ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

LUCKNOW (INDIA) VOL 12 No 4 OCTOBER, 2006

IN THIS ISSUE

Earth Environment is Changing Fast

Scientific consensus is a rare thing. But the experts agree almost unanimously on one thing - humankind is changing the Earth's natural environment, and quickly. As an expanding global population spreads ever further around the globe, habitats are being destroyed to make room for mushrooming towns and cities, all the while consuming more and more oil and other fossil fuels. In many ways humans have never had it so good: average global life expectancy has shot up by almost 20 years in the past half-century, most countries are getting richer by the day and medical science has beaten scores of previously fatal or debilitating conditions.

And yet there are increasing fears that this human-dominated phase of the Earth's long history is not sustainable. Species are becoming extinct at a speed around 100 times faster than would happen naturally. Almost half the world's original forests - the habitat which supports around two-thirds of the wildlife has disappeared in the past three decades. Other UN data shows arable land being eaten by deserts around 30 times faster than ever before seen and the disappearance of almost a third of all coral reefs, while air pollution is thought to kill 50,000 annually in the United States alone.

Most seriously of all, the climate appears to be changing. The billion of tons of carbon dioxide pumped into the earth's atmosphere annually, along with other so-called greenhouse gases, is causing the Earth to heat up, virtually all environmental scientists agree. The findings of a major climate change international conference published this year reiterated warnings that average global temperatures are expected to rise between 1.4 and 5.8 degrees Celsius by the end of the century. Such a change would have a wide range of impacts on the natural world and human society. Environment campaigners want urgent action. The way in which the main trends are panning out at the moment means that we really should be very alarmed as a global community. We still have time to do something about these things, but time is now extremely short.

The international response has been mixed. The 1997 Kyoto protocol committed industrialized nations to cut their combined greenhouse gas emissions below 1990 levels by 2008-12, but was undermined after the United States, the biggest global polluter, declined to ratify the deal. Washington opposes Kyoto's methods rather than its aims. But whatever the consensus on diagnosis, there is little agreement on action, something the UNEP warns must change. To tackle global warming, it warns, "only a fundamental change in lifestyle and economy, with a significant moderation in the consumption of resources, can bring any hope of a solution.

Source: (Internet)

- Informative news, views and popular articles/write-ups on current environmental researches/issues are invited for publication in ENVIRONEWS.
- Environews is published quarterly on the first of January/April/July/October; and is supplied free to all members of ISEB.
- Environews is also supplied in exchange for scientific literature published by reputed organisations.
- All correspondence should be addressed to : **The Secretary, International Society of Environmental Botanists,** National Botanical Research Institute, Lucknow - 226 001 (India).
- **E-mail : isebnbrilko@satyam.net.in • Website : http://isebindia.com**

LETTERS

After seven busy and exciting years I am leaving Kew in September to take up a new role at The University of Chicago. My successor will be Professor Stephen Hopper, currently Foundation Professor of Conservation Biology at The University of Western Australia and former Director of Kings Park and Botanic Garden, Perth.

Steve is taking over at a crucial time. The Millennium Ecosystem Assessment has focused international attention on the links between environmental degradation and human well-being. The challenge now is to evaluate potential responses and follow through on them. This will require determination and commitment at the highest levels, as well as increased public understanding, stronger advocacy and further research.

Plants are fundamental to a sustainable future. We are applying our scientific expertise and resources to some of the key priorities. Especially important are building science and conservation capacity in the developing world, renewed efforts to engage the public's attention, conservation action on the ground, and protecting plant species in the face of climate change.

Over the past year we have made considerable progress: the Millennium Seed Bank project has had its most successful year to date, visitor to Kew and Wakehurst Place have reached record levels, and our work is making a real difference from Borneo to Madagascar and from southern England to southern Africa. The scale of impact of Kew's work with partners all over the world continues to increase.

But there is more to do. I know that Steve Hopper, an excellent scientist and passionate conservationist, will take Kew forward with even greater vigour in the coming years and Kew's contribution will become even more significant. To achieve this we are dependent on the support of many individuals and organizations, particularly the UK government, and I would like to take this opportunity to thank all those who have helped.

If you would like to know more, or think we can be of assistance in some way, then please do contact me.

Professor Sir Peter Crane FRS
Director
Royal Botanic Gardens, Kew,
Richmond, Surrey TW9 3AB, ***U.K.***

I'm writing a paper for my Environmental Conservation class at the University of Wisconsin. (US) I've chosen to write about Keibul Lamjao National Park.

I came across the list of abstracts from ICPEP-3. In it I read the abstract to the paper "Water Quality in a Floating National Park" by Daisy Angom and Asha Gupta of the University of Manipur. I believe it would be helpful in writing my paper.

I'd really like to use this paper as a resource, but I don't know how to get it. Any help would be appreciated.

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University of Wisconsin, ***U.S.A.***
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I have recently joined as Head of the Institute of Environment & Development Studies, Bundelkhand University, Jhansi. Kindly note the change in my address for incorporation in your records:

Dr. Amit Pal
Head (Course Coordinator), Institute of Environment & Development Studies,
Bundelkhand University, Jhansi-284128, U.P.
Email:apu13@rediffmail.com

I am very happy to know about the activities of the ISEB. Last year, I was in UK through Commonwealth fellowship for postdoctoral study with Prof. JNB Bell at Imperial College, London. He showed me photographs of ICPEP-3 Conference, and it was very nice to know about your current activities. He shared with me his pleasant memories of his several visits to NBRI to attend ICPEP Conferences organized by your Society.

I have been awarded the National Best University Teacher Award (NBUTA) by Higher Education Commission (HEC) of Pakistan in March 2005.

Dr.A. Wahid
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We¹d like to introduce you to the Orion Grassroots Network (OGN) - it¹s a service of the Orion Society, based in Great Barrington, Massachusetts, U.S.A. and is made up of over 960 organizations like yours located throughout North America and **we recently learned about your organization (ISEB). Your work looks great, and we think you¹d make a wonderful addition to the OGN.**

Network members are diverse in their work and constituencies, yet common values run through them all, such as illustrating ways to live more lightly on the Earth, building local knowledge of history and land, practicing real democracy, and helping communities link all of these ideals together. Membership in the Network gives access to a blend of inspirational and practical support services promoting the full spectrum of grassroots work that is advancing a more sustainable human community.

The Orion Grassroots Network connects the full diversity of non-profits engaged in the social and environmental movements of North America and beyond. The 950-plus member organizations are recognized in their communities as leaders in the fields of conservation, restoration, education, democracy, justice, health, and economics.

If you are interested in receiving information about this program, please contact us. You can call Orion toll-free at (888) 909-6568, visit our website at http://www.oriononline.org/ogn, or e-mail us at grassroots@orionsociety.org.

We hope you¹ll consider joining the OGN, and we look forward to hearing from you soon.

Erik Hoffner & Peter Viola
The OGN Team, 187 Main Street, Great Barrington, MA 01230, ***U.S.A.***
E-mail: grassroots@orionsociety.org

I want to become a Life member of **International Society of Environmental Botanists, Lucknow.** I want to get information about your payment package. As mentioned in your website, Life members from SAARC countries have to pay Rs. 2,500 (payable once only). Can I pay in Pakistani Rupees or is it necessary to pay in Indian currency? Will you accept cash payment?

Sara Malik
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WELCOME NEW LIFE MEMBER

Dr. Javed Ahmad, Reader in Botany at Jamia Hamdard (Hamdard University), New Delhi has joined International Society of Environmental Botanists (ISEB) as a Life member. He has extensive teaching and research experience in medicobotany, embryology and ecology. He participated in the First World Conference on Oriental Medicine & Yoga held at Bangkok, Thailand in 1988 and received a Silver medal on the research paper presented by him. He was also awarded by the Association of Alternative Medicine, Kolkata in 1988. He participated in the International Symposium on Liver Diseases held at Hamdard University, Karachi, Pakistan (1993).

Dr. Javed worked as an Assistant Professor in Toyama Medical and Pharmaceutical University, Japan where he developed a database on preserved crude drugs in the museum of Materia Medica at the Institute of Natural Medicine. He also participated in the 8th International Symposium on Traditional Medicine, which was held at Toyama University, Japan in 2001. He has visited a large number of herbaria, botanical gardens/institutes in India, Pakistan, Singapore, Japan, Thailand and Saudi Arabia.

Dr. Javed steered several research projects sponsored by various departments and has published over 50 research papers in reputed journals.

NEWS FLASH

USING TO COMMUNICATE CLIMATE CHANGE
16TH INTERNATIONAL CHILDREN'S PAINTING COMPETITION ON THE ENVIRONMENT

UNEP in cooperation with the Japan-based Foundation for Global Peace and Environment (FGPE), Bayer and the Nikon Corporation invites children from around the world to express their thoughts on climate change through the medium of art.

Children who will be between the ages of 6 and 14 years on World Environment Day 2007 (5 June) from all regions of the world are invited to submit their paintings on the theme to their Regional UNEP Office by 31 December 2006.

Winners for the regional competitions will be announced in April 2007. Winners for the global competition will be announced on World Environment Day, 5 June 2007.

The regional first prize winners and the global winner will each receive a cash prize and a trip for them and a accompanying adult to the 2007 official World Environment Day celebrations in Tromsø, Norway. Other prizes include diplomas, plaques, T-shirts, stationery and drawing sets.

Entries from **Asia and the Pacific** should be sent to:

**UNEP Regional Office for Asia and the Pacific United Nations Bldg.,
Rajdamnern Avenue10th Floor,
B-Block, Bangkok 10200, **THAILAND**
Tel: (66-2) 2881870
Fax: (66-2) 2803829
Email: sarabuddhi@un.org

Satwant Kaur
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United Nations Bldg., Rajdamnern Avenue, 10th Floor, B-Block
Bangkok 10200, **THAILAND**
Tel: (662) 288-2127
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E-mail: kaur@un.org
Web: www.roap.unep.org

LUCKNOW SCIENTIST BAGS PRESTIGIOUS AWARD

Dr. Vinod Bhakuni, a young scientist of Central Drug Research Institute (CDRI) has been selected this year (2006) for the India's prestigious Shanti Swarup Bhatnagar (SSB) Prize in the field of Biological Sciences. He is working on proteins that can be used in invention of new drugs for better treatment of tuberculosis and pneumonia. Dr. Vinod is also the recipient of the National Bio-sciences Award 2001 and Raman Research Fellowship 2003.

Dr. Vinod is the son of a well-known Indian scientist, Dr. D.S. Bhakuni, a former Scientist in Director's Grade at CDRI and a recipient of Shanti Swaroop Bhatnagar Prize (1975). Dr. D.S. Bhakuni is a Life Member of International Society of Environmental Botanists.

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WELL KNOWN ENVIRONMENTALIST IS NEW TREASURY SECRETARY OF U.S.A.

Henry Paulson, Chairman of the Board of Directors of The Nature Conservancy, the world's largest conservation organization has been appointed new Treasury Secretary of U.S.A. As Chairman of the investment firm 'Goldman Sachs' he ramped up its investments in energy efficiency and renewable energy, including solar, wind and biofuels. In 2004, under Paulson's watch Goldman Sachs donated 680,000 acres of wilderness in Southern Chile to the Wildlife Conservation Society. Paulson has also worked with environmental groups including the World Resources Institute and the Natural Resources Defense Council.

Paulson believes that environmental health and financial well-being are inextricably linked. According to him the environment and economy have been wrongly considered as incompatible and they are the opposite sides of the same coin.

PROF. R. S. TRIPATHI'S VISIT TO USA AND THE U.K.

Prof. R.S. Tripathi, FNA, the INSA Senior Scientist, at NBRI, Lucknow and a life

member of International Society of Environmental Botanists was invited by the World Association for Vedic Studies (WAVES) Inc. USA to participate in the Sixth International Conference on "Vedic Ideas for Global Harmony and Peace in the Modern Context" held at the University of Houston, Houston, Texas, USA during 8-10 July, 2006. He presented a thought-provoking research paper entitled, "Evidences galore in Manu-Smriti for environmental conservation, a key element for ecosystem stability and global harmony". Quoting profusely from the Manu-Smriti, Prof. Tripathi emphasized that Manu has put forward a real holistic approach for conserving environment and natural resources, and aesthetic and spiritual values formed the core of nature protection in Manu-Smriti.

The gist of his presentation is as follows:
"The social codes relating to environmental protection and biodiversity conservation contained in M.S. have their seeds in Vedas. According to M.S., man must observe the righteousness in his conduct. A righteous conduct encompasses the kind behaviour towards every creature, be it a plant, or an animal and even non-living objects. M.S. stipulates provisions for the protection of plants, animals, small creatures and physical environment, and for the conservation of natural resources.

In M.S. there are references to several plants with the attributes, which may be exploited for different purposes. M.S. also mentions the names of many plants that are capable of conserving soil. It also presents eco-friendly methods for land-use pattern, landscape planning and maintenance of water reservoirs. M.S. prescribes many codes for conserving plants, animals as well as non-living components of ecosystem. According to Manu, those who violate these codes are certainly liable to severe punishment. The degree of utility of different components of the environment, regardless of whether they are living or non-living, has been considered the basis for determining the severity of the punishment to the offender(M.S. VIII: 227).

In his concluding remarks Professor Tripathi observed that "during the course of the progress of civilization, man has lost the desired connectivity with the other creatures and physical factors of the environment, and this has caused ecosystem degradation and several environmental problems including shortage of vital natural resources and their deteriorating quality. This has given rise to a situation of conflict and disharmony among the community of nations and has adversely affected the stability of ecosystems. In this context, the codes related to environmental conservation as enunciated in Manu-Smriti assume enormous practical and ethical significance. Manu considers environmental conservation as the Dharma worth holding."

Prof. Tripathi also Co-chaired the session on "Yoga, Ayurveda and Science" at the said conference. Before the commencement of the WAVES conference he visited the NASA Space Center at Houston and the artificially created Tropical Rain Forest in Galveston, Texas.

After attending the WAVES conference at Houston, Prof. Tripathi left for the U.K. where he visited the Royal Botanic Garden at Edinburgh, University of Edinburgh, University of Leicester Botanic garden, Cambridge University Botanic Garden, Savill Garden and Department of Plant Biology of Imperial College at Silwood Park.

SOCIAL JUSTICE AND HABITAT RESTORATION A COMMENTARY ON THE SCIENCE AND PRACTICE OF ECOLOGICAL RESTORATION

Anton G. Endress

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Throughout the world, there is an expanding interest in restoring terrestrial and freshwater environments. Some are motivated by the disappearance of wild places and the species that inhabit them; others are motivated by the loss of recreational opportunities; and still others are concerned about the declining quality of life and wonder what the legacy to future generations will be. Whatever the motivation, the role of restoration ecology in revitalizing transformed and often degraded landscapes by increasing their natural character, restoring ecological integrity, and conserving biodiversity is so powerful and fundamental that it has been identified as the *career* for the 21st century and the *future* of conservation biology. Definitions vary, but an essential aspect of restoration ecology in the United States is the goal of bringing an ecological system back to some or all of its original or former state. Elsewhere, the goal of restoration is less directed towards a particular historic assemblage of organisms than it is directed towards establishment of a self-regulating system that functions ecologically within its particular landscape context. Achieving such goals requires both the understanding of ecological and evolutionary processes ranging from the molecular to landscape levels of organization and the integration of ecology, economics, sociology, psychology, and public policy among several disciplines.

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Landscape Modification Drives the Need for Ecological Restoration

Environmental problems today are unprecedented in nature and magnitude. As a result of agriculture, industry, recreation, international commerce, and urbanization, the ever-expanding human population has extensively transformed the landscape. The resulting consequences have been significant: loss of biodiversity, climate change, biotic species additions and losses, atmospheric eutrophication, and altered biogeochemistry. For example, the Midwestern USA comprises a region in which agricultural, urban, and suburban development has placed increasing demands on the region's land. In terms of the proportion of land that remains in a natural or semi-natural state, this region is one of the most degraded landscapes in North America. In Illinois for example, much has changed since 1820 when Euro-American immigrants began to settle in its forests, grasslands, and savannas. Habitat losses were rapid: annual rates of forest clearing in the late 1800s approached 2% (equivalent to contemporary tropical deforestation

rates) and prairie conversion to cropland occurred at the annual rate of 3.3% between 1830-1860. The remaining pre-settlement forest, prairie, and wetlands are ca. 0.1%, <0.01%, and 5% respectively of the pre-settlement ecosystems. Most of its landscape was converted to agriculture; Illinois ranks 49th nationally for its portion of pre-settlement habitat remaining, and often leads the USA in annual maize and soy production. Habitat fragmentation has also been significant: <17% of the remnant prairie is in parcels >4 ha; only ca. 11% of remnant forest sites are >40 ha; 14 prairie bird species have declined at an average of 38%; and edge species are flourishing. Invasions of non-indigenous species are increasing in severity and scope. In the past century, one in seven native fish species in Lake Michigan was either extirpated or suffered severe population crashes and exotic species have assumed the roles of major predators and major forage species. Nearly 32% of the vascular plant species in Illinois today are non-native, up from 10% in 1878 and 16% in 1950. Members of the Poaceae and Asteraceae contribute ca. 25% of the non-native taxa.

Which restorations? Where? What goals? Who decides?

From such extensive landscape transformation and degradation, however, is the phoenix of ecological restoration borne. Complex restoration efforts are underway or have been envisioned in urban, rural, terrestrial, and aquatic systems. Although restoration is often accomplished (or attempted) at a small spatial scale, some of the largest restorations in the USA are now underway or planned in Illinois and surrounding states (e.g., Midewin National Tallgrass Prairie, Lost Mound, Kankakee Sands, and Badger Arsenal). The intention is to enhance natural structure and function to restore ecological health.

Ecosystem restoration has roots in ecology, landscape architecture, conservation, reclamation, environmental mitigation - and a corresponding diversity of approaches and applications. Generally, the practice of ecological restoration is based on individual experiences of practitioners that are usually gained at the local level. However, the theoretical foundation of ecology is often drawn from research conducted in pristine habitats or places largely free of severe anthropogenic impact; specific theory-driven predictions in the local context are often lacking. The Midwestern landscape is dominated by agriculture, but is also punctuated by numerous communities with large human populations. Therefore, efforts to develop theory for restoring habitat and preserving biodiversity must also account for the complexity and variation within an urban-exurban framework.

Restoration ecologists are currently developing and refining an array of research- and experience-based techniques and technologies suitable for the challenges presented. Whether a particular restoration project is ultimately judged to be successful depends on the achievement of pre-established goals, of which some may be ecological in nature, while others not. Considering restorationists are a diverse community of scientists and practitioners who live with a variety of sometimes inconsistent goals, it is not surprising that any given target for restoration could be supported by a mix of science and values, and tenaciously argued by its proponents.

So how are restoration decisions involving today's fragmented and urbanized landscapes made? Most, if not all, of the alternative choices seem to require more than scientific knowledge: Which site to restore? Which habitat to preserve or species to conserve? Which restoration approaches are most likely to succeed? Will societal benefits exceed the costs? The power to affect human policy regarding the use of biotic resources and the maintenance of biological diversity depends on research and explicit public discourse about management alternatives and their actual costs. In consequence, social scientists, political scientists, and members of the general public also have important roles in ecological restoration.

Environmental decision-making about restoration has shifted away from accepting just the claims of experts and now accommodates a greater diversity of contentions. The expert-based processes of the past often grew from legal statutes developed by municipalities and agencies that outlined decision-making processes. Stakeholders, particularly those lacking political clout or scientific expertise, were excluded from decision forums, and at best, were treated as 'the public interest' by planning processes. While land management decisions previously were conducted *based on science* and expert opinion, the shift frames decisions as *informed by science* and expert opinion, but essentially driven by a more inclusive representation of stakeholder values. As a result, establishing restoration goals, determining priorities, and making decisions become a social process in which scientific expertise is democratized. Because restoration practice is typically conducted within a context of land use change, the forces influencing the goals of any given restoration frequently become tied to community-based decision processes. The empowerment of communities via socially just processes should thus become an increasingly important feature of restoration.

Issues related to empowerment often surface during implementation of a project, but they don't surface as often or often enough at the planning stage when project goals are being defined. This may result from a lack of stakeholder awareness, interest, or access. Or it might stem from the tension between scientists wondering whether citizens have the capacity to be meaningfully involved with decision-making about complex issues and citizens who no longer accept uncritically the judgments of scientists in matters of social welfare and public interest. Yet such tension is moot given decisions whether defining restoration

goals or prioritizing actions inevitably require, and citizens often demand, participation and active involvement. The scientists do not have the authority to place boundaries around the scope of dialogue relevant to goal setting.

Many of the values underlying the process of goal setting may have a strong emotional component attached to them. Unfortunately, these are frequently ignored when restoration advocates make decisions about the criteria to which a site will be restored. Ecological restoration projects can become volatile when public values are assumed, not assessed, or ignored. An example from an Illinois restoration project is illustrative. The removal of non-native trees associated with a prairie restoration was viewed as a necessary task with beneficial consequences. However, nearby residents, many viewing themselves as environmentalists, perceived the removal of non-native trees and brush as being a destruction of nature, as lacking respect for historical uses, and disrupting the area's sense of place. Other stakeholders, such as birders or hunters, viewed the removals as a shift in wildlife habitat, and one that precluded survival of their favourite species. Citizen groups felt ignored and struggled to voice their concerns to a seemingly closed decision process.

Summary

The challenge of ecological restoration is thus complex and profoundly important, requiring the integration of knowledge and methods across disciplinary, cultural, and social boundaries. While retaining its fundamental anchor in science, ecological restoration must engage an explicit social process in which diverse, and even conflicting, values beyond the science are articulated. Social justice emerges from a mutual sharing of knowledge amongst stakeholders (experts and non-experts included) within a forum where the discourse is larger than the science. When community stakeholders have been engaged in the process and perceive it to be fair, the restoration goals defined and priorities set are most likely to be supported community-wide. With such support, the community becomes invested in the restoration project and a successful outcome is more likely.

LICHENS AND AIR POLLUTION

James P. Bennett

Gaylord Nelson Institute for Environmental Studies, U. S. Geological Survey and University of Wisconsin-Madison, U.S.A.

Lichens are small, non-vascular plants consisting of a fungus and an alga growing together in one tissue. The most commonly known lichens are those that are found on the bark of trees, or the reindeer lichens growing on the ground, but many other species grow on rocks, fences, roofs, tombstones, and other man-made objects.

Even though some lichens are extremely tough and grow in very inhospitable habitats, they are also notoriously sensitive to air pollutants, primarily sulfur dioxide and heavy metals. Lichen deserts, a phenomenon where lichens disappear from cities, were described over a hundred years ago and determined to be caused by sulfur pollution. Lichens are especially sensitive to air pollutants because they have no outer impermeable layer of tissue to exclude gases and particles that impair their metabolism. Consequently, accumulation of pollutants is greater than it is in the foliage of vascular plants, which have impermeable cuticles. Lichens accumulate unusually large amounts of deposits, including heavy metals, which eventually reach toxic concentrations.

Lichens are therefore excellent bioindicators and biomonitors. As bioindicators, the presence/absence of sensitive species is used to look for distribution patterns that reflect pollutant deposition. Voids in distributions may indicate whether lichens have died out due to heavy metals and/or sulfur oxide pollution. These observations are determined by conducting taxonomic inventories or surveys, which include sampling many species in many localities in the study area.

Lichens that do not die out, but are still present and are known to accumulate trace elements are used to indicate patterns of deposition. Common species that are found in most localities are used to facilitate collecting enough samples geographically. Many lichens are collected in bulk in a locality to avoid collecting an anomalous sample that might falsely suggest that a hot spot is present. The samples are typically cleaned of extraneous material, not washed, ground to a fine powder, and analyzed chemically for elements of interest. Typically, both nutritional and anthropogenic elements are included to evaluate the health of the lichens as well as for enabling a geographic study of deposition.

Hundreds of studies on air pollution have been done using lichens and have been published during the last one hundred years. Most of these studies have been carried out in Europe and North America where lichenology was given adequate attention for a long time. Air pollution, however, occurs worldwide, and may be greater now in other countries as Europe and North America have passed air quality legislation and brought air pollution under control. Fortunately, in the past few decades, studies on lichens have also begun in other countries where air pollution is bad.

For example, using *Recent Literature on Lichens* on the Internet, I discovered five papers on air pollution and lichens from China, dating back to 1980. These studies have been done in Hong Kong,

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Nanjing, and Hangzhou. In India, six studies have been done in Lucknow, Faizabad and Kolkata starting about 1995. Africa is represented by two studies from Morocco and Tanzania just a few years ago. South America is well represented by 11 studies from Argentina, Bolivia, Brazil, Chile, and Venezuela dating from the mid-1980s. I even have one unpublished study from a national park in central Peru. It is good to see these studies appearing from the other major continents of the world. There are probably more studies than these that are not yet in the lichen literature database.

Why are the studies on lichens engaging the attention of researchers? There are two good reasons: (i) to increase our knowledge of lichens, and (ii) to do something that may help improve air quality. First, these studies add to our knowledge of lichen distribution. I have conducted or have been involved in dozens of such studies over the past 25 years. Most of these studies have been focused on lichen inventories. Most of these have been conducted in United States National Parks, and have been used to compile a database on lichens in the parks which is now on the World Wide Web (www.ies.wisc.edu/nplichen). Voids in lichen distribution have been detected in some parks as a result of this work.

Second, these studies have increased our knowledge of species sensitivities to air pollution. The presence/absence of species in areas with low or high levels of air pollutants and the element burden of species allows us to better understand the sensitivity of lichen to air pollution. The more we know about which species are where in the landscape, in cities, parks and industrial areas the better we will know which species may die out in the future. This is critical to understanding air pollution impacts and for regulating the pollution levels.

Finally, do these studies help improve air quality? From our experiences in the United States the answer is a qualified yes. Our country has many specially designated areas, including parks and wilderness areas, where good air quality is maintained by providing a high degree of protection to these areas. In these areas sensitive resources must be inventoried and monitored for impacts. Lichens have been included in these inventories, and many studies have been done in national forests and parks for this reason. This has helped the land managers understand the resources better, and to be better informed in making air quality decisions whenever necessary.

The studies on lichens with particular reference to impact of air pollutants on them are valuable to society and a well-established scientific endeavor. This work should be supported wherever possible. Academia, government, industry, and the public are all involved and affected by this.

INTELLECTUAL PROPERTY RIGHTS

Mohd. Usama and Amit Pal

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One of the most important issues, due to the emergence of modern biotechnology, is the legal characterization and treatment of trade related biotechnological processes and products, popularly described as intellectual property, and the rights associated with this are known as Intellectual Property Rights (IPR), or rights given to people over the creations of their minds.

Types of Intellectual Property Rights

1. Intellectual property is intangible and includes "Patents", "Trade Secrets", "Copyrights'' "Trade marks" and "Plant Breeders' Rights".
2. The rights to protect this property prohibit others from making, copying, using or selling the proprietary subject matter.
3. Under biotechnology, one of the most important examples of intellectual property is the processes and products, which result from the development of genetic engineering techniques through the use of restriction enzymes to create recombinant D.N.A.

Intellectual Property Rights (IPR) can be described as follows:

Patents: Granting of special exclusive rights (for trading new articles) has been a practice to encourage innovations, e.g. monopoly rights (only to inventors) were granted in some countries of Europe, as an incentive to develop new articles that would benefit the Society. Under the US Laws, a patent means selling an invention for a period of 17 years. In India, there is "Indian patent act of 1970" that allows to process patents, but no product patents for food, chemicals, drugs and pharmaceuticals. The duration of patent in India is 5 years from the date of grant of patent or 7 years from the date of filing the application, whichever is less. On December 26, 2004 the Indian government promulgated the patents (amendment) Ordinance 2004 as also the patents (Amendment) Rules, 2005 to comply with the Trade Related Intellectual Property obligations.

Before a patent can be issued, following specific conditions must be met:

- The invention must be new, (novelty) and should have utility.
- It must be inventive.
- It must be disclosed (discloses) in a way, which enables a person of normal skill to reproduce it.
- The scope of protection to be granted must be in proportion to the invention.
- It must relate to a technology, where patents are permitted (Patentable).

Trade Secrets: Trade secrets often include private proprietary information or physical material that allows a definite advantage to the owner. This can be illustrated by the popular example of coca-cola brand syrup formula. Trade secrets in the area of biotechnology may include material like Hybridization conditions, Cell lines, Corporate merchandising plans,

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Customer lists etc.

Unlike patents, trade secrets have an unlimited duration. Disclosure of a trade secret and its unauthorized use can be punished by the court of law and the owner may be allowed compensation. However, if trade secret becomes public knowledge by independent discovery or other means it is no longer protectable.

Copy rights: It involves only the expressed material (printed, painted, tape recorded, video recorded or expressed in any other form). In biotechnology, the copyright may cover the D.N.A. sequence data, which may be published. Computer databases and photomicrograph of D.N.A. instruction manual may also become copyright material.

Trademarks: A trade mark is the word or symbol adopted and used by a manufacturer or merchant to identify his goods and distinguish them from those manufactured or sold by others.

Plant Breeders' and Farmers' Right: Plant varieties are generally protected in several countries (not in India) through plant breeders' rights (PBR) or plant variety rights. Plant Variety Production (PVP) laws granting Plant breeders' right patents of a lesser degree to whomsoever claims to have discovered or developed a "new plant variety gives exclusive monopoly control over that variety".

Under the existing convention due to 'International Union for the Protection of New Varieties' (UPOV), the breeders' rights prohibit the farmer from reuse (plant back) of farm-saved seeds of a variety from his own harvest for planting another crop. Furthermore, the protected plant variety may be freely used as a plant genetic resource for the purpose of breeding other varieties.

When patent or plant breeders' rights are not available for true breeding crop varieties, plant breeders, particularly private plant breeders of countries like Germany, may feel tempted to focus their efforts on developing hybrid varieties, because hybrids do not breed true and give higher yields, no one would raise a crop from harvested seeds that will give reduced yield. Thus hybrid varieties may help in protecting intellectual property. A protected variety should be -

- New (previously not exploited commercially).
- Distinct (clearly distinguishable from all other varieties)
- Uniform (all plants of the variety should be uniform.)
- Stable (variety can be reproduced and multiplied without losing its characteristics and uniformity).

In India, new crop varieties are bred at State Agriculture Universities and at State Departments of Agriculture. Seeds of new crop varieties flew freely to farmers and to private companies and no royalty was payable. This really encouraged farmers, in the past, to grow new varieties leading to green revolution. Imposition of PBR in India will lead to following problems

1. The cost of seeds will increase.
2. There will be delay in the spread of new varieties to the farmers.
3. The benefit of new varieties will be restricted to a small segment of farmers.

Farmers' rights: It is a concept developed and adapted in FAO (Food and Agriculture Organization) as a resolution and endorsed by all member countries.

It recognizes the fact that farmers and rural communities have greatly contributed to the creation, conservation, exchange of knowledge for the utilization of genetic diversity. Therefore, it is the obligation of world community to help these farmers to carry out this task and help them in utilizing the genetic diversity available with them.

India's PVP Legislation: The protection of plant variety and Farmers' Rights Act, 2001- even though it supposedly attempts to balance breeders' rights and farmers interests, essentially establishes IPR on plant varieties. Another domestic legislation regulates people's interaction with plant genetic resources in the biological diversity act of 2002. It was essentially passed with the objective of conservation of biological diversity and the equitable sharing of benefits from the use of biological resources.

World-class talent: There is no provision for patenting of plants in Indian patents act of 1970, but other countries like U.S. do have provision. Ironically, India hold patents on plants in foreign patent offices. Through the CSIR (Council of Scientific and Industrial Research) the Indian government has a plant patent (PP12426) on a novel mint plant 'Kosi' characterized by its high menthol content. CSIR also holds another U.S. patent for inventing a "novel damask rose progeny" (PP13203), ama 1, plant gene patent held by D.B.T.

International Developments in Plant Protection: Intentionally, there is no one forum to effectively deal with the grant of patents on unlawfully acquired biological resources or traditional knowledge. Farmer groups, indigenous communities and community-based organizations have not only to lobby their government to reserve the IPR trend but also campaign against patents at the international level.

The only way to protect biological resources and their traditional knowledge (TK) is to create IPRs on them. At the world intellectual property organization (WIPO), within the intergovernmental committee on genetic resources, discussions are ongoing on traditional knowledge and folklore on designing a suitable IPR system to protect TK (traditional knowledge).

Biodiversity related issues : Biodiversity convention was held in May 1992 at Nairobi to formulate a treaty that was designed to be signed at U.N. Conference on Environment and Development (UNCED) later held in Brazil in June 1992. In this treaty, an agreement was sought by the developed countries to allow, as a matter of right, access of every country on the germplasm or biodiversity available anywhere in the world. Since tropical developing countries are far richer than

temperate developed countries, such a treaty would have benefited only the developed countries. In view of this, the developing countries particularly India had rejected such a treaty because it meant to globalize the natural resources and not the benefits derived from biotechnological inventions. The developed countries wanted to privatize biotechnology through patent and other IPR. The developing countries wanted their share in biotechnology. They are gene rich and are willing to share their rich biodiversity, but they want technology transfer to be cheaper. At earth summit, Johannesburg (2002) there was agreement to share the benefits of using biodiversity with tribal people who had traditional wisdom and knowledge.

Biopiracy: Simply means smuggling of diverse forms of flora and fauna. World wide opposition to biological piracy is rapidly building up as more and more groups and people are becoming aware that big corporations are reaping massive profits from using the knowledge and biological resources of third world countries. Farmers and indigenous people are outraged that plants they have developed are being "**hijacked**" by multinational companies by having their patents by doing slight modifications in genetic resources of developing countries.

By providing documented evidence from ancient Indian texts that medicinal use of turmeric was well known in India for centuries, turmeric patent was stopped from going in the hands of multinational private companies. India has also won its battle against grant of Neem patent for its pesticidal use from W.R.Grace Company after a long battle

Can life forms be patented : The US court in 1980 allowed to patent a life form of a bacterium *Pseudomonas* developed by an Indian scientist Dr. Chakraborty. The modified life form contained at least two stable energy generating plasmids, each of the said plasmid providing a separate hydrogen degradation pathway." The subject of the above claim was an organism, made more effective in treating oil spills by manipulating a natural *Pseudomonas*. Oncomouse- Genetically engineered mouse, carrier of human cancer gene was protected by U.S. patent in 1988. Microorganisms such as E .coli in which human genes have been incorporated for production of human insulin, human growth hormone, human tissue plasminogen activator (t-PA), etc. have been recognized for patents in U.S.A. Microbial cells, engineered to produce antigens and antibodies also qualified for patents. Transgenic plants like herbicide resistant cotton, insect resistant tobacco, virus resistant potato and boll worm resistant cotton have also been patented.

Government Initiatives : The government has taken steps after signing TRIPs agreement on IPR related issues in general and product patent in particular. According to reports, Rs 120 crore modernization plans of the patent offices across the country are nearing completion. The patent offices are in Delhi, Kolkata, Chennai, and Mumbai. The patent information service, Nagpur has been developed as an intellectual property training institute (IPTI).

NEWS AND VIEWS

GLOBAL WARMING AND CARBON DIOXIDE EMISSIONS

There is overwhelming consensus that carbon dioxide and other 'green house' gases emitted as a result of man's activity are raising global temperatures, and the resulting devastation from ice cap melting and weather pattern changes is expected to be phenomenal.

Already 50% more CO_2 is in the atmosphere due to the emissions of the 'modern age'. Now it is not enough to simply stabilise CO_2 emissions to stop the greenhouse effect, but rather emissions need to be reduced by 60 to 80%. Generating electricity burns huge amounts of coal, which releases carbon dioxide (CO_2) into the atmosphere. Petrol use and production also releases much CO_2. Global warming is generally considered the most pressing environmental problem we face today.

Carbon emissions exceed the capacity of the earth's natural systems to 'fix' carbon dioxide. Since scientists began recording average annual Earth temperatures in 1996, the 14 warmest years on record have all occurred since 1980, and the temperature in 1998 was not only the warmest on record, but also represented the largest increase in one year ever. If we fail to curb our CO_2 emissions, it is estimated that by 2050 the Earth's temperature will rise 2-6°F, the oceans will rise 2-3 feet (submerging several major coastal cities and populated areas), and extreme climatic aberrations like storms, flooding and severe hurricanes will become common place.

Global warming could fundamentally alter one third of plant and animal habitats by the end of this century, and cause the eventual extinction of certain plant and animal species.

Based on calculations of carbon emissions balanced with the earth's ability to absorb at the most 9 billion tons of carbon dioxide per year, thirteen planet earths would be needed to bear 6 billion people (the world's total population) living an American lifestyle

In South Africa, almost all electricity is generated from coal-fired power stations. For each kilowatt-hour (or unit) of electricity that is used, almost one kg of coal is burnt in a power station somewhere, which releases about a kg of CO_2 into the atmosphere. On an average, South Africa releases 10 tons of CO_2 into the atmosphere per person per

year - which is substantially higher than the world average of 4 tons per person per year. South Africans thus have a significant role in contributing to global warming.

FUELLING THE FUTURE WITH CITRUS WASTE

To establish ethanol as an alternative to petroleum fuel, researchers are seeking new sources that are cheap, abundant, and sustainable. In Florida, which is one of the world's largest producers of citrus products, researchers are looking for ways to use the ~3 million t of wet pulp and peel waste produced every year by citrus-processing companies. The waste could yield 50 million gal of ethanol fuel annually.

They have demonstrated the concept with a 100-gal ethanol-production system. They are currently conducting full-scale tests at a 10,000-gal pilot facility at the start of the citrus season this November.

The ethanol produced at the new facility could replace methyl-tert-butyl ether (MTBE) as a gasoline additive in central or southern Florida. Some states have banned MTBE because of groundwater pollution problems. Since 1992, MTBE has been used as a gasoline additive in the U.S. to boost oxygen levels; this helps the gasoline burn more completely and reduces tailpipe emissions. Converting citrus waste to ethanol also yields the valuable co-product limonene, an organic solvent.

Ethanol is made from citrus waste in four steps: pretreatment, enzyme hydrolysis, fermentation, and distillation. Hydrolysis converts the cellulose, which comprises ~1015% of the dry citrus waste, into glucose, a sugar that yeasts can ferment into ethanol. Developments by companies have brought down the cost of the enzymes that govern this process, making the cellulose-to-glucose conversion economically feasible.

Currently, citrus processing companies dry the pulp and peel waste to make cattle feed and convert the liquid into molasses, which they sell to the beverage industry. This is not profitable for the companies because of the high cost of producing feed pellets and exporting them to Europe

Source: ES&T Online News

SURPRISING RELEASE OF METALS FROM CO_2 STORAGE

Injecting CO_2 deep within the earth remains one of the more promising of getting rid of the greenhouse gas. So far, rocks, composed of porous sandstone filled with salty water many hundreds of meters below the surface, are the main storage-site candidates. But preliminary geochemical data from the first U.S. project to inject CO_2 into such a formation, indicate that because CO_2 makes the deep ground water more acidic, metals in the sandstone get released.

The scientists observed rapid dissolution of calcite and mobilization of large amounts of iron and other metals as a result of major drop of pH from 6.4 to 3. These data are not a snag for CO_2 storage in continental sedimentary basins. However, the data do strongly suggest that CO_2 injection wells should use acid-resistant cements and that abandoned wells should be avoided or monitored carefully.
These former oil and gas wells were never engineered to last for a long time. Another reason to avoid old wells is that most are shallow, and deeper ones are generally considered better for CO_2 sequestration.

The release of metals represents a new element of risk, because it shows the potential for reactive chemistry that could be of concern. But these new results are not likely to present a substantial complication to underground storage. This is because metal-bearing oxides and hydroxides usually make up <1% of saline aquifers and such aquifers have kept saline brines isolated over 100-million-year geological time scales.

Scientists already have enough information to be confident in the ability of some rock formations to hold CO_2 for a long time. But clear guidelines are needed to tell a good place from a bad place.

Source: American Chemical Society

CLIMATE CHANGE PREDICTIONS FOR ASIA

Asia, home to more than half the world's 6.3 billion people, could be badly affected by climate change, many experts warn, as the predicted rising sea levels, melting glaciers, droughts, floods, and food and water shortages take their toll.

Here is an overview of how climate change might affect Asia:

The western Pacific already experiences more typhoons than any other part of the world. Scientists fear Asia will be hit by more frequent and severe storms. While nations like Japan, Korea and Taiwan can afford better protection, others around the Bay of Bengal such as Bangladesh probably will not, and their flat, dense settlements already make them badly susceptible to cyclones.

India and Bangladesh will have to draw up permanent relocation plans for millions of people as sea levels rise. Around 15 percent of Bangladesh would be under water if the sea level rose by a metre in the next century. Japan's major coastal cities, and island nations are also threatened. Vietnam, Thailand, Indonesia, Cambodia and China, could suffer sharp cuts in their gross domestic product because of rising sea levels, according to a World Bank estimate

Glaciers around the world have been retreating since the 1850s, as the climate has warmed. Around 67 percent of Asia's Himalayan glaciers in Nepal, west China and north India, are now melting more rapidly because of global warming, according to a WWF report. Their melting poses a major threat to the Indian subcontinent, Southeast Asia and parts of China, the Intergovernmental Panel on Climate Change (IPCC) says. Water scarcity will worsen because seven of Asia's main rivers, including the Ganges, Indus, Brahmaputra and the Mekong, begin in the Himalayas. Summer glacial melt- water is crucial to hundreds of millions of people downstream, who rely on it for irrigation and hydroelectric power. Asia already has 60 percent of the world's population

but only 36 percent of the globe's freshwater, the UN World Food Programme has said.

Northern China, already threatened by the advance of Mongolia's Gobi desert, faces the further loss of arable land to desertification. Warmer winters and less rainfall make topsoil more susceptible to being blown away by strong winds. Over a quarter of China's huge landmass is classified as desert, and up to 400 million people are threatened by fast-advancing deserts.

Climate-related risks to Asia's rich array of species are climbing. As many as 1,250 of India's 15,000 higher plant species are threatened, and similar trends are evident in China, Malaysia, Myanmar, and Thailand. Many of Asia's mammals and birds are likely to be wiped out because of the combined effects of climate change and habitat fragmentation.

Clean Energy Nepal (*Source: PlanetArk*)

SUN KILLS 60,000 A YEAR, WHO SAYS

As many as 60,000 people a year die from too much sun, mostly from skin cancer according to a World Health Organization report. About 90 per cent of such cancers are caused by ultraviolet light from the Sun. Radiation from the Sun also causes sunburn, skin aging, eye cataracts, pterygium a fleshy growth on the surface of the eye, cold sores and other ills.

Ultraviolet light is needed to activate production of Vitamin D in the body, which prevents rickets, osteomalacia and osteoporosis. The report advises that people seek shade, use sunscreen with an SPF of at least 15, and stay out of tanning salons. The application of sunscreens should not be used to prolong sun exposure but rather to protect the skin when exposure is unavoidable.

Snow, sand and sea foam reflect ultraviolet light and thinning ozone filters out less and less of it. Ultraviolet radiation can neither be seen nor felt. Time of the day, latitude and cloud cover all affect the amount of radiation reaching the ground. Fair skinned people suffer from sunburn much more readily than dark-skinned people.

Source: **Reuters (Washington)**

POLLUTANTS AND TOXIC CHEMICALS

Tens of thousands of toxic chemicals are continuously being released into Earth's ecosystems, many of which cannot be effectively absorbed nor do they break down easily.

We mine cadmium because it is useful for things like batteries, then we dump them, and nature has no way of absorbing them. They become poisons in the system. In laboratories and factories we're manufacturing over 70 000 man-made substances, most of which cannot be broken down in nature. No one knows the long-term effect they'll have on the planet. It was originally thought CFCs were safe, and it won awards for being clean. No one dreamed that once it got into the stratosphere it would start eating the protective ozone layer.

Heavy metals are leaking from the stored accumulated metals, and they will continue to accumulate in nature even if we cease completely to mine them.

One litre of oil can contaminate 800 000 litres of water and each year we dump 3 177 million litres of oil into the world's rivers and oceans.

In 1987 the Mpumalanga area of South Africa, where most of the coal-burning electricity power stations and metal working industries are located, was responsible for 1.84 million tons of sulphuric acid and 0.84 million tons of nitric acid emissions, potentially resulting in destructive acid-rain.

Much radioactive waste from nuclear power stations remains dangerously toxic for thousands of years. Internationally there are no approved long-term storage sites for this waste, and the same applies to South Africa - which generates such waste at the Koeberg nuclear power station. It is amazing that people today take decisions to meet their short term energy needs which will leave heavily toxic trails for hundreds of generations to come.

DEFORESTATION

About half of the world's original forest cover has been destroyed by man, and we continue to wipe out the rain forests at a rate of about 2 acres per second. Nearly half the forests that once covered the earth are gone. In just 15 years, between 1980 and 1995, more than 400 million acres of forest were lost - an area larger than all of Mexico.

Tropical rain forests provide between 25% and 40% of all pharmaceutical products. Three thousand plants have ant-icancer properties; of these, 70% inhabit the rainforests. The rainforest contains such a plethora of life that humans have been unable to classify and name all of it. Many species are becoming extinct without their existence ever being recorded.

It is estimated that if current wood consumption trends continue, all natural woodland in the former 'homeland' areas of South Africa will be denuded by the year 2020.

CYCLING GOOD FOR HEALTH AND ENVIRONMENT

Cycling is environment-friendly, specially on shorter trips. A person who weighs 70 kg and bikes one hour four times a week he burns about 2000 Kcal that is about four chocolate bars. Studies have shown that those who don't get much exercise otherwise, can improve their fitness by as much as 20% by bicycling 5 kilometers a day. It also helps to check weight gain and reduces the risk of heart disease, circulatory problems and osteoporosis. It also reduces blood pressure and strengthens legs.

Bicycles run on essentially renewable fuels (the food that we eat). Using a bicycle instead of a car on short trips does the environment a lot of good. People who travel 5 km to work by bike instead of driving a car cut their CO_2 emissions by 0.7 tons a year.

Source: Swedish Society for Nature Conservation, **Stockholm**

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Near East University Nicosia Northern Cyprus
MERSIN 10 - Turkey
Contact: ess2007@neu.edu.tr;
ghuseyin2007@gmail.com
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Contact: biosymp@battelle.org
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13th International Interdisciplinary Conference on the Environment
Portland, Maine, USA
June 30 - July 3, 2007
Contact: Dr. Kimberly Reiter, Conference Chair
kreiter@stetson.edu,
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4th World Environmental Education Congress (WEEC 2007).
2-6 July 2007, Durban, South Africa
carol@confco.co.za; announce@weec2007.com;
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Contact: owaters.@wessex.ac.uk
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7-13 January 2007, Accra, Ghana
Contact: soils_intoconf@yahoo.co.uk;
Marco.Nocita@fao.org

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Printed and Published by
Dr. K.J. Ahmad
for International Society of Environmental Botanists, National Botanical Research Institute, Rana Pratap Marg, Lucknow-226 001, India
Executive Editor :
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