ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

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BANGARI MUTA MAATHAI – A TRIBUTE

Bangari Muta Maathai, the first African Woman recipient of the Nobel Peace Prize died on 25 September 2011 after a long struggle with cancer. She was 71. Maathai won the Nobel Prize in 2004 for combining environmentalism and social activism. She was the founder of the Green Belt Movement, where over 30 years she mobilized poor women to plant over 30 million trees. Maathai's inspiration for her life's work came from childhood experiences in rural Kenya, where she witnessed forests being cleared and replaced by commercial plantations, which destroyed biodiversity and the capacity of forests to conserve water.

Maathai was also awarded the Indira Gandhi Prize for Peace, Disarmament and Development 2006 by Ms. Pratibha Patil, President of India in New Delhi on November 19, 2007, for her contribution to environmental protection.

- Members of ISEB are requested to immediately intimate any change in their contact address including postal, Email, Fax, Telephone to ISEB office.
- All correspondence should be addressed to: The Secretary, International Society of Environmental Botanists, National Botanical Research Institute Campus, Lucknow - 226 001 (India).
- E-mail: isebnrilko@sify.com • Website: http://isebindia.com

LETTERS

I read with great interest, Dr. C.S. Nautiyal's article "Biofertilizer and biopesticide for developing world: A boon for sustainable agriculture" in the Environews. I am grateful to ISEB for sending the newsletter to me on a regular basis.

I participated in the 12th International Symposium on Soil and Plant Analysis at the Mediterranean Agronomic Institute in **Chania**, Crete, Greece, June 6-10.

I retired from the Canadian Forest Service, Natural Resources Canada last year after serving the department for almost 43 years as Soil Chemist (Head, Soil and Plant Analysis).

Yash P. Kalra
Retired Soil Chemist, Canadian Forest Service,
Natural Resources Canada, Edmonton, Alberta, **Canada**
E-mail: yashpk1@hotmail.com

Thanks for sending the information and the link to newsletter. I found the newsletter very interesting.

Ramesh V. Bhat
Kakateeyanagar, Hyderabad 500007, **India**
E-mail: rameshvbhat@yahoo.com

I am highly interested in the International Conferences on Plants & Environmental Pollution (ICPEPs) which are being organized by you from time to time. Kindly tell me when you are going to organize the next Conference.

Dr. Ms. Mehwish Jamil Noor
Dept. of Environmental Sciences
Fatima Jinnah Women University, Rawalpindi, **Pakistan**
E-mail: mehwish_jn@yahoo.com

When I was working with Sahyadri Nisarga Mitra for the conservation of Marine Turtle and vulture along the coastline of Maharashtra state of India, I found that large and tall trees, have gradually vanished while rumpled vultures laying eggs in the nest made on the top of those trees are now using coconut trees for the nesting, which is a cash crop for the farmers of that area. Hence, a conflict has been started between farmers and vultures. Also due to droppings of these birds the whole plant dies after a year.

Therefore, I am looking for the list of tallest plants, which can grow more than 30m. If I get such list I will make sampling of it and would recommend their planting along the sea coast of India.

Ram Fugare
Mudhe galli, Tah- Mangalwedha,
Dist- Solapur-413305, Maharashtra State, **India**
E-mail: ramfugare@yahoo.com

I am writing this mail to you regarding "The Fifth International Conference on Vetiver (ICV-5)" which is being organized by the CSIR-CIMAP, Lucknow from 28-30 October 2011. The theme of the ICV-5 is "Vetiver and Climate Change". Vetiver is now grown in over 100 countries for its multifarious environmental applications.

Although, India is the native home of Vetiver, but this conference dedicated to this miracle grass is being held in India for the first time. Further details about the conference are available at **http://icv-5.cimap.res.in/**

U.C. Lavania
Organizing Secreatary : ICV-5
Central Institute of Medicinal and Aromatic Plants
Lucknow 226 015, **India**
E-mail: lavaniauc@yahoo.co.in

We, the Science Pub Publications support@scipub.org would like to offer our services to publish all accepted Research/Review articles and short communications (full length) presented in the Fourth International Conference On Plants & Environmental Pollution (ICPEP-4), organized by you in one of our journals. Our offer is a step forward to fulfill our objectives:

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I feel very happy to learn that ISEB is opening regional chapter at Kolkata (W.B.). I am equally interested to open ISEB regional chapter in Mehsana (Gujarat). I am sure that you will strongly support my proposal. I look forward to have a positive response.

Prof.(Dr.) K. M. Patel
(Retd. Principal Muncipal Arts & U.B. Science College,
Mehsana, Gujarat. **India)**
kmpatel.flyfortune@gmail.com

We would like to open a Regional Center of your esteemed ISEB in Chandigarh. My cv is enclosed for your kind perusal. I am looking forward to have more interactions with you and ISEB.

Dr. Swaranjit Singh Cameotra
Senior Principal Scientist, Institute of Microbial Technology,
Chandigarh, **India.**
Emails:swaranjitsingh@yahoo.com, ssc@imtech.res.in

WELCOME NEW MEMBERS

Patron Member

Prof. O.P. Agrawal, is the President, International Council for Biodeterioration of Cultural Property (ICBCP), Lucknow, India

icbcp1995@gmail.com

Life Members

Mr. Vasant Ramakant Pusalkar is Managing Director, Aruna Planta Medica, Alagapuram, Salem, Tamil Nadu.

vrpusalkar@yahoo.co.in

Dr. R.P. Sinha is an Associate Professor in the Laboratory of Photobiology & Microbiology, Centre of Advanced Study in Botany at Banaras Hindu University, Varanasi.

r.p.sinha@gmx.net

Miss. Richa is a Research Scholar in the Department of Botany at Banaras Hindu University, Varanasi.

connectingricha@gmail.com

Dr. Manisha Halder (Biswas) is a Senior Research Fellow in Species Survival Society (Ref.: www.natureindian.net), Kolkata.

maniurdr1@hotmail.com

Dr. S.K. Srivastava is Dean, Faculty of Science at Amity University, Lucknow.

sksrivastava@lkoamity.edu

Dr. Mrs. Elizabeth Margaret is Head, Department of Botany at St. Anns College for Women Mehdipatnam, Hyderabad.

Margaret_nje@yahoo.com

Dr. Sukumar Sarkar is an Associate Professor of Botany at Presidency University Kolkata.

sarkarsdss@hotmail.com

Dr. Geetha S. Menon is an Associate Professor at Arts Science & Commerce college Ulhasnagar Thane Maharashtra.

drgeetamenon@gmail.com

Dr. Swaranjit Singh is a Senior Principal Scientist at IMTECH Chandigarh.

ssi@imtech.res.in

NEWS FLASH

A team of ISEB officials led by Ms Kanti Srivastava, Convener Awareness Programme Committee and comprising, Ms. Aparna Chakraborty and Vijay Kumar Yadav carried out an awareness and educational Programme in Narharpur Primary School about 22 km from Lucknow on 9th August 2011. During their interaction with the school children and villagers, the volunteers explained various environment related issues as also the importance of local medicinal plants and the ecological hazards of Parthenium weed growing abundantly in the area.

Nominations Open for UNEP's Champions of the Earth Award

2012 Awards Come in Run Up to Rio + 20 and UNEP's 40th Anniversary Celebrations

Nominations are now open for the 2012 Champions of the Earth – the United Nations' flagship environment award that recognizes outstanding visionaries and leaders in the fields of policy, science, entrepreneurship and civil society action.

The prize, which is organized by UNEP, seeks to honor men and women whose actions and leadership have made a positive impact on the environment. Whether by helping to improve the management of natural resources, demonstrating new ways to tackle climate change or raising awareness of emerging environmental challenges, the Champions of the Earth should serve as an inspiration for transformative action across the world.

Members of the public can also nominate a candidate who they believe is a true champion of green development. Nominations will be accepted until October 31, 2011 and can be made via the website: www.unep.org/champions

unepasiapacificregionalnews@un.org

Dr. Swaranjit Singh Cameotra, a Life Member ISEB & Sr. Principal Scientist in IMTECH Chandigarh was awarded the prestigious **Loyola Award** in an impressive ceremony on the 29th August 2011 for his excellent work on Biosurfactants. He has guided 6 Ph. D. students and four are currently working with him. He had joined MTCC in IMTECH in 1987 and has worked extensively on Environmental Biotechnology, Biodiversity and Microbial Biochemistry. Dr. Cameotra is a Member of the WFCC Task Group.

E-mail: ssc@imtech.res.in

World's Population

In the coming days, a baby will be born who will take the global population above 7 billion (7,000000000) for the first time in the history of our planet.

SCIENTIFIC LITERATURE RECEIVED BY ISEB ON GRATIS

1. **A World of SCIENCE**: Vol. 9, No.3, July-September 2011 (Natural Sciences Quarterly newsletter published by UNESCO, Paris)

   www.unesco.org

2. **Acid News:** No. 2, June 2011(Published by Air Pollution & Climate Secretariat, Gotenborg, Sweden)

   http://www.airclim.org/acidnews/index.php

3. **PLANET Earth:** August 2011and September 2011 issues Published by Gateway Media, Hyderabad, India (Executive Director: Ramprasad)

   www.planetearth-india.com

OBITUARY

Dr. Vinod Bhakuni, Head of the Division of Molecular & Structural Biology at the Central Drug Research Institute Lucknow passed away on15th July 2011after a sudden cardiac arrest. He was 49. Dr. Bhakuni was a highly promising scientist of international fame. He was elected as a Fellow of Indian National Science Academy. He was awarded Shanti Swarup Bhatnagar Prize in the field of Biological sciences in the year 2006.

Dr. Peerzada S.H. Khan, former Scientist of National Botanical Research Institute Lucknow and a noted plant taxonomist and seed biologist passed away in Lucknow following a heart attack on 19th July 2011. He was 80. With his trade mark Sherwani and Cap, Dr. Peerzada was very popular in social, cultural and academic circles of Lucknow.

Dr. D.D. Awasthi, former Reader in Botany at the University of Lucknow and a former Emeritus Scientist (CSIR) expired on 21 August 2011in Lucknow after a brief illness. Dr. Awasthi was 89. Considered to be the doyen of Lichenology in India, Dr. Awasthi established a world famous School of Lichenology at the University of Lucknow which produced enormous work on Indian Lichens. He was a Fellow of the Indian National Science Academy.

Many of Dr. Awasthi's students are occupying positions of eminence in India and abroad. In the ISEB family, the President, two Vice-Presidents, Secretary, Treasurer, several Executive councillors and scores of members were his students.

THE TWO SIDES OF NITRIC OXIDE (NO). A BRIEF HISTORY: HOW A POLLUTANT BECOMES A GOOD FRIEND FOR PLANTS AND ANIMALS.

By Francisco J Corpas
Department of Biochemistry, Molecular and Cellular Biology of Plants, Estación Experimental del Zaidín, High Council for Scientific Research (CSIC), Apartado 419. E-18080 Granada, **Spain.**
E-mail: javier.corpas@eez.csic.es

The gas nitric oxide is one of the most simple molecules in nature because it is composed of one atom of nitrogen (N) and one atom of oxygen (O), "NO" being its chemical formula. During the Seventies, the attention in this gas was focused on its participation in the air pollution because nitric oxide (NO) contributes to acid rain, and is also involved in the depletion of the ozone layer. Both aspects have harmful effects on plants, environment and human health. For that reason this molecule was considered as "toxic".

However, the scientific perception on NO suffered a drastic and significant change during the eighties when different scientific researchers identified that nitric oxide (NO), in fact, was the endothelium-derived relaxing factor (EDRF). It means the molecule regulates vasodilation of the blood vessels. This finding was published in 1986 independently by two researchers, Prof. Salvador Moncada (awarded with the Spanish "Prince of Asturias Scientific and Technological Research Award" in 1990) and Prof. Louis Ignarro (awarded with the Nobel Prize for Medicine in 1998). This discovery provoked a revolution in the research on NO because the basic investigations showed how a gas which contributed to air pollution is also produced inside of the cells providing important benefits.

Years later, it resulted in a boom in the NO research. Thus, it was demonstrated that this gas was generated in mammalian cells from the amino acid L-arginine by a family of enzymes designated as nitric oxide synthases. Furthermore, it was demonstrated that in animals, NO was also involved in an ample spectrum of key physiological functions affecting the cardiovascular, immune, and nervous systems. At present, it is well established that the alteration in NO production is also involved in a wide array of human pathologies such as tumours, heart disease, asthma, infectious diseases, diabetes, hypertension, atopic dermatitis, Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis, among others. As a result, numerous investigations are underway to develop nitric oxide based drugs by the pharmaceutical companies.

In plants, the research on NO started later, principally during the nineties. In

the same period, it was also demonstrated that NO is also produced inside of plant cells, although with different mechanisms. This molecule was also involved in the important functions of plant growth and development, including seed germination, root growth, flowering, pollen-tube growth regulation, fruit ripening, senescence, defence response against pathogen and environmental stresses. In this sense, plant research in this area could contribute to establish biotechnological strategies to improve plant productivity or mechanism of defence against adverse environmental conditions (i.e. extreme temperature, drought, salinity, etc.) which are responsible for major losses in plant yield and crop productivity.

To summarise, it could be concluded that the basic scientific research can contribute towards understanding the greatness of Nature and a good example is the discovery of the two sides of NO, a simple gas molecule considered a pollutant which is also produced inside of the animals and plants where it regulates an ample number of physiological functions providing multiple beneficial effects.

LICHENS - A POTENTIAL ORGANISM FOR SUSTAINABLE AGRICULTURE

Rajesh Bajpai and Dalip K. Upreti
Lichenology Laboratory, CSIR-National Botanical Research Institute
Rana Pratap Marg, Lucknow-226001, India
bajpaienviro@gmail.com; upretidk@rediffmail.com

When most people see lichens growing on trees, rocks, electric poles and decaying wood they believe, they are plants. In facts, lichens and the partners from three different kingdoms are both taxonomically and physiologically a very diverse group, which makes them interesting from both ecological and biotechnological point of view. They are the stable vegetative products of a mutually beneficial symbiotic relationship between a fungus and cyanobacteria or green alga, capable of producing food by photosynthesis.

This highly successful strategy for nutrition, transferring carbon from the photosynthetic 'producer' to the fungal 'user', allows lichen associations to become 'plantlike', and thereby to exploit a much wider range of terrestrial habitats than would otherwise be available to fungi alone.

In general, three major life forms of lichen thallus are recognized: crustose (crust-like biofilm), foliose (leaf-like), and fruticose (branched tree-like, shrubby and pendulous) thalli. A fourth type, gelatinous thallus, is restricted to some cyanobacterial lichens. Even without roots, lichens can efficiently extract nutrients (Phosphorus, Magnesium, Calcium, Potassium, Sulfur, and Iron) from recalcitrant surfaces. Lichens often grow in habitats with extreme light, dryness, or temperature, which are less favorable or unsuitable for higher plants. Both mycobiont and the algal photobiont may participate in seasonal photoacclimatization in green algal lichens. The light and desiccation tolerance is greater in the lichen symbiosis than in its isolated partners. Lichens adapted to open habitats tolerate extreme desiccation and UV exposure via their screening cortical pigments by preventing the formation of or by scavenging free radicals. Lichen thalli are poikilohydrous, which means that their water status passively follows the atmospheric humidity and the presence of water, rapidly activates lichen metabolism. The continuation of water metabolism, green algae in lichens are able to activate their photosynthesis with water vapor while cyanobacteria in lichens need liquid water. Due to this reason green algal lichens survive in dryer habitats than cyanobacterial lichens. Some cyanobacterial lichen species with gelatinous polysaccharides-containing thalli and green algal lichens with cushious water-storing thalli are able to extend their daily metabolism compared to thin, easily drying lichen species.

Lichens and their natural products have a long history for their use in decorations, brewing/distilling, perfumery, dyeing industries, food, pollution monitoring and climate change. Lichens are an integral part of all ecosystem, they are often responsible for either fixing or capturing essential nutrients from the air.

A famous lichenologist Trevor Goward, says that "Lichens are fungi that have discovered agriculture" (Dayan & Romagni 2001). This statement elaborates that the lichens are common primary successional species, preparing a previously barren landscape for other plants and organisms to exploit. Lichens secondary metabolites in particular the weak acids, begin the breakdown of sedimentary and igneous rocks, providing a loose soil matrix in which other nonvascular and vascular plants can root. With modern technology, the potential of discovering and utilizing useful metabolites in lichens has increased simultaneously and may open new path of research.

The success of modern agriculture can be attributed, in part, to the advance in the chemical control of pests, weeds and to prevent insect and microbial damage to crops by chemical means, accompanied by the use of fertilizer, as helped to drive the 'green revolution' of the last 5-6 decades (Dayan & Romagni 2001). However, public concern over the effects of xenobiotic compounds such as pesticide, fertilizers on the environment and human health have caused a dramatic change in the attitude toward synthetic pesticides as well as fertilizers. Natural products are now being considered as an alternative to the arsenal of synthetic compounds. This

paper provides a brief note on the potential use of lichens in production of biopesticide and biofertilizers in near future for sustainable agriculture.

Ecologically, lichens are also important as major nitrogen-fixers in grassland and forest ecosystems. Lichens, especially those that have the capacity of fixing nitrogen, grow a good deal more quickly than is generally imagined, making them important as 'biological fertilizers', some producing 2–4 cm linear or radial growth per year in a short burst of winter growth (cyno lichens). In this role lichens are important in colonising disturbed habitats – perhaps investigation into possible practical applications of lichens in habitat restoration could be useful.

The cyanolichens such as *Collema*, *Leptogium*, *Lobaria*, *Peltigera*, *Cococarpia* and *Peltula* are abundantly found in India. All are containing *Nostoc* cyanobacteria in their thallus except *Cococarpia* and *Peltula* having different phycobiont like *Sytonema* and *Anacystis* respectively. They have large thallus (foliose) except *Peltula* (Squamulose) and have great capacity to fix atmospheric nitrogen and leading to maintain the ecosystem. Lichen communities are therefore vital primary producers in the cycling of carbon and nitrogen nutrients in our forest and grassland ecosystems, and in addition, they can tell us a great deal about the health of our environment. About 78.084% of nitrogen is freely found in the atmosphere. It is a single gas in the atmosphere that cannot be used directly by either plants or animals and must be concentrated to a reduced state in order to be useful for higher plants and animals. In the atmosphere, it exists in inert nitrogen form and must be converted before it becomes useful in the soil. Some microorganisms (nitrogen fixing bacteria) can utilize atmospheric nitrogen to manufacture nitrogenous compounds for use in their own cells. This process called biological nitrogen fixation, requires a great deal of energy. Therefore, free living organisms that perform the reaction, such as *Azotobacter* generally fix little nitrogen each year (less than 20 lb/acre) because food energy is usually scarce. Most of this fixed nitrogen is released for use by other organisms upon death of the organism. Bacteria such as *Rhizobia* receive much food energy from legume plants can fix much more nitrogen per year (100 lb/acre) a number of unrelated plant species such as *Alnus*, Lichen, *Myrica* and *Gunnera* also seem to capture minute nitrogen (Hermann *et al*. 2007).

Osborne & Sprint (2002), highlight the ecological significance of cyanobacteria in lichens and their impact in nitrogen cycling in nutrient-poor environments where nitrogen leaks from growing and degrading lichens. Prevention of desertification and restoration of desertificated lands could be aided by focusing land restoration on biological soil crusts comprised of mosses and nitrogen fixing cyanobacterial lichens (Bowker *et al*. 2005). The latter may also play an important role in increasing soil water-holding capacity and nutrient availability. It is proposed that lichen fragments as well as culture could be combined with plant seeds and adapted to extremes and sand-fixing liquid mixture, which is sprayed on to desertificated land (Yang 2002). The lichen thallus can be cultured in a stainless steel bioreactor with specific growth medium. After some time (abundant biomass produced) it is taken out from bioreactor and mixed with some carrier and supplied to the farmers. The biotechnological aspects of lichens that is recombinant DNA technology, identification of resistant gene from phyocobiont and its inoculation may be useful for future. The use of lichen cyanobacteria coupled with various crops may improve the soil health of the agricultural field. In developing countries like India the conventional agricultural practices are more common and need advancement. Leading to these context this type of low cost fertilizer input to the field is beneficial for the farmers in reducing the dependency on synthetic fertilizers.

In other aspects lichens are also well known organisms to produce about more than 850 different types of secondary metabolites. These metabolites are derived from three pathways such as, Acetate polymalonate pathway, Mevalonic acid pathway and Shikimic acid pathway. The common metabolites atranorin, zeorin, parietin, norstictic, lecanoric and usnic acid are the most frequently occurring secondary metabolites in lichens. Majority of these chemicals are produced by the species of lichen genera *Lecanora, Parmotrema, Heterodermia, Cladonia, Xanthoparmelia, Lepraria* and *Diploschistes*.

At present, most of the secondary metabolites are successfully targeted against various human pathogens in India and abroad. The medicinal aspects of lichens has turned to new directions after the untiring research work done by Japanese workers, who studied the anti-tumor and anti-HIV activity of lichens (Upreti & Chatterjee, 2001). But the crop pathogenic activity has been neglected. Lichen metabolites have the capacity to develop defense against several pathogens such as anti fungal, anti viral, anti bacterial and anti cancer are proven as best biocontrol agents (Table-1). In agricultural practices the lichen metabolites (mycobiont culture/ lichen fermentation) may be used against several crop plant pathogens like Fusarium, Alternaria, Phytopthora, Albugo etc as well as other bacterial and viral pathogens. These metabolites may be used during seed sowing (mixed with seeds) or spraying over seedlings it develops defense at rhizosphere as well as phyllosphere region of the crop plants.

The lichenological application in agriculture may proven a better option in near future for crop improvement and safe environment. This type of study needs more research in this way against targeted organism and make commercialized products (lichenoproducts) for sustainable agriculture and eco-friendly environment.

TABLE 1 Targeted lichen metabolites

Metabolites	Target	References
Evernic acid, extracts of *Evernistrum cirrhatum* , *E. prunastri*	Fungicidal: strong growth inhibition of plant pathogens	Halama & van Haluwin (2004)
Extracts of *Ramalina farinacea*	Antiviral: reduced lenti - and adenoviral infectivity	Esimone *et al.* (2005)
Ext ract/purified compound from *Collema*	For 80% UVB protection: UV absorbency 220 –425 nm	Claes *et al.* (2005)
Gyrophoric acid	Antiproliferative effect (cytostatic)	Kumar & Müller (1999)
Usnic acid	Antimicrobial, antiprotozoal, antiviral, antiproliferativ e, anti-inflammatory, antipyretic, analgesic. Eukaryotic protein kinases inhibition. Against bacterial biofilm. Fungicidal: total/strong growth inhibition of plant pathogens	Davies *et al.* (2002), Francolini *et al.* (2004), Halama & Van Haluwin (2004)
Vu lpinic acid	Eukaryotic protein kinases inhibition	Davies *et al.* (2002)
Atranorin	Inhibition of leukotriene B4 biosynthesis in leukocytes	Kumar & Müller (1999b)
Compounds from *Cladonia* sp.	Antimicrobial: for packages of frozen food	Savvateeva *et al.* (20 02)

ENVIRONMENT, CLIMATE CHANGE AND DISASTERS: CHALLENGES FOR NATURAL RESOURCE MANAGEMENT

Anil Kumar Gupta and Mohammad Yunus
School of Environmental Sciences, Baba Saheb Bhimrao Ambedkar University,
Vidya Vihar, Rae Bareli Road, Lucknow, India
mykabdali@yahoo.co.in

Mother Earth has enough to satisfy the need but not the greed of its children' said Mahatma Gandhi, proves much relevant in times of recent challenges of climate-change. Environmental changes, be the natural or man-made, are increasing hydro-climatic disasters. These disasters are, for example, floods, drought, cyclone, vegetation fire and pest attacks. Incidences of extreme events like heat wave, cold wave, hailstorm, cloudburst, fog and smog, have become frequent, intense and more uncertain to forecast. Warnings of such disastrous risks have been given by environmental scientists and writers since 70s in 20th century.

Global distribution (1993-2002) indicated 42% of catastrophic disasters occurred in Asia where most people's life and livelihood directly depend on natural resources. 66% of those affected were the low human development index people. In recent years, 90% of natural disasters worldwide have been related to water and climate; floods account for nearly 70% of the people affected in Asia. During 1991 to 2000, Asia accounted for 83% of the population affected by disasters globally. In India, 62% of net sown area covering 13 states is chronically prone to drought, whereas more than 50 million hectares is prone to various degrees and kinds of flood disasters. 5700 Km long coastlines are prone to cyclone, coastal erosion, salt water intrusion and coastal droughts.

Environment and Disasters

Environmental degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems, habitat and the loss of natural homeostasis. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable, be it

quantitative or qualitative. Disasters are the events of environmental extremes which are inevitable entities of this living world.

Climate-change, land-use and natural resource degradation are known to generate or aggravate disasters especially those of the hydro-meteorological origin. Increasing trend of these disasters like floods, drought, cyclone, pest-attack and fires, world-wide and especially in continents of Asia and Africa is a serious concern for governments and communities. Besides causing new hazards and aggravating precursors of disaster events, degradation of environment increases socio-economic vulnerability. Bioproductivity, livelihoods, water, food and nutrition, sanitation and health, housing, entrepreneurship and economics, are the key components of vulnerability reduction and capacity development.

Disaster events are known for serious impacts on environment affecting natural processes, resources and ecosystems, and thereby creating conditions for secondary or new disasters including complex emergencies, epidemics or conflicts. Environmental sustainability is also compromised during disaster management operations and recovery process due to improper disposal of disaster and relief waste, acute exploitation of natural resources and inappropriate landscape modifications.

Climate-change Impacts

'Climate-change' has been rated by Time magazine survey (2008) as top ranking human-made disaster. Intergovernmental Panel on Climate-change (IPCC) in its 4th Assessment Report released in 2007 have categorically reinforced climate-change impacts in the form of disasters and natural resource challenges. These impacts can be roughly grouped into following two categories:

Environmental impacts:

- physiological effects on crops, pasture, forests and livestock (quantity, quality);
- changes in land, soil and water resources (quantity, quality);
- increased weed and pest challenges;
- shifts in spatial and temporal distribution of temperature and rainfall;
- sea level rise, changes to ocean salinity;
- increased extreme weather events, flooding, drought and fires;
- sea temperature rise causing fishes to inhabit different ranges.

Socio-economic impacts:

- decline in yields and production;
- reduced marginal GDP from agriculture;
- fluctuations in world market prices;
- changes in geographical distribution of trade regimes;
- increased number of people at risk of hunger and food insecurity;
- migration and civil unrest.

Natural Resource Degradation

When it is realized that disasters associated with water, climate and vegetation occur most and affect widely, significance of natural resource management for disaster risk management is now being recognized. On the other hand the worst sufferers of these disasters, low human development people including the small farmers, poor, marginalized and *dalits* are the people directly dependent on natural resources for their health and livelihoods. Land-degradation is a major challenge in India, be it in the mountains, coastal areas of plains, the soil-health has deteriorated drastically and is the leading cause of increasing natural hazards. Large tracts of wastelands in the form of fallow, ravines, saline, alkaline, overburdens, or abandoned sites within forests, rural and other natural areas still remain out of concern to disaster risk managers. Monoculture has increased damage risks and vulnerability. Wetlands have been lost at the rate of around 70% on urban lands and 30-40% in rural and forest areas over the last 40 years. Depletion of surface water bodies and ground water reserves add to the complexity of disaster risks as these not only cause hazards and vulnerability but also alter the local and regional ecology including climatic regimes.

Landscape modifications reducing the entropy have been envisaged as a developmental concern without understanding its implications for ecology, natural resources and disaster risks. Implications of genetic recession and loss of diversity, habitat destruction, and intrusions into the natural systems like catchments, rivers, and coastal areas without understanding their ecological dynamics have aggravated the conditions of new or prevailing risks. Loss of quality in natural resources have caused crisis for livelihood, food and health resources and thereby caused conditions for people's vulnerability to disaster's impacts.

Hydro-meteorological Disasters

Hydro-meteorological hazards are the environmental processes or phenomena of atmospheric, hydrological or oceanographic nature, which may cause loss of life or injury, property damage, social and economic disruption, or ecological degradation. These include: floods, debris and mud floods; tropical cyclones, storm surges, thunder/hailstorms, rain and windstorms, blizzards and other severe storms; drought, desertification, wildland fires, temperature extremes, sand or dust storms; permafrost and snow or ice avalanches. Hydro-meteorological hazards can be single, sequential or combined in their origin and effects. During the period 2000 to 2006, 2,163 water-related disasters were reported globally in the EM-DAT database, killing more than 290,000 people, afflicting more than 1.5 billion people and inflicting more than US$422 billion in damages. The United Nations University Institute for Environment and Human Security (UNU-EHS) warns that unless preventative efforts are stepped up, the number of people vulnerable to flood disasters worldwide is expected to mushroom to two billion by 2050 as a result of climate change, deforestation,

rising sea levels and population growth in flood-prone lands.

Integrated Land and Water Resource Management

Integrated land and water management practices rely on utilizing the ecosystem dynamics of the region for sustaining soil-health and bio-productivity. Ecosystem-based risk management options are often more accessible and affordable to the poor than adaptation interventions based on infrastructure and engineering. It is consistent with community-based approaches to adaptation; can effectively build on local knowledge and needs; and can provide particular consideration to the most vulnerable groups of people, including women, and to the most vulnerable ecosystems. As examples, at the local specific level, these include appropriate agricultural and water management practices, breeding techniques for introduction of drought-tolerant, salt-tolerant, and standing-water tolerant crops and tree species; improved livestock management and fodder management practices.

Institutional framework and legal implications

United Nations agencies including UNEP, UNDP, IUCN, UN-ISDR and UNU Institute of Environment and Human Security, jointly with ADPC, WWF, GFMC, ProAct Network, SEI, and the Council of Europe, have formed a Partnership for Environment and Disaster Risk Reduction (PEDRR) in year 2008 with headquarter at Geneva. UN-OCHA has also setup a joint Environment Unit with UNEP to emphasize environmental aspects of disasters and their management. However, at national levels the initiatives for convergence of the two are yet to be institutionalized. In India, the National Disaster Management Authority is the apex national organization for development of guidelines and plans on various aspects of disaster management, whereas the Ministry of Environment & Forests is the nodal agency for environmental protection dealing with climate-change, forests and habitat conservation, environmental quality, EIA, etc. Various aspects of land-use and natural resources are dealt by different Ministries like Rural Development (Land Resources Deptt.), Water Resources, Agriculture, Earth Sciences, Science & Technology, Biodiversity, etc.

Role of Knowledge Management

The climate-change concerns have brought-in the greater understanding on the role of global, regional and local environmental issues in disaster management (risk assessments, mitigation, early warning and effective response). In many countries, the disaster management has been functional in total separation from the systems that deal environmental protection and natural resource management. However, the Millennium Ecosystem Assessment, IPCC 4th Assessment Report, Ramasar Convention, Convention on Desertification, and strategic publications of UN-ISDR and IUCN have emphasized environment based disaster management. In India, Disaster Management Act (2005) and the national guidelines on disaster management, national disaster mitigation plans and manuals especially on floods, drought and cyclone, have emphasized environmental routes of disaster reduction.

Government of India has strides in area of environmental data and knowledge promotion with implementation of National Natural Resource Data Management System (NNDRDMS), Environmental Information System (ENVIS), Environmental Statistics Compendium (by Central Statistical Organization), Biodiversity Board, Forest Survey of India, India Meteorological Department, Geological Survey, and initiatives of space technology application. Recent Indo-German Conference on Environmental Knowledge for Disaster Risk Management (2011) at New Delhi released a special volume wherein the noted environmental scientist Prof. M. S. Swaminathan stressed on rural ecosystems approach to disaster risk management and climate-change adaptation. Knowledge of environmental-natural systems and processes is, therefore, key to disaster management and sustainability of natural resources in developing nations like ours.

LATHYRISM: THE ULTIMATE CRIPPLING DISEASE

Avik Basu[1] and Saikat Kumar Basu[2*]
[1]Medical College Kolkata, WB **India**; [2]University of Lethbridge, AB **Canada**
*email: saikat.basu@uleth.ca

In a big country like India, housing people of diverse castes, customs and habits, the staple food items of daily diet vary a great deal. From boiled rice to biryanis and from idli to tandooris almost every single edible goody has found its place in the ever-extending list of daily Indian cuisine according to the choice of people and the conditions favoring the growth of the principal food grains in the particular areas of the country. But this daily consumption of some specific food-crops in some specific districts of India has given rise to development of some complicating diseases that may lead to disabilities and deformities in the human body and also, fatality of which Lathyrism stands out as a prominent member. Lathyrism is a crippling disease that may occur in human beings as well as in other animals, the former being known as neurolathyrism and the latter osteolathyrism according to the part of the body involved (Park, 2009). The main causative agent behind this disease is 'Khesari dal' (*Lathyrus sativus* L.) containing a potentially lethal neurotoxin BOAA (Karmakar, 2007). This food grain is consumed mainly by the field workers of Madhya Pradesh, Uttar Pradesh, Bihar and Orissa due to their cheap prices (Park, 2009). Consumption of 'Khesari dal' for a continuous period of 2-6 months, with this food grain accounting for about

30% of daily diet will lead to Lathyrism (Park, 2009). Cases of Lathyrism outside India have been reported from Spain and Algeria (Park, 2009).

The disease mainly manifests in the age group of 15-45 years in four successive stages in untreated cases (Park, 2009). In the initial or latent stage, the individual displays only unsteadiness of gait and is otherwise normal (Park, 2009). Then comes the no-stick stage when the person walks, without the help of a stick, with short jerky paces (Park, 2009). This is followed by one-stick, two-stick and the crawler stages (Park, 2009) when the unsteadiness of gait progresses to muscular spasticity and paraplegia of lower extremities (Karmakar, 2007) accompanied by muscular atrophy (Park, 2009), making it one of the most dreadful toxic spastic myelopathies (Hauser and Ropper, 2008).

No specific treatment regimen has yet been formulated. Prevention is thus the only management procedure. This includes removal of the toxin by parboiling of rice (Park, 2009), restricting consumption of the food grain to less than 25% of daily diet (Karmakar, 2007) and also Vitamin C prophylaxis (Park, 2009).

NEWS & VIEWS

GREEN ROOFS

Green roofs entail growing plants on rooftops, which partially replaces the vegetation that was destroyed when the building was constructed. They are the tools to help mitigate effects of pollution. Green roofs provide numerous benefits that can help offset the negative aspects of pollution, especially in the urban environment. They can improve storm water management by reducing runoff and improving water quality, conserve energy, mitigate the urban heat islands; reduce noise and air pollution, sequester carbon, increase urban biodiversity by providing habitat for wildlife and provide more aesthetically pleasing environment.

Source: D. Bradley Rowe *Environmental Pollution* 159: 2100-2110, 2011

INDOOR PLANTS TO REDUCE POLLUTION

Indoor plants can filter air pollutants in the indoor atmosphere. An **Adiantum** plant can absorb 20 micrograms of formaldehyde in one hour. It can also contain Xylene and Toluene released by monitors and printers. **Aloes** can absorb formaldehyde, carbon dioxide and carbon monoxide. When harmful elements in the air exceeded threshold level, typical spots appear on the leaves. The problem can be remediated by adding more pots in the room. **Rubber** plant is a multifunctional cleaner. It can absorb carbon dioxide, carbon monoxide and fluoride. It can also reduce dust in the atmosphere. **Asparagus** emits fragrance which can contain bacteria and viruses in the indoor. **Ivy** plant is very effective in absorbing formaldehyde. It can also absorb Benzene. It is estimated that in a 10 meter enclosed area 2-3 pots of Ivy will be able to clean air and dust. **Cacti** are known to be effective in reducing radiation. They can also absorb carbon dioxide at night to release oxygen. They are also strong in eliminating bacteria. **Chlorophytum** can perform photosynthesis under weak light and absorb harmful air. One pot of Chlorophytum in a 8-10 square meters of room is enough to perform as an air filter, which releases oxygen and absorbs carbon, carcinogens like formaldehyde and styrene. Chlorophytum is very strong in absorbing carbon, monoxide and formaldehyde. It decomposes benzene and nicotine in tobacco.

Source: *Care2 news network*

SWIMMING POOLS: A BREEDING GROUND FOR CANCER!

Reports suggest increased cancer risk caused by excessive amounts of chlorine in the drinking water. Chlorine, when ingested at high amounts, significantly increases the chances of cancers of the bladder and rectum while causing multiple other types of diseases. On top of this, scientists now believe that chlorine in swimming pools may significantly increase the risks of cancer as well. New studies have emerged that link the byproducts of chlorine to increased cancer markers.

In a vast majority of swimming pools, there are high amounts of chlorine used as a disinfectant. When chlorine cleans these pools, they create byproducts as a result of the disinfection, which can be more dangerous than the chlorine itself. A study performed in 2010 revealed that over 100 chemicals can be found in pools created as a result of chlorine disinfection.

Chlorinated water creates byproduct that bind to urine, blood, and breath that creates inflammation, leading to rectal and lung cancer in animals. To measure the results in humans, 50 people were asked to swim for over half an hour to measure the effects on their blood, urine, and breaths before and after swimming. After swimming, almost all the participants showed increased level micronuclei in all three categories of testing. Increased micronuclei results suggest DNA damage that has been shown to directly lead to cancer.

These results have only observed short-term rather than long-term, but they still raise major questions about the safety of using chlorine for swimming pools. Despite this, the problem with chlorination is that it is one of the most affordable, effective options for killing undesirable microbes in pools. Until now, most assumed that chlorine alone would not cause considerable harm, as long as it wasn't being drank or used in excess. There have been alternative methods for the cleaning of swimming pools that are starting to become

considered, although they are either expensive or not proven to work. Some of these include Ozone treatment and copper ionization.

By showering before and after, wearing a cap, and limiting time in the pool to a reasonable amount, we can significantly reduce the amount of chlorination we are introducing to our body. If a pool smells heavily chlorinated or makes breathing more difficult, we should avoid it.

Source: *Charles R. Brown in Ezine articles*

DOES FRACKING CAUSES EARTHQUAKE?

Currently over 90% of the natural gas used in U.S.A. is through 'Fracking' or 'Hydraulic fracturing' of the Earth's crust. It is a simple technique where a drill burrows deep into the earth's crust, and a fluid is poured through the well head to crack the rocks which form the foundation stones of our planet. Inside this foundation, oil, natural gas and water can be forced out, at a lower cost than other drilling methods.

Internationally fracking is less commonly used because environmental damage, the risk of earthquakes, and sinkholes. In U.K., fracking was stopped after the town of Blackpool experienced a minor quake while in France it is banned. This raises questions whether an unlikely earthquake which cracked the ceiling of famous Washington Cathedral, was actually man-made rather than a natural disaster.

The fact that a nation is willing to destroy its environment, and endanger millions of people because of a dependence on oil, and gas, shows that if this continues and further earthquakes occur, the cost of the further damage of future earthquakes, could probably exceed the initial investment needed to build a society that runs completely on sustainable green energies.

Was the East coast earthquake a warning message, by mother earth for energy companies to stop damaging our planet foundation stone?

Source: *Mark W. Medley in Ezine Articles*

MELTING ARCTIC ICE THREATENS WALRUSES

Walrus is a large sea mammal with thick drooping moustache. It is related to seal. Walruses are accomplished divers and frequently plunge hundreds of feet to the bottom of the continental shelf to feed. They use sea ice as platforms to give birth, nurse their young and elude predators, and when sea ice is scarce or non-existent, as it has been this summer, they come up on land.

Fast-melting ice appears to be pushing walruses to move to land. The loss of sea ice caused an estimated 10,000 to 20,000 walruses to venture into land. The loss of sea ice (due to climate change) has put Pacific walruses at grave risk

Polar bears, which also use ice in the Chukchi Sea as platform for hunting, are also threatened by the declining sea ice in the Arctic.

Source: *Sandra Maler (Reuters)*

CLIMATE CHANGE IMPACTS INDOOR ENVIRONMENT

People all over the world are aware of potential links between climate change and outdoor air quality. However, very few studies leave focused on climate change and indoor air quality. A recent report by scientists from Harvard School of Public health has identified indoor air quality as priority that deserves an important place in climate change research.

Most people spend the majority of their time indoors, so it makes sense that people will experience climate change from a housing perspective while making efforts to either mitigate or adapt to climate change residential and commercial buildings will have to undergo structural changes. Climate change mitigation plan seeking to reduce CO_2 emission often have the goal of reducing the amount of energy needed to maintain a comfortable in-door environment. Coal combustion is a primary source for electricity production. Steps such as weatherizing buildings to make them more energy efficient could create near indoor problems worsen existing conditions. For example caulking and sealing leaks in building may alter airflow and concentrate an pollutants such as tobacco smoke, radon, and chemical emissions from building materials and trapped moisture can spur mold and bacterial growth.

Severe weather presents another opportunity for indoor air hazards. For instance, family's face and increased likelihood of flooded basements or mold in attics related to predicted increases in extreme weather. An increase in cases of Carbon monoxide poisoning has been traced to the improper use of portable gasoline powered generators, which limit high levels of carbon monoxide.

Identifying complex public health issues that connect global climate change and indoor air environments can leads to sound policy decisions that could save lives. We need to connect global climate change with the indoor air environment to give proper guidance to people.

Source: Carol Potera
In: *Environment health Perspectives*

TOXIC DUST OF 9/11 ATTACK

More than 18,000 people are suffering from illness linked to the dust from the attack on New York's World Trade Center on 11 September 2001. The most common afflictions are respiratory problems including asthma, sinusitis, muscular and intestinal conditions and loss of memory. Damage to the lungs-interstitial fibrosis is one of the most serious effect which results in the formation of a scar in the lung with loss of its capacity to exchange oxygen and carbon dioxide.

The dust had a high proportion of highly alkaline particles from the pulverized concrete, asbestos and heavy metals like lead and mercury from thousands of computers and light fixtures. It is feared that many people would die due to the exposure to the toxic dust

Source: *David Shukman Environment & Science Correspondence BBC news*

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Central Institute of Medicinal and Aromatic Plants
P.O. CIMAP, Lucknow 226 015, India
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Website: http://wcmanu.com

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Contact: Dr. D.K. Upreti, Scientist
Lichenology Laboratory, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow-226001
Phone: 0522-2297850, 851; FAX: 0522-2205836, 2205839, Email: upretidk@rediffmail.com

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Contact : Dr. T.Sasipraba
Organizing Secretary, GTEC-2011, Sathyabbama University, Jeppiaar Nagar, Rajiv Gandhi Road, Chennai – 600 119. Tamilnadu, INDIA.
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Editors:
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Dr. Mrs. Kamla Kulshreshtha

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Dr. K.J. Ahmad
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Tel. 2297821: 2205831-35 Extn. 821
Fax : 2205836

E-mail : isebnbrilko@sify.com
Website : http://isebindia.com