# ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

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## IN THIS ISSUE



**Call for Registration & Abstracts**

## THIRD INTERNATIONAL CONFERENCE ON PLANTS & ENVIRONMENTAL POLLUTION

**(ICPEP-3)**

**29 November – 2 December 2005**

**Lucknow (INDIA)**

*Organized by:*

International Society of Environmental Botanists &

National Botanical Research Institute, Lucknow, India

*Co-sponsored by:*

International Union of Biological Sciences

The Academy of Sciences for Developing World

United Nations Educational, Scientific & Cultural Organization

*Organizing Secretaries (ICPEP-3)*


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***Last date for Registration & Abstracts: 31st August, 2005***

- Informative news, views and popular articles/write-ups on current environmental researches/issues are invited for publication in ENVIRONEWS.
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- **E-mail** : isebnbrilko@satyam.net.in **Website** : http://www.geocities.com/isebindia/index.html

# LETTERS

Thanks for the Environews that you sent me, I really appreciated it. I´m looking for the date and instructions to submit abstracts on the ICPEP-3. By the way, it is a pleasure to contact you. I saw your book "Plant Responses under Environmental Stress". How can I apply for or where can I buy it? I´m a biologist, Master in Ecology and manager of Terrestrial Ecosystem Sector of Environmental Agency of São Paulo State (Brazil) and work on the effects of pollution on plants, air or soil pollution, ozone, fluoride, lead, chromium, and so on.

***Rodrigo Fialho***
*Mannager of Terrestrial Ecosystem Sector of CETESB*
*Environmental Agency of São Paulo State,*
*São Paulo 05459-900,* ***Brazil***
*E-mail: rodrigof@cetesb.sp.gov.br*

With much regret and deep sadness, I wish to inform you that it has been brought to my attention that Dr. Moire Wadleigh (University of Newfoundland, St. Johns, NF, Canada) passed away on November 3, 2004. As you know well, she and her husband were at ICPEP-2 in Lucknow in February 2002 and her paper from the Conference was published in the Special Issue of Environmental Pollution.

Although I do not know the details, for me it is difficult to accept the news, because just during the last year, I served as an external reviewer for Dr. Wadleigh's promotion to a Full Professor at her University. Dr. Wadleigh, in my mind was an excellent scientist and teacher and most importantly, a fine person. I truly enjoyed our discussions in Lucknow and was attempting to develop a scientific collaboration with her, prior to her untimely demise.

God has ways and reasons. What a sad ending for a rising scientist? , but, I hope she is in good hands.

***Prof. Sagar V. Krupa***
*University of Minnesota,*
*St. Paul, MN 55108,* ***U.S.A.***
*E-mail: krupa001@umn.edu*

Thank you for sending the electronic version of Environews, January 2005. Among other materials, it was especially interesting for me to read the article "Lichens in the changed Environment of Lucknow" by Dr. Upreti.

***Dr. Gregory Insarov***
*Institute of Global Climate and Ecology*
*20-b Glebovskaya Street, 107258 Moscow,* ***Russia***
*E-mail: insarov@lichenfield.com*

My colleague and I were pleased to see our article on" Scotobiology – The Biology of Darkness" in your latest newsletter. I have tried to get a copy and 'am willing to become a member for present & future issues. My request has been unanswered and am hoping you may be able to help.

Would you also be so kind to send the copy of the announcement to Dr. Bidwell, FRSC at his e. mail address: ts@ns.sympatico.ca . Professor Bidwell, the creator of the word "SCOTOBIOLOGY", is well known for his work on photosynthesis, development, metabolism and environmental physiology of plants. He taught for many years at Queen's University in Kingston, Ontario, Canada and is now Professor Emeritus.

***Peter L.E. Goering***
*Director, Muskoka Heritage Foundation (retired)*
*"Ecology of the Night" Symposium*
*c/o 12 Brendan Road, Toronto ON M4G 2X1,* ***Canada***
*Email: goeringp@sympatico.ca*

I wish to let you know that as a member of the International Advisory Committee, I have delivered via e-mail to more than 100 institutions and people of Argentina the attached information about ICPEP-3, to be held at Lucknow next November-December.

I am looking forward to present at the Conference a contribution, perhaps a lecture, dealing with the shift of vegetation and structure in the temperate, semi-arid zone of Argentina due to anthropogenic management. This is the subject in which have been working for the last twenty years. It is very much related to conservation, loss of biodiversity and land restoration.

It will be a matter of pleasure to get in contact with you once again. I hope I will get the financial support to visit once more the National Botanical Research Institute and Lucknow.

***Osvaldo A. Fernández***
*Consultant Professor*
*Agr. Eng. Univ. Buenos Aires)*
*CERZOS-CONICET*
*Bahia Blanca -* ***Argentina***
*E-mail: ofernan@criba.edu.ar*

As you know, Jamia Hamdard is one of the few institutions in the country, which focus specifically on environmental aspects in their teaching and research programmes. We also have a post-graduate teaching programme leading to the award of M.Sc. degree in Environmental Botany. We shall be pleased hosting a day-long satellite session of Third International Conference on

Plants and Environmental Pollution (ICPEP-3), in our campus if you kindly agree to it. We have a team of dedicated workers who may organize the show dexteriously and we also have adequate infrastructural facilities required for holding such an international meet.

Having heard from you in reply, I shall ask Prof. M. Iqbal, Head of Botany Department in this University to keep in touch with you and finalize the details of the programme.

***Siraj Hussain, I.A.S.***
*Vice-Chancellor*
*Jamia Hamdard (Hamdard University)*
*Hamdard Nagar, New Delhi-110062*
*E-mail: vice-chancellor@jamiahamdard.edu*

I congratulate you and your team for the commendable job of preparing the draft of the circular inviting registration and abstract. The entire package is superb. I have following suggestions on the draft:

1) The date for submission of registration form and abstract can be the same; 2) $O_3$ depletion can be stratospheric $O_3$ depletion; 3) Methane efflux can be replaced by methane emission; 4) Instead of increased UV-B, Enhanced UV-B may be used; 5) Heavy metal pollution may be kept as a separate topic; 6) Bioremediation may include three categories: (a) higher plants (b) lower plants (3) microorganisms.

***Prof. Madhoolika Agrawal***
Department of Botany,
Banaras Hindu University
Varanasi, India
*E-mail: madhoo@bhu.ac.in*

I commend you for a thorough and timely call for registration. I am attaching a proposed revision of the ICPEP-3 Circular in MS-Word. It contains a number of changes throughout in punctuation, style, format and, in some cases, content. I hope it will be helpful for you and the organizers. RTF is not all that common in the US and many other countries. I would strongly recommend accepting abstracts in MS-Word as well. It would be most helpful for many considering submissions.

One more inquiry. Is there a poster announcing the meeting? I would like to distribute some to several universities here that may be interested in the meeting. If so, could it be sent electronically? I could print out copies accordingly.

***Prof. R.F.E. Crang***
*University of Illinois, Urbana,* ***U.S.A.***
*r-crang@life.uiuc.edu*

I wanted some help in making Gauhati the fragrant city. I wanted to know about its viability analysis, species selection, zoning and how to ensure income generation for people. Idea is to involve people and also make the city green and fragrant. I am a DFO here and in a position to do a project. Also I would seek your kind help in letting me know other resource people for the endeavour.

***Hirdesh Mishra***
*hm@assamforest.org*

The International Union of Biological Sciences Secretariat is currently compiling a Calender of Events for 2005-2007. This is to be published in Biology International online and we hope to include as many events involving our members as possible. I would be extremely grateful if you would be so kind as to inform me of any forthcoming conferences, congresses, symposia, training courses, or other such events that involve your organization or institute. The publication of this information in Biology International online will help us at the IUBS Secretariat to keep up to date with our members' activities, and also to provide useful publicity for your events.

I very much hope that you consider this to be a worthwhile exercise, so I await your timely response.

***Laura Raggatt***
*IUBS Secretariat, 51, bld de Montmorency, Paris, France*
*E-mail: lraggatt@iubs.org*

I came to know about ICPEP-3 to be held at Lucknow in Nov.-Dec.2005. I am keen to attend and present a paper on 'Phytoremediation - Case Study of Vetiver grass.....'. I would be happy to be a member on your international advisory committee/ board. Please send details of the Conference.

**Rajiv K. Sinha**
*Visiting Senior Lecturer*
*Griffith University, Brisbane,* ***Australia***
*Rajiv.Sinha@griffith.edu.au*

Thank you for information about ICPEP-3. I would like to take part in it. The topic of my lecture: "Mountain biodiversity of Kazakhstan, problems of sustainable use and conservation."

May I ask you to inform me of your decision on my participation?

***Baitulin Issa Omarovich,***
*Professor,*
*Academician of the National Academy of Sciences,*
*Honoured Scientist of the Republic of* ***Kazakhstan***
*lyssenko@land.ru*

# NEWS FLASH


### MASHELKAR TAKES OVER AS PRESIDENT OF INSA

Dr. R.A. Mashelkar took over as the President of Indian National Science Academy (INSA) recently. Dr. Mashelkar has occupied various academic positions in Europe and U.S.A. He was appointed as Director of the National Chemical Laboratory, Pune in 1989. Currently he is the Director General of India's Council of Scientific & Industrial Research (CSIR) and Secretary to Government of India, Department of Scientific & Industrial Research.

Dr. Mashelkar has over 235 research publications to his credit in non-Newtonian fluid mechanics, gel science and polymer research engineering. He is a Fellow of Royal Society London and also Foreign Fellow of U.S. National Academy of Engineerig.

Prof. Mohammad Iqbal, Head of the Department of Botany, Hamdard University and an Executive Councillor of International Society of Environmental Botanists, has taken over as the Acting Vice Chancellor of Hamdard University New Delhi. He replaces Mr. Siraj Husain I.A.S. whose term as Vice-chancellor ended recently.

Prof. Madhoolika Agrawal, Department of Botany, Banaras Hindu University, a Life Member & Executive Councillor of ISEB has received **Dr. P. Sheel Memorial Young Women Scientist Award** of National Academy of Sciences, Allahabad, India.

Dr. Vivek Pandey, scientist of the Stress Physiology Laboratory at NBRI and a Life Member of ISEB visited Germany for 3 months under CSIR-DAAD Bilateral Scientists Exchange Programme (26.10.2004 to 21.01.05). Dr. Pandey worked in the lab of Prof. Karl Josef Dietz, Faculty of Biology, University of Bielefeld. Prof. Dietz's research group has main focus on redox regulation and peroxiredoxins, which are part of the plant redox network. Dr. Pandey worked on salicylic acid induced gene expression in *Arabidopsis* plants.

Ms. Sunita Narain, well known environmental activist and Director of Centre for Science & Environment, New Delhi has been conferred **Padmashri Award** by the President of India.

### NBRI DEVELOPS NEW CHRYSANTHEMUM VARIETY

National Botanical Research Institute, Lucknow, India developed a novel *Chrysanthemum* variety 'Mother Teresa' by using open pollinated seedling selections method. This variety has won a U.S. patent (PP13,678).

### TRAINING PROGRAMME TO MOTIVATE INNOVATIVE AND CREATIVE POTENTIAL OF SCHOOL CHILDREN IN S & T

A group of Scientists from Eco-Education Division, National Botanical Research Institute, Lucknow led by Dr. Kamla Kulshrestha, Head of the Division and Joint Secretary ISEB, organized a series of popular lectures and training programme under Year of Scientific Awareness (YSA) programme of U.P. State Council of Science & Technology. The programme was held on 15, 16 and 28 February 2005 at Shahjehanpur, Bareilly and Ghaziabad districts of Uttar Pradesh, India, respectively.

The aim of programme was to "*Motivate the innovative and creative potential of school children in Science & Technology*". Dr. Kamla Kulshreshtha emphasized on the importance of science for the school children and tried to boost up their scientific temperament that help in shaping India as a developed country through Vision 2000.

In this programme, many areas of science like Physics, Chemistry, Zoology, Geology, Environmental science etc. were covered by the experts who also distributed informative booklets to the students. The members of District Science Clubs of Council of Science and Technology also participated in a quiz competition. The communication in the programme was two-way and highly interactive which helped students to satisfy their curiosity and solve their problem with scientists.

# NEW LIFE MEMBERS

**Justice S.C. Verma,** Lok Ayukta of the State of Uttar Pradesh, India has joined International Society of Environmental Botanists as a Life Member. Justice Verma obtained degrees in Science and Law from the Allahabad University. He was elevated as Judge of Allahabad High Court in 1990. After his superannuation he took oath of the Office of Lok Ayukta, Uttar Ppradesh in March 2000. Justice Verma has participated in several Ombudsman conferences in South Africa, China, Japan, South Korea and Canada. Justice Verma is a keen sportsman, a nature lover and an active environmentalist.

**Mr. Abhilash P.C.** joined International Society of Environmental Botanists as a Life Member. Mr. Abhilash, a research scholar, is working in the Eco-Auditing Group, Biomass Biology and Environmental Sciences Division of National Botanical Research Institute, Lucknow.

# BIOMONITORING OF AIR POLLUTANTS WITH PLANTS*

**LUDWIG DE TEMMERMAN, J. NIGEL B. BELL, JEAN PIERRE GARREC, ANDREAS KLUMPP, GEORG H.M. KRAUSE & ALFRED E.G. TONNEIJCK**

Since the Industrial Revolution at the end of the 19th century it has been recognized that air pollutants can cause dramatic effects on plants. However, the first recognition in print of air pollution damage to vegetation is in John Evelyn's book "Fumifugium" published in 1661.

Biomonitoring consists of the use of responses of individual plants or plant associations at several biological organization levels in order to detect or predict changes in the environment and to follow their evolution as a function of time. Some plant species are sensitive to single pollutants or to mixtures of pollutants. Those species or cultivars are likely to be used in order to monitor the effects of air pollutants as bioindicator plants. They have the great advantage to show clearly the effects of phytotoxic compounds present in ambient air. As such, they are ideal for demonstration purposes. However, they can also be used to monitor temporal and spatial distributions of pollution effects. Standardization of methods is crucial in order to develop air quality standards based on effect monitoring.

Many plants are useful as bioaccumulators and the choice of species depends on the aims of biomonitoring. Mosses and lichens accumulate heavy metals and other compounds very efficiently because of their large specific surface and slow growth. As such they serve mostly as passive biomonitors to provide an indication of the pollutant impact at the ecosystem level. On the other hand, field crops and vegetables can serve as an immediate step to detect effects on food and fodder quality and safety. Bioaccumulators are not only used to measure deposits of heavy metals but also radionuclides, polycyclic aromatic hydrocarbons, dioxins and all kinds of aerosols which can also be accumulated efficiently. As far as contaminants of food and fodder crops are concerned, they are a crucial step to evaluate the potential transfer to consumers.

The idea of biomonitoring goes back to the 19th century when NYLANDER (1866) used the abundance of lichens as a measure for air pollution effects. For the purpose of surveying ambient air quality, biological indicators were used the first time in 1958 in the basin of Los Angeles, US; however, the low cost of this method in comparison to the chemical-analytical methods was the decisive factor by otherwise similar objective targets (HECK 1966). HEGGESTAD & DARLEY (1969) reported work with tobacco (Bel–W3) on the detection of ambient oxidant effects in California and VAN RAAY (1969) used indicator plants to study the effect of HF and $SO_2$ in the Netherlands. However, it was SCHÖNBECK et al. (1970) who pointed out for the first time, that biological indicators gain effects-related information which cannot be assessed by means of chemical analytical methods of air pollution monitoring systems.

The significance of biomonitoring air pollution burden by plants offers some important results from different abilities:

- Plants show an integrated response to the pollution climate, thus giving information even on the potency of complex pollutant mixtures, occurring simultaneously or alternatively in a stochastic pattern, reacting only to the effective part of a given pollution situation. This allows largely realistic estimates of the given risk potential with regard to the objectives to be protected.
- Plants react to an ambient air pollution burden (often with a strongly fluctuating pattern) with an assessable and verifiable reaction, while modeling of dose-effects renders information with a much lesser degree of confidence due to e.g. random distribution of pollutants in time and space.
- Different levels of organization of the plant can be used for biomonitoring, ranging from the single plant (leaf or even plant cell) to the plant association and the ecosystem. The response that is obtained at the community level (e.g. shift in species composition) is a result of an integration of different factors over a relatively long period experienced by competitive plant species and as such cannot be detected on the basis of physical and chemical measurements.
- Some air pollutants have very low ambient concentrations and are difficult to measure accurately with physical and chemical methods. Plants can accumulate those pollutants to a level that is easier to analyze.
- Effects are expressed in sensitive plant species as visible injury (leaf injury or changes in habit), and in less sensitive species (even pollution-tolerant species) in the accumulation of pollutants; both providing an important tool in recognizing air pollution effects (making the invisible visible) and/or the transfer of trace pollutants within the biological chain.

Many of these attributes render biomonitoring as being particularly suitable for developing countries. In such places there is generally only a very limited air monitoring network and biomonitoring offers the opportunity to determine the large scale pattern of pollutant distribution, as well as temporal changes. Continuous physico-chemical monitoring requires the use of expensive equipment and skilled personnel, as well as ready access to maintenance of the former and access to spare parts. These are invariably in short supply in most developing countries and in many cases effectively non-existent.

There are several possible goals when carrying out biomonitoring of air pollutants.

- Spatial distribution of air pollutants in order to map pollution effects on regional or supra-regional scale. This can be carried out for air pollution effects with bioindicators and for deposits of particulate and gaseous pollutants with bioaccumulators.
- Temporal distribution of air pollutants (time series) can also be done to assess effects of particulate deposition as well as gaseous pollutants.

- Source monitoring is a lot easier than large scale monitoring and is applicable to a broader range of pollutants when they reach phytotoxic levels. The climatic differences between the different measuring locations are almost negligible on a regional scale.
- At the ecosystem level, the plant community is a very interesting tool to study the pressure of air pollution on plant communities and ecosystems and to detect effects on biodiversity.
- Bioindicator plants are also very useful to draw public awareness to air pollution problems, since they can demonstrate the visibility of otherwise invisible air pollutants, especially in city environments and in developing countries where industrialisation and urbanisation are increasing.
- Plants could probably serve as health indicators. Comparisons of biomonitoring work on trace elements and the occurrence of epidemiological disturbances in human health can be helpful, but are not yet convincing and need to be developed further. Bioaccumulator plants are particularly valuable in order to study the transfer of airborne chemicals to the food chain as crops can be used for this purpose.
- Biomonitoring offers a support and scientific background for the elaboration of effect-based limit values and directives on air quality.

*Ludwig De Temmerman, Veterinary & Agrochemical Research Centre, Tervuren, Belgium*
*Nigel Bell, Imperial College London, U.K.*
*Jean-Pierre Garrec, INRA Nancy, Champenoux, France*
*Andreas Klumpp, Institute for Landscape & Plant Ecology, University of Hohenheim, Stuttgart, Germany*
*Georg H.M. Krause, Landesumweltamt Nordrhein-Westfalen, Essen, Germany*
*Alfred E.G. Tonneijck, Wageningen University & Research Centre, Wageningen, The Netherlands*

*(*Condenced from "**Urban Air Pollution, Bioindication & Environmental Awareness"** edited by Andreas Klumpp, Wolfgang Ansel & Gabriele Klumpp & published by Cuvillier Verlag, Göttingen, 2004)*

# BIODIVERSITY CONSERVATION OF FRESHWATER ECOSYSTEM IN INDIA

**S.K. KULSHRESTHA**

## INTRODUCTION

Biodiversity includes assemblage of plants, animals and micro-organisms; their genetic variability expressed in varieties and populations; their habitats, ecosystems and natural areas, the mosaic of which gives richness to the natural environment. Biodiversity or biological resources provide food, clothing, housing, medicine and spiritual nourishment to human beings. Apart from the rich flora, India is having 7% of the 89,500 animal species, found in the world. The loss to Indian biodiversity is mainly from habitat destruction, over-harvesting, pollution and inappropriate introduction of exotic plants and animals.

As stated in 'Global Biodiversity Assessment', published by the UNEP, "unless action is taken to protect biodiversity, we will lose forever the opportunity and the most precious assets of natural resources, available to the mankind." Biodiversity conservation is of critical importance as it may be of direct or indirect benefit to mankind.

Among major biodiversity countries, the number of species of higher plants in Brazil is 55,000 followed by Columbia 35,000, China 30,000, Mexico 25,000, South Africa 23,000, former Soviet Union 22,000, Indonesia 20,000, Venezuela 20,000, United States of America 18,000, Australia 15,000 and India 15,000.

## FRESHWATER RESOURCES

Over 99% of biosphere water occurs in oceans and polar ice deposits, out of which 97.61% occurs in oceans. The freshwater is mainly in the form of ice, snow and ground water, 0.009% in freshwater lakes, 0.0009% in atmospheric water vapour and 0.00009% in rivers. Only 0.01% of the global freshwater is available in rivers, lakes and reservoirs. The dam reservoirs contain five times as much water as in rivers. The surface waters sustain freshwater biodiversity, perform ecological functions and support human needs such as agriculture, hydro-electricity, industry, sewage and sanitation, aquaculture, fisheries, drinking water, transportation, recreation and spiritual needs, etc. About 54% of accessible surface run off is used. About 45,000 species of freshwater organisms are known while about one million are yet to be discovered. Major organisms include viruses, bacteria, diatoms, plants and animals from protozoa to mammals. Freshwater organisms constitute about 25% of the total number of organisms.

Aquatic bacterial diversity knowledge is increasing rapidly. Almost 20% of the fishes, found globally, are extinct, vulnerable or endangered. The rich endemic ichthyofauna of African Lake, Victoria, has been reduced by exotic predatory Nile perch, over-fishing and eutrophication. Groundwaters, as deep as 2.8 Km, may have rich bacterial flora. According to World Bank, 80 countries with 40% of the world's population have water shortage that could cripple agriculture and industry. Fish diversity is threatened by construction of dams, hydro-electric facilities, channelization projects and invasion of non-native biota. The Ganges and Brahmaputra rivers carry more than 3 billion metric tons of soil to the Bay of Bengal each year, spreading it over 3 million sq. km of sea bed.

## BENEFITS FROM FRESHWATER BIODIVERSITY

Freshwater biodiversity provides benefits to humans. This includes inland water fishing for food, aquaculture

production, ornamental fish trade, recreational fishing, rice farming, harvest of a variety of other living resources, medicinal plants, fuel resources and ecological functions including primary production, provision of three dimensional habitat, biogeochemical recycling, pollutant remediation, moderation of nutrient pulses and population . Terrestrial and aquatic ecological functions have been estimated to be worth US $ 33 trillion per year globally. Freshwaters and their varied biodiversity form part of the Earth's ecosphere which restores us spiritually, inspires us aesthetically and must be passed on to future generations. The Biodiversity Convention and the World's Charter of Nature have emphasized that like all other life forms, freshwater organisms have an intrinsic right to survival and warrant respect.

## WETLANDS

Wetlands are transitional areas between dry terrestrial and permanent aquatic ecosystems. These are recognized as highly productive ecosystems. Wetlands include 22 habitat types (IUCN, 1989). The Indian wetland area is about 7.6 million ha, excluding paddy fields, rivers and canals, out of which 3.6 million ha is inland and 4 million ha coastal. There are 2,175 natural wetlands having 1.46 million ha area and 65,254 man-made lakes having 2.85 million ha area in India. The total number of animal species, reported from India, is 89,461; out of which 17,853 belong to wetlands comprising 19.9% of the total number. About 50,000 ha area of wetlands is degraded every year in Asia. It results in soil acidification, soil erosion, loss of soil nutrients, change in hydrology, loss of flora and fauna and disruption of delicate ecosystem. The wetlands perform enormous variety of functions including regulatory, carrier, production and information functions. The regulatory functions include storage and cycling of nutrients, human wastes and organic wastes; groundwater recharge and discharge; control of natural floods, erosion and salinity; water treatment, climatic stabilization; and maintenance of ecosystem stability; integrity of other ecosystems and biological diversity. The carrier functions include agriculture, irrigation, transport, energy production, tourism, recreations, human habitat and settlements and as nursery for plant and animal species. The production functions include water, food, wood fuel, medicine resources, genetic resources and raw materials for building, construction and industrial use. The information functions include research, education, monitoring and their role in cultural heritage. The natural functions of the wetlands include climatic, biodiversity, habitat, hydrological and hydraulic and water quantity functions. Among biodiversity functions are centers of endemism, ecosystem diversity, habitat diversity, species and population diversity. Besides this, they provide diverse species assemblages, highly diverse microbiological activity, large genetic pool and link between terrestrial and aquatic ecosystems, Wetlands are being modified or reclaimed through out the world, their resources over exploited, and their lands converted to other uses. Since 1900, more than half of the world wetlands have disappeared. Water management in wetlands has been oriented towards the needs of people, such as transportation, flood control, agriculture and settlement. There are many stakeholders whose diverse interest lay claim on the wetland function. These include direct extensive and intensive users, exploiters who dredge sediments or exploit mineral resources, agricultural producers who drain and convert wetlands to agricultural land, water abstractors who use wetland as source of drinking or irrigation water, human settlements expansion and indirect users who benefit from flood control use of the wetland . Our primary objective should be to build capacity for wetland management. Compilation of national wetlands database is the first stage of a conservation strategy. All products from the natural environment should be valued and costed according to their real costs, including the cost of sustainable production and environmental protection. In India, efforts have been made to restore Chilka Lagoon, a coastal wetland and along Gandak sub basin, Bhoj Wetland and other such water bodies. However, baseline data on the biodiversity of freshwater ecosystem, in India, is meagre. In our studies on the Lowe Lake and Mansarovar Lake, which for a part of Bhoj Wetland, we found 93 species of phytoplankton, 53 taxa of zooplankton, 130 of periphyton, 38 of macrozoobenthos and 26 species of fish. We found rich aquatic flora and fauna in Chambal, Kshipra and Khan rivers. Scattered studies are available on the biodiversity of waterbodies in India. However, a continuous and comprehensive database is not available. Compilation of a national database is the need of the time.

## CONSERVATION ACTION PLAN

The conservation of aquatic biodiversity should be done at ecosystem level. Appropriate management of wetlands and rivers may be a proper step in this direction. Restoration of acidified, eutrophied or weed infested lakes need different treatments, The main problem in Indian lakes, are: siltation, eutrophication, weed infestation, pollution and human encroachment for habitation, agriculture, aquaculture and land use. The lake management includes passive and active actions. In passive action, minimum human interference maintains the ecosystem in a natural way; such system is possible in unpolluted lake. In active management, manipulation of environmental conditions is undertaken to affect the desired change. The active management includes soft strategies, covering water control and weed eradication, while hard strategies include altering of the vegetation, construction of dikes, canals, etc. for changing the environmental conditions. An effective lake management would include both soft and hard strategies. The restorative measures would include afforestation of lake basin or catchment area; shoreline stabilization and demarcation; maintenance of water level; restoration of eutrophied lakes by prevention of sewage or nutrients from point and non-point sources, biological control, chemical control, mechanical control, aeration and sediment removal; restoration of lakes having aquatic weed infestation by manual, mechanical and biological methods; pollution control; monitoring the water quality for various physico-chemical and biological parameters; development of fisheries, tourism, etc.; environmental awareness and evaluation of restorative measures.

All rivers, lakes, reservoirs, wetlands, etc. should be treated as integrated component of a river basin and a mechanism for coordination between all programmes for conservation and management should be developed. Necessary steps are required to ensure

adequate flow in rivers for maintaining their ecological integrity, water quality and biodiversity. The abstraction of river and surface waters for various uses, such as, for agriculture, domestic and industrial use should be regulated in relation to the total flow. The return flow of adequate quality by recycling and reuse of wastewater should be endured. Certain rivers may be given status of "National Heritage Rivers". Conservation and restoration of floodplains and protection of upper watersheds of rives, throughout the country, should be given priority. A network of "Protected Areas of River Systems" may be established to conserve riverine biodiversity. A holistic integrated approach for conservation of rivers and other inland surface waters should be adopted.

**CONCLUSIONS :**

Wetlands, lakes and rivers are daughters of the land. Ecologically sound and economic practices on land as well as in the water realm, will maintain and restore aquatic ecosystems and faltering species can be reinvigorated with them. We need suitable practices in watersheds and waterbodies, and willingness to share the planet's surface with other species.

*Prof. S.K. Kulshrestha, President 'Academy of Environmental Biology' is a former Professor of Zoology at M.V.M. Bhopal.*
*His current address is: 27/3 Geetanjali Complex, Bhopal-462003, India*
*E-mail: <drskulshrestha@yahoo.co.in>*

# NEWS AND VIEWS

## RADON-RESISTANT CONSTRUCTIONS

**R**adon occurs naturally in soil and rock and can enter buildings through openings in the foundation or walls. Long-term exposure to high indoor radon levels can increase risk of lung cancer and since any home could face the problem, all homes should be tested. When elevated radon levels are found, they can be reduced, and new homes can be built using radon-resistant construction technique while building a home, a passive radon control system should be included in the construction process. It is an inexpensive addition to the total cost of the new house. It involves the following steps for construction.

i) Gas Permeable Layer: Install a layer of clean gravel or aggregate beneath the slab or flooring system to allow soil gases to move freely beneath the home, ii) Impermeable Layer: Cover that with a vapour barrier (plastic or polyethylene sheeting) to prevent radon and other soil gases from entering the home. iii) Vent Pipe: Run a 3-4 inch PVC pipe from the gas permeable lay through the roof, iv) Caulking and Sealing: Caulk and seal all openings

## FOLIC ACID REDUCES BLOOD PRESSURE

**W**omen who consume large amounts of folate (about 1,000 micrograms a day) had 46% lower risk of developing hypertension than women who took less than 200 a day, as reported in the Journal of the American Medical Association. It is not yet clear how folic acid does this, although the supplement is known to reduce levels of homocysteine, a blood component that can damage blood vessels. Women who got their folate eating foods naturally high in the Vitamin – such as nuts, leafy greens and berries – did not derive the same benefit as those who took folic acid supplement, perhaps because it is hard to eat enough vegetables in one day.

Men have not yet been studied as thoroughly, but there is no reason to think they would not get the same benefit from high doses of folate. Other scientists caution that early studies suggesting that large doses of vitamin E protect against heart disease have not panned out.

But since millions of people in Asia suffer from high blood pressure, and there is not any known downside to taking folate, it might not be a bad idea for all adults to take the current recommended dose of 400 micrograms a day.

***Sanjay Gupta***

*in TIME Magazine (U.S.A.)*

## AIR POLLUTION CAN THICKEN BLOOD

**A**ir pollution thickens the blood and increases the likelihood of inflammation, according to researches carried out by scientists at Edinburgh University. The study may help explain why poor air is linked to an increased risk of heart attacks and stroke, as well as worsening respiratory problems. The researchers focused on ultra-fine pollutants known as particulate matter, which may be able to alter cell function. The researchers tested the inflammatory and blood clotting response of human immune cells called macrophages, lung cells and cells taken from the umbilical cord by exposing them to particulate matter. The results showed that levels of clotting factor, which thicken the blood, were raised in almost all the cell types.

Recent research has shown that particulate matter is so tiny that, when inhaled, it can pass through the lungs directly into the blood stream. This may mean that its effect on macrophages could be deadly in people who are at risk of heart diseases. Macrophages are a major component of the plaque deposits, which can build up on the walls of the arteries. Particulate matter produced high levels of charged particles called free radicals, which can damage the body's tissue. They stimulate a change in the blood, which make clots more likely to form.

## HOME FIRES WARMING GLOBE

**T**he burning of wood, agricultural waste and animal manure for cooking is the largest source of black carbon in the air in South Asia, according to a team of research scientists at IIT Bombay. Control

of these emissions through cleaner cooking technologies, in addition to reducing health risks to millions of users, could be of crucial importance to climate change mitigation in South Asia.

The effect of soot in the air over the Indian Ocean is some ten times that of green house gases. The pollution causes the air to absorb more sunlight, warming the atmosphere and cooling the surface beneath. Such changes can affect rainfall patterns, helping make floods and droughts more intense.

## DOLLARS FROM CARBON TRADING

**T**hanks to the Kyoto Protocol that came into effect recently, developing nations like India can earn foreign exchange from developed countries by reducing pollution levels. Kyoto Protocol makes it obligatory for 37 developed countries to reduce their emissions of six deadly greenhouse gases – including carbon dioxide. These 37 countries, which account for 61.6 per cent of global carbon dioxide emissions in 1990, have to reduce them by an average of 5.2 per cent below the 1990 levels by 2012. They can do this through a combination of direct domestic action and by paying cash to developing countries who reduce these emission levels. The rationale behind this is that cutting greenhouse gas emissions in any part of the world is a good thing. By paying others to cut emissions, developed nations ensure reductions at costs lower than in their own countries, while countries like India earn cash and benefit from technology transfer.

Reducing one tonne of carbon dioxide is called a Certified Emission Reduction (CER). Every CER can be bought and sold on global exchanges. The United Nations Framework Convention on Climate Change (UFCCC) designed a Clean Development Mechanism (CDM) to implement this through a web of designated monitoring agencies. Currently, a tonne of carbon dioxide emission saved can fetch between three to seven US dollars.

With developed countries now paying to reduce global warming, there is a huge opportunity for India.

***Srinivasa Prasad***

*Clean Energy News, Nepal*

## CRACKDOWN ON ALIEN SPECIES

**A**n increasing range of non-native invasive species pose a serious threat to natural habitats, species and heritage in Scotland. Although they have typically been introduced innocently, many of these species are out-competing some of the most valuable and vulnerable native plants and animals, causing potentially irreversible damage. An audit by Scottish Natural Heritage found at least 988 alien species occurring there. These consisted mainly of higher plants, as well as mosses, mammals, birds, fish, insects and mollusces. They occur in all habitats from mountains to the marine environment.

Seemingly innocent plants such as the familiar rhododendron (*Rhododendron ponticum*) are toxic to other plants and cast dense shape making it difficult for other plants to grow. By rapidly spreading and preventing the regeneration of native woodlands it can wipe out natural tree cover and associated species dependent on native woodland for the right habitat and conditions.

Japanese Knotweed (*Fallopia japonica*) grows much larger in Scotland than it does in Japan and can burst through tarmac and on occasions can penetrate houses, as well as out competing almost all other vegetation. The extensive root system is very difficult to eradicate.

Efforts to tackle invasive non-native species require cross-border co-ordination as they are best addressed on a biogeographic basis, i.e. within natural geographic and ecological boundaries.

## GLOBAL WARMING

**S**cientists have lately detected the clearest evidence yet that global warming is real – and that human industrial activity is largely responsible for it. Researchers have cited a range of evidence that the Earth's temperatures are rising:

The arctic regions are losing ice cover; the populations of whales and walrus that Alaskan Eskimo Communities depend on food are crashing, fresh water draining from ice and snow on land is decreasing the salinity of far northern oceans, while the salinity of ocean waters near the equator has increased as the rate of evaporation of warmer tropical and subtropical oceans quickness; many species of plankton the microscopic plants that from the crucial base of the entire marine food web are moving north to escape the warning water on the ocean surface of Greenland and Alaska.

Records show that for the past 50 years or so, the warming Ice core drilled deep into the Greenland ice show that salinity of the ice at the upper layers of the cores has decreased sharply due to the incursion of fresh water draining from melting snows on the surface. Changes in the fresh water balance of the oceans has already caused severe drought conditions in America's western states and many parts of China and other Asian countries.

Another piece of evidence cited for the ecological impact of warming in the Arctic emerged in the Bering Sea, where hundreds of thousands of birds died and the common plankton plants on which they depend totally for food was replaced by inedible plants covered with calcite mineral plates. Those plants thrive in warmer waters and require higher - than – normal levels of carbon dioxide – the major greenhouse gas – to reproduce.

*From:* ***San Francisco Chronicle***

## MERCURY HURTS CHILDREN MOST

**P**ollutants that might be tolerated by an adult have a larger impact on a child. A young child's liver and kidneys – the body's cleaning systems – are not fully developed and are less able to remove poisons. At the same time, his or her brain is forming, and a disruption to this process can cause life-long damage.

Mercury, a toxic metal, has harmful effects on the minds of growing children. Unfortunately, mercury is present in every lake and river. Most mercury comes from power plants that burn coal. The metal is released into the air and settles into lakes, rivers and streams, where it can enter the food chain. When mercury enters the brain of a child, it can cause irreversible damage to his or her nervous system – which translates to lowered IQ, impaired hearing and memory, poor coordination or retarded physical or verbal development. Usually, kids get mercury by eating contaminated fish or when their mothers eat fish while pregnant. Each year in the U.S.A., about 630,000 children are born

with mercury levels that are considered unsafe. Research shows that even the timiest amounts of mercury can have subtle but lasting effects on growing minds and bodies.

Unlike some other pollutants there is no cleaning technique that will reduce the amount of mercury, we consume from eating fish.

*By* ***Christine Ziebold***

## BIOFUELS CAN FUEL THE CARBON TRADING POTENTIAL OF INDIA

**I**ndia can tap the $ 52-billion global market for carbon trading by encouraging production and use of biofuels and plantation of trees having oil-bearing seeds and materials, like *Jatropha* and *Pongamia* species. Other plantations having oil-bearing seeds or materials are sal, mahua, kokum, pilu, phulwara, dhupa, neem, mango, kusum, paranja, ratanjyot, jatropha, tumba, jojoba, simarouba.

Biofuels, apart from enhancing energy security, ensuring employment and development, and mitigating environmental pollution, can be instrumental in carbon trading if certain criteria of the clean development mechanism (CMD) of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) are fulfilled.

According to a recent study by Point Carbon, the potential of global carbon market over the next several years is around $ 52 billion per annum. Growing at a rate of 4 per cent per year, India, the sixth largest producer of greenhouse gases (GHGs), contributing almost 3 per cent of the world' total emissions (including $CH_4$ from waste generated by cattle)is seen as one of the most attractive destinations for CMD linked investments. Estimates put the cumulative foreign direct investment (FDI) on account of such projects of about $ 2 billion, growing at the rate of $ 200 million per year.

In light of increased evidences of climate change effects and their mitigation methodologies, several carbon market and investment mechanisms are slowly evolving. Though the carbon market dynamics are not transparent, the scenario indicates a huge potential in future. Till January 2004, the total volume traded in project based transactions is 78 million tonne of carbon dioxide emissions ($CO_2$). The buyer side included Japan with 41 per cent and the Netherlands and CFB with 23 per cent each. According to estimates, if the CMD captures at least 35 pper cent of the global market, the estimated value to the concerned countries would be $ 18 billion.

A study jointly done by Srikanta K. Panigrahi, consultant with the Planning Commission; A. Mohana Reddy, Director, ZenthEnergy, Hyderbad; and PP. Narendra, a senior consultant of the same company said that as per one estimate, each tonne of biodiesel produced or consumed leads to a reduction of GHGs by about three times that is it avoids 3 tonne of $CO_2$.

These reductions in GHG emissions can be accumulated and traded as carbon credits. The CMD facilitates selling of these reductions in terms of certified emission reductions (CERs), a unit of which equals to one tone of $CO_2$.

The study further said that the present market price of carbon credits is around $ 5 per CER, which translates into an additional revenue of Rs. 690 per tonne of biodiesel consumed (@ 75 paise per litre). This additional revenue from sale of carbon credits can be used to raise plantations of trees having oil bearing seeds and materials, or meet unforeseen expenses during stabilization period of bio-diesel technology, the study suggested. The study also pointed out that during 2011-12 there would be a reduction in GHG emissions to an extent of 40 million $CO_2$ with 20 per cent biodiesel blend in the country.

It also said that large-scale plantation of trees having oil-bearing seeds and materials, like *Jatropha* and *Pongamia* species will fix carbon by photosynthesis via the carbon cycle.

When the oil derived from these seeds is burnt, same amount of $CO_2$ is emitted as was sequestered.

Biodiesel avoids release of anthropogenic emissions like $CH_4$, and $N_2O$ as is the case with conventional petroleum diesel.

Thus the consumption of biodiesel as an energy source either in stationary or mobile combustion leads to "no net-addition of $CO_2$ to the atmosphere".

*From:* **Biofuels India.**

## PHYTOPLANKTON

**A** NASA researcher has published a study showing that tiny free-floating ocean plants called phytoplankton had declined in abundance globally by 6% between the 1980s and 1990s. These tiny plants help regulate our atmosphere and the health of our oceans. Phytoplankton produce half of the oxygen generated by plants on Earth. They also can soften the impacts of climate change by absorbing carbon dioxide, a heat-trapping greenhouse gas.

In addition, phytoplankton serve as the base of the ocean food chain, so their abundance determines the overall health of ocean ecosystems. Given their importance, it makes sense that scientist would want to closely track trends in phytoplankton numbers and in how they are distributed around the world.

However, the researches used NASA satellite data from 1998 to 2003 to show that phytoplankton amounts have increased globally more than 4%. These increases have mainly occurred along the coasts. No significant changes were seen in phytoplankton concentrations within the global open oceans, but phytoplankton levels declined in areas near the center of oceans, the mid-ocean gyres. Phytoplankton growth is largely dependent on amounts of nutrients and light available to the plants. Warmer water temperatures can create distinct layers in the ocean surface, which allows less of the nutrient rich, colder deeper water to rise up and mix with sunny surface layers where phytoplankton live. Winds churn and mix the ocean water, carrying nutrient rich waters to the sunny surface layer, so when winds decline, mixing declines and phytoplankton can suffer.

## GARBAGE BURNING EXPOSES CITIZENS TO RESPIRATORY AILMENTS

**T**he practice of burning garbage by roadsides and at unattended dumps in residential areas of Karachi is on the rise, which has exposed citizens to respiratory ailments, cancer, immune system damage and other health problems.

Instead of removing garbage properly the sanitary workers often set the heaps on fire for their convenience,

making the residents of nearby areas suffer from this air pollution on regular basis.

Heaps of garbage could be found burning on both sides of the road, creating clouds of thick smoke in almost all localities of the city. It was also observed that garbage was burnt on regular basis at those vacant plots of residential areas where either the people throw their domestic waste or sanitary workers use it as 'garbage transfer stations'.

Despite ban, the cited practice is continued because the agencies concerned have failed to ensure strict implementation of the related rules.

The smoke is a known health and environmental hazard and its inhalation might cause irritation and asthmatic attacks, and increases long-term health risks for especially those suffering from respiratory problems.

*Source: http://jang.com.pk/thenews/mar2005-daily/21-03-2005/metro/k10.htm*

## E-WASTE PROBLEM IN ASIA-PACIFIC

**A**n expert group meeting on 'E-waste Management in Asia and the Pacific' was held from June 22 to 23 2004, at United Nations Environment Programme (UNEP) Regional Office in Bangkok, Thailand. The meeting organized by UNEP, was attended by experts from the U.S.A., China, India, Thailand and Japan, among others. The UNEP, in collaboration with the various governments in the region, expert institutions, and relevant agencies, has plans to promote e-waste management in Asia and the Pacific by initiating a regional level activity for knowledge-sharing.

Objectives of the meeting included:

- Assessment of e-wastes at the national and sub-regional levels.
- Discussion of strategy for promoting e-waste management in the region.

A number of Asian countries are generally considered to be the main importers of e-wastes generated around the world. Importing countries try to earn significant income from refurbishing used PCs and disassembling obsolete PCs, monitors, and circuit boards and then recovering the gold, copper and other precious metals.

The environmentally sound management of electronic wastes is an important element of the Strategic Plan now being developed by the member governments of the Basel Convention. The UNEP Regional Strategy for Asia and the Pacific has identified e-waste as an emerging environmental issue for the region. Despite the initiatives by some of the countries, agencies with the mandate on waste management in the region, have no specific knowledge of composition of e-wastes and their management.

A recent study by the U.S. Environmental Protection Agency shows that e-waste already forms approximately one per cent of the municipal solid waste stream. Research also shows that the generation of e-waste in Europe is increasing three times faster than other municipal waste.

India generates 1,050 tons of electronic scrap a year and although a wide range of environmental legislations are available, more attention should be paid to tackling electronic waste. The share of electronics in generation of overall industrial waste may not be very high at this stage but it is necessary for us to take preventive steps to contain this before it reaches unmanageable proportions.

The concept of environmental management through use of cleaner technologies initiated jointly by Department of Information Technology, Govt. of India and United Nations Development Programme is a welcome step, which will ensure reduction in the waste generation.

*Source: www.toxicslink.org*

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Banff Park Lodge, Banff, Alberta, Canada
Host: Biosphere Solutions, Calgary, Alberta, Canada
Contact: Dr. Allan H. Legge,
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Contact: Carlos Brebbia
Conference Director **Or**
Rachel Green, Senior Conference Coordinator
<rgreen@wessex.ac.uk>
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Contact : Katie Banham, Conference Secretariat
Email: kbanham@wessex.ac.uk or Fax: + 44 (0) 238 029 2853
Wessex Institute, Ashurst Lodge, Ashurst Southampton, SO40 7AA, UK
Tel: +44 (0) 238 029 3223 Fax: +44 (0) 238 029 2853
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China Agricultural University, Beijing 1000 94, P.R. China
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U-112, Vidhata House (3rd Floor), Vikas Marg, Shakurpur, Delhi-110 092
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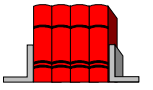

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