



# ENVIRONNEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

## Newsletter

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### Prof. Samir K. Brahmachari

Prof. Samir K. Brahmachari, Director, Institute of Genomics and Integrative Biology (IGIB), New Delhi has taken over as Director General of Council of Scientific & Industrial Research, New Delhi.

Born on 1<sup>st</sup> January 1952, Prof. Brahmachari had a brilliant academic and professional career. Dr. Brahmachari has shown exemplary scientific leadership and has made outstanding contributions in the area of Functional Genomics with special emphasis on molecular genetics of neurological and psychiatric disorders and functional genomics in silico. Centre for Biochemical Technology of CSIR underwent major transformation over the last 10 years under his stewardship to emerge as a leading Institute of Genomics and Integrative Biology of the country.

Prof. Brahmachari has demonstrated the structural flexibility of DNA and the role of repetitive sequences in DNA transactions much before the discovery of repeats associated with genetic disorders. His work on the structure flexibility of telomeric repeat sequences is one of his well-cited contributions. He has made major contributions in molecular analysis of genetic disorders associated with trinucleotide amplification and repetitive sequence instability.

Prof. Brahmachari has won many prestigious national and international honours and awards like, Shanti Swarup Bhatnagar Award of CSIR, FICCI Award, Ranbaxy Research Award and the Jagdish Chandra Bose Medal of INSA. He has been associated with a large number of scientific committees, academic bodies, research councils, editorial boards and working groups as chairman or, as a member. He is Fellow of Indian National Science Academy, New Delhi, Indian Academy of Sciences, Bangalore and the National Academy of Sciences, Allahabad.

In the international arena, he has earned many laurels and recognitions. He has been elected as a Member of the prestigious Human Genome Organization Council. He is a Council Member, Federation of Asian & Oceanic Biochemistry and Molecular Biology. He is a Member of the Advisory Group on Biotechnology and Human Rights to H.R. High Commission, Geneva. He has delivered a large number of invited lectures/talks in universities and research institutes in India and abroad. He was nominated as a Member/Leader of several important delegations of Government of India/CSIR.

### Happy New Year 2008

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 ENVIRONNEWS.

With this issue,  
Environews enters the fourteenth year of its publication

## ABOUT ISEB

**I**nternational Society of Environmental Botanists was founded on 3 December 1994 to promote and highlight environment related issues such as pollution indication and remediation, biodiversity conservation and sustainable utilization of plant wealth. During the past over thirteen years, ISEB has organized three international conferences on Plants & Environmental Pollution with large international participation, involving deliberations of highest scientific and academic standards. However, our basic objective and solemn commitment to bring highly technical and complicated scientific findings and researches on environment to the reach and domain of non-specialists like members of corporate sector, policy makers, civil servants, political leadership, electronic and print media and, especially school children and housewives remains undiluted. To a great extent, we are promoting these objectives through the medium of our quarterly news magazine, ENVIRONNEWS, which now has a global reach and impact.

The membership of ISEB is growing steadily and in the current year itself, there was a 27% increase over the last year. With the addition of 17 Life members this year, the total membership now stands at 206. This is not a small achievement for a young scientific society with limited resources. While ISEB has reached all corners of India, it has also spread its wings in U.K., U.S.A., Canada, Sri Lanka and Bangladesh.

The website of ISEB (<http://isebindia.com>) created by Er. Jamal Masood (Retired Chief Engineer UPSEB), a well wisher of ISEB, some three years back, has become immensely popular, not only in India but also in different parts of the world. It is being regularly and meticulously updated by him. As of date, it has been visited by over 9400 individuals in different parts of the world.

I wish to request our Life members to promptly inform us about any change in the place of their residence (mailing address and e-mail IDs). While most members follow this rule, some do not. Because of this, we have lost track of some of our valued Life members like, Dr. Ms. Rekha Thakre (Retd. Dy. Director NEERI), Dr. Rakesh Shanker (Indian Foreign Service), Prof. Shashi Kant (Jammu University) and Prof. R. K. Trivedy (Pune). We shall be grateful to any one, who could provide us their current mailing/e-mail addresses.

Environews has been regularly publishing articles from reputed environmentalists/plant scientists, not only from India, but also from a large number of overseas countries like, U.K., U.S.A., Canada, Germany, Japan, Turkey, Sweden, Switzerland, Spain, Argentina etc. Articles published in Environews are often cited in leading international research journals. This bears enough testimony to the growing popularity and stature of Environews. However, our basic objective is to reach wide range of readership, which includes non-specialists and hence, we give preference to articles written in simple format and easy to understand language.

ISEB is based on the campus of National Botanical Research Institute, Lucknow, which is a world-renowned plant science institute of India. Director of NBRI and other staff members are extending all possible facilities and cooperation to ISEB. Without their support and co-operation, ISEB would not have achieved so much in such a short span of time.

On behalf of ISEB and on my own behalf, I wish to extend all members of ISEB, readers of Environews and our brethren of NBRI a Very Happy & fruitful New Year.

**K.J. Ahmad**

Secretary ISEB

<isebnbrilko@satyam.net.in>



## LETTERS

**Y**our organization is included in WiserEarth.org, a web site that includes more than 106,000 non-governmental, social benefit organizations working towards social justice and the protection of the environment.

WiserEarth was launched by the Natural Capital Institute (NCI). WiserEarth supports the people and organizations that address the central issues of our day: climate change, poverty, the environment, peace, water, hunger, social justice, conservation, human rights, and more. Here people can connect, share knowledge, launch projects, recruit staff, seek funding, and build alliances. It has a searchable library of resources, events, people, and organizations - growing larger

every day.

**Natural Capital Institute**

3 Gate Five Road, Suite A, Sausalito, CA 94965. USA

E-mail: [melinda@wiserearth.org](mailto:melinda@wiserearth.org)

**I**wish I could actively participate in the activities that ISEB is organizing from time to time. This is the need of the moment. I am receiving your newsletter, Environews and keep myself updated through this. I read Dr Tuli's message and it is indeed heartening to know that the newsletter is reaching far and wide carrying the message of the efforts that India is making in the direction of addressing the issue of the environment. We have an ancient history of keeping our

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environment secure which needs to be preserved and perpetuated.

I wish you a huge success in all your academic and social activities.

**Dr Arif Ali**

Professor & Coordinator Biotechnology Program  
Jamia Millia Islamia, New Delhi, **India**  
<aliarif@rediffmail.com>

**I**t is indeed a great effort of ISEB under the ongoing programme of INSA (Lucknow Chapter) to screen the documentary film "An Inconvenient Truth" to school children who are caretakers of future environment. Unfortunately, I was not able to come but wish to see the documentary some day.

**Prof. Madhoolika Agrawal**

Department of Botany, Banaras Hindu University,  
Varanasi, **India**  
E-mail:madhoo58@yahoo.com

**A**ll of you are well aware of the fact that environmental pollution is posing a serious threat to all kinds of diversities on earth, in particular, plants. There is a need to manage plant resources more prudently, not only in quantity but also in quality. The sustainability of food production depends on the sustainability of plant resources. Keeping in view the enormity of the problem and with a view to highlight its impact and to seek possible solutions, Erciyes University in Kayseri Turkey, is going to organize an "**International Conference on PLANTS & ENVIRONMENTAL POLLUTION**" during **6-11 July, 2009**.

The conference will cover discussions on the recent developments in the field of pollution and plant life and shall provide a platform for reviewing a number of issues which concern the future of plant life, especially in the light of growing environmental concerns. It will cover six sessions namely; Responses of Plants to Environmental Pollution (**SESSION-I**), Bioindicators & Phytoremediation (**SESSION-II**), Biodiversity & Pollution (**SESSION-III**), Environmental Biotechnology (**SESSION-IV**), Climate Change & Plant Productivity (**SESSION-V**) and Medicinal Plants and Pollution (**Session VI**).

Please circulate this information among members of ISEB and readers of *EnviroNews*.

**Prof. Dr. Munir OZTURK**

Ege University, Botany Department, Izmir, **Turkey**.  
munirozturk@gmail.com, munirozturk@hotmail.com

**H**appy Anniversary and Best Wishes for Further Growth of ISEB!!

**Prof. Arun P. Kulshreshtha**

Director,  
Centre for Science & Technology of Non-Aligned and Other

Developing Countries (NAM S&T Centre), NEW DELHI,  
**India.**

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**I** am indeed happy to know of the 13<sup>th</sup> foundation day anniversary of the ISEB. It is indeed very creditable that you have a sizable number of members covering the whole world, which, in fact, reflects the concern of the whole world on Environmental issues and particularly the preservation of plant biodiversity and its sustainable development as a partial solution. With the global perception on climate change the Earth is faced with a disaster of a high magnitude, the effects of which ought to be contained the world over through ecosystem-specific human interventions in trapping the CO<sub>2</sub> emissions by means of eco-development. In fact the wetlands adjoining the coastline should receive the focus of attention, as it is most vulnerable to the perils of climate change.

With my best wishes for continued success in your efforts.

**Dr. P. K. K. Nair**

Director,  
Environmental Resources Research Centre,  
Thiruvananthapuram, **India.**  
E-mail: errc1230@gmail.com >

**I** am indeed delighted to know that International Society of Environmental Botanists has completed 13 years of its existence and it is releasing 52<sup>nd</sup> issue of its quarterly newsletter on the New Year Day. Earlier it had published two special issues, namely, Millennium Issue on 1<sup>st</sup> January 2000 and a Golden Jubilee issue on 1<sup>st</sup> July 2007. ISEB is indeed dedicating itself to protecting our environment and preserving its plant diversity in the coming years! On the occasion of its Thirteenth Foundation Day, I extend my greetings and felicitations to the founders and promoters of this Society. Wishing many years long life to you and the ISEB.

**Dr. P. Pushpangadan,**

DG, AIHBP, Trivandrum, **India**  
(Former Director NBRI & President ISEB)  
E-mail: palpuprakulam@yahoo.co.in

**T**he International Society of Environmental Botanists has played a key role in protecting, preserving and enhancing planet Earth's environment. Congratulations on its Thirteenth Foundation Anniversary! I fondly remember attending the international conference that you organized in 2005. It was an excellent Conference.

As I send this email, Edmonton's temperature is -18 °C (Where is global warming when we need it?)

Happy New Year!

**Prof. Yash P. Kalra**

Canadian Forest Service, Natural Resources Canada  
Edmonton, Alberta, **Canada**

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**T**he NAM S&T Centre has initiated a new Joint NAM S&T Centre-ZMT Bremen Fellowship scheme in Tropical Coastal Marine Ecology and Biogeochemistry in association with the Centre for Tropical Marine Ecology (ZMT), Bremen, Germany and is pleased to invite nominations for the same for the year 2008. The Fellowships for a period of three months are aimed at providing opportunity to the scientists and researchers from the developing countries to work at ZMT Bremen under the supervision of one of ZMT's senior scientists to upgrade their research skills and conduct joint research in Tropical Coastal Marine Ecology and Biogeochemistry. Depending on the research topic, the Fellows can also benefit from the ZMT's association with the MARUM Research Center in Bremen, which brings together the other Marine Science institutions in the University of Bremen and the Max Plank Institute for Marine Microbiology.

The fellowships are awarded to a maximum of 5 young scientists each year from the developing countries strictly on competitive and first-cum-first basis after evaluating the research plan to be submitted in support of the applicant. The Fellows will be provided a subsistence allowance of €1000 per month for accommodation, meals and out-of-pocket expenses in Bremen. The NAM S&T Centre will pay the return international air fare from the home country to Bremen, Germany.

Applications in prescribed form complete in all respects including a proposed research plan may be submitted to the NAM S&T Centre. To prepare the proposal the applicants may carefully study the material available on the website of ZMT Bremen [www.zmt-bremen.de] and then, if necessary, get in touch with the ZMT at zmtsekr@zmt-bremen.de. All applicants are required to seek administrative clearance from their respective parent organizations and those eligible for the

international fare from the NAM S&T Centre are further required to seek endorsement of the Focal Points of the NAM S&T Centre in the respective country.

Kindly disseminate this announcement to the members of ISEB and forward the applications of suitable scientists to us for necessary action.

**Prof. Arun P. Kulshreshtha**

Director,

NAM S&T Centre, New Delhi - 110003, INDIA

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Homepage: <http://www.namstct.org>

**W**e have linked the excellent website of International Society of Environmental Botanists Lucknow at <http://isebindia.com> with our "**EcoEarth.Info -- Environmental Portal**" at <http://EcoEarth.Info/> We would very much appreciate a reciprocal link to our long-standing massive and widely used environmental portal.

Your site has been linked at EcoEarth Info generating some **212** hits. Your URL is linked from the following EcoEarth.Info categories: Land/Biodiversity/Organizations and Land/Ecology/Plants.

If you can provide a return link to our "EcoEarth.Info" at <http://EcoEarth.Info/> it would be much appreciated.

Best of luck with your important work.

**Dr. Glen Barry**

President

Ecological Internet, Inc.

P.O. Box 433, Denmark, WI 54208, U S A

<[info@ecologicalinternet.org](mailto:info@ecologicalinternet.org)>



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## NEWS FLASH

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### INDIRA GANDHI PEACE PRIZE FOR WANGARI MAATHAI

President Pratibha Patil conferred the Indira Gandhi Prize for Peace, Disarmament and Development 2006 on Nobel Laureate Prof. Wangari Muta Maathai of Kenya on 19 November 2007 for her contributions to environment protection. Prof. Maathai's "Green Belt Movement" which has succeeded in planting 300 million trees across Kenya to prevent soil erosion, is now spearheading the UN's billion Trees Campaign.

The President praised Prof. Maathai for her commitment to the cause of development, women's issues and the environment.

### AL GORE'S 'AN INCONVENIENT TRUTH' SCREENED AT NBRI

Indian National Science Academy (Lucknow Chapter), under the guidance of its Convener, Dr. Rakesh Tuli has launched a series of programmes to sensitize children about the challenges in Environmental science, especially the changes faced by our planet due to

climate change.

International Society of Environmental Botanists (ISEB) is organizing these programmes in collaboration with the National Botanical Research Institute, Lucknow.

The first programme sponsored by INSA was a debate competition on "Climate Change: A Myth or Reality" on 19 July 2007.

The next programme under the series was organized on 19 November 2007 to

coincide with the birthday of late Indian Prime Minister Indira Gandhi, whose interest in environment and children is too well known. On this occasion, famous documentary film "An Inconvenient Truth" produced by Nobel Laureate Al Gore was screened at NBRI auditorium. The film show was watched by nearly 100 students and teachers of St. Fidelis, Montfort Secondary School, CMS Mahanagar, Navyug Inter College, Bright Land Inter College, CMS Station Road and La Martiniere Girls College. A galaxy of local scientists, Fellows of INSA, distinguished citizens, members of ISEB, staff members of NBRI and representatives of print and electronic media thoroughly enjoyed the movie.

Earlier NBRI Director and President of ISEB Dr. Rakesh Tuli welcomed the guests and Dr. S.C. Sharma Vice-president ISEB proposed a vote of thanks.

**Dr. U.N. Rai**, a Senior scientist at NBRI and a Life member of ISEB, delivered an invited lecture on the topic "Emerging Trends in Phytoremediation of Toxic Metals from Industrial Waste" at Central Institute of Fisheries Education (Deemed University), Mumbai (CIFE) on 29 October 2007. Thereafter, a brain storming session was organized to discuss a collaborative research programme between NBRI, Lucknow and CIFE, Mumbai. Subsequently, it was decided to undertake a collaborative

research project on "Bioremediation and Monitoring of Polluted Water for Aquaculture"

**Professor Muhammad Iqbal of Jamia Hamdard**, New Delhi has been nominated by the Prime Minister of India on the Prize Committee for the Indira Gandhi Paryavaran Puraskar 2006. The six-member committee includes the Speaker of the Lok Sabha, the Minister for Environment & Forests, Govt. of India, three experts nominated by the Prime Minister, and the Secretary to the Ministry of Environment & Forest. The Committee is chaired by the Hon'ble Vice-President of India. The IGPP award includes, in addition to a Silver Lotus Trophy, one prize of Rs 5 lakh (for organization) and two prizes of Rs 3 lakh and Rs 2 lakh (for individuals).

**Dr Mrs. Seshu Lavania**, Reader, Department of Botany, Lucknow University and Joint Secretary, ISEB has been awarded "Woman Scientist Medal, 2007" by the Indian Botanical Society. This medal is awarded annually to a woman scientist for her significant contribution in the field of Botany. Earlier, she was also the recipient of "Certification of Technical Excellence in Vetiver System Applications" awarded by The Vetiver Network-International USA in 2006.

**Dr. Ms. Anamika Tewari**, Senior Research Fellow (CSIR) and a Life

member of ISEB, delivered a plenary lecture (on behalf of Dr. U.N. Rai, Scientist NBRI) on "Amelioration of municipal sludge by *Pistia stratiotes*: Role of antioxidant enzymes in detoxification of metals" at 18<sup>th</sup> All India Congress of Zoology and National Seminar on Current Issues in Applied Zoology and Environmental Sciences with special reference to Eco-restoration and Management of Bioresources (SCIAZE) on December 7-9, 2007.

**Dr. Virendra Nath**, Scientist & Head, Plant Biodiversity and Conservation Biology Division NBRI and a Life member of ISEB has been elected as an Executive Councillor of Indian Botanical Society for a three year term.

#### ISEB AWARENESS PROGRAMME

International Society of Environmental Botanists (ISEB), organized an Environmental Awareness Programme in Ram Bharose Maiku Lal Inter College located at Telibagh in a rural setting, 20 km away from Lucknow on 16<sup>th</sup> October, 2007. The theme of programme was to sensitize the children towards environmental protection and sustainable plant wealth utilization. In this programme, Ms. Kanti Srivastava, Convener Environmental Awareness Programme ISEB and Ms. Babita Mishra gave lectures on different aspects of environment.

#### COST Strategic Workshop on 'Forest ecosystems in a changing environment: identifying future monitoring and research needs'

Dear Secretary of the ISEB,

For our **COST Strategic Workshop on 'Forest ecosystems in a changing environment: identifying future monitoring and research needs'** to be held on 11-13 March 2008 in Istanbul, Turkey we are looking for an attractive on-line journal which may be interested in publishing our workshop's outcome. In particular, we wish to publish a book of (extended) abstracts (such as in November 2005) including approximately 40 contributions to share the workshop's results with the public and to give the authors an opportunity to have their contributions cited. Please, find attached the rough

program outline of the workshop.

For the April 2007 issue in EnviroNews, I was myself invited to write an article and enjoyed a very efficient and professional publication procedure with EnviroNews! I would very much appreciate if you could let me know whether EnviroNews is interested in publishing such a special issue as outlined above.

**Dr. Marcus Schaub**

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**Website:** [http://www.wsl.ch/personal\\_homepages/schaub/index\\_EN](http://www.wsl.ch/personal_homepages/schaub/index_EN)

## WELCOME NEW LIFE MEMBERS

**Dr. Shama Bhatnagar** is an Assistant Professor at Ayojan School of Architecture, Jaipur, Rajasthan, India. She obtained her Master of City Planning degree from Indian Institute of Technology, Kharagpur, India. She is deeply interested in various environmental issues.

<shama.ambastha@rediffmail.com>

**Dr. Mrs. Kum Kum Mishra** is Reader in the Department of Botany at Lucknow University, Lucknow, India. Her field of specialization is Cytogenetics of plants in relation to environmental pollution.

<dr\_kumkum@rediffmail.com>

**Fr. Wilson Andrade** is the Principal of Lucknow's prestigious educational institution, St. Fiedelis College. He holds a Ph.D. degree in Psychology from Agra University. He had worked in the socio-cultural set up of tribals in the rural settings in Ranchi, Jharkhand from 1981 to 1996.

Gardening is his main hobby and he is deeply interested in

various environmental issues. Under his watchful eyes and constant guidance, his college campus has maintained a clean and green environment. He has worked on the roof top rain water harvesting system.

<stfidelislko@yahoo.co.in>

**Mr. Bijaya Kumar Padhi**, is a young Ph.D scholar at the Centre for Environmental Studies at Visva-Bharati University, Shantiniketan, West Bengal, India. Earlier he studied at North Orissa University, Takatpur for his graduation.

He has extensively carried out air quality monitoring in the rural and sub-urban areas in different parts of India. He has also worked in the fields of natural resources and biodiversity conservation. His current research activities focus on study of atmospheric quality by using biomonitors. He has published several research papers and articles in referred journals. He is a Fellow of International Congress on Environmental Research & Development and member of several scientific bodies.

<bkpadi@gmail.com>

## Environmental Challenges In The Anthropocene

**J. S. Singh**

*Professor Emeritus, Banaras Hindu University, Varanasi 221005, India*

The Earth today is experiencing environmental conditions which it has never experienced in the past. For example, the CO<sub>2</sub> concentration has varied between 180 to 280 ppm during the past 420,000 years but it has now increased to 379 ppm. 40% of known oil reserves have been exhausted by humans in the last 150 years that took hundreds of million years to generate, 50% land surface has been transformed affecting biodiversity, soil biology and climate, more nitrogen is fixed synthetically for fertilizers than is fixed naturally, >50% of all accessible freshwater is appropriated for human use and ground water resources are being rapidly depleted, concentrations of climatically important gases have substantially increased, coastal and marine habitats have been dramatically altered; 50% mangroves have been removed and wetlands are reduced by one-half, 22% of recognised marine fisheries have been depleted and 44% are at their limit of exploitation, and extinction rates have been increasing

sharply. This human-dominated era is therefore termed Anthropocene and is argued to have started since 1850. It should be emphasized that *Homo sapiens* is not only an invasive species capable of displacing all other species but is also a keystone species having the capability of changing profoundly the surroundings. This species appropriates more than 40% of the total terrestrial net production of the Earth.

The anthropogenic activities, to a great extent, are responsible for bringing about global climate change. Predictions indicate that the average temperature of the Earth's near surface could increase by 5.8°C, and sea level may rise by an additional 88 cm by the year 2100. The total temperature increase from 1850 1899 to 2001 2005 is 0.76 [0.57 to 0.95]°C, and the rate of sea level rise was 1.8 mm/yr between 1961-2003, and 3.1 mm/yr between 1993-2003. For India, predictions include: frequent dry days, 38% drop in per capita water

availability by 2050, 50 million people would be displaced in coastal areas due to sea level rise, by 2035 Himalayan glaciers may disappear and food grain production may fall by 30%, vector borne diseases and those associated with floods and droughts will increase, and 25% flora and fauna may be at a high risk of disappearance by 2030. World-wide, 2.2 billion people living under moderate or severe water stress will increase to 4 billion by 2025. The immediate task with Indian scientists includes (i) assessing climate change effects through systems and scenarios analysis, modeling, computer simulation, experimentation and data integration, (ii) developing strategies and policy options for adaptation with reference to food production, water resources, biodiversity and human health, and studying and analyzing trade offs, e.g. 3,500 litres of irrigation water will be needed for production of one litre of ethanol besides diversion of acreage from grain crops to sugarcane.

E-mail: [jssingh@bhu.ac.in](mailto:jssingh@bhu.ac.in)

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Dependence of humans on forest resources is high. 1.6 billion people rely heavily on tropical forest resources for livelihoods, 1.2 billion people in developing countries use trees on farms to generate food and cash, more than 2 billion people rely on biomass fuels (mainly fuel wood), natural products from forests are the only source of medicine for 75-90% of people in developing countries, thus one out of four of the world's poor depend directly or indirectly on forests for their livelihood. However, 350 million ha of tropical forests have been deforested (0.8% per year) and 500 million ha of secondary and primary forests have been degraded, affecting the generation and flow of ecosystem services vital for human well-being. More the poverty greater is the human dependence on forests, and greater the dependence, greater is the stress on remaining forests. This calls for sustainable forestry, which should include (i) harnessing the potential of forests to reduce poverty, integrating forests into sustainable economic development, and protecting local and global forest values.

Apart from deforestation, vast areas (air, water and soil) have been altered and contaminated by industrial, mining activities, and use of

fertilizers/pesticides. This calls for development of low cost technologies (e.g. solar-powered pollutant removal systems) for decontamination needed; in this respect phytoremediation using genetically modified plants holds promise.

Biodiversity is the underpinning of ecosystem services. These services include (i) provisioning Services- goods such as food, fresh water, wood and fibre, (ii) regulating Services- disease control, climate regulation, water purification, flood regulation, etc., (iii) cultural Services- education, recreation, etc., and (iv) supporting Services- nutrient cycling, soil formation, primary productivity, etc. 14 out of identified 24 services are now declining. According to one estimate, the current economic value of the 17 ecological services for 16 biomes is in the range of US \$ 1654 trillion per year. Issues need to be investigated include (i) how do changes in ecosystem structure and functioning affect delivery of ecosystem services?, (ii) location, abundance, rates of renewal and resilience?, (iii) how is the delivery of ecosystem services distributed across social groups ?, and (iv) how do people respond to changes in ecosystem service provision?

Studies indicate that we have entered into a phase of mass extinction; today we seem to be losing two to five species per hour from tropical forests alone. This amounts to a loss of 16 million populations of various species per year or 1800 populations per hour. This calls for concerted efforts at documenting species, their threat status and conservation. This is specially relevant because between 1970 and 2003, the Living Planet Index (biocapacity of the Earth) fell by about 30 per cent and as of 2003 Ecological Footprint (area of biologically productive land or sea required to produce food, material and energy) exceeded the Earth's biocapacity by 25%. Evidently, there is a need to reduce the ecological footprint through sustainable development. Some of the possible actions required for reducing the ecological footprint include (i) slowing population growth, (ii) reducing consumption of goods & services, (iii) reducing footprint intensity, (iv) extending bioproductive area, and increasing bioproductivity per ha.

Solutions for all of the above need concerted research efforts.

## Recommended Urban Forest Mixtures To Optimize Selected Environmental Benefits\*

Dommm<sup>3</sup>, A. Drew, R. Greene<sup>3</sup>, E. Ripley<sup>3</sup>, R. Smardon, and J. Tordesillas<sup>3</sup>

Allan Drew, Ph.D., Professor of Forest and Natural Resources Management, SUNY College of Environmental Science and Forestry, 1 Forestry Drive, Syracuse, NY 13210 USA Email: apdrew@syr.edu

<sup>2</sup>Richard Smardon, Ph.D., Professor of Environmental Studies, SUNY College of Environmental Science and 13210 USA Forestry, 1 Forestry Drive, Syracuse, NY, USA Email: rsmardon@esf.edu

<sup>3</sup>Graduate Students at SUNY/ESF

### Introduction

Urban forests are all the trees and other vegetation that grow in places where people live, work and play. This includes trees on public and private land, along streets, in residential areas, parks and commercial developments, and in other locations within a

community. Their proximity to people provides substantial environmental and recreational benefits to urban dwellers (McPherson, 2000). One of these environmental benefits is improving air quality through deposition of pollutants to the vegetation canopy, sequestration of atmospheric CO<sub>2</sub> in woody biomass,

and reduction of summertime air temperatures and associated ozone formation.

Urban forest carbon sequestration is an environmentally acceptable and cost effective way to reduce atmospheric carbon concentrations. As urban forests

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\*Contact Richard Smardon for full paper including figures and tables.

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are usually owned and managed by local governments, and are not subject to commercial harvest, they can become permanent reserves and thus, can be permanent repositories of carbon. As the growth of urban forests increases, so does their potential to store atmospheric carbon.

However, urban forests can reduce air quality through emissions of biogenic volatile organic compounds (BVOC's, primarily monoterpenes and isoprene) that are involved in ozone formation and carbon monoxide formation. BVOC's can also exacerbate smog problems. Fortunately, these compounds are temperature-dependent and increased urban tree cover is believed to lower overall VOC levels and therefore reduce ozone formation (Cardelino and Chameides, 1990).

Although researchers haven't fully determined the net effect of urban forests on air quality, results from modeling studies indicate that benefits can be substantial (Nowak, 1994.). Additionally, forests are one of the most cost-effective means of mitigating urban heat islands (Akbari, et al. (Eds.), 1992).

### Objectives

The objectives of the present study are:

To evaluate current contribution of the Syracuse USA urban forest to carbon sequestration, volatile organic compound emissions, and energy conservation; to predict forest species mix with recommended management options that will maximize selected urban forest functions.

The first objective will give us a baseline to make comparisons against. It will allow us to determine if improvements can actually be made to the urban forest mixture within some guidelines used by forestry professionals. The second objective will allow us to make recommendations for the future urban forest mix in Syracuse USA. We chose to focus on increasing carbon sequestration, which is an indicator of

removal of atmospheric carbon dioxide, reducing VOC emissions (isoprene and monoterpenes), which contribute to the production of ground-level ozone, and demonstrating energy savings from proper placement of shade trees.

### Methods

In order to determine an optimal forest mix based on selected urban forest functions, maximization of carbon sequestration and minimization of VOC emissions, USDA Forest Service UFORE data (USDA City Urban Forest Data Draft) for the city of Syracuse were analyzed. Specifically, data pertaining to the carbon sequestration levels of current urban forest species was analyzed. The carbon sequestration data and the leaf biomass for each tree species was used to calculate an average carbon sequestration per unit leaf biomass for each species per year. This information was used to determine the most effective trees at carbon sequestration. In order to determine VOC emission rates for specific species, data from two different papers was utilized (Guenther et al., 1994; Benjamin et al., 1996). This data was combined with the leaf biomass data for each species to create numbers that could be used to compare relative rates of VOC emissions for the trees being studied. The CO<sub>2</sub> and VOC data sets were merged to create one data set that compared both carbon sequestration and VOC emissions. This was used to determine the optimum trees to use for both of these functions.

To determine an optimal urban forest species mix, management recommendations by Nowak were utilized (Nowak, D. In-Personal Conversation). The following characteristics were focused on: 1) relatively large (at least 25 ft.), 2) long-lived (greater than 50 yr. lifespan), 3) disease resistant (e.g., eliminated American Elm (*Ulmus americana*) based on susceptibility to Dutch Elm disease), and 4) native or non-invasive species (e.g., eliminated Tree-of-Heaven (*Ailanthus altissima*) because of

invasive quality). In addition to the management recommendations, a species, genus, family ratio of no more than 10% of one species, no more than 20% of one genus, and no more than 30% of one family for the optimal species mix was utilized (Santamour, 1990). To select the urban forest mix based on the newly created CO<sub>2</sub> and VOC dataset, management recommendations, and urban forest diversity ratio, the Selectree tool provided online by Cal Poly's Urban Forest Ecosystems Institute was utilized (<http://selectree.calpoly.edu>).

Finally, energy conservation recommendations were based on a study done for the Greater Toronto Area by the Heat Island Group at Lawrence Berkeley National Laboratory (Lawrence Berkeley National Laboratory, 2001). Given the temperature similarities between Toronto and Syracuse, the general energy conservation recommendations based on urban forestry could be easily applied to Syracuse.

### Results

Using the data taken from the UFORE Study (USDA City Urban Forest Data Draft) for tree populations in Syracuse, NY, USA and carbon sequestration, and VOC emissions data from several different papers (Guenther et al. 1994; Benjamin et al., 1996), relative values for carbon sequestration and VOC emissions were calculated for each tree species.

The results of changing the urban forest mix varied greatly depending upon what the goal was. All results are in percent change from current conditions which were weighted averages amounting to 0.568 mt carbon sequestered/yr per mt leaf biomass and 8.134 ug VOC emissions/g leaf biomass per hr.

The Carbon Sequestration Maximization mix was able to increase carbon sequestration by 346% more than tripling the average carbon



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sequestration per unit leaf biomass, although it showed an increase in VOC emissions by 25%. The VOC Minimization Mix was able to virtually eliminate VOC emissions, as well as increasing carbon sequestration by 173%; however it did not take into account the overall health of the urban forest. The Optimum Mix without Forest Management Recommendations was able to improve upon this, again, virtually eliminating the VOC emissions, while showing an increase of 205% in carbon sequestration. This mix also did not take into account overall urban forest health. The Optimum Mix with Forest Management Recommendations tried to optimize carbon sequestration and VOC emissions while planning for urban forest health and longevity (Santamour, 1990; Nowak & O'Connor, 2001). This mix was able to increase carbon sequestration by 86%, while also reducing VOC emissions by 88%. In addition, the mix was made up of long-lived desirable trees that if planted in the correct locations can help to reduce energy use, thus reducing CO<sub>2</sub> emissions from power generation stations.

The benefits of shade trees have been demonstrated in a study of the Greater Toronto area (2001) sponsored by Lawrence Berkeley National Laboratory. The metropolitan area of Toronto has a population of over 4.2 million with nearly 1.5 million households. With 320 cooling degree-days and 420 heating degree-days, Toronto is one of the few metropolitan areas where a study has been done whose geographic location is somewhat similar to Syracuse, New York USA. The estimates of cooling and heating Avoided Peak Power (MW) and Annual Energy Savings (M\$) for the Greater Toronto area are substantial. The reduction of cooling energy equates to a reduction of approximately 31,000 kg of CO<sub>2</sub> emissions, using data from B.P. Global's carbon calculator (<http://www.bp.com/sectiongenericarticle.do?categoryId=9008658&contentId=7016688>).

#### **Discussion:**

The results of the data analysis for carbon sequestration indicate that the carbon sequestration capacity of the urban forest can be improved dramatically by changing the urban forest mixture. Varying degrees of improvement can result depending upon what changes are made in future tree planting proportions. There are two mixes that were studied that eliminated VOC emissions entirely. Both showed a significant increase in carbon sequestration as well. They did not, however, take into account good forest management practices, and because of this, they may result in an unhealthy forest, or one consisting mainly of small or short-lived trees. This would not serve to improve the aesthetics of the city.

The carbon sequestration maximization mix showed the greatest improvement in carbon sequestration, with an increase of over 300%, but it also showed an increase in VOC emissions, which may end up being inconsequential when compared to the CO<sub>2</sub> removal. It also did not take into account forest management practices, so it would be difficult to recommend as a mix to use for a long term planning strategy.

The Optimum Forest Mix with Management Recommendations was chosen as the best mix to recommend for long term forest planning. It showed modest improvements in both carbon sequestration and VOC emissions reduction, while taking into account the management practices recommended for a healthy forest. It uses a variety of tree species of both large and small trees that are long-lived. In addition, it includes trees that will be useful for reducing energy use, such as evergreens for wind breaks, and large deciduous trees that when properly positioned will provide useful shade in the summer.

The study of energy savings from trees in Toronto can be assumed to be very similar to energy savings that can be

achieved in Syracuse, due to similarities in climate and geography. Shade tree savings provided significant energy savings due to reduced need to use air conditioning in the summer. This equates to a significant reduction in CO<sub>2</sub> emissions, assuming that the energy used was generated using fossil fuels.

We have shown that significant reductions in greenhouse gases can be achieved using a few simple recommendations in the urban forest of Syracuse. If the urban forest mixture is changed to include more desirable trees, and the locations of certain trees are chosen carefully, Syracuse can easily become a contributor to the reduction of greenhouse gases in the atmosphere.

#### **Synthesis of Data Results:**

The results showed significant projected reductions in greenhouse gas output with the exception of carbon monoxide and volatile organic compounds. This reduction will help in improving the overall air quality in Syracuse, NY USA.

The effects of the urban forest will serve to reduce these numbers even more, decreasing the net (total output minus removal by the urban forest) amount of greenhouse gases and pollution released into the atmosphere by the city. The forest mix chosen as a recommendation by our group is projected to increase carbon sequestration by 86% over current urban forest contributions, thus decreasing the net greenhouse gases released by Syracuse. Unfortunately, trees take a long time to grow and to completely replace the current urban forest mix in Syracuse with mature trees that reflect the recommended mix may take up to 40 years. As revealed by our research, the urban forest is contributing to carbon sequestration in Syracuse. Further, significant increases in the carbon sequestration rate could be achieved if urban forest canopy cover increased. This can be accomplished through better management of the current urban forest as this will lead to

larger, longer-lived trees that are capable of sequestering more carbon. Canopy cover could also be increased

through enhanced tree planting and replacement efforts both of which, by increasing the number of trees in

Syracuse, would lead directly to an increase in canopy cover and additional carbon sequestration.



## NEWS AND VIEWS

### PLANTS LOVE MUSIC

Researchers from the National Institute of Agricultural Biotechnology in South Korea have studied the effect of classical music on plants by blasting the classical music over rice fields. They found that sounds at frequencies in the range of 125 Hz to 250 Hz made plant genes more active than sounds at 50 Hz. These findings could enable farmers to switch specific genes on and off to make crops flower at will or grow quickly.

We know that plants respond to various stimuli and Sir J.C. Bose identified the sensitive nervous systems of plants, which prompted them to respond to shocks just like animal muscles. Bose also found that plants grew more quickly when exposed to pleasant music and slowly amid harsh sounds.

Besides their musical taste, plants actually communicate chemically with one another, too. For instance, research shows that spider mites let loose on Lima bean plants, prompt the injured plants to release a chemical that changes their flavour, making them inedible to the mites. The plants then release more chemicals that drift away to other plants, triggering the same defensive mechanism before the mites even reach them. Scientists believe this is the plants' way of screaming, "I am being attacked". Some of these chemicals attract a whole new batch of mites that, rather than eating the plants, prefer to eat the mites attacking them.

Agricultural scientists could some day genetically engineer these floral defences into crops to reduce the need

for chemical pesticides.

**Prakash Chandra**

(in Hindustan Times)

<pchandra@hindustantimes.com >

### MAGNOLIA CAN CURE BAD BREATH

Bad breath or halitosis is a major social and psychological problem that affects the majority of the general population. Earlier, it had been claimed that Magnolia could also alleviate the symptoms of condition ranging from rheumatism to asthma. Researchers in U.S.A. have recently discovered that the Magnolia bark extract demonstrated a significant anti-bacterial activity against organisms responsible for oral malodour and can be incorporated into mints and chewing gum for improved breath refreshing benefits. It was found that among volunteers the Magnolia mint had killed more than 60% of bacteria, compared to 3.6% among those who had consumed a normal mint. Bacteria killed included those responsible for halitosis, as well as *Streptococcus mutans* blamed for tooth decay.

Standard mints and mouth washes only really mask bad breath temporarily and while chewing gum can be effective due to its ability to increase the flow of saliva, this research might be another step forward in developing an even greater role in good oral health practice.

**B B C News**

### DIESEL POLLUTION DANGEROUS FOR HEART

It is well established that long term exposure to air pollution increases the

risk of heart problems. WHO has estimated that it causes 800,000 premature deaths worldwide each year. Air pollution reduces blood flow and interferes with the body's natural ability to break up blood clots according to a research study published in the New England Journal of Medicine.

During the study the researchers tested 20 male volunteers, all of them heart attack survivors, who pedaled an exercise bike while breathing diluted fumes from the exhaust of an idling volvo diesel engine. The exposure was comparable to the pollution levels found while driving in traffic. The researchers found that when the volunteers breathed diesel fumes, their hearts were far more likely to be starved of oxygen than when they were breathing clean air. On testing the blood samples it was found that the fumes inhibited the body's natural system of breaking down the clots that can spark a heart attack or stroke.

The study was specific in evaluating the effects of dilute diesel exhaust, an extremely complex mixture of particles and gases. It was not possible to determine the constituents of diesel exhaust, which were responsible for the observed effects.

Physical exercise is already known to be beneficial for heart and it especially decreases the risk that a person will have a heart attack while exerting himself. However, the risk-benefit ratio may be optimized if people exercise away from traffic.

**Genbe Emeri** in PLANET ARK

## 'CARBON FOOTPRINT' ENTERS EVERYDAY VOCABULARY

Buying locally-produced fruit and vegetables, riding bikes or taking the train instead of using private cars, buying carbon offsets and staging carbon-neutral weddings: all are part of the climate-change awareness taking root in many countries. Individuals keen on reducing their "carbon footprint" the dangerous greenhouse gas that each of us emit through our purchases and activities can now turn to a multiplying panoply of tools to calculate their pollution, reduce it or compensate for it. "Our daily habits are responsible for 50% of greenhouse gas emissions," says France's Agency for the Environment and Control of Energy (ADEME).

Transport alone causes a quarter of global greenhouse gas emissions, and even though automakers are making efforts to reduce carbon dioxide (CO<sub>2</sub>) in new vehicles, the "clean car" still does not exist outside the research lab.

On journeys of around 1,000 kilometers in France, an express train emits roughly a quarter less CO<sub>2</sub> than an aircraft per passenger, according to ADEME. A bus emits between 10 and 20 times less CO<sub>2</sub> than a car, and both are of course beaten for greenness by walking and cycling if distances permit. If you have to use a car, keeping your speed down can also help to reduce emissions. Very fast driving can increase a car's CO<sub>2</sub> emissions by 40%. Another energy saving method is to climb stairs rather than use lifts and escalators, a practice actively encouraged in Japan and Belgium for example.

Climate Action Network (CAN), an international collective of environmental groups, including Greenpeace and Friends of Earth, lists "50 Top Tips" by which an individual can make a dent on global warming (<http://www.climnet.org/publicawareness/toptips.htm>). They include adjusting the thermostat, turning off TVs and

computers and, rather than leave the office machine on, transferring the hot brew to a Thermos flask.

AFP, Paris

## GLOBAL WARMING BLAMED FOR ATLANTIC HURRICANES

Climate scientists have blamed global warming for dramatic rise in the number of storms in the Atlantic over the past century. Their study showed that the average number of storms that develop every year has doubled since 1905. They suggested that the trend is due to the rise in sea surface temperatures, a phenomenon with a well-established link to climate change.

Tropical storms are powered by the energy in the oceans they pass over, with warmest sea surfaces leading to more intense storms. In the past century, the surface temperature of the Atlantic has risen by 0.7°C.

The increase in storm frequency was most recently visible in 2005, with more than double the average number of storms, including Hurricane Katrina, the most costly natural disaster in U S history. It claimed almost 2000 lives.

In a recent study carried out by the National Centre for Atmospheric Research it was found that between 1905 and 1930 there was an average of six major storms a year; the annual average rose to 10 storms between 1931 to 1994 and finally to 15 storms a year from 1995 to 2005.

*The Guardian*

## WHAT ARE CARBON CREDITS?

One carbon credit is equivalent to one tonne of CO<sub>2</sub> EMISSION. Credits can be sold in the international market at the prevailing prices via certain credit exchanges. Formalised in the Kyoto Protocol, carbon credits help developing/under developed countries as they traditionally have a lower per capita carbon emissions than developed countries and will need to emit CO<sub>2</sub>

owing to increasing industrial growth. At this point, these countries can sell their carbon credits to other countries and reap economic benefits of not polluting the planet.

Amol Badsra  
(Times of India)

## VISION LOSS DUE TO INDOOR POLLUTION

A 15-year old girl developed blurred vision, vomiting and subsequently complete loss of vision while working in a factory in Karnataka State which processes ornamental plants for export. The kind of work she had to do was to plant freshly cut stems of different household plants in bottles. For decontamination, the workers had to apply isopropyl alcohol. Some rays are focused on plants to kill the germs. The workers were supposed to wear glasses while entering the room where the plants were kept. Some time workers were exposed to isopropyl alcohol fumes due to non-availability of glasses. According to the medical report from the super-specialty Hospital, where the girl was treated she continued to have 'ill sustained pupillary radiation'.

Source: Times of India

## POISON GAS IN THE ATMOSPHERE

Phosgene was used as a chemical weapon in the trenches in the First World War, but an international team of scientists has discovered that it is present in significant quantities in the atmosphere today. Phosgene was still stockpiled in military arsenals but its continued presence in the atmosphere today is due to man-made chlorinated hydrocarbons used in the chemical industry.

Phosgene plays a major role in the preparation of pharmaceuticals, herbicides, insecticides, synthetic foams, resins and polymers. Chlorinated hydrocarbons don't occur in nature but as chlorinated solvents they are used by industry. They are short-lived and they decay rapidly into phosgene.



## CONFERENCES

**3rd International Conference on Global Warming and Climate Change (GWCC 2008)**  
February 22-25, 2008. London, U.K.  
Conference Chair: Dr. John Mukapa  
(E-mail: mukapa@idorg.org)  
Contact: Ms Stella Gray (E-mail: registration@idorg.org)

**International Conferences of Plant Scientists**  
27 Feb. - 1 March 2008; Faisalabad, Pakistan.  
Contact: Prof. Dr. Muhammad Ashraf  
E-mail: ashrafbot@yahoo.com  
Dr. Muhammad Yasin Ashraf  
E-mail: niabmyashraf@yahoo.co.uk

**Fourth International Conference on Waste Management and the Environment**  
2 - 4 June 2008, Granada, Spain  
Organised by: Wessex Institute of Technology, UK  
Email: rcreasey@wessex.ac.uk

**International Conference on Plants & Environmental Pollution**  
July 6-11, 2009. Erciyes University, Kayseri, Turkey.  
Secretariat: Dr. Dilek D. Yılmaz, Dr. Fatih Duman  
Erciyes University, Faculty of Science, Biology Department, 01130 Kayseri, Turkey.  
E-mail: aksoy@erciyes.edu.tr

**XVI Congress of the Federation of European Societies of Plant Biology (FESPB)**  
17-22 August 2008; Tampere, Finland  
E-mail: fespb2008@congrex.fi

**Air Pollution and Climate Change at Contrasting Altitude and Latitude**  
7-12 September 2008. Murten, Switzerland  
Email: loewenberg@sbb.ch

**23<sup>rd</sup> IUFRO Conference for Specialists in Air Pollution Effects on Forest Ecosystems**  
7-12 September 2008; Murten, Switzerland  
Website: [http://www.wsl.ch/iufro\\_ch\\_2008/index\\_EN](http://www.wsl.ch/iufro_ch_2008/index_EN)

**9th International Congress on Plant Molecular Biology**  
October 25-30, 2009; St. Louis, Missouri USA  
Contact: J. Perry Gustafson  
E-mail: ipmb2009@missouri.edu

**Conference on Forest Bioenergy and Climate Change**  
20-21 March, 2008; Casablanca, Morocco  
Contact: Dr. Mohammed Ellatifi, Conference Chair  
E-mail: sylvia.world@yahoo.fr

**Urban Transport 2008**  
1-3, September; Malta  
Rachel Creasey Secretariate  
Email: rcreasey@wessex.ac.uk

## BOOKS



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