ENVIRONEWS

INTERNATIONAL SOCIETY OF ENVIRONMENTAL BOTANISTS

Newsletter

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IN THIS ISSUE

Save Himalayas

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Lucknow, India

Himalaya, the abode of glaciers snow, ice and natural resources is a sustainable source of fresh water to one third of the world population. World's largest rivers Brahmaputra, Ganga and Yamuna originate from Mount Kailash. Himalayas stretch approximately 2,500 km from east to west. The highest peak of Himalayas, Mount Everest lies in Nepal attaining a height of 8,848 m is the highest in the world. Himalayas cover an area of 75,000 square kilo meters. Himalaya was created 70 million years ago and is the youngest mountain range in the world. Himalayas are the geo-political boundaries which separates Indian subcontinent from the Tibetan Plateau.

Himalayas cross five countries: India, Pakistan, Nepal, Bhutan and China. Great Himalayas have profoundly shaped the cultures of South Asia. Many Himalayan regions are the sacred seats of religions: Hinduism, Buddhism, Jainism and Sikhism. The Himalayas are magnificent and have captured people's imagination for centuries. It is a region of stunning landscapes and incredible diversity, from the world's highest snow bound peaks to the rich alpine meadows, dense temperate forests and humid lowland jungles.

Naturalists from all over the world come to visit the Flower Valley near the Badrinath shrine in September to enjoy the splendid beauty of the flowering seasonal. Himalaya is the home of millions of people and thousands of unique species of plants and animals. In the Eastern Himalayas alone, there are some 10,000 plant species, 900 bird species, 300 mammal species, which are not found anywhere on the planet Earth. Iconic and threatened species: Bengal Tiger, Asian Elephant, one horned Rhino, Red Panda, Snow Leopard, Black necked Crane and Gangetic Dolphin are found in the Himalayan regions. It is the region of fascinating cultural and spiritual heritage, where millions of people from diverse faith and cultures and religions come and live for seeking peace and eternal bless.

The Himalaya is the treasure house of biodiversity of edible, fuel, timber, medicinal and agricultural crops. Himalayas shows the highest diversity (51%) of edible plants and more than 675 wild plant species are used as food. Himalaya is a mosaic of the fragile environment that faces wide range of challenges.

Due to the global warming and climate change, glaciers melt down alarmingly and glacial

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Call for online pre-registration
Fifth International Conference on Plants & Environmental Pollution(ICPEP-5)
3-6 December 2014; Lucknow, India
Organised by International Society of Environmental Botanists & CSIR-National Botanical Research Institute
Pre-registered delegates:
Indian-586, Foreign: 86 (From 40 countries), Total : 672
Algeria-1; Australia-1; Azerbaijan-2; Bangladesh-4;Belgium-1; Botswana-1; China-1; Czech Republic-1; Egypt-1;Estonia-1; Finland-3;France-2; Germany-4; Ghana-1; India-586; Iran-5; Italy-1, Kazakhstan-1; Mauritius-1; Nepal-7; New Zealand-1; Nigeria-4; Pakistan-6; Portugal-1; Russia-7; Saudi Arabia-3; Slovak Republic-1; Solomon Islands-1, South Africa-2; Spain-1; Sri Lanka-2; Switzerland-1;Tunisia-1; Turkey-1;Turkmenistan-1;U.A.E-5; U.K-4; Ukraine-1;U.S.A-2; Vietnam -1 Yemen-1
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lakes burst their banks which cause sudden floods. Downstream water availability is becoming increasingly uncertain due to the unpredictable seasons which bring either too much water or too little water. Both, the people and wild life, of the Himalayan regions depend on the natural resources of the Himalayas. Human population is increasing and people are using the resources faster than the Himalayas can replenish them. Forests are becoming fragmented which is a serious problem for the species like the tiger and elephant as they need larger territories for wandering. People and wild life are increasingly coming into closer contact. Human population is growing fast while the wild species are decreasing. Man and animal conflict is causing harm to the Nature. For their survival, animals create havoc destroying standing crops and killing the livestock in the rural as well as urban areas. If the wild species are to be protected, we have to protect their habitats. Due to our callousness, if a biological species is lost, it is lost forever. Reconstruction of the living species in the nature is not possible and it remains a fantasy of the Jurassic movie.

Sustainable use of natural resources from the mountains, rivers, forests and grasslands should be seriously considered for their consumption in our daily life. The flora and fauna of the Himalayas vary with the altitude, climate, rainfall and edaphic conditions. The climate in the Himalayas ranges from the tropical at the base of the mountains to permanent ice and snow at the highest elevations. The unique floral and faunal wealth of the Himalayas is undergoing structural and compositional changes due to the climate change. Green house gasses deplete the Ozone layer, increase the global temperature, melt the glaciers and compel various animal species to shift to higher elevations. *Quercas* (Oak) forests are being invaded by the Pine forests in Garhwal Himalayan region. Impact of the climate change in the Himalayan regions, can be seen in the early flowering and fruiting especially in *Rhododendron, Myrica* and *Pyrus* (Apple).

The link between the climate change and biodiversity has long been established. Although throughout Earth's history, the climate has always changed the ecosystems and species are coming and going. Rapid climate change affects the ecosystems and species are not able to adapt, so the loss of biodiversity increases tremendously. Ecosystems are already showing negative impacts under the current levels of climate change which is still modest, compared to the projected changes in future. In addition to the warming temperatures, more frequent extreme weather events and changing patterns of rainfall and drought can be expected to have significant impacts on the biodiversity.

In recent years scientists have monitored a notable increase in the rate of glacier retreat across the Himalayan regions as a result of the global climate change. We have to protect the fragile ecosystem of Himalayas through education and sustainable development. We should check the illegal wild life trade and protect the natural environment. Uncontrolled tourism and pilgrimage to the shrines pose threat as well as pollute the pristine beauty of the Himalayan regions. We have to build the future, where humans live in harmony with the nature without destroying the incredible biodiversity. Recent calamity in the Kedarnath valley was triggered due to the combination of atmospheric and anthropogenic pressure, blasting of the mountains for construction of roads, hotels and resorts in the name of development. Himalayan devastation in Uttarkashi is the whisper of Nature for introspection and retrospection. We cannot prevent the natural events but we can certainly minimize the damages by proper planning and better management of the developmental projects without damaging the fragile ecosystem of Great Himalayas.

LETTERS

Greetings from the Centre for Science and Technology of the Non-Aligned and Other Developing Countries. I am pleased to inform you that I have received a personal request from H.E. the Ambassador of Ecuador in India seeking the assistance of our Centre in identification of suitable Indian scientists in areas such as Life Sciences, Natural Resource Sciences, Production & Innovation Sciences and Social & Behavioural Sciences to carry out joint projects in public universities, polytechnic schools, research institutes and public entities of Ecuador in connection with the implementation of a programme titled 'Prometeo Viejos Sabios' of the Government of Ecuador, which aims at promoting research, technology and innovation through collaboration with the foreign invited scientists. The Ecuadorian Government will provide the return air ticket and will also give adequate financial support for sustenance of the selected scholars and scientists during their ~6 months' stay in Ecuador.

The interested scientists and experts may kindly send their brief proposal on the work they would like to carry out in the Ecuadorian host organisation during their stay in that country along with their CVs directly to H.E. Méntor Villagomez, Ambassador of Ecuador in India at email **eecuindia@mmrree.gob.ec**. All material may please be sent only in electronic form with scanned attachments, if any, with a copy marked to the NAM S&T Centre.

Prof. Dr. Arun P. Kulshreshtha,
Director and Executive Head,
Centre for Science & Technology of the Non-Aligned and Other Developing Countries, (NAM S&T Centre), India Habitat Centre, Lodhi Road, New Delhi, **India**
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Recently we have been informed about the Fifth International Conference on Plants & Environmental Pollution (ICPEP-5) planned by you for taking place 3-6 December 2014 at Lucknow, India.

Most topics of your Conference meet exactly our scientific interests. Therefore, we plan to attend your meeting. Additionally we are already announcing your conference on our homepage at http://www.EISN-Institute.de.

Before I will be more active in contributing to (for example I will be guided in case, if we are able to go for Lucknow in Dec. 2014, by Dr. Simone Wuenschmann, who is able to give an excellent talk related to different themes/areas already proposed by you) and up to promoting of your Conference in Germany, Europe and worldwide, I need some time for our own activities. For example from this Sunday we will attend the big congress of INTECOL 11 in London. The overall topic is on "Into the next 100 years).Please have a look to the

homepage of the Congress. I am - since a (too) long time - extended Board member of INTECOL and are include so far d in preparing this Congress taking place all four years (the "Olympic games of Ecology). For London already more than 2000 international scientists have been formerly registered.

Till the end of next year you have enough time to organize a perfect conference, for sure Please keep us informed on all news related to your conference.

Wishing you an excellent time.

Prof. Dr. Bernd Markert
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I am Laszlo Makra, associate professor at the Department of Climatology and Landscape Ecology, University of Szeged, Szeged, Hungary.

My research field is pollen climatology, in more detail the association of pollen concentration (especially ragweed pollen concentration) with meteorological elements. I have publications on this field in several international journals.

I admire India and Indian people. I was in India in 2005 when I participated at a scientific conference organized by the International Society of Environmental Botanists & CSIR-National Botanical Research Institute, Lucknow, India. I become acquainted with several botanists from India and I have very nice reminiscences from your country. Concerning my request to work together and publish together with your collaboration a paper in a highly reputable international journal is very respectful for me and my co-authors. Of course, if you send me the data requested, you in return will receive from us all the similar data for potential processing from Europe.

Waiting for your kind mail.

Dr Laszlo Makra PhD habil.
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WELCOME NEW LIFE MEMBERS

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NEWS FLASH

Diamond Jubilee Lecture at CSIR-NBRI

Under the ongoing of CSIR-National Botanical Research Institute Diamond Jubilee lecture series, an informative talk was delivered by Dr. D.J. Bagyaraj, NASI Sr. Scientist and Chairman, Centre for Natural Biological Resources and Community Development, Bangalore on "Arbuscular mycorrhizal fungi for sustainable agriculture". In his lecture he explained that the mycorrhizal association in agricultural crops, shrubs and tropical and temperate trees were of arbuscular type .Arbuscular mycorrhizae (AM) are formed by non-septate Glomeromycetous fungi. He explained that the mechanism of improved plant growth caused by mycorrhizal inoculation is through roots as a means of increasing phosphate uptake. They also improve the uptake of other diffusion-limited elements like Zn, Cu, etc. The other beneficial effects are their role in the biological control of root pathogens, biological nitrogen fixation, hormone production and greater ability to withstand water stress. In his concluding remark, he underscored the importance of microbial inoculants in sustainable agriculture.

Seminar on Himalayan Devastation and Eco-balancing

Sudden cloud burst and heavy flood in the Mandakini River on June 16 and 17, 2013 brought great miseries to the local people and the pilgrims visiting Kedarnath Shrine. More than 10,000 people lost their lives and unaccounted cattle, flora and geological components caused ecological disbalances in the Himalayan regions.

For introspection and retrospection of the calamity, Dr. S. C. Sharma, Vice President, International Society of Environmental Botanists (ISEB), conceptualized the Idea for organizing the seminar on the Himalayan devastation and eco-restoration under the aegis of the Botany Department, University of Lucknow. Accordingly a daylong Seminar on: Himalayan Devastation and Eco-balancing was organized on

August 31, 2013 at the Malviya Hall, University of Lucknow under the Patronship of Prof. S. B. Nimse Vice Chancellor. Dr.S. C. Sharma, an active Environmentalist participated in the organization of the Seminar and gave all inputs for the success of the seminar.

Prof. Y. K. Sharma, Convenor of the Program, welcomed the guests, faculty members, delegates, students and media persons and explained the genesis of the seminar. Prof.Nimse, Vice Chancellor introduced the guest speaker Dr. A. K. Gupta, Director, Wadia Institute, Dehradun. Dr. A. K. Gupta gave an illustrated, informative talk posing a question: Whether Kedarnath disaster was triggered only by the climate change. Incessant heavy rains in Uttarakhand on 16 and 17 June, 2013, washed down Uttarkashi leading to the worst disaster in the country in which thousands of pilgrims, local people and cattle perished.

Apparently, there were four major causes of this unprecedented natural event (1) Cloud bursts in more than one river valleys (2) Heavy rainfall and breaching of glacial lakes (3) Disintegration of Kedar Dome, a glacial like body of rock and ice. (4) Mushrooming of the residential constructions in unsafe areas including buried plateau of river beds, deforestation and unscientific construction of roads to the rapidly increasing tourist population. These factors have adversely affected the fragile ecosystems of the Himalayan region, which resulted the devastation of the Kedarnath valley and surrounding areas.

Hill slopes in the Himalayan regions are known for their instability due to ongoing tectonic activity. However, increasing anthropogenic intervention in the recent times has contributed to terrain instability in addition to the natural factors which have been observed by increasing frequency and magnitude of the landslides. There is urgent need for undertaking future developmental activities in Uttarakhand with due consideration of such unexpected events with proper scientific approach.

Dr. A.K. Tangari, Senior Scientist, Remote sensing Application Centre, Lucknow, presented the paper on: Slow and Steady Natural Disasters in Himalayas. Due to the climate change, glaciers are melting 40 meters per year. Greater the rise in temperature more will be retreat of the glaciers. Gangotri glaciers are "Divine Fresh Water Reserve for millions of People".

Diminishing discharge of water and dry rivers will cause great suffering to human beings in near future.

Prof. R. P. Shukla, Ecologist, Botany Department, Gorakhpur University presented Paper on: Growth Strategy Combination of Forest Plants for Eco-restoration of Devastated Himalayan Ecosystems. The natural forest ecosystem provides valuable services in addition to food, fuel and timber. Forests and other highly productive ecosystems become biological scrubbers by sequestering CO2 from the atmosphere to mitigate significantly annual emission.

Dr. Tariq Husain, Head Systematics and Herbarium Division, National Botanical Research Institute Lucknow shared his experience of field studies to the western Himalayas. Wild edibles and medicinal plants are important sources of supplement and substitute food during the period of scarcity. Himalayas show the highest diversity (50.96%) of edible plants. More than 675 wild plant species are used and consumed raw, roasted or in the boiled form. There are several evidences of habitat destruction and successional changes in the Himalayan regions because of the anthropogenic pressure. Increasing anthropogenic pressure has also led to the invasion of alien species which are supported by the climate change to occupying newer and empty niches. The protection of the critical habitats and long term conservation management strategies can not be achieved without improving economic conditions of the local people.

Dr. D. K. Upreti, Head, Lichenology and Plant Diversity Division CSIR- NBRI, Lucknow presented a paper on: Role of lichens as Bioindicator to assess the Environmental Conditions of the Himalayas. Lichens are excellent example of the symbiotic association of nonvascular cryptogams, which occur in all possible environmental habitats through out the world. Lichens are extremely sensitive to the environmental stress and frequently used in the atmospheric pollution, eutrophication and climate change studies.

Lichens grow abundantly in the Himalayas and reported extensively in the systematic studies of the taxa. Lichens can be used to assess the present environmental condition and future changes due to the anthropogenic as well as climatic changes.

Dr. Dhruv Sen Singh, Geologist, Centre of Advanced Study in Geology, University of Lucknow, presented the paper: Nature, Man and Disaster in the Glaciated terrain of Himalayas. Himalayan regions have attracted the tourists / pilgrims that the temporary population is much more than the permanent population in a year. The Himalayas which provide social, economical and political security to India, is affected by earthquake, cloud burst, landslide and flash floods in the last few decades causing severe loss of life and property. Cloud bursts, flash floods and landslides are well known in Himalayas but it develops into disaster due to the increasing gap between natural laws and anthropogenic activities. Recent Himalayan devastation was due to the cloud burst induced landslides, which blocked the Mandakini River and its tributaries forming ephemeral lakes. Bursting of these lakes caused flash floods which washed out the settlements and roads and brought huge devastation in the Uttarakhand mainly in Kedarnath region. The development should be eco-balancing, sustainable and free from pollution. The nature should be conserved and the natural resources exploited in such a way that it could be available also for the posterity.

There was also the Poster Session, where the Research Scholars presented their work on the recent calamity in the Kedanath Valley.

In the end Dr. S.C. Sharma, Vice President, ISEB, expressed his views that the Himalaya which is the life line for one third of the world population, should be saved by conducting the educational and awareness programs especially by the NGOs. There should be check on the uncontrolled eco-tourism and pilgrimage to the shrines in the Himalayan regions. One day Seminar on the Himalayan Devastation and Eco-balancing has well conveyed the message to the cross section of the Society that the development in the Himalayas should be undertaken without damaging the eco-systems in the Himalayan regions. It should be always remembered that Man is the Partner of the Natures not Master of the Nature.

Dr. Riti Thapar Kapoor, Assistant Professor in Amity Institute of Biotechnology, Amity University, Noida and a life member of ISEB was invited as a session co-chairperson in the International Conference on Agriculture and Animal Sciences in Colombo, Sri Lanka during July 8-9, 2013. This international conference was hosted by International Center for Research and Development (ICRD), Sri Lanka in collaboration with Chungnam National University, Daejeon, South Korea. The international conference (Agrianimal - 2013) was attended by 120 participants from 17 countries The conference provided an important opportunity for the participants to exchange their views and experiences on the climate change, global warming, agriculture, animal sciences, biodiversity, scientific temper and latest developments in biotechnology as well as to facilitate strong research collaborations among different countries.

Prof. Mohd Yunus, Vice President of the International Society of Environmental Botanists (ISEB) has been appointed Vice-Chancellor of Mohammad Ali Jauhar University, Rampur, Uttar Pradesh. Prof. Yunus was Head & Area Co-ordinator of Environmental Science Division at CSIR-NBRI when he was offered the post of Professor of Environmental Sciences by the Babasaheb Bhimrao Ambedkar (Central) University at Lucknow in 1998. He served the university as Head & Dean, School for Environmental Sciences, Registrar of the University and Founder Director, University Science Instrumentation Centre. Prof. Yunus was a founder member of ISEB and the editor of Environews from its founding in 1994. He is one of the Editors of International Journal of Environmental Botany, a biannual journal launched by ISEB and Climate Change and Environmental Sustainability (CCES).

New generation eco-friendly plant nutrients for sustainable agriculture

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For years together, the solo objective of fertilizer application to crop plants had been to provide nutrients to plants and in turn obtain enhanced or sustained optimal yield and hence the fertilizer producers and users had been and are being attempting to improve fertilizer use efficiency in terms of nutrient uptake and crop yield. It has been realized that the excessive use of inorganic fertilizers, which is the common agricultural practice of green revolution, is not a sustainable farming practice from either economic or ecological point of view.

Nitrogen is one of the major nutrients for the plant productivity. The inorganic forms of N i.e. nitrate, nitrite and ammonium are assimilated by the plants including bacteria into the primary amino acid, L- glutamic acid. Ammonium is the entry port for incorporation of inorganic N into the organic cycle. The primary sources of nutrient N are nitrate (in most of the arable soil), ammonium (mostly in anaerobic conditions) and biological fixation of di-nitrogen into ammonium (symbiotic and non-symbiotic). The nitrate gets reduce to nitrite in presence of the enzyme nitrate reductase (NR), which subsequently reduced to ammonium in presence of the enzyme nitrite reductase (NiR). Ammonium get assimilated into L- glutamine in presence of L- glutamine synthetase (GS) and subsequently produces L-glutamic acid by incorporation of amide nitrogen of the glutamine into 2-oxoglutarate which is catalyzed by L-glutamate synthase (Fd- GOGAT and NAD(P)H- GOGAT) . In this pathway one L- glutamic acid molecule is used to produced L- glutamine and subsequently two L- glutamate molecules are produced with a net benefit of one L- glutamate. This pathway was discovered in early 1970s in bacteria and subsequently in plants. Another enzyme, for which at least 14 isoforms have been reported, L-glutamate dehydrogenase (NADH-GDH and NAD-GDH), which occurs in almost all living organism has been reported to catalyze a direct amination and deamination of ammonium to and from L- glutamic acid. Being a reversible catalytic system GDH pathway of ammonium assimilation is considered as an alternative pathway which generally operates under the stresses when ammonium is available in excess amount. The assimilated N gets incorporated in proteins, nucleic acids and many other metabolites essential for the functioning of living organisms.

Nitrogen deficiency is one of the major yield limiting factors in plants especially in cereals, hence application of N- fertilizers are considered as an essential input to maintain high yield of the crops. Plants are responsive to the applied N which constitutes most of the vital macromolecules and metabolites related to its vegetative and reproductive growth and metabolism. The applied fertilizer N enhances crop productivity per unit area, as agricultural soil is deficient in N worldwide. The fertilizer application is thus considered essential to meet the requirements of the burgeoning population, particularly in the developing countries.

The losses of chemical fertilizers occur in many forms. Due to runoff and leaching it contaminate ground and surface water bodies which causes eutrophication and its environmental consequences. High levels of nitrate and phosphate etc. have been reported to be associated with the many kinds of toxicity to zooplanktons and aquatic animals and health hazards to cattle and ruminants and human being specially children. The nitrite may combine with organic pollutants and form nitrogenous xenobiotic compounds which affect nervous system, induces heart diseases and cause many types of cancers. The excessive use of N fertilizer are known to cause enhanced volatization of ammonia and emissions of NOx gases which are very potential threat to the global warming. Organic manures also emit methane in anaerobic conditions.

In most of the countries, applications of chemical fertilizers, pesticides, energy based tools and equipment and high

water consumption for irrigation to gain high yield in plant agriculture have raised cost of production, on one hand, and have degraded soil, water and biosphere, on the other. Therefore, there is an urgent need to develop innovative procedures, tools, techniques, production, transportation, distribution and marketing systems, which are based on low input agriculture, sustained productivity and yield and sustainable resource management.

Organic manures e.g. cow-dung, compost, vermi-compost and farm yard manure (FYM) etc. have been recommended as an alternative to the chemical fertilizers in organic farming systems. However, these manures are slow acting and thus required to be applied in bulk to maintain high crop yield similar to that obtained by the application of chemical fertilizers. In recent years due to rapid urbanization and industrialization globally the populations of cattle and ruminants have decreased rapidly and thus the availability of organic manures in bulk is difficult. The practices to convert other organic wastes of agricultural and urban sources in manure have yet to be established at large scale in most of the developing countries.

Biofertilizers have been identified as an alternative to chemical fertilizers to increase soil fertility and crop production in sustainable farming. These are the products containing living cells of different types of microorganisms, which have been ability to convert nutritionally important elements from unavailable to available forms through biological processes. In recent years, biofertilizers have emerged as an important component of the integrated nutrient management programs (INMP) and hold a great promise to improve crop yield minimizing environmental degradation caused by the application of chemical N forms e.g. Urea in excess. Strains of *Azotobacter*, *Rhizobium*, *Bradyrhizobium*, *Azospirillum*, *Pseudomonas*, *Bacillus* and *Acetobacter* etc. have been developed as biofertilizers for cereals, pulses, vegetables, oil seeds, cotton, sugarcane, wheat etc. Though, Biofertilizers offers an economically attractive and ecologically sound alternative to the chemical fertilizers, for realizing the ultimate goal of increased productivity its efficacy is significantly low in relation to the crop yield when compared with the recommended doses of chemical fertilizers.

The microbial diversity is enormous and its evolution and adaptations to the changing environment is significantly better. A bio-prospecting of soil microbes from different agro- climatic conditions to isolate, select and improve plant growth rhizobacteria (PGPR) is a thrust area which will provide new and improved strains of biofertilizers who can enhance the nutrient availability by converting biologically non-available nutrients to its available forms. The genera, species, strains and ecotypes for symbiotic and non-symbiotic N_2 fixers, phosphate solubilizing bacteria (PSB), potassium solubilizing bacteria and Fe solubilizing bacteria etc. have been discovered. Genetic improvement in the selected microbes can be done using conventional method and gene technologies. The selected microbes which are potential PGPRs are required to be optimized for its dose responses for different crops and different agro-climatic conditions. New carriers of such microbes are to be discovered and designed for providing more vibrant and productive micro-environment to these bio-fertilizers during storage, transport and application in the fields.

Slow- or controlled-release fertilizers containing plant nutrient(s) in a form which delays its availability for plants or which extends the nutrient availability to the plant for significantly longer duration (preferably for entire vegetative and reproductive cycles) than a reference 'rapidly available nutrient fertilizer' such as ammonium nitrate or urea, ammonium phosphate or potassium nitrate etc. Such retention of the nutrients for longer duration (slow release fertilizers; SRFs) or its release in rhizosphere as per the nutritional requirements of the crop (controlled release fertilizers; CRFs) can be obtained by the technical interventions which reduce the nutrient losses and provide nutrients to the plants for a comparatively longer duration. It plays an important role in improving fertilizer use efficiency by plants, thereby mitigating environmental pollution and can be seen as a major nutritional component of the sustainable agriculture.

Slow/ Controlled fertilizers (SRFs) have a potential to manage high crop productivity without the problems and risks associated with the soluble chemical fertilizers. Unlike the rapidly available soluble fertilizers, SRFs are slow acting due to the delayed release of nutrients often available in bound/immobilized form in or onto a non-toxic, biodegradable and inert matrix. A good SRF should release the nutrients in rhizosphere at the rates and amounts that match the need of the growing plants.

Several formulations of slow release fertilizers have been developed by condensation of small nutrient molecules, by coating to a matrix, developing super granules adsorbed or immobilized nutrients into a matrix, amending nitrification and urease inhibitors etc. The SRFs amended with nitrification inhibitors are also known as stabilized fertilizers. A new term i.e. customized fertilizers has also been introduced recently which indicate the modified forms of conventional chemical fertilizers to reduce nutrient losses and to increase its efficacy.

The commercial application of use of SRFs in main stream agriculture has been limited to a few countries e.g. Japan, USA, Israel, Australia, China and Europe and that too for the few cropping systems. The developing countries with extensive agricultural practices and pressure to produce more food to feed its burgeoning population, have not yet adopted it in its main stream plant agriculture. It is primarily due to high cost involved in production of SRFs/ CRFs which are not covered under the fertilizers subsidies in countries like India. Lack of appropriate endogenous technology, appropriate appreciation and awareness on SRFs by the existing agricultural network in these countries, ignorance to the associated environmental and health threats and overall the increased price of these fertilizers over the conventional soluble chemical fertilizers (subsidized), biofertilizers and organic fertilizers may be seen as the major limitations to realize the potentials of SRFs/ CRFs in the contemporary crop agriculture systems in many parts of the world.

We have developed certain formulation of SRFs which are based on use of organic matrix containing local non-toxic, biodegradable and comparatively low cost matrix to bind chemical nutrient forms which have performed very significantly for major cereals e.g. rice, wheat and Indian mustard etc. Some of our formulations are eco- friendly and cost-effective; however, it needs further validation in larger agricultural fields.

Use of low cost binders and other modifications to make it novel and yet cheaper are needed to meet the challenges in popularizing SRFs in the developing world. We are making significant efforts in this direction which has yielded encouraging results. We have developed organic matrix entrapped bio-fertilizers granules which have significantly higher efficacy as compared to the conventional bio-fertilizers available in market. Application of low cost slow/ controlled release fertilizers can be a viable alternative strategy to reduce excessive use of split doses of high N-responsive hybrid crops. These fertilizers can maintain high productivity with single basal application, reduce chemical fertilizer load and minimize nutrient (N) losses to the environment.

Further sustained N-availability to plant rhizosphere through chemical fertilizers as well as SRFs increase plant N-status and a significant portion of inorganic N-forms remain unassimilated in the aerial sinks especially in leaves which can cause a health hazard to the consumers on one hand and prove as an ultimate loss of the nutrient through the vegetative and reproductive parts of plant residue on the other. An improved NUE by manipulating N-assimilation, transport and sink-source relationship using recent biotechnological approaches can increase the yields of the chemical fertilizers as well as SRF applied plants further. Attempts should be made in the recent future to overcome these bottlenecks in N-relation to plants.

As alternative to the green revolution to agriculture, organic farming has been adopted in some regions, however, there has been over emphasis on the organic products with ignorance of practical problems and scientific know how. As a result the organic farming has become an elite farming system with expensive products and involvement of less quantum of human resources. The emphasis of the organic farming has lead on organic products with environmental concern only and economical concerns of the masses have been ignored. In place of organic farming an ecological farming is to be evolved to increase the efficacy of eco-friendly alternatives of the agricultural inputs by better selections and technological interventions. We have to develop the eco-friendly plant nutrients for ecological farming which can be cost effective, eco-friendly and can address the problems of productivity and yield of major crops. It has to be made available to a larger community including small and marginal landholders in the developing countries and must incorporate the interest of agricultural laborers and consumers at large scale. We understand that our work in relation to developing organic matrix based slow release fertilizers with amendments of reduced amount of chemical fertilizers, multiple nutrients, microbial biofertilizers etc. have a great potential in resolving the nutritional limitations in ecological farming system.

Uttarakhand Disaster 2013 - Floods and Landslides: *Lessons of Ecology Not Yet Learnt*

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Uttarakhand, a part of Indian Himalaya, is not new to disasters. But the frequency and intensity and in particular the complexity of natural processes and their devastating consequences are on rise. Climate change is a known issue, aggravating large scale land-cover and water regime changes, causing vulnerability of land and its people. Equally and even more important, the degradation and massive alteration of landscape, that resulted in their instability and fragility, is due to short-sighted, profit oriented, poorly planned, ecologically unsustainable developmental and infrastructure projects with namesake feasibility studies without any system based approach of impact studies. Disaster of 2013 June was not actually a surprise. Several prior warnings were given by the nature itself - in the form of floods, landslides and tremors of varying intensity almost every year. Scientists and local ecologists also warned the engineering centered economists, government and people to be aware of what may be consequences of ignoring ecological limitations and local geology. This disaster is, thus, a consequence of the "lessons of the past not learnt" and of "deliberate ignorance" of carrying capacity concerns, indigenous knowledge and locally sustainable models of economic growth.

The Disaster: Triggers of this catastrophic mega-disaster, although natural (i.e., hazard - heavy rainfall), its effects on land, its forming of loadings with silt, logs, boulders and unchecked velocity - led it to ferocity. On the flash flood's way, were the denuded, eroded, fragile landscapes along with their poorly maintained infrastructure like bridges, culverts, towers, wrongly located and poorly designed buildings, etc. and floating population in ignorance and unpreparedness of such tragedy to come. Absence of local level risk management systems, altogether synthesized the grave consequences in terms of lives lost, human sufferings, infrastructure and business loss and

equally important a further permanent damage to the eco-geological systems. It recorded more than 340 millimetres (13 inch) of rainfall, 375 per cent more than the benchmark of 65.9 mm rainfall during a normal monsoon on June 17, 2013, may be attributed either to implications of climatic changes or to natural and man-made disturbances to ecosystems. Space based studies, geological, ecological interrogations and social-media versions pose few other origins like Glacial Lake Outburst Flood (Kedarnath) or a heavy Cloudburst, or even of 'terrorist's activity of scientific sabotage' or even a foreign hand. Specific features of flash flood are given in table 1.

Table 1. Specific features of flash flood

	Flash Hoods
Features	Rapid water level rise above natural channels Reaches peak flow within minutes up to a few hours; Rapid recession (within minutes to few hours); Often dissipates quickly; Not necessarily related to base flow levels; Short lag times
Causes	Very high intensity rainstorms/cloudbursts; Rapid snow/glacial melt due to rapid increase in temperature; Dam (both artificial and natural) breaks
Associated problems	High sediment and debris loads; Very high hydraulic force and erosive power
Frequency	Occasionally, any time during the year
Affected areas	River plains and valleys; Alluvial fans; Mostly local extent; Generally small to medium areas are affected
Predictability	Very difficult to forecast
Potential mitigation measures	Early warning systems; Community preparedness and awareness; Appropriate emergency measures

Heavy rainfall for four consecutive days as well as melting snow aggravated mountain floods caused heavy floods in Himachal Pradesh, Uttarakhand and Western Nepal. In the city of Dehra Dun, capital of Uttarakhand, this was the wettest June day for over five decades. Death toll over thousand, missing much more than it, and more than 60,000 stranded in known and unknown locations, were the direct impact on human life. Damages and losses to other life forms - rare to concern in our 'damage assessment' systems, but certainly of notice to the academic and scientific community to work upon. On a rapid assessment, following are the major aspects of this major disaster:

(a) Making of the Catastrophic Ecological Risk: There are several ecological, anthropic and economic factors known to have made the 'natural hazard' a 'catastrophic risk'. Largescale commercial ventures that primarily degraded or modified the natural landscapes of the hills and devastated the land from its original vegetation cover (which the system-ecologists can explain) causing changes in drainage pattern and watercourses, erosion, and precursors of several (thousands) landslides. Transport and aviation fuelling hot emissions are known to affect the thermal flux possibly attributed to increased glacial meltdown, climate-change implications (to which Hindu Kush Himalaya HKH region is highly prone), and ABC (atmospheric brown cloud, a regional impact of biomass and fuel burning). Rise in the vegetation cover even up to 4000 mts height as against the earlier up to 3200 mts or so (which is reported sometimes as great achievement) but the fact is that it increases thermal profile and snowmelt, with exposed soil. Some scientists referred to the British intervention of replacing broad-leaved forests with pine plantations to cause increased erosion. Lack of recognition of a system approach in impact assessments and feasibility studies resulting in poor explanation of eco-geo-physiological contexts and their consequences (Table 2), led to improper and inappropriate developmental activities include infrastructure and production units, in their location, design and site restoration management. Besides this, the non-recognition of relations between earthquake tremors, floods, forest fire, ecological succession and landslides, and their effects on land (hills and slopes) and infrastructure including buildings increased the risk. Declining respect to the natural and old river or stream courses and missing of upsteam-downstream relations added to the complexity of challenge in terms of blockade to natural flow of floodwaters. There are several other aspects besides those mentioned here that need to be studied and brought into a common research platform to facilitate a forensic base of investigations.

Table 2. Factors affecting catchment run-off

Climate	**Physiographic**	
	Basin characteristics	**Channel characteristics**
Forms of precipitation (e.g., rain, snow, hail)	Geometric factors (size, shape, slope, orientation, el evation, stream density)	Carrying capacity (size and shape of cross section, slope, roughness, length, tributaries)
Types of precipitation (e.g., intensity, duration, aerial distribution)		

Interception (depends on vegetation species, composition, age and density of stands, season, storm size, and others)		
Evaporation (depends on temperature, wind, atmospheric pressure, nature and shape of catchment, and others)	Physical factors (land use and cover, surface infiltration condition, soil type, geolo gical conditions such as permeability, topographic conditions such as lakes, swamps and artificial drainage)	Storage capacity (backwater effects)
Transpiration (e.g., temperature, solar radiation, wind, humidity, soil moisture, type of vegetation)		

(b) Making of Human and Infrastructure Vulnerability: Receding of value and application of traditional wisdom and indigenous technology in locating and designing housing and shelters, and polarization of constructions and population due to 'low-labour high return' aspiration factor attracted them to pilgrim towns, contributed to increased exposure to this disaster event. Unregulated inflow of tourists and pilgrims without any briefing about the terrain, its climate, its risks, with large number of vehicles plying in, and many staying in ill-located, ill-designed and even ill-constructed hotels contributed to death toll besides loss of such constructions. Poor capacity in terms of training, skills and motivation of the local administration and regulators to reject or disallow such constructions, besides poor maintenance of roadside landscapes (especially up and downsides stabilization) and bridges, culverts, hilltops vegetation (with suitable species), etc. also contributed to the disaster. Buildings affected by tremors and floods previously were never assessed in an effort to document the local level Hazard-risk and vulnerability and to draw a local level risk mitigation and disaster management plan, which otherwise is a legal mandate prescribed by the Disaster Management Act 2005 and National Policy of 2009. Increasing urban sense leading to reduced social cohesion coupled with non-resident people, migration of youth for income and wages, gender and age related factors are equally important aspects of vulnerability.

(c) Making of the Disaster and Complex Challenge: The ignorance of the 'risk-sense' over the meteorological forecast has been the primary lapse. Failure to 'concern of poor or no mobile connectivity' in most stretches of the affected region in the immediate hours of the tragedy, and no effort to raise the frequency, made the situation more complex. Primary impact of floods on mobile towers, bridges, roads and public service system caused the incident to become a great challenge and stalled rescue and relief to start. Difficult terrain and limited atmospheric suitability affected the air force's operations for rescue and relief. Aspects of pollution and ecological degradation in affecting atmospheric and land conditions have also been referred. Over and above the lack of adequate understanding or planned approach at the State Government level and obsolete records as disaster management plans at district level and in particular lack of risk management mechanism at local administration made this challenge to convert to a disaster. Himalaya has attracted the attention of ecological researchers, geologists, botanists, foresters and social reformers, but lack of cohesiveness and coordination resulted in no use of the knowledge and lessons generated by their studies, and a wide gap between the scientific facts and administrative understanding resulted in this state of grief and misery.

(d) Greening Relief Actions - For future risk reduction: Internationally, a rapid Environmental Impact Assessment (EIA) of disasters is common practice. REAI of Indian Ocean Tsunami was carried out even in smaller countries like Sri Lanka and Indonesia, however, in India we keep away from such useful tools and practices. This needs academic and research interventions to give a call on the sustainable recovery and ecological compatible reconstruction framework with proper scope for livelihood restoration as key to reducing social vulnerability. Like few earlier ones, Uttarakhand disaster also witnessed huge waste dumps left by relief operations, with used, unused or scrapped non-degradable materials, posing a serious threat to our ecosystems, and the consequences to be faced by human societies of the region. International guidelines 'Green Guide to Relief Actions' are followed in most developed countries and we need to learn and adapt those, as these form key to avoiding future risks. An estimation (and its reference in the restoration and recovery plan) of the damage/losses to the natural resources and ecosystems including forests due to rescue and relief operations needs to be effected to ensure that local people's resources and future sustainability are less-compromised.

(e) **Sustainable Reconstruction and Recovery:** 'Built back better' is a basic key strategy for post-disaster reconstruction, which now implies incorporating sustainable - ecologically and geo-physiographically, and socially compatibility dimensions of development. The term 'structure' is under interrogatory explanation in disaster management context and incorporates - landscape, ecosystems, civil constructions, and community relations. Recovery in terms of livelihood, health, peace and well-being with minimal living standards calls for recovery of services and goods supplies including ecosystem services, employment, industry & commerce, and psychosocial stability. After the phase of 'extended relief' is to be over, it is a great challenge to draw the regionally conducive and site-specific development-models that takes care of

ecological safety and future disaster risk reduction, besides ensuring inclusive growth.

Lessons Taught but 'Not yet learnt': There has been no dearth of studies and lessons to light on the path towards sustainability in ecologically sensitive areas of Indian Himalaya region. The concept of Carrying Capacity Based Planning has been piloted for the Doon Valley region in 1995 but the recommendations and lessons were seldom brought to the planning and policy table. It's an irony in a country aloud enough on environmental and disaster management issues on international meetings that the Planning Commission and National Disaster Management Authority's remain devoid of an ecologist as member expert. On the part of ecologists and academic world, there has been great lapse of keeping away from their practical utility to the safety and risk reduction of the people. Time calls for convergence of the two fraternities. Nature's warnings are foremost important but they need thoughtful minds with intelligent and dedicated research systems to interpret which is yet to be realized. Local level planning with community participation and indigenous & traditional wisdom forms local strengths of risk reduction. This needs to be effectively integrated with our environmental education and risk management systems. A framework of flood mitigation is given in table 3.

Table 3. Framework of flood risk mitigation

Pre-flood activities	*"During-flood" activities*	*Post-flood activities*
Flood risk management for all causes of flooding and disaster contingency planning.	Detection of the likelihood of a flood forming (hydro-meteorology).	Relief for the immediate needs of those affected by the disaster.
Construction of physical flood defense infrastructure and implementation of forecasting and warning systems.	conditions from the hydro-meteorological observations.	Reconstruction of damaged buildings, infrastructure and flood defenses.
Land-use planning and management within the whole catchment.	Warning issued to the appropriate authorities and t he public on the extent, severity and timing of the flood.	Recovery and regeneration of the environment and the economic activities in the flooded area
Discouragement of inappropriate development within the flood plains	Response by the public and the authorities	Review of the flood management activities to improve the process and planning for future events in the area affected and more generally, elsewhere.
Public communication and education of flood risk and actions to take in a flood emergency.		

Role for Ecologists and Plant Scientists: When it is realized that anthropogenic implications and natural factors cause large scale changes in our climatic system, landscape and ecosystem stability, which is further aggravated by changes in biodiversity, land-cover and species composition, atmospheric quality, ecological factors like fire, flooding, pests, etc. it calls for a 'system approach' to the study of disaster risk and vulnerability. This shall enable prudent planning and enforcement of effective strategies of risk mitigation, green relief, and sustainable recovery paradigms. Management of hydro-meteorological risks in the Himalaya region needs in-depth ecological research interventions especially after we have lessons of Uttarakhand disaster 2013. Post-disaster EIA and environmental needs assessment is yet to be taken up, and environmental recovery framework is yet to be drawn.

Latest Developments and Epilogue: The Uttarakhand disaster triggered acceleration to national and international thought process on role of ecosystems and their services in terms of disaster risk reduction and reducing people's vulnerability. Partnership of Environment and Disaster Risk Reduction (UN-PEDRR) involving UNDP, IUCN, WWF, ADPC, CADRI, and pioneer institutions like NIDM of India, has evolved a mechanism called Ecosystem Approach to DRR (ecoDRR), which is now being considered through the State Authority created for guiding post-disaster rehabilitation and recovery in Uttarakhand. The in-making national plan for disaster management has focused on mainstreaming DRR and recognized ecoDRR and community centric interventions as key issues. It also calls upon the academic world and Universities to review and revise the curriculum of environmental sciences studies to emphasize adequately on disaster management related issues. Forest Department of Government of Uttarakhand is initiating a strategic intervention on role of forest restoration in DRR. It is high time a consortium of academic institutions and agencies related to environment, social development and disaster response evolves and installs a procedure of working together for the common cause of sustainable development.

Fracking - How harmful it can be to the environment

Today, the world's crude oil requirements are estimated at approximately 90 million barrels per day. The world is assured of crude oil and other petroleum products for the next 25 years only. Consequently, the need for renewable and eco-friendly sources of energy is necessary to combat the threats of environmental disasters.

There are so many ways by which oil is extracted from the earth's crust to the surface of the earth. The conventional method of recovering oils is by drilling wells through the non-porous rock barrier that traps the oil and pumping it to the surface. But this process is inaccessible and expensive. Another type of oil extraction is "Fracturing" or hydraulic fracturing. It is the process of drilling and injecting chemical fluid into the ground at high pressure causing shale rocks to break creating fissures where natural gas flows into the well. But this process causes immense damage to environment and results in serious health problems. For a single fracturing to be accomplished, it needs 1-8 million gallons of water throughout the entire process. The water is mixed with sand and other chemicals to create a fracturing fluid. Nearly 40,000 gallons of 600 different chemicals make up the fracturing fluid including carcinogenic and toxic chemical compounds. In the U.S.A, there are 500,000 hydraulic fracturing sites. One could imagine the extent of damage it could cause the environment where these wells undertake fracturing one after the other and become fully operational.

Over 1000 cases of ingested water of contamination around the areas of oil drilling have been reported. Several health issues are linked to contaminated water supply which causes burning eyes, sore throats and headaches. Contamination takes place when methane and other chemicals percolate to nearby groundwater during the process. According to a study, toxicity is 17 times higher in contaminated drinking water wells near fracturing sites than the regular well. Other health hazards including sensory, neurological and respiratory related illnesses are also recorded.

The ill-effect of fracturing to the environment is very alarming, because only a handful amount of fracturing fluid is recovered during the process, and the rest stays aground, which is neither biodegradable nor environment-friendly in the long run. This toxic fluid evaporates as it is left in open pits discharging harmful volatile organic compounds (VOC) into the atmosphere causing damages to ozone layers.

R. Acosta, Ezine Articles

Oil Spills Kill Birds

Oil-covered birds are practically a universal symbol of the environmental damage wreaked by oil spills. Any oil spill in the ocean is a death sentence for sea birds. Some species of shore birds may escape by relocating if they sense the danger in time, but sea birds that swim and dive for their food are sure to be covered in oil. Oil spills also damage nesting grounds, which can have serious long-term effects on entire species. Oil spills can even disrupt migratory patterns by contaminating areas where migrating birds normally stop.

Even a small amount of oil can be deadly to a bird. By coating the feathers, oil not only makes it impossible for birds to fly but also destroys their natural waterproofing and insulation, leaving them vulnerable to hypothermia or overheating. As the birds frantically try to preen their feathers to restore their natural protections they often swallow some of the oil, which can severely damage their internal organs and lead to death. The Exxon Valdez oil spill killed somewhere between 250,000 and 500,000 seabirds, plus a number of shore birds and bald eagles.

Source: Environmental Issues

Warmer climate pushing plant species to higher elevations

Increasingly warmer and drier climate is pushing plant species to higher elevations on a southern Arizona mountain. Comparing plant communities today with a survey taken 50 years ago, University of Arizona-led research provides the first on-the-ground evidence for Southwestern plants being pushed to higher elevations by climate change. The findings confirm that previous hypotheses are correct in their prediction that mountain communities in the Southwest will be strongly impacted by an increasingly warmer and drier climate, and that the area is already experiencing rapid vegetation change. If climate continues to warm, as the climate models predict, the subalpine mixed conifer forests on the tops of the mountains - and the animals dependent upon them - could be pushed right off the top and disappear. The study was made possible by the existence of a dataset compiled 50 years ago.

Focusing on the 27 most abundantly catalogued plant species, the scientists discovered that three quarters of them have shifted their range significantly upslope, in some cases as much as a thousand feet, or now grow in a narrower elevation range compared to 1963 data. According to researchers the main point emerging from the study is that plant communities on the mountain were different 50 years ago because plant species do not necessarily move toward higher elevations as a community.

Source: Journal Ecology and Evolution.

Tattoo can cause skin cancer

Melbourne Researchers from Melbourne, Australia have warned that the toxic chemicals in tattoo ink could penetrate human body and increase our chances of getting cancer. A new study has discovered that ink nanoparticles could enter the bloodstream and build up in major organs of the body which can potentially impair their functionality. The recent research supports a previous study that showed that some tattoo dye contains carcinogens, including cobalt and mercury.

Experts insisted that rules and regulations should be formed for the tattoo industry, similar to those governing the smoking and sunbathing industries.

Source: ANI

CONFERENCES

2nd International Conference on Biodiversity and Climate Change (ICBCC 2013)
17th-18th November 2013; Abu Dhabi, United Arab Emirates
Contact : Mr Issac Lee
E-mail: icbcc@cbees.org;Website:http://www.icbcc.org

National Seminar on Climate Change in the Indian Context
14th December, 2013; Vadodara, Gujarat, India
Organized by: Department of Botany Faculty of Science, The M.S. University of Baroda, Vadodara, Gujarat, India
e.mail: aryaarunarya@rediffmail.com, iaapc.india@gmail.com, www: msubaroda.ac.in

3rd International Conference on Climate Change & Plant Diseases: Challenges and Opportunities (ICPPS 2013)
December 23-25, 2013; University of Karachi, Karachi (Pakistan)
Contact: Amjad Shahzad Gonda
Department of Agriculture & Agribusiness Management, University of Karachi, Karachi (Pakistan)I
E-mail: info@3rdicpps.org; Website: www.3rdicpps.org

4th International Conference on Future Environment and Energy - ICFEE 2014
4th-5th January 2014, Melbourne, Australia
Contact : Mr. Issac Lee
E-mail: icfee@cbees.org; Website: http://www.icfee.org

International Conference on Environment and Climate Change
January 09-10, 2014; Athens, Greece
http://www.waset.org/conferences/2014/01/athens/icecc

National Conference on Fly Ash Utilization for Sustainable Environment Management
16-17 January, 2014; Nerul, Navi Mumbai 400 706
Address for Correspondence:
Dr. Seema Mishra, Organizing Secretary
SIES Indian Institute of Environment Management
Sri Chandrashekarendra Saraswati Vidyapuram
Plot 1E, Sector V, Nerul, Navi Mumbai 400 706
E mail: fausem2014@gmail.com
Website: http/www.siesiiem.net

5th International Conference on Environmental Science and Development - ICESD 2014
19th-20th February 2014, Singapore
Contact person: Mr. Issac Lee
E-mail: icesd@cbees.org
Website: http://www.icesd.org

7th International Conference on Waste Management and the Environment
12 - 14 May, 2014; Ancona, Italy
Conference Secretariat
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9th International Conference on Risk Analysis and Hazard Mitigation
4 - 6 June, 2014, New Forest, UK
Contact: Christine Young
Wessex Institute of Technology, Ashurst Lodge, Ashurst Southampton, SO40 7AA
Email: cyoung@wessex.ac.uk

22nd International Conference on Modelling, Monitoring and Management of Air Pollution
7 - 9 July, 2014; Opatija, Croatia
Contact: Genna West
Wessex Institute of Technology, Ashurst Lodge, Ashurst Southampton, SO40 7AA
E-mail: gwest@wessex.ac.uk

BOOKS

Principles of Terrestrial Ecosystem Ecology
(Eds.) Chapin III, F Stuart, Matson, Pamela A., Vitousek, Peter
Springer 2012
ISBN 978-1-4419-9503-2
Price: 149,95 €

Recarbonization of the Biosphere Ecosystems and the Global Carbon Cycle
(Eds.)Lal, R.; Lorenz, K.; Hüttl, R.F.; Schneider, B.U.; von Braun, J.
Springer 2012
ISBN 978-94-007-4158-4
Price: 149,95 €

Managing Forest Carbon in a Changing Climate
(Eds.) Ashton, M.S.; Tyrrell, M.L.; Spalding, D.; Gentry, B.
Springer 2012
ISBN 978-94-007-2231-6
Price: € 69,95

Monitoring of Harmful Algal Blooms
By Pettersson, Lasse H., Pozdnyakov, Dmitry
Springer 2013
ISBN 978-3-540-22892-9
Price: 139,95 €

Ecosystem Services and Carbon Sequestration in the Biosphere
(Eds.) Lal, R.; Lorenz, K.; Hüttl, R.F.; Schneider, B.U.; von Braun, J.
Springer 2013
ISBN 978-94-007-6454-5
Price:149,99 €

Biology, Controls and Models of Tree Volatile Organic Compound Emissions
Series: Tree Physiology, Vol. 5
(Eds.) Niinemets, Ülo; Monson, Russell
Springer 2013
ISBN 978-94-007-6606-8
Price:149,99 €

Environmental Monitoring and Assessment
By Bhupinder Dhir
Springer 2013
ISBN 978-81-322-1306-2
Price: € 99,99

Emerging Issues in Our Global Environment
UNEP Year Book 2013
ISBN: 978-92-807-3284-9
UNEP/GC.27/INF/2
DEW/1565/NA
E-mail: uneppub@unep.org

Environmental Bioremediation Technologies
(Eds.): Singh, S.N.; Tripathi, R. D.
Springer 2013
ISBN 978-3-540-34790-3
Price: 209,00 €

Invasive Plant Ecology
(Eds.) Shibu Jose, Harminder Pal Singh, Daizy Rani Batish, Ravinder Kumar Kohli
CRC Press Taylor & Francis group, New York, USA 2013
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