ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

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IN THIS ISSUE

President ISEB's New Year Message

It is a matter of great pride and satisfaction that NBRI-based International Society of Environmental Botanists has completed 17 years of its existence. It was founded on 3rd December 1994 under the guidance and inspiration of Dr. P.V. Sane, the then Director of NBRI, who was also its first President. Since ISEB was founded at NBRI where it was protected and nurtured all these years, Dr. R.A. Mashelkar, former Director-General of CSIR aptly described it as a "useful offshoot of CSIR's National Botanical Research Institute, Lucknow". From a small 28 member Scientific Society, ISEB's impact and influence is felt now far and wide with nearly 400 members in all corners of India as well as several foreign countries like U.K, U.S.A, Spain, Canada, Bangladesh & Nepal.

Four International Conferences on Plants and Environmental Pollution (ICPEP) were jointly organized by ISEB and NBRI during 1996, 2002, 2005 & 2010 at CSIR- National Botanical Research Institute, Lucknow. Hundreds of delegates from all corners of India and over 160 distinguished scientists from 45 other countries participated in these highly successful international conferences. Besides several government ministries and departments, scientific academies, international organizations like UNESCO, UNEP, TWAS, IUBS, COSTED, NAM S&T Center, AusAID and Indo-U.S. Science & Technology Forum also sponsored and enthusiastically supported these conferences.

ISEB maintains a highly informative and educative website which has become extremely popular in different parts of the world and, during the past three years it has been visited /accessed by nearly 32,000 individuals from 135 countries across the globe.

With an aim to bring latest and complex scientific reports and researches and new findings on plant and environmental sciences to the reach of non-specialists, ISEB is publishing a quarterly newsletter *Environews* since January 1995. This highly educative an informative scientific news magazine has a global reach and a number of highly distinguished environmental and plant scientists have been regularly contributing articles in *Environews*. We have recently received requests from scientists in Byelorussia and Estonia for translating it from cover to cover in their respective languages on a regular basis. The present issue of *Environews* is the first issue of 2012 and with this, 69 issues have been released without a single interruption.

During the past seventeen years, ISEB organized a wide spectrum of activities including environmental awareness, educational and training programs, lectures, debates, demonstration, film shows, art and poster competitions at schools, colleges, urban slums and primary schools, community health centers etc. in rural and peri-urban areas.

On behalf of ISEB, and on my own behalf, I wish to extend my warmest greetings and best wishes to all members of ISEB and readers of Environews for the New Year 2012.

Chandra Shekhar Nautiyal
President ISEB & Director NBRI

Happy New Year 2012

President and Members of the Executive of International Society of Environmental Botanists wish a Very Happy and Prosperous **New Year** to all Members of ISEB and readers of ENVIRONEWS.

With this issue,

Environews enters the eighteenth year of its publication

Dr. Chandra Shekhar Nautiyal honoured with VIGYAN GAURAV SAMMAN

Dr. Chandra Shekhar Nautiyal, Director of CSIR-National Botanical Research Institute (CSIR-NBRI), Lucknow has been honoured with 'Vigyan Gaurav Samman' for the year 2010-11 by Uttar Pradesh state minister for science and technology Abdul Mannan at a function organised at Sir CV Raman auditorium here on November 29, 2011. The highest scientific award of the Uttar Pradesh has been instituted with an amount of Rs 1 lakh, a memento and a certificate of appreciation to recognize and reward scientists with outstanding track record in biological sciences and a deep commitment to find innovative solutions to major problems related to life sciences and biotechnology for the state of Uttar Pradesh. This award is conferred on Dr. Nautiyal, for his eminence and contributions in the field of biotechnology for enhancing the yield of plants that maximises the economic, environmental and societal benefits to the people of Uttar Pradesh. Working along with Department of Agriculture, U.P. Government Dr. Nautiyal's bio-inoculant consisting of rhizosphere competent stress tolerant plant growth promoting microbes since 2004 have covered over 3.7 crore hectares of agricultural land resulting into chemical fertilizers saved 17,530 tonnes, chemical fertilisers cost saved Rs. 153 crore; crop yield increase of 25 ± 5% resulting into enhanced farmer income of about Rs. 932 crore, and the area is increasing progressively, each year. The Department of Agriculture, U.P. Government has 17 laboratories all over Uttar Pradesh, which use the technologies to manufacture bio-fertilisers and, the demand is going up, given the awareness programmes that department runs at block level and training imparted by CSIR-NBRI to farmers of Uttar Pradesh.

Dr. Nautiyal joined NBRI in February 1994, after spending about 10 years in Canada and USA working on various positions ranging from Post Doctoral Fellow to Production Manager in a Biotechnology Company in Boston, USA. His research interests include area of fundamental and applied aspects of Plant-Microbe Interactions and relate to elucidation of relationships between microbial populations and environmental stresses, working out the intricacies of relationship between microbes and plants, and utilizing the knowledge base thus developed for enhancing the yield of plants through transfer of commercially exploitable technologies for its further dissemination among farmers, for the development of sustainable management of soil fertility and crop production that so desperately need to be protected. Major spin-off of his contributions has been several patents, publications and a utilization of these technologies by several biotechnology companies nationally and internationally. Dr. Nautiyal has been bestowed with 5 National awards viz., 'TATA Innovation Fellow' by the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India; Industrial Medal Award of the Biotech Research Society of India; The Biotech Product and Process Development and Commercialization Award, DBT; Vigyan Bharati Rashtriya Puraskar, and All India Biotech Association Award, for his outstanding research contributions. He is a Fellow of ***The National Academy of Sciences, India*** and Fellow of ***National Academy of Agricultural Sciences***. Dr. Nautiyal's future ***vision*** is to provide best-of-scientific solutions for our country's need based oriented research in the area of agriculture biotechnology, by adopting an appropriate mix that suits its needs and resources to improve plant stress tolerance and yield production.

Dr. C.S. Nautiyal, President ISEB (left), is being honoured with the "VIGYAN GAURAV" by Hon'ble Abdul Mannan, State Minister for Science & Technology, U.P.

LETTERS

Today, I received a copy of "ENVIRONEWS" (Vol 17 NO. 4, Oct.2011) and read the article entitled "Lichens - a potential organism for sustainable agriculture". The article impressed me much and I feel pleasure to inform you that this article has been proposed by me to be included as one of the topics in our university (Sardar Patel University) syllabus of adaptive biology of third year B.Sc. Botany 2012. I believe that this will be accepted by the Board of studies.

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Late Prof. H. S. Srivastava, who happened to be a member of the First Executive of ISEB, had contributed very significantly through his research and teaching of 'Environmental Plant Biology' during his illuminative career. Prof. Srivastava had initiated an International Journal '*Physiology & Molecular Biology of Plants*' (www.springerlink.com/pmbp) which is now in its 17th year of publication and has grown its reach to over 7,000 institutions spread globally through Springer Marketing Network. A Society namely, *Professor H. S. Srivastava Foundation for Science and Society* (PHSSFSS) (www.phssfoundation.org.in) has been established in the year 2002 soon after his untimely demise to commemorate and to keep Prof. Srivastava's initiatives and mission continue.

We, on behalf of PHSSFSS, propose to honour a Scientist during your periodic conferences (ICPEP) through your Society (International Society Environmental Botanists). The Scientist will be honoured for his outstanding research contributions either of the following areas:

Nitrogen, Environment & Plant;
Air Pollution & Climate Change

We would appreciate if a representative of our Foundation is associated with the selection process of awardees by ISEB. To facilitate the above referred award, one time grant amounting to Rs one lakh may be handed over by the Foundation to ISEB, once our proposal is accepted. During your ICPEP Conference, one technical session relevant to Prof. Srivastava's area of interest may also be dedicated.

Looking forward for a positive response from your side soon.

Rana P Singh
Secretary, PHSS Foundation
BBA University, Lucknow, **India**
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Mohammad Yunus
President, PHSS Foundation
BBA University, Lucknow, **India**
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After a three week trip, I just returned from Mexico. I was an invited speaker at a conference on "Science, Technology and Innovation", along with six Nobel Prize winners in Physics, Chemistry, Medicine and Economics. I also taught a course there. Nevertheless, if I do any writing for Environews, it will have to be in the next 4 days.

Sagar Krupa
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WELCOME NEW MEMBERS

Patron Member

Prof. P.K. Seth (F.N.A) is the Founder and Chief Executive Officer, Biotech Park, Lucknow. Earlier he was Director CSIR-IITR, Lucknow
<ceo.biotech@gmail.com>

Life Members

Ms. Preeti Sonkar is Life member of ISEB She completed her M.Phil on the Topic Assessment of water quality of Atiyatal of Jhansi city(u.p.)" Presently she is pursuing her Ph.D.
<preetisonkar1@gmail.com>

Dr. Ashok Kumar Vishwakarma is an Associate professor in V.P. & R.P.T.P Science College at Anand, Gujarat
<ashok151259@gmail.com>

Ms. Richa Dave is a Lecturer at Amity University, Noida. She is also pursuing for her Ph.D. degree.
<richadave11@gmail.com>, <rdave@amity.edu>

NEWS FLASH

Dr. Muhammad Iqbal, Professor in the Department of Botany, Hamdard University and a Senior Executive Councillor of ISEB has been conferred upon the prestigious "Vigyan Gaurav Samman" (2010-2011) by the Council of Science and Technology, Government of Uttar Pradesh for his outstanding contributions to scientific research and learning.

Dr. S.K. Raj Chief Scientist NBRI has been honoured by "Vigyan Ratna" Award 2010-2011 from Uttar Pradesh Science and Technology (UPCS&T), Lucknow; for his major scientific contributions in the area of Plant Virology and Biotechnology specially for identification and characterization of several plant viruses, development of virus diagnostics and virus resistant transgenic plants for protection of floricultural and horticultural crop plants by viral diseases.

Prof R.K. Kohli, Department of Botany, Punjab University, Chandigarh and a Life Member of ISEB has been elected as a Fellow of the Indian National Science Academy, New Delhi for his outstanding researches in the field of physiological ecology. He has elegantly elucidated the impact of allelopathy and plant invasion on the diversity of native species. His studies have opened up new vistas in weed management research.

Dr. R.D. Tripathi, Senior Principal Scientist, Plant Ecology and Environmental Science Division, National Botanical Research Institute and a senior Executive Councillor of ISEB has been elected as a Fellow of National Academy of Sciences Allahabad. Dr. Tripathi has made outstanding research contributions on various aspects of metal/metalloid phytoremediation and detoxification with a special emphasis on arsenic metabolism. He is involved in understanding arsenic metabolism in plants and in identification of contrasting arsenic accumulating rice genotypes.

DISTINGUISHED VISITORS TO ISEB OFFICE

Prof Arun Goyal President & Chief Executive Officer, Indo-US Foundation for Research Education & Environment, Department of Biological Sciences, East Tennessee State University, Johnson City TN, U.S.A

<arungoyal2010@gmail.com>

Prof. Muhammad Iqbal, Department of Botany, Hamdard Univ., New Delhi.

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Report On Workshop Entitled "Methods & Approaches In Plant Systematics" held at CSIR-NBRI during 5th – 14th December 2011

After the Rio Convention on biodiversity the importance of taxonomists is being felt more and more. Taxonomists are expected to play a much more vital role not only in inventorization and flora writing but also in contributing to a greater extent to the conservation and sustainable use of biodiversity in the country. To equip ourselves to face the big challenge ahead, capacity building in Taxonomy is most essential and hence, a workshop was organised on the methods and approaches in plant systematic during 5-14 December 2011 at CSIR-NBRI, Lucknow.

Being treated as a conservative subject, taxonomy has received a kind of apathy and step motherly treatment in the past which resulted into the total decline of trained manpower. Realizing this grave situation, different government organizations have now identified Taxonomy as a thrust area and steps are being taken to generate trained manpower in the subject.

The first circular about the organization of this workshop was flashed on NBRI institute website in August 2011. Different Universities, Colleges and Organizations located in remote areas were also informed through surface mail. We received an overwhelming response from more than 250 applicants from different states of the country.

Based on the criteria that candidates representing remote areas with less exposure to taxonomic research or candidates who have just initiated or will be initiating taxonomical research, teachers teaching botany-plant taxonomy in colleges/universities or candidates carrying out plant-based research involving taxonomy, and foresters/government officers working in forestry and planning, 35 candidates, were selected. Out of these, 35 candidates were selected. Out of these 35 selected candidates,11 were females and 24 were males representing 26 states, particularly from remote areas of Chattishgarh, Jharkhnad, Himachal Pradesh and Uttarakhand. A total of 42 lectures were delivered together with 6 practicals by experts in the area of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Angiosperms,

Gymnosperms, as well as molecular systematics.

The workshop was targeted mainly towards young research scholars, teachers working at various institutions, colleges and universities. Fresh M. Sc. students with interest to carryout taxonomy-based researches were also encouraged. In order to make the course more interesting, apart from taxonomy its different applied aspects were also as given below:

- Collection, preservation and identification techniques in algae, fungi, lichens, bryophytes, pteridophytes and gymnosperms. Herbarium techniques and curation of plants
- Importance and methods in chemotaxonomy, numerical taxonomy, cytotaxonomy Molecular taxonomy, phylogeny and barcoding of plants
- International code for Botanical Nomenclature, Botanical keys, floras and revisions, species and population concept
- Palynology, reproductive biology, Phytogeography and global information system
- Ethnobotany, Bioprospection, Pollution monitoring and climate change studies with plants
- Garden plants and landscaping, Agronomy and Forestry
- Remote sensing in study of diversity

A plant collection trip to Banthra Research Station and Botanical garden of NBRI were organised to provide the participants "hands on training" on various group of plants, knowledge to collect field observations, processing and preservation. The excursion benefited the participants in identification of some common plant groups in field itself.

Through this workshop while classical taxonomists got an exposure to the new horizons of taxonomy, the experimental taxonomists got exposed to certain classical aspects of taxonomy dealing with the microbes, Fungi, Lichens, Algae, Bryophytes, Pteriophytes, Gymnosperms and Angiosperms.

If this Workshop results in generating even 5 'real' taxonomists (if not more) who can appreciate both the classical side as well as the experimental side of taxonomy, we can say with confidence that the workshop at CSIR-NBRI has served its purpose. The organising committee is grateful to the Director General, Council of Scientific and Industrial Research, New Delhi for the generous support for organising this workshop.

EARTH'S DYNAMIC HISTORY OF CO_2 A FASCINATING AND SURPRISING TALE

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There is an old saying; "*The Whole is greater than the sum of the parts*". We cannot have complete faith in the ability of any computer models to predict future behavior of any natural system - especially a system as complex as that for the whole planet! So we have a lot more to learn and to study about complexity of ecosystems, climate, and their computer models before we get too emotional about the "Greenhouse effect. Any type of system from the micro- atoms to the macro- galaxies in the Universe are self-organizing and self-regulating, relating to one another, where we can find clues of the past events inscribed on the stones as fossils or in other natural archives. This enlightens us about the future patterns and predictability of global climatic change. Scientists have enormous data which enable us to identify and have a better understanding of the present and possible future global weather by looking at the planet's weather through geological time.

There are several scars of cataclysmic events that our planet Earth has experienced in the past before man arrived. No doubt man has evolved our planet into the present Eden where only handful of population is concerned for it and the rest are busy enjoying the heavenly gifts on this Earth. The several jolts to the Earth in the past have removed 90% of the species that have ever existed. It is very hard to say about the precise reason which was responsible to set the catastrophic events but surely created a disbalance in the level of the carbon dioxide content in the air throughout the Earth's geologic time. Long-term reconstructions of atmospheric CO_2 levels going back in time show that 500 million years ago atmospheric CO_2 was some 20 times higher than present values. Some 200 million years ago this level dropped and then rose to 4-5 times of present levels--a period that saw the rise of giant fern forests--and then continued a slow decline until recent pre-industrial time. Carbon dioxide (CO_2) forms approximately 0.04% of the Earth's atmosphere. It is essential for photosynthesis in plants and other photoautotrophs, and is also a prominent greenhouse gas.

Global carbon dioxide emissions

Carbon dioxide is released to the atmosphere by a variety of natural sources, and over 95% of total CO_2 emissions would occur even if humans were not present on Earth. For example, the natural decay of organic matter in forests and grasslands, such as dead trees, results in the release of about 220 gigatonnes of carbon dioxide every year. This carbon dioxide alone is over 8 times the amount emitted by humans. The increasing measured fraction of CO_2 in the atmosphere over the last 100 years implies that the level of equilibrium between sources and sinks of CO_2 is rising. **Biological**

consequences of earth's climatic change through geological periods (macro change) - the age of fishes, age of amphibians, age of reptiles - resulted in high magnitude changes and widespread extinctions (with some carry over remnants). These catastrophic events caused populations of individual species to shrink or expand inducing changes in the food chain and creating ripple effect in an ecosystem which is called 'tropic cascading'.

Relationships between the Ocean and Carbon:

Oceans are the 'Carbon Bank' where most of the Earth's carbon including CO_2 is stored. It has been that way for millions of years with contributions of both organic and inorganic sources in the oceans, from the atmospheric gas exchanges, and from fluvial sources through rivers and other erosion methods on land of terrestrial organic and inorganic materials. Tectonic movement and undersea volcanic action also release CO_2 to the atmosphere in varying amounts so that there has been periods during the earth's geological time scale when the ocean released more CO_2 into the atmosphere than it removed. The removal and storage of atmospheric CO_2 by the oceans is done by biological means involving the total oceanic food chain (waste materials and dead organisms accumulating on the ocean floor) and the structural recruitment by calcifying organisms (coral reefs and limestone beds built up by corals, coraline algae, and other plants). Presently the ocean releases less CO_2 back into the atmosphere than it removes during the 'carbon cycle' because it 'locks' a percentage of the CO_2 into limestone and ocean floor sediments. The CO_2 rises to the ocean's surface for atmospheric exchange through geochemical methods such as tectonic and volcanic activity, up wellings of deep ocean currents bring dissolved sediments to the surface and limestone erosion.

Man, Climate & the Carbon dioxide

Man's ancestors appeared at least 2 million years ago. There has been no perceptible change in man's physiology in 40,000 years - so why didn't agriculture and civilization begin 40,000 years ago? The Earth's climate was very erratic (during this 40,000 year period) up to 10,000 years ago - when the last ice age ended. After that last ice age (10,000 years ago) the weather went from erratic (normal) to stable (abnormal) and helped foster the birth of civilization through predictable climate (regular seasonal cycles of temperature change and wet/dry periods) best described as the 'steady-state environment'. This abnormal 'Steady-State' climate has made possible the progression of agriculture, which resulted in stable human societies and a greatly accelerated growth in the human population. Over the past 50 years, man's effect on Earth has been very detrimental, directly and indirectly - due to the huge growth in man's population and technology. We have the knowledge to reverse the negative impact we have made on reefs and oceans. We have the knowledge to reduce CO_2 in the atmosphere by reduction of emissions and enhancement of biological fixing (capture) methods. It is just a matter of time and the Earth's 'hot-cold' and 'wet-dry' macro-climatic cycles will take us out of the present 'steady-state' environment we have experienced over this short geological period of the past 10,000 years.

Similarities with our Present World Average global temperatures in the **Early Carboniferous Period** were **hot**- approximately **20° C (68° F)**. However, cooling during the Middle Carboniferous reduced average global temperatures to about **12° C (54° F)**. Similarly, atmospheric concentrations of **carbon dioxide** (CO_2) in the **Early Carboniferous Period** were approximately **1500 ppm** (parts per million), but by the **Middle Carboniferous** had declined to about **350 ppm** -- comparable to average CO_2 concentrations today!

Earth's atmosphere today contains about 380 ppm CO_2 (0.038%). Compared to former geologic times, our **present** atmosphere, like the **Late Carboniferous** atmosphere, is **CO_2 impoverished!** In the last 600 million years of Earth's history only the **Carboniferous Period** and our present age, the **Quaternary Period,** have witnessed CO2 levels less than **400 ppm**. There has historically been much more CO_2 in our atmosphere than which exists today. For example, during the **Jurassic Period** (200 mya), average CO_2 concentrations were about **1800 ppm** or about 4.7 times higher than today. The highest concentrations of CO_2 during all of the Paleozoic Era occurred during the **Cambrian Period**, nearly **7000 ppm** -- about 18 times higher than today.

The **Carboniferous Period** and the **Ordovician Period** were the only geological periods during the Paleozoic Era when **global temperatures were as low as they are today**. To the consternation of global warming proponents, the Late Ordovician Period was also an **Ice Age** while at the same time CO_2 concentrations then were nearly 12 times higher than today-- **4400 ppm**. According to greenhouse theory, Earth should have been exceedingly hot. Instead, global temperatures were no warmer than today. Clearly, other factors besides atmospheric carbon influence earth temperatures and global warming.

Scientists are busy developing future technology that may greatly be important to our adaptation to climatic change rather than its prevention. These survival technologies to adapt to climatic changes will help the present day species to sustain on this changing earth and would put a strong option before mankind to accommodate in Mars and other planets with the advance technology for sustenance.

IMPACT OF CLIMATE CHANGE ON MOUNTAIN ECOSYSTEMS OF INDIA: SPECIAL REFERENCE TO THE EASTERN HIMALAYAS

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India ranks 10th in the list of most forested nations in the world with 76.87 million ha of forest and tree cover. Like other forests of the world, our forests also provide critical ecosystem goods and services. However, the significant role of forests in carbon storage and sequestration has increased their importance manifold and brought them to the centre-stage of climate change mitigation strategies. India's forest and tree cover accounts for about23.4% of the total geographical area of the country. Over the past decades, national policies of India aimed at conservation and sustainable management of forests have transformed India's forests into a net sink of CO_2.

Why should India be concerned about climate change?

Indians should be concerned about climate change since this phenomenon might have substantial adverse impacts on them. Not all possible consequences of climate change are yet fully understood, but the three main 'categories' of impacts are those on agriculture, sea level rise leading to submergence of coastal areas, as well as increased frequency of extreme events. Each of these pose serious threats to India. However, these are long term issues. The overriding immediate concern for India should be the fast pace at which negotiations are taking place on the climate front. India's main energy resource is coal. With the threat of climate change, India is called upon to change its energy strategy based on coal, its most abundant resource, and to use other energy sources (e.g. oil, gas, renewable and nuclear energy) instead, which may turn out to be expensive.

Mountain biodiversity and climate change

Mountains are amongst the most vulnerable and hazardous environments in the world: they also harbour rich repositories of biodiversity. Some of the world's most threatened and endemic species are found in mountain areas. Mountains have been recognised as important ecosystems by the Convention on Biological Diversity (CBD) and its special programme on 'mountain biodiversity' which aims to reduce the loss of biological diversity in the mountains at global, regional, and national levels. There are enormous impediments to this because of various drivers of global change, including climate change (Nogues-Bravo et al. 2007). In the context of climate change, mountains could suffer wide-ranging environmental and socio-economic impacts, for example on the hydrological cycle, and this in turn would alter the distribution, seasonality, and amount of precipitation and result in changes in river runoff, ultimately affecting not only mountain watersheds but also the lowlands below (Beniston 2003). There is an evident inter-connectedness between climate change and biodiversity, not just in the impacts of climate change on biodiversity but also in concomitant changes occurring in the carbon and water cycles. The Millennium Ecosystem Assessment (MEA) identified climate change as one of the major drivers having adverse affects on biodiversity and associated goods and services (MEA 2005). Studies on climate change in mountain areas are incomplete and scattered (IPCC 2007, Nogues-Bravo et al. 2007),although certain studies from the Hindu Kush-Himalayas (Shrestha et al. 1999) do indicate that climate change has an undesirable impact on Himalayan biodiversity and its services.

The Eastern Himalayas

The Eastern Himalayas (EH hereafter) are counted in the 'crisis ecoregions'; 'biodiversity hotspots'; 'endemic bird areas'; 'mega diversity countries'; and 'global 200 ecoregions' (Brooks et al. 2006).. As yet, there are no concrete studies assessing the magnitude of future warming and its impact on biological resources in the EH, although considerable efforts have been undertaken to conserve the region's unique biodiversity. Three bio geographical realms meet in the EH Region; namely, the Indo-Malayan, Palaearctic, and Sino-Japanese, and it contains parts of three of 34 global biodiversity hotspots, accounting for 39% of the Himalayan hotspot, 8% of the Indo-Burma hotspot, and 13% of the Mountains of Southwest China hotspot. The complex topography and extreme altitudinal gradients from less than 300 m (tropical lowlands) to more than 8,000 m (high mountains) have led to a variety of vegetation patterns.

Climate-Change Scenario, Threats, Vulnerabilities and Potential Impacts on Biodiversity Climate-change trends and projections

The Himalayan region, including the Tibetan Plateau, has shown consistent warming trends during the past 100 years (Yao et al. 2006). Current knowledge of the climatic characteristics of the EH region, however, is limited by both paucity of observation and the insufficient theoretical attention given to the complex interaction of spatial scales in weather and climate phenomena in mountain areas. The analysis of spatial distribution of annual and seasonal temperature trends (Shrestha and Devkota 2010) shows that annual mean temperature is increasing at the rate of 0.01°C/yr or more. Though warming in the winter is much greater and more widespread in area, the warming trend

has been greatest during the post-monsoon season and at high elevations. An analysis shows progressively greater warming rates with increasing elevation.

The past trend and change projections suggest that temperatures will continue to rise and rainfall patterns will become more variable, with both localised increases and decreases. The figures for the EH region do not present a drastic deviation from the IPCC outcomes for South Asia; they reinforce the scientific basis for the contention that the EH region is undergoing a warming trend (Shrestha and Devkota 2010).

The analysis of the region suggests the following:

- The Eastern Himalayas are experiencing widespread warming and the rate is generally greater than 0.01°C per year.
- Using usual seasonal dichotomies, the highest rates of warming are in winter and the lowest, or even cooling, are in summer.
- There is progressively more warming with elevation, with areas higher than 4,000 m experiencing the greatest warming rates.

Threats to and vulnerability of biodiversity

Assessing the consequences of climate change in the EH region is indeed a big challenge mainly due to limited data availability, uncertainties associated with the climate scenarios, and the existence of non-linear feedbacks between impacts. Nevertheless, through various review and consultative processes we have focused on some thematic indicators such as land-use and land-cover change, critical habitats and eco regions, bioclimatic zones and phenology, agro-biodiversity, and threatened and endemic species that throw light on the potential impacts and vulnerabilities of biological diversity due to climate change.

Land-use and land-cover changes

Changes in land cover (biophysical attributes of the earth's surface) and land use (human purpose or intent applied to these attributes) are among the most important drivers of climate change as they relate to carbon sequestration and nitrogen deposition (Lal 2004; Foley et al. 2005). Land-use and land-cover changes contribute to local and regional climate changes (Chase et al. 1999) and global climate warming (Penner et al. 1994; Houghton et al. 1999); and they have a direct impact on biodiversity (Chapin et al. 2000), influencing the reduction in species' diversity (Franco et al. 2006). However, there is little documentation on changes over time (Khan et al. 1997). Land-use change from forest to other usages in the EH has been quite conspicuous in the last few decades, causing depletion of natural resources in the Himalayas (Singh and Singh 1992). Shankar Raman (2001) revealed that the North Eastern states of India lost 378 sq.km. of forest due to human-induced activities between 1989 and 1991; 488 sq.km. between 1991 and 1993; and 175 sq.km. between 1993 and 1995. Other information from the North Eastern Indian states from 1991-2005 shows an increase in forest cover in Assam, Meghalaya and Tripura and either mixed or decreasing trends elsewhere. The gross forest cover of these seven states increased by 1,250 sq.km. (0.7%) in total between 1991 and 2001, and 19 sq.km. (0.01%) between 2003 and 2005.

An analysis made of overall land cover in the 1970s and 2000s, based on six broad categories, using satellite images revealed that land-cover types in the EH changed significantly over 25 years between the1970s and 2000s The data revealed a substantial increase of 17,394 sq.km. (40.4%) of shrub land, which accounts for 3.3% of the total area of the EH. Forest cover decreased by 9,314 sq.km (3.4% of the same class and 1.8% of the whole EH) and grassland decreased by 3,261 sq.km (8.2%), accounting for 0.6% of the EH. Cultivated area changed by only 594 sq.km. (0.5% of the same class and 0.1% of the EH). The area of denuded and uncultivated land increased by 1,369 sq.km (6.1%), accounting for 0.3% of the EH. No significant change took place in water bodies which show a decrease of 10 sq.km. Snow cover decreased by 6,756 sq.km. (24.6% of the same class and 1.3% of the EH).

Vulnerable habitats and ecoregions

The EH region is known for diverse habitats and eco-regions that are subject to a high level of human-induced threats (Myers et al. 2000; CEPF 2005; 2007). Conservationists from across the globe have realized that the prevailing climate change trend and projections could mean that there will be substantial changes in critical habitats and the species therein because of the limited scope for expansion as the habitats outside protected areas are subject to intense fragmentation (Pounds et al. 1999; Wilson et al. 2007). Among the 25 eco regions, 17 protected area complexes, and 41 candidate priority areas in the EH are many which are extremely important for biodiversity conservation (WWF and ICIMOD 2001). Among the eco regions, Eastern Himalayan broadleaved forests, Brahmaputra Valley semi-evergreen forests, and Himalayan subtropical pine forests have the greatest conservation values because of the number of mammals, birds, and plants found in them (WWF and ICIMOD 2001).

Bioclimatic zones and phenology

Although there is no strict compartmentalization of vegetation along altitudinal gradients in the EH region, elevation has important implications for its ecology, evolution, physiology, and conservation and is highly relevant to species' composition and phenology patterns (Chettri et al. 2001; Carpenter 2005). As a result of microclimatic variations, most organisms found in the EH are confined to specific habitats such as highland pastures, forests, and so on. This is a special risk factor for highland species that are sensitive to climate change (Pounds et al. 1999) and more likely to be at risk of extinction. Globally, there is evidence of the shift of species towards the north in latitude (Hickling et al. 2006) or higher elevations (Wilson et al.

2007), especially for species in the transition zone between subalpine and alpine which are more vulnerable to climate change as they have limited scope for movement. Analyses for the EH are few and limited to certain pockets of areas (Carpenter 2005). Observations have been made about the change in events related to plant and animal phenology and also to shifting of tree lines and encroachment of woody vegetation into alpine meadows. Phenological changes, such as early budding or flowering and ripening of fruits in plants, and hibernation, migration, and breeding in animals, could have adverse impacts on pollination patterns. Consequently, this may have an impact on the population of pollinators, leading to changes in ecosystem productivity and species' composition in high-altitude habitats (Thuiller et al. 2008).

Recommendations and Future Strategies

While acknowledging the significant diversity of biological resources in the EH and the existence of a fair understanding of the important drivers of change, it is recognized that concerted efforts to monitor and research the impacts of climate change on biodiversity in the EH region are essential. An enabling policy environment is essential to support and strengthen community efforts to cope with change. Documentation and assessments indicate the need for policy dialogue focusing on areas identified. A clear concern was the multiplicity of policy actors governing natural resource management and livelihood support and the need for convergence of different (often conflicting) policies under one forum for ease of implementation. There is a critical role for scientific institutions in regard to policy formulation concerning natural resource management, livelihood support, and climate change. Policy makers require authentic data inputs and, more often than not, these are not available or not in a comprehensible form. Scientific institutions need to fill this gap so that policy making can be based on scientific findings.

ORGANIC FARMING AND FOOD SECURITY

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Agriculture in India is one of the most important sectors of its economy. It provides livelihood to almost 2/3rd of the work force in the country and accounts for 18% of India's GDP. Agriculture plays a vital role in the overall socio-ecomic development of India. Large scale use of inputs, both organic and inorganic has been a common sight in many of the farming situation in the past several decades. In recent times, the concept of organic farming is being forcefully projected, as the only method for sustaining agricultural production in the country.

Organic farming is a form of agriculture which avoids or largely excludes the use of synthetic fertilizer and pesticides, plant growth regulators and livestock feed additives. Organic farming relies on crop rotation, crop residues animal manures, biofertilizer and mechanical cultivation to maintain soil productivity and tilth to supply plant nutrients to control weeds, insect and other pests.

At present, there is a gap of nearly 10 million tonnes between annual addition and removal of nutrients by crops which are met by mining materials from soil. A negative balance of about 8 m.t. of NPK is foreseen in 2020, even if we continue to use chemical fertilizer, maintaining present growth rates of the production and consumption. It is seen that only about 20-30% nutrient needs of Indian agriculture can be met by utilizing organic sources.

India's food situation is at a precarious level, as food production has not kept pace with the population growth in the recent years. A recent UNESCO report states that 305 million children die every year in India due to malnutrition. In this disturbing scenario, the need of the hour is to increase our agricultural productivity. Given the constraints of shrinking land area, drinking water resources, the only way is to increase the agricultural production i.e. crop yield per hectare through modern farming techniques and scientific inputs. With a growing population and precarious food situation, undue emphasis on "Organic farming" would put our national food security at a greater risk.

Crop productivity also declines under organic farming and the extent of decline depends on the crop type, farming system /practices. The cultivated area required to maintain the present level of food grain production in India, without using fertilizer will be more than Geographical area of the country.

In order to raise organic crops, massive quantities of farmyard manure or green manure would be required and for this we need to raise a large cattle population which need manure quantities of feed. All these will necessitate more area being brought under farming, even converting forest lands into farm lands.

Scientific inputs like hybrid seeds, synthetic fertilizer and pesticides have helped our first green revolution and the same will usher the country into the second' Green Revolution'. Integrated crop management with the balanced use of organic and inorganic inputs and sustainable use of natural resources will help us to move towards an "Ever green revolution " for the benefit of present and future mankind.

Saltwater, sewage used to grow trees in desert

Scientists in Israel are growing trees in the barren land of the Arava desert by using recycled sewage and salt water. The forest planted over the summer is soaking up excess carbon dioxide from the atmosphere and releasing beneficial oxygen. The environmentalists involved in the project hope that it wound not only help reduce humanity's carbon foot print but will also show how other nations could establish a local plant species on a piece of land thought unusable, to improve air quality. Once the trees grow up, they are also hoped to turn a renewable source of biofuel, reducing dependence on fossil fuels. India, central Asia and Africa in particular have large swathes of such land, including the sahara desert.

Shale gas exploration An environmental nightmare?

Energy companies in England are planning a huge increase in the number of drilling sites for shale gas, but environmentalists have expressed the view that the controversial fuel is unsafe. The company responsible for active shale gas drilling recently claimed a gigantic 200 trillion cubic-foot find at its sites near Blackpool, Lancaster, the biggest discovery in Europe.

Supporters, of shale gas exploration claim that it could be a "game change" for Britain, resorting its self-sufficiency in energy, raising billions in taxes and cutting CO_2 emission by displacing higher emitting fossil fuels such as coal. They claim Britain could follow the United States, where shale gas production has reduced energy prices

Opponents say shale gas will stop Britain meting its climate targets and condemn the controversial technique used to obtain the fuel, called" fracking", which invalues fracturing the shale rock with a high pressure mixture of water, sand and chemicals. The "Frack off" campaign group describes fracking as a nightmare causing toxic and radioactive water pollution; tap water can be set on fire, earthquakes and runaway climate change.

Source: Anderen Gilligan in The telegraph

Mercury poisoning

Toxics like mercury are slowly killing millions of individuals in different parts of the world. Blacksmith Institute has identified over 300 sites where concentrations of mercury exceed internationally recognized standards threaten local people. Artisanal small-scale gold mining (ASGM) operations account for 41% of all sites identified. The contamination stems from using the mercury to separate gold from ore.

Mecury is added to ore and sediments and binds to the gold, forming mercury-gold amalgam. This amalgam is then heated to burn off the mercury and leaves behind the gold. This process is dangerous and usually results in miners and their families inhaling the mercury that is lost in the process. What is not inhaled rises into the atmosphere and ends up in distant oceans and food chains.

The amount of mercury lost during the ASGM process can be reduced dramatically through the use of a simple and inexpensive mercury capture devise called a "retort'. A retort costs between $5-$10 and typically captures 95% or more of the mercury vapor during the heating process and condenses it back into its liquid form for reuse.

According to Blacksmith Institute estimates, almost 10,000,000 people in low and middle-income countries are at risk of mercury poisoning and the Institute Scientists are working with local partners to reduce that number and save lives

Source: Geoffrey Chorbajian Senior Director of Development Blacksmith Institute

Ozone hole remains over Antarctica

The Antarctic ozone hole reached its annual peak on September 12, 2011, stretching 10.05 million square miles, the ninth largest on record. Above the South Pole, the ozone readings dropped to 102 Dobson units, tied for the 10th lowest in the 26-year record.

The ozone layer helps protect the planet's surface from harmful ultraviolet radiation, NASA and NOAA use balloon-borne instruments, ground instruments, and satellites to monitor the annual South Pole ozone hole, global levels of ozone in the stratosphere, and the human made chemicals that contribute to ozone depletion.

The upper part of the atmosphere over the South Pole was colder than average this season and the cold air is one of the key ingredients for ozone destruction. Other key ingredients are ozone-depleting chemicals that remain in the atmosphere and the ice crystals on which ozone-depleting chemical reactions take place. Levels of most ozone-depleting chemicals in the atmosphere have been gradually declining since an international treaty to protect the ozone layer, the 1987 Montreal Protocol, was signed. That international treaty caused the phase out of ozone-depleting chemicals, then used widely in refrigeration, as solution and in aerosol spray cans. But many of these chemicals have long lifetime, remaining in the atmosphere for decades.

In August and September (spring in Antarctica), the sun begins rising again after several months of darkness. Circumpolar winds keep cold air trapped above the continent, and sunlight-sparked reactions involving ice clouds and human made chemicals begin eating away at the ozone.

Scientists around the world are looking for evidence that the ozone layer is beginning to heal, but this year's data from Antarctica do not hint at a turnaround.

*Source***:** Science Daily (Oct. 20, 2011)

Killer Cell Phones: Why Honey bees Are Dying Worldwide

In just the last ten years or so, the world's honeybee population has come down significantly. Suspected causes of the unprecedented global honeybee die off include pests, predators, disease, pesticide sprays, climate change, and mobile phones. However, there may be one single factor behind the reduction of honey bees' population.

To identify that factor we have to find out what on earth has changed so drastically in the last ten years that would cause billions of honeybees to perish? There has been no drastic change in nature or the global

environment that can adequately explain this occurrence. Honeybee pests and predators have been around for centuries, their populations have not exploded recently. Diseases have similarly come and gone. Our climate has been changing recently, but not so drastically or in such a short time period as to explain the mass disappearance of a single insect species. Thus we can reasonably rule out any natural causes for the world's honeybee population decline, and look for the culprit among possible artificial (i.e man made) causes. Although pesticide sprays have been in use for decades, their worldwide use has not increased dramatically in recent years.

The only other suspected manmade cause of the honeybees' death is mobile phones (i.e. cell phones)-or more precisely, the radio waves emitted by cell phones. During the last ten years the world's use of cellular telephones has exploded dramatically, and an ever-growing global network of transmitter towers established now continuously fills much of the Earth's air with a thick invisible web of electromagnetic radiation. Moreover, the negative effects of this artificial radiation on living organisms are already well known and documented by scientists.

Nothing matches the worldwide decline in honeybee population like the worldwide increase in cellular telephone transmissions during the same time frame.

Thus, it is reasonable to draw a link between the two and theorize that the former is the MAIN CAUSE of the latter. Researchers at Panjab University in Chandigarh, India fitted cell phones to a beehive and activated them twice a day for 15 minutes each. Within three months, honey production had ceased, the queen laid half as many eggs, and the hive population had fallen significantly.

But the effect of mobile phone towers on bees is even more drastic than that of individual phones. A bee keeper in California for 40 years, explained how until numerous cell phone towers were constructed near his property, he had been collecting 100 gallons of honey a week. But as the use of cell phones expanded, all of his bees died within a few weeks until he discovered a small area near the base of the hill where there was no cell phone service. Once he moved his hives to that particular area, the bees once again began to thrive and reproduce. The radiation may be interfering with the bees' built-in navigational systems, disorienting them and preventing them from finding their way back to their hives, as many researchers think, or it may be killing them in a more direct fashion. It is clear that the radio waves from cell phones are lethal to bees. Honeybees play a critical role in the world's food chain: they pollinate 75 percent of all the crops consumed by humans. Thus the extinction of honeybees would precipitate a global food crisis of almost unthinkable proportions.

By Justin Soutar

Source: www.bestcareerbright.com

Recycling - A Boon to Mother Earth

Recycling is the process of collecting and then processing the discarded or waste materials collected for reuse. Hence, this is a method in which the material is used again and again than being thrown off. So the used products are used as raw materials in converting it into a new product. Owing to this, natural raw materials or resources of the earth don't go to extinction. If this product doesn't get decomposed, then it is present on the land as a garbage heap. This garbage heap is responsible for various serious ailments and infections.

The money that is spent on clearing this disposed waste is several times greater than a recycling procedure. Recycling will conserve resources from earth like water, wood and minerals. Almost every substance can be recycled. These include paper, plastics, metals, glass, oil and electronics. Newspapers, colored papers, magazines and printed papers can be recycled to a new paper. Glass and plastic bottles need one million years to get pedigreed whereas aluminum cans take around 200 years. The disposable diapers that the babies wear require a time of 500 years for degradation. In comparison to other objects, paper needs only five months to degrade.

Recycling paper can prevent environmental exploitation in many ways. Paper is manufactured by cutting the natural resource (trees), which increases the chances of soil erosion due to deforestation. Hence, paper should be recycled to save our trees from extinction. Recycling offers employment to people. School children should be included in this. This can be done by depositing the food waste as a natural fertilizer for plants inside their premises. As these food wastes get decomposed in three weeks, it acts as a fertilizer to the plant.

Michael Izi Rosenblit

Source: http://EzineArticles.com

CO_2 Emissions up 5.8% of last year

After the recession, carbon dioxide did a full swing, growing more than 5 per cent in 2010. This is the highest increase in the last two decades. Without accounting for the land use sector, global CO_2 emissions reached 33 billion tonnes, and 45 % increase since 1990, driven mostly by a 7.6% increase in coal consumption.

This means the world now uses coal for a third of its energy demand - the biggest share since 1970. Use of the fossil fuels soared too, with natural gas consumption increasing by 7% and oil consumption jumping by 3%.

The report shows that the growth of emissions was driven in parts by economic growth in China and India, with10% and 9% increase in 2010, respectively. While India's per capita emissions remain fairly low China's 6.8 tonnes per head per year already overtake large polluters such as France, Italy and Spain.

Source: Climate Action Network International/ Acid rain

Particles killing two million people

WHO estimates that more than two million people die every year from breathing in tiny particles present in indoor and outdoor air pollution. These tiny particles can cause heart disease, lung, cancer, asthma, and acute lower respiratory infection. This information is based on data from nearly 1100 cities across 91 countries.

WHO air quality guideline for PM10 is 20 micrograms per cubic meter ($\mu g/m^3$) as an annual average, but the data released shows that the average PM10 level in some cities has reached up to 30 $\mu g/m^3$. Average PM 10 levels in European cities range between 29 and 42 $\mu g/m^3$, the world average is 71 $\mu g/m^3$. The highest average PM10 levels are in the eastern Mediterranean region with a range of 137-142 $\mu g/m^3$, followed by Southeast Asia.

Source: ENDS Europe daily/ Acid rain

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