IM&EJ Co-Convenor D. Satyanarayana Conference Secretary S. K. Mahanta, Editor The IM&E Journal Important Dates Submission of Abstracts in 500 words: 15th October 2009, Final Communication of Selected papers: 10th November 2009, Final Submission of papers: 10th Feb. 2010. Organised by The Indian Mining & Engineering Journal & The IME Journal Readers' Forum. For details please contact: i.me.journal@hotmail.com or sjayanthu@rediffmail.com.
- 23-24 June 2010**: AusIMM International Uranium Conference 2010, Adelaide, SA Contact: The AusIMM Events Department; Telephone: +61 3 9662 3166; Facsimile: +61 3 9662 3662.
- 06-10 September 2010**: XXV International Mineral Processing Congress 2010, Brishbane, QLD. Contact: Alison McKenzie; Telephone: +61 3 9658 6123; Facsimile: +61 3 9662 3662, Conference Website: <http://www.impc2010.org/>

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Please mail to the attention of **Dr. Gurdeep Singh**, The Co-ordinator, ENVIS Centre and Professor & Head,
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**Glimpses of Elocution Competition on ‘Climate Change and Energy Options’
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From:
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