



# CGES Newsletter

CLEAN AND GREEN ENVIRONMENTAL SOCIETY

Lucknow (India)

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## VISION

Clean and Green Environment for Healthy Life

## MISSION

To Strive for A Clean and Healthy World

### In This Issue

President's Message .....	1
Advisor's Message .....	2
Vice President's Message .....	2
CGES Life Members .....	2
CGES, Aims & Objectives	
Dr.S.C.Sharma .....	3
Urban Pollution & Phytoremediation	
Dr.S.C.Sharma .....	4
Having The Clean and Green Together	
Prof.Rana Pratap Singh .....	6
Green Buildings for Sustainable Environment	
Er.Sumer Agarwal .....	7
Microbial Assistance in Building Clean and Green Society	
Jitendra Mishra and Dr.Naveen Arora .....	10
Effect of Sub-lethal Doses of Disinfectants on the Stability of Coliforms in the Drinking Water	
Dr.Suman Upadhyaya .....	12
Events .....	13
Forthcoming Conferences .....	16
Books .....	16



Er.Sumer Agarwal

### PRESIDENT'S MESSAGE

Dear Friends,

I extend season's greetings to you and family members on behalf of the Clean and Green Environmental Society (CGES). As the CGES continues to grow from strength to strength in its very first year, we are celebrating first foundation day on July 8, 2016. On this occasion, we are also releasing the inaugural issue of the CGES Newsletter. CGES has been working actively for creating awareness about the environment; identifying and involving new members for our society. We are pleased to announce that at present we have about 125 members of the CGES, representing cross section of the society, including prominent professors, scientists, doctors, engineers, judges, advocates, corporates locally as well as from other states. Our society has been able to organize many useful programs during the last one year. Society has also been able to put up its own website: [www.cgesindia.org](http://www.cgesindia.org), where our members can access the CGES activities and share their views and suggestions. We are working with our renowned and eminent members to take up the work of the society with the State and Central Governments. We are also planning to take up some model projects to making city, state and country environment friendly where the CGES will act as the FACILITATOR. I am sure with the abundance of talent that we have in the CGES, the members can make a meaningful contribution for making an eco-friendly society.

I am thankful to the Secretary General, **Dr.S.C.Sharma**, who conceived the idea for establishing the CGES. Due to his Down to Earth approach, untiring efforts, innovative ideas and constant involvement, CGES has become a vibrant society to taking care of the environmental issues. I would also like to draw your kind attention towards the meritorious persons in the field of environment, who shared their experiences on the water conservation and management during the environment day celebrations on June 9, 2016. My gratitude to Vice President, Prof.P.K.Seth, Er.M.S.Gulati and Dr.Rakesh Tuli for their active support.

I am grateful to the Executive Councillors and Advisors for their active cooperation and advice on the crucial matters. My special thanks to **Justice K.L.Sharma**, former Legal Remembrancer, Govt. of Uttar Pradesh, former judge, Allahabad High Court and Advisor, CGES for his guidance in preparing the Memorandum of Association, Rules and Regulations and Byelaws of the Society. I am also thankful to Dr.Naveen Arora, Prof.Rana Pratap Singh, Mr.Jitendra Mishra for taking up the responsibility for the publication of the CGES, Newsletter for the benefit of the readers. I am thankful to Dr.Virendra Nath, treasurer for managing funds in the interest of society.

I would also like to thank Dr.A.K.Singh, Convenor, Environmental Awareness and Publicity Committee for successfully organizing the out-reach programs and briefing the media persons about the activities of the Society.

I hope that each of us will be willing to participate in the activities of CGES and actively support the CGES network in India and around the world.

Let us do our bit for saving the Environment and having a Clean and Green world.

**"Clean and Green Environment is Essential to the Planet's Survival"**

**Er.Sumer Agarwal**  
Chairman, LEVANA Group  
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## ADVISOR'S MESSAGE



**Dr.C.R.Bhatia**

*My heartiest congratulations and best wishes to the Clean and Green Environmental Society (CGES) on its First Foundation Day July 8, 2016. Dr.S.C.Sharma, Secretary General is a very committed and inspiring leader. Due to his and eco-friendly devoted team member's untiring efforts, CGES an NGO has become the vibrant society just in one year. Dr.Sharma keeps me in touch regularly with the activities of the Society and I am glad to see that the Aims and Objectives of the Society are being fulfilled. The noble objectives of the Society to care and share the nature, create greater awareness of the environmental issues, and serve as the Think Tank, should not overlook the reality of tradeoffs between the environment and aspirations of the people. Almost all aspire for better food, housing, health care, education, income, and personal transport, besides healthy environment with clean air and drinking water. Tradeoff is inevitable between the development and environment as the world population keeps on growing, adding 180 thousand each day. The same is true for energy demand, the best measure of overall development and environment. Society should convince the masses that each of us has to reduce the use of natural resources of the planet earth and overall consumption by following simple living and avoiding ostentatious display of wealth on all social events.*

*Wishing, personal and societal, sustainable development for all with minimal environmental perturbations.*

**Dr.C.R.Bhatia**

Former, Secretary, Department of Biotechnology, New Delhi  
Former Director, Bio-Medical Group, Bhabha Atomic Research Center, Mumbai  
Advisor, Clean and Green Environmental Society, Lucknow  
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## VICE PRESIDENT'S MESSAGE



**Prof.P.K.Seth**

*I am extremely delighted that the seed we sowed about a year back has flourished so well that today it is playing an important role in creating awareness among masses regarding the importance of clean and green environment. These are being achieved by holding lectures, tree plantation and several other events. The main driving force of the Clean and Green Environment Society (CGES) is Dr.S.C.Sharma, Secretary General who has taken the Vision and Mission as the Passion. Due to his untiring efforts a number of successful programs were organized in the last one year. CGES in its own way is contributing to "Swatch and Swasth Bharat Abhiyan" in the country.*

*I am sure under the leadership of Dr.S.C.Sharma, guidance of Er.Sumer Agarwal, President, Vice Presidents, Advisors and cooperation of the Executive Councillors, the Society will achieve new height in the coming years.*

**Prof.P.K.Seth FNA**

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## CGES LIFE MEMBERS

Dr.Jagdish Gandhi, Dr.V.P.Kamboj, Mr.Anant Jahauri, Dr.K.P.Singh, Dr.Samir V. Samant, Mr.Divakar Tripathi, Mr.R.D.Paliwal, Dr.Naveen Kumar Arora, Mrs.Preeti Arora, Mr. Raju Chaurasia, Mrs.Neeta Chaurasia, Mr.M.C.Sharma, Mrs.Neena Sharma, Dr.Renu Tripathi, Mr.Dinesh Kumar Pathak, Mrs.Pushpa Sharma, Mrs.Parvati Sharma, Ms.Gauri Sharma, Dr.A.K.Asthana, Er. Umesh Sharma, Mrs.Ravjeet Sodhi, Dr.Seema Mishra, Mrs.Shail Saxena, Mrs.Shuchi Sharma, Dr.Prabodh Trivedi, Dr.Ritu Trivedi, Mrs.Sunita Agarwal, Mrs.Sheela Singh, Captain Sunil Sharma, Er.Virendra Agarwal, Mr.Mohd Usama, Dr.Uma Shankar, Mrs.Sarita Singh Agarwal, Mr.Balbir Agarwal, Dr.Sanjay Dwivedi, Dr.Rajan Johri, Er.M.L.Sharma, Mrs.Kusum Sharma, Dr.Suman Upadhyya, Mr.Anoop Upadhyaya, Mr.Netesh Agrawal, Dr.Priyanka Agnihotri, Er.R.D.Pal, Er.R.K.Pandey, Er.Virendra Agarwal, Mr.Ganga Ram Gautam, Er.Lalit Kumar Srivastav, Mr.Pradip Kumar Tiwari, Er.A.A.Malik, Mr.Carol Paul Joseph, Dr.A.K.Asthana, Er.S.P.Sharma, Smt.Neelam Sharma, Dr.Ashima Singh, Shri Anil Kumar Anand, Er.K.K.Agarwal, Mrs.Rita Agarwal, Dr.Kamini Narain, Ms.Swati Sachdev, Dr.Mirdul Kumar Shukla, Dr.Ranjeev Kumar Sahu, Dr.Harsh Singh, Er.N.K.Trivedi, Dr.R.P.Bansal, Mr.S.C.Shkla, Mrs.V. Shukla, Dr.Smita Kumar, Ms.Kanti Srivastava, Prof.Jamal Nasrut, Mr.Ram Sagar. Mr.Mewa Lal, Dr.S.R. Singh, Dr.(Mrs.) Anuradha Sharma, Mr.Jitendra Mishra.

*Seven Billion People One Planet, Consume the Resources with Care.*



**Dr.S.C.Sharma**  
Secretary General, CGES;  
Lucknow

## **CGES, Aims and Objectives**

Clean and Green Environmental Society, (CGES) has been established as a vibrant body of professionals to promote the program for Clean and Green India to save the environment with the following aims and objectives:

1. CGES will act as a Think Tank to promote Environmental Education, Diffusion of useful knowledge for the Protection and Preservation of the Environment among the members, public, institutions etc.
2. Think Globally but Act Nationally.
3. Care and Share Nature.
4. To provide an opportunity for better interaction among researchers, teachers, social workers, school children and NGOs on the environmental issues.
5. To generate awareness among the masses and policy makers for saving the environment.
6. To organize lectures of reputed professors and environmental scientists of India as well as abroad.
7. To hold seminars/symposia/workshops/training programs, focusing thrust areas of environmental awareness/issues at national/international levels.
8. To grant financial support to scientists/research workers for attending National/International seminars/ symposia in India.
9. To award medals/certificates/honors to individuals/organizations who/which have achieved outstanding distinction in the area of environmental education, awareness, conservation of bio-diversity and research programs.
10. To honor outstanding environmentalists, life members of the CGES as 'Fellow of the Society'.
11. To publish Newsletter of the Society.
12. To address all such issues or matters as may be related to the protection, preservation etc. of the environment at the local, state, national or international levels.
13. To provide consultancy services for the establishment and improvement of the Botanical Gardens, Arboreta, Parks, Herbal Gardens, Green Belt, Construction of Urban Ecology etc.
14. To conduct the training courses for the gardeners, supervisors and managers under the Skill Development Program and other such programs in Uttar Pradesh and other states.
15. To provide authentic information on the medicinal, economical, ornamental, pollution tolerant plants and their source of availability.

**Dr.S.C.Sharma**

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# Urban Pollution and Phytoremediation

Dr.S.C.Sharma

India suffers from three major problems, population, poverty and pollution. Pollution causing global warming leads to the Climate Change. In the present century, Pollution has become the biggest menace for the survival of the biological species. There are various types of pollution e.g. air, water, soil, dust, sound and mental pollution. The worst is the mental pollution, which blocks the mind from triggering the positive ideas. Earth was a beautiful landscape, but the man has ruthlessly exploited it for his greed specially, in the last century. With rapid industrialization and random urbanization, environmental pollution has become a serious problem. Over exploitation of the open spaces, an ever-increasing number of automobiles and demographic pressure have further aggravated the problem. There are various ways and means to mitigate the urban pollution. Planting of trees, shrubs and herbs with proper planning for the abatement of pollution and improvement of the environment, is an effective way and well recognized throughout the world. Earlier, the purpose of planting trees in the urban areas was purely aesthetic. The incessant increase of urban environmental pollution has necessitated to reconsider the whole approach of the urban landscaping and its orientation in order to achieve the dual effect e.g. bio-aesthetics and mitigation of pollution. Proper planning and planting scheme depending upon the magnitude and type of pollution, selection of pollution tolerant and dust scavenging trees and shrubs should be done for bioremediation of the urban environmental pollution. Pollution, the major problem in cities, is compounded by the fact that there is no exhaust for the polluted air to escape. Environmentalists and landscape architects can solve the pollution problems related to the urban landscape by creating a micro-climate.

## **Arboriculture**

It is the cultivation, management, and study of trees, shrubs, vines, and other

perennial woody plants. The science of arboriculture studies how these plants grow and respond to the cultural practices and to their environment. The practice of arboriculture includes cultural techniques such as planning, selection, preparation of pits, planting, training, fertilization, pest and pathogen control, pruning and tree surgery for giving the shape and removal of the diseased and dead woods. Arboriculture practices fall under the umbrella of horticulture.

## **Planting along the road**

Roads are the important sites of the urban areas, which contribute significantly in generating the pollution. By plantation on both sides of the road, pollution can be reduced significantly. Unfortunately, in most of the old Indian cities and towns, there is hardly any provision of sufficient space for the same. It is necessary to study the edaphic conditions, type of road, overhead and underground telephone and electric cables and space available on both the sides, central verge, traffic triangles, round-about, squares and other open space available before taking up any plantation. It has been observed that trees and shrubs which are drought / frost resistant are generally tolerant to the pollution. Selection of trees is another important task. Before selecting any plant species, it is necessary to consider following characters: agro-climatic suitability; height and spread; canopy architecture; growth rate and habit (straight undivided trunk); aesthetic effect (foliage, conspicuous and attractive flower color); pollution tolerance and dust scavenging capacity. Some of the ornamental trees which provide aesthetic effect as well as pollution tolerant, have been screened and recommended for planting along the roads: *Acacia auriculiformis*, *Ailanthus excelsa*, *Albizia lebbek*, *Bauhinia acuminata*, *B. purpurea*, *Butea monosperma*, *Cassia fistula*, *C. marginata*, *C. siamea*, *Casuarina equisetifolia*, *Crataeva religiosa*, *Drypetes roxburghii*, *Ficus benjamina*, *Lagerstroemia*

*duperreana*, *L. flosreginae*, *L. rosea*, *Mimusops elengi*, *Polyalthia longifolia*, *P. longifolia* 'Angustifolia', *P. longifolia* 'Pendula', *Peltophorum ferrugineum*, *Tectona grandis*, *Terminalia arjuna*, *T. muelleri*, *T. catappa*, *Thespesia populnea* etc. Emphasis should be given on the native plant species, which are comparatively well acclimatized, stress and pollution tolerant. The best plant for the roadside plantation is *Mimusops elengi* (Molshri).

### **Central Verge**

Central verge of the two way roads in the cities and highways are often found neglected and devoid of any planting. It is recommended that these areas should be well utilized by planting dwarf trees and shrubs. This will not only serve aesthetic purpose but also functional being physical barrier for the glare of head lights of the vehicles, which is essential for effective and safe operation of the roads during dark hours. Planting may be done either in a single or double row depending upon the available space. Since these plants are more close to the automobile exhaust, their capacity for pollution tolerance should be well considered before the final selection. Following shrubs have been reported as well as observed as the pollution tolerant are recommended for plantation: *Acalypha wilkesiana*, *Bougainvillea* 'Chitra', 'H.C. Buck', 'Lady Mary Baring', 'Mary Palmer Special', 'Partha', 'Shubhra', 'Zulu Queen'; *Caesalpinia pulcherrima*, *Callistemon lanceolatus*, *C. polandii*, *Cassia surattensis*, *Duranta plumeri*, *Euphorbia milli*, *Hamelia patens*, *Hibiscus rosasinensis*, *Ixora coccinea*, *Jatropha panduraefolia*, *Lantana camara*, *L. depressa*, *Malpighia cocci gera*, *M. glabra*, *Murraya paniculata*, *Nerium oleander*, *Phyllanthus niruri*, *Rosa* 'Gruss anTeplitz', *Tabernaemontana coronaria*, *Thevetia neriifolia*, *Vinca rosea*, *Wadelia lacinata* etc.

### **Traffic Islands**

Traffic islands on the main road intersections, vary in shape and size from square, triangle to round. Whatever may be the shape, these islands should be properly planted with the dwarf trees, shrubs and ground covers recommended for planting along the road and central verge, which will

contribute effectively in mitigating the air pollution.

### **Greenbelts**

Greenbelt is defined as the mass plantation of the pollution tolerant trees and shrubs, encircling the cities and industrial regions for the purpose of minimizing the air pollution by filtering, intercepting and absorbing pollutants in an effective manner for improvement of the environment. Every town and city must have certain area earmarked for the development of greenbelts. The effectiveness of the greenbelt depends on several factors viz. climatic conditions, design, selection of plant species and its characters and type of pollutants. The importance of Greenbelt can be ascertained from the estimate of cleansing capacity of 3.7 tonnes of CO<sub>2</sub> from atmosphere and supply of 2.5 tonnes of oxygen from one hectare of woodland. Following trees and shrubs are recommended for planting in the greenbelt which have aesthetic effect as well as pollution tolerant capacity: *Acacia auriculiformis*, *Albizia lebbek*, *Azadirachta indica*, *Bougainvillea cultivars*, *Bauhinia purpurea*, *Butea monosperma*, *Cassia siamea*, *C. surattensis*, *Dalbergia sissoo*, *D. latifolia*, *Drypetes roxburghii*, *Ficus infectoria*, *Diospyros embryopteris*, *Lagerstroemia duperreana*, *Melia azedarach*, *M. burmanica*, *Millingtonia hortensis*, *Murraya paniculata*, *Nerium oleander*, *Nyctanthes arbortristis*, *Parkinsonia aculeata*, *Polyalthia longifolia*, *Terminalia arjuna*, *T. muelleri*, *Thevetia neriifolia* etc.

Considering the present scenario of urban environmental pollution, there is a growing need for changing the approach of planting trees and other plant species. Inclusion of the ornamental plants having pollution mitigating ability in the landscape plan, will serve the dual purpose of making the cities green and pollution free in the long run. Proper planting scheme will bring healthy life and colour in the cement concrete jungle of large congested cities. There is an urgent need for saving Lucknow, City of Gardens especially Gomti Nagar, New Lucknow, which has been converted into the City of stone by ill planning and short sightedness. Solution lies in having a strong

and selfless political will. There should be a nodal agency for coordination of the arboricultural activities of the Forest Department, Horticulture Department, Municipal Corporation, Lucknow Development Authority, NGOs, Horticulturists, Landscape Architects and Environmentalist. Only sincere efforts will be able to transform Lucknow into the 'Green Capital' having 30% forest cover within next three years. Governments may go and come but the momentum should be maintained, so that the citizens may feel

healthy and happy in a clean and green city. Lucknow is well known all over the world for its heritage, culture and hospitality. Let us sustain the old culture under the green cover.

**Dr.S.C.Sharma**

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## **Having the Clean and Green Together**

**Prof.Rana Pratap Singh**

Cleanness is a need, not a choice. It provides pleasure, health and safety from many odds and diseases. Cleanness is not just one which looks from the eyes. More dangerous dirt's like PM<sub>10</sub>, PM 2.5 and PM<sub>1</sub> toxic metals and gases, toxic organic and inorganic residues, bacteria, virus, fungi and their toxins are beyond the vision of our eyes and we need scientific machines to see them and to understand their way of invasion and toxication.

Plants are nature's boon on the earth. Green plants synthesize food for us from the solar energy harvest, carbon-di-oxide fixation and splitting of the water molecules. They assimilate inorganic nutrients, which no member of the animal kingdom can do. They release the 'Pranvayu' oxygen for the life of all the inhabitants of the Mother Earth. We all others are their guest. They give us food, shelter, life and pleasure. Bacteria recycle the waste and make our surroundings clean. So to clean our places in a real sense, we need to develop green eco systems around us. Having a green in clean agenda completes the issue of cleanness, health and pleasure. We should have forests, green belts, parks, orchards, agricultural fields, agro forestry and household greeneries suitable for all seasons and each Agro-climatic regions.

The global community gathered for the recent climate change conference in

December 2015 at Paris, (COP-21) has derived out more participatory commitments by the participating countries for the low emission and climate-resilient development. All one hundred and eighty-eight countries have agreed to limit global temperature rise below 2° and have submitted their Intended Nationally Determined Contributions (INDCs) showing a road map for the future climate resilient and sustainable development with desired emission cut.

The targets set are big challenge for the nations of Africa, small island, developing states and less developed countries of South Asia. The Paris Agreement ensures sufficient, balanced adaptation and mitigation support for developing countries, particularly those, which are poorest and most vulnerable.

The governments are more concerned about economic growth and least for environmental issues, unless a crisis like global warming emerges, which directly causes serious threats to the economy. With all announced commitments and INDCs, and mobilization of finances to develop and scale up the green technologies and capacity building, it will not be so easy for the Governments running under the pressure to show fast economic growth. The significance of ecosystem services has neither appreciated by the public nor by the governments as yet up to the desired level.

In this scenario achieving the targets of COP-21 may be difficult for many countries. We must look on the green mitigation strategies, too, as cushion to the targets. Establishment of new designer ecosystems suitable for various microclimates can be one novel approach to green barren land, waste land and riverine belts for enhancing the carbon sinks, other ecosystem services and value added products useful for livelihood and additional income generation for the local inhabitants.

These novel designed ecosystems can be developed in non-vegetation areas by developing the maximum below ground and above ground biodiversity in the land not under use in agriculture, horticulture, forestry or construction. The establishment of new microbial consortium with good potential of complimentary and symbiotic togetherness with the multifacet functional diversity e.g. rhizosphere nutrient enrichment, soil reclamation and bioremediation etc. can restore the soil ecosystems on one hand and can enhance, the carbon and nitrogen sequestration potential on the other. The microbially enriched soil with better soil organic carbon and enhance water holding capacity can provide a new soil ecosystem to support the development of new plant communities with optimum population density in the restoring lands. The plant communities will increase sequestration of carbon and other air pollutants and greenhouse gases

(GHGs) from the surrounding atmosphere and their aging and dying tissues can enhance soil carbon status to support more microbial population and activity.

The endemic deep rooted grass species as well as xerophytic shrubs and trees can be selected from the local agro-climatic regions to replant on the wasteland. They will need with initial care support for nutrient application and irrigation and grazing protection to get established in the first phase. The ecological competitions and successions will occur and novel surviving rhizospheric microbes and plant communities will get established. It will create new ecosystems on unused lands with enormous carbon sequestration potential, ecosystem and economic services new to the environment. It will also reduce the main animal conflict due to availability of new shelter for wild animals. Such studies and designing of such novel ecosystems have been initiated, but its full potentials are yet to be realized. We have a lot of barren, uncultivated and waste lands, the riverine and riparian belts for the development of such novel ecosystems as a new sink of GHGs.

**Prof.Rana Pratap Singh**

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## **Green Buildings for Sustainable Environment**

**Er.Sumer Agarwal**

### **Introduction**

#### **What is a Green Building?**

Green building focuses on increasing the efficiency of resource use – energy, water and materials while reducing building impact on human health and the

environment during the building's lifecycle, through better sitting, design, construction, operation, maintenance and removal. Green Buildings should be designed and operated to reduce the overall impact of the built environment on its surroundings.

## Why Green?

We are steering into an era of unprecedented public and private sector development at significant environmental costs. This massive increase in use of environmental resources has brought us towards, unpredictable environment. The time has come where we can no longer ignore the benefits of green building practices that have a major impact on our environment.

## Why Green Buildings?

- Our planet faces challenges- especially climate change and sustainable economic development which are global in nature and so we need global solutions.
- The building sector, which consumes as much as 40% of the world's energy, 12% of its water and contributes 40% of the waste sent to landfill, is a major part of a global problem.
- However, the building sector can be even a bigger part of this solution.
- As we live in one world, we have a collective responsibility to work together to achieve change around the globe and especially in India.
- An international research confirms that green buildings consume less energy, less water and generate less waste, and create a healthy and productive environment for employees as well as common people.
- Green building practices can reduce the building's operating cost by as much as 9%, increase building values by 7.5% and realize 6.6% increase in return on the investment.
- Green Buildings don't just sound ecological and environmental sense; they make economic sense too.

Some of the other benefits of having **Green Buildings** are:

1. Some of the lighting/energy consumption is met through renewable energy such as Solar.
2. Increased property values and decreased infrastructure strain.

3. Increased employee attendance as well as productivity.
4. Sales improvement- studies show better sales in stores that utilize natural light.
5. Improved Schools-lead to significant reductions in student absenteeism.
6. Improved health makes healthier lifestyles and recreation.

## How to achieve sustainability?

In today's era lot of developments are going on in public as well as private sectors due to rapid urbanization. The rapid pace of development has resulted in the use of scarce resources, which are having the major impact on our environment.

We need to design our buildings in such a way that they should be closer to preserving the greenery and self-sufficient in the use of energy, water and materials. Green Buildings bring together the wisdom of traditional architecture and modern technology to create a sustainable future.

The buildings need to be designed on the principle of "**What gets measured, gets managed.**", because then only we will be able to know how much we are helping in preserving the environment.

The construction needs to be done in a manner which utilizes all the resources efficiently. Sustainability lies in the approach to designing, construction and operation relating to large developments, townships and other residential and commercial buildings. The buildings need to be designed in a manner which is resource efficient throughout the life-cycle of the building.

Some of the important factors which should be looked into while constructing green buildings are:

- Buildings should be designed in such a way that they make the least impact on the environment, response to the climate of the area and appropriate care is taken to preserve the environment while the construction is being undertaken.
- Suitable health and safety conditions of workers on site, improving energy efficiency of the

buildings, and ensuring proper waste management during construction and operation.

- We also need to have a rating system which suits our country's needs that will help us in the design and evaluation for green building and habitat by which the environmental performance of buildings can be evaluated based on certain quantitative and qualitative norms thereby providing standard criteria of green buildings and habitats. This criterion will try to reduce resources consumption, waste generation and over all ecological and environmental impact of the buildings and habitats.

### **What is GRIHA?**

**GRIHA:** (Green Rated for Integrated Habitat Assessment) council is India's own rating system for **Green Buildings**. It is developed on the Indian ethics and facilitates stream lining sustainability in the built environment in India.

The government and development authorities are giving financial and other incentives to green rated projects such as:

- GRIHA - rated projects get benefits such as additional FAR, discounted development premium, fast track environmental clearance, house-tax rebate, and concessional rate of interest for loans, all depending on their respective jurisdiction.
- What is needed is to create awareness in the mind of the designers, builders, architects/consultants and various other departments about the advantages of having green buildings for sustaining the environment.
- GRIHA council is an independent society created by The Energy and Resources Institute (TERI) and Ministry of New and Renewable Energy (MNRE) Govt. of India. It administers, implements and promotes GRIHA rating with its variants to achieve India's sustainability goal in the building environment.

- In order to enable and equip the building professionals need to create Green Buildings and sustainable habitat, the GRIHA way for professionals in the construction industry is the need of the hour.
- We all know that green building movement is one of a strategy to reduce our impact on the Mother Nature due to the unchecked development architectures. Let us join the mission with GRIHA-our national rating system and help develop India as one of the greenest and sustainable places to live for both us and our future generations.

### **Benefits of adopting - GRIHA**

- ✓ 30-50% reduction in energy consumption.
- ✓ Enhances transparency through web-based portal.
- ✓ 5-30% of lighting energy consumption or its equivalent met through renewable energy.
- ✓ 40-65% reduction in building water consumption.
- ✓ Outdoor lighting on renewable energy.

Apart from all this, the Principal Industry Specialist, Green Buildings, IFC Climate Business Group and the founder of EDGE; certification system to resource-efficient buildings; have shared these thoughts and ideas about the future of Green Buildings in India as well as globally.

***"Miracles do not happen in contradiction to Nature but only to that which is known to Nature."***

1. The technical device set up for the first time, allows an optimal management of the water consumption, optimizing the natural light and offers an upper wellbeing to the real estate buildings.
2. All these architectural high-end technologies not only enable the

reduction of energy consumption but also increase savings to the owners.

**"More than 12 lac trees every year are required to feed the infill needs of over 100 lac doors each year."**

3. Energy Efficient Windows: Windows are an important element in passive solar home design, which uses solar energy at the site to provide heating, cooling, and lighting for a house.
4. Energy Efficiency in the Building as per Vaastu Shastya.
5. The Vaastu Shastra was evolved keeping in view the influence of the Sun and Earth's magnetic fields on the living beings on the Earth.

6. Vaastu Shastra, therefore worked out the Sun rays to the inmates of a house.

Lucknow (the City of Nawabs) also has been chosen amongst other cities to develop as the Smart City in Uttar Pradesh (India). Green Buildings are literally the building blocs of a Smart City, which can be directly influenced by architects/engineers and designers.

With the abundance of talent that we have in our country, our thinkers and professionals will address the core issues and come out with meaningful suggestions, capable of practical application that will be worthy of emulation by others.

**"Green buildings are essential to the planet's survival."**

**Er.Sumer Agarwal**

Chairman LEVANA Group, Lucknow

## **Microbial Assistance in Building Clean and Green Society**

**Jitendra Mishra and Dr.Naveen Kumar Arora**

To make our earth clean and green is very essential for the survival of all of its inhabitants. A plethora of human activities are responsible for making the environment unstable and polluted. Anthropogenic activities have a global impact and no place on earth is now untouched from it. Some investigations monitoring the effect of contaminants on Earth reveal that even Antarctica and Tundra, which were previously believed to be free from contaminants, now contain traces of dangerous pollutants. Similarly, some of the natural resources of water have now crossed the threshold value of contamination and pose severe health issues for human and other organisms. These trends, clearly indicate that how it would be difficult in future to sustain life and maintain the quality of the ecosystems. CGES has one of its motto as think globally act locally. This means we should do effort to make the ecosystems clean and sustainable at individual level. We humans always want to live in a society which is clean and green or in another word we can

say we want clean air to breath, fresh and safe water to drink and a land free from contamination. In this context role of microbes cannot be ignored. Cyanobacteria first of all made this planet oxygen rich which resulted in evolution of diverse life forms including humans. Microbes work beyond our imagination and have been considered as chief ecological engineers. Amongst the different types of microbiota, microbe inhabiting in the rhizospheric region are of great importance. The rhizospheric microbes also known as plant growth promoting microbes (PGPM) are extremely important in maintaining plants health by preventing it from pathogens, enhancing growth and taking part in biogeochemical processes that strongly affect the yield and quality of crops. These microbes are now being utilized as biofertilizers and biopesticides. Apart from rhizosphere microflora, endophytic microbes also help plants to provide nutrients and protection in an eco-friendly manner. Chemical substances especially used in agrochemicals have adverse effects

on humans as well as health of other organisms and soil. A recent example of pesticide use in India has been noticed in the Malwa region in Punjab. The region was named as the 'cancer belt' of India because of unusually high incidence of cancer cases. The investigation indicated that it has been linked to the excessive use of pesticides by cotton farmers. Hence, eco-safe alternatives in the form of biopesticides are required urgently.

About 0.1 million tons of municipal solid waste is generated in India every day however an average 94% is dumped on land, and 5% is composted. Microorganisms take sole responsibility of degradation of solid wastes. By various mechanisms, these microbes alter physiochemical properties of waste and transform it into lesser toxic or reusable forms. Now a day's easy indoor composting techniques have been devised that could convert household organic waste in good quality of compost. Effective microorganisms (EM) are a mixture of beneficial, naturally occurring microorganisms, such as yeast, lactic acid cultures, and photosynthesis bacteria and have broad application in microbe-mediated environmental management. Microbes can degrade recalcitrant xenobiotic compounds and make the environment pollution free. Microbes have been used from ancient times to raise the economy of our society as there are many industries which utilize various microbes in the production of several useful commodities. They also have an important role in medical, pharmaceutical and biotechnological applications.

Although microbes are very important parts of our society (**Box 1**) yet we humans are not entirely aware of their contribution to humanity. Anthropogenic activities are also posing a threat to microbial habitats and diversity. Various studies indicate that microbial diversity in healthy soil is decreasing day by day. Similarly, human intervention on earth is also affecting the microbial driven biogeochemical cycles which can further lead to drastic changes in the whole environment.

For building our society more sustainable, some of the good practices are required. For example, we should separate biodegradable

**Box 1. Some innovative and green uses of Microbes**

<b>Pollutants cleanup</b>	Certain types of bacteria degrade pesticide, utilize oil spill.	
<b>Decontaminate radioactive substances</b>	<i>Geobacter</i> bacterium helps in remediation of uranium contamination.	
<b>Climate Change</b>	Microbes like methanotrophs metabolize methane, eliminating the greenhouse gas. Carbon sequestering microbes can be also used.	
<b>Biofuel</b>	Bacteria like <i>Clostridium</i> can be used in butanol production. By utilizing lignocellulose materials, <i>Brocadia anammoxidans</i> may transform human sewage into hydrazine which is used in rocket fuel.	
<b>Plant growth and disease suppression</b>	Plant growth promoting microbes (PGPM) containing biofertilizers and biopesticides enhanced crop productivity by several means.	
<b>Drug Delivery</b>	<i>Clostridium sporogenes</i> , may be used to deliver drugs in cancer therapy. <i>C. sporogenes</i> when injected into a tumor log with cancer drugs, the bacteria can help the drugs kill the tumor cells without affecting healthy tissue.	
<b>Microbial Fuel Cell</b>	Bacteria with tiny wire-like appendages called nanowires generate electron during utilization of waste chemicals and produce electricity.	

waste from non-biodegradable and every home should be involved in making compost from its kitchen or garden waste. We should subside the use of synthetic chemicals and invoke the use of biofertilizers and biopesticides in agriculture. Awareness programs and campaign should be organized at local levels for creating knowledge of useful and harmful microbes.

For making a city green, it will be very apt to carry out systematic plantation drives. The plantation should be accompanied with the use of organic methods and bioformulations/biofertilizers should be used to enhance the growth of the plant. Microbes can be used and exploited in various ways to make our planet 'clean and green'.

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## **Effect of Sub-lethal doses of Disinfectants on the Stability of Coliforms in the Drinking Water**

**Dr.Suman Upadhyaya**

Earth is the only planet in our solar system and probably in the whole galaxy, which can support human life. When seen from outer space, Earth appears as a large greenish-blue disc with blue oceans and sparkling white polar ice caps. It is evident that water is an essential component for life. Around 70 % of the planet Earth is covered with water. However, a fraction of it is available in rivers, lakes, streams and ground water for the human consumption. These water bodies are also a major source of ailments like gastroenteritis. In developing countries, where proper sanitation and adequate drinking water treatment facilities are scarce, frequent outbreaks of epidemics are common. In addition to this scenario, pollution of the water bodies by domestic and industrial waste water, makes the situation miserable. Disinfection is a vital process in the production of drinking water. This is achieved through the treatment of drinking water by disinfectants such as Chlorine, Chloramines and UV radiation. The free radicals generated by Chlorine in water e.g., CL<sup>-</sup> and OCL<sup>-</sup> are potential germicidal agents. The action of Chlorine results in nutrient deprivation and loss of Coliform culturability. Similarly, UV radiation is known to cause the damage in the genetic material of microorganisms. Recently, use of UV has been preferred over other chemical disinfectants due to the generation of toxic substances. Furthermore, photo- reactivation may take place in UV-damaged cells. Inadequate or sub-lethal doses of disinfectant may render the bacteria temporarily inactive or non-culturable. However, they can recover from an injury when disinfectants are removed. Therefore, the detection of the injured bacteria in water is an important concern of

the public health. Chlorine is known to react with a larger variety of biological organic compounds and concern, has been expressed about the generation of toxic substances like Trihalomethane (THM), which are presumed to be carcinogenic and other chloro-organic compounds suspected to be hazardous to the public health. UV radiation is known to have a range of strong inhibitory effects on the growth and physiology of the microorganisms. UV radiation leads to the production of highly reactive Oxygen species that causes strand breakage and base change in DNA. Strand breakage is usually lethal, while base changes may result in a block in replication and another mutagenic effect. Bacterial re-growth in the treated water is associated with the presence of biodegradable organic matter. The concentration of assimilable organic carbon (AOC) has been used as an indication of the strength of the water to support bacterial re-growth. It is shown that AOC is rapidly utilized by bacteria and it is improbable that sufficient AOC remained after a three-week incubation period to enhance the recovery of Coliform. Although disinfectant is known to eliminate microorganisms efficiently from contaminated water, Studies have indicated that the occurrence of sub-lethal injury to Coliforms during chlorination. Inadequate treatment of drinking water has been a matter of serious concern. It causes temporary injury to the contaminating organisms as they recover from injury when stress is removed. Studies on Coliform re-growth in chlorinated drinking water indicate that such technique significantly underestimates Coliform death due to the chlorine injury, which induces a viable non-culturable (VNC) state. Sub-lethal doses may render the bacteria temporarily

inactive or non-culturable and such damage may be corrected by DNA repair mechanisms that (are active in most living cells. Therefore, the optical inactivation process is sometimes reversible, particularly for the bacteria in the stationary phase of growth. Little is known about the pathogenicity of viable but non-culturable organisms. Although, many researchers have studied the injury of bacteria in water induced by disinfectant

but there is no information available on effect of disinfectants on stability and transmissibility of R-plasmid. Hence complete disinfection of drinking water should be ensured as sub-lethal doses have a profound effect on the rate of resistance transfer and partial loss of R-plasmid.

**Dr.Suman Upadhyaya**

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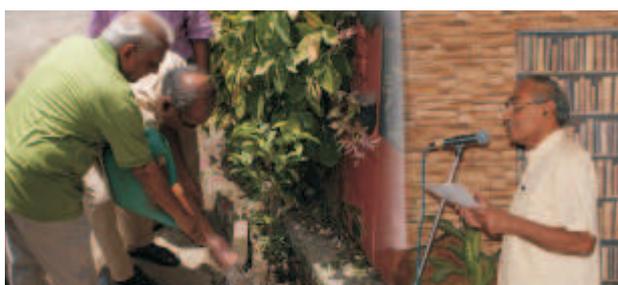
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## EVENTS

### World Environment Day : June 11, 2015

CGES celebrated the World Environment Day on June 11, 2015, jointly with “Prithvi Innovations” at the PacknChew an eco-friendly restaurant, Gomti Nagar, Lucknow. The theme of the event was “Environment and Health”. The program started with the plantation of the saplings of *Mimusops elengi* (Molshri). Dr. S.C. Sharma, Environmentalist, delivered a talk on Urban Pollution and Solution with a particular reference to Lucknow city. Divakar Tripathi former Secretary Department of Information, Govt. of Uttar Pradesh and Representative of

Shri Raj Nath Singh, MP from Lucknow and honorable Home Minister, Govt. of India, New Delhi, was invited as the Chief Guest in the function. Shri Tripathi, explained the details of the development plan of Lucknow lucidly. Prof. P.K. Seth, CEO, Biotech Park, Lucknow delivered a talk on environment and health. Mrs. Anuradha Kumar, Prithvi Innovations delivered a talk on 'Be Food Wise-Leave-No Foodprint'. An interactive session was also arranged for discussing the burning environmental issues with the distinguished audience and media persons.



### Climate Change Program: January 25, 2016

CGES organized the program at the Levana hotel, Hazratganj, Lucknow on the Climate Change. Padma Shri Prof.Pramod Tandon, CEO, Biotech Park, Lucknow delivered the lecture on the Impact of Climate Change on the Bio-diversity. Prof.Tandon very lucidly explained the impact of the climate change especially on agriculture, plants and animals. With the rise in temperature 1.2 °C, glaciers are melting fast, sea level is rising and the coastal regions are under constant threat. Countries all over the world are facing frequent cyclones, tsunamis, droughts. Climate change has changed the weather pattern, which has badly affected the agriculture production. Climate



change is the reality and countries like China, USA and India must lower down the carbon emission for saving the environment of planet Earth. After the lecture, there was an interactive session where the distinguished participants asked questions on the carbon emission, global warming, climate change and probable solutions for saving the environment of planet Earth.

### Farmers Get-together Program at Tirath Ram Farm House, Kursi Road on : March 6, 2016

The program was organized for Cultivation and Marketing of Medicinal and Aromatic Plants for enhancing the income of Farmers.



### Tree Plantation Program: March 10, 2016

CGES organized the tree plantation program at Viram Khand II Park, Lucknow. Shri S.B.Tripathi, Er.S.P.Sharma, Er.K.K.Agarwal and the residents of Viram Khand II Association actively participated in the program. Shri L.K.Jhunjhunwala, Chairman FICCI, Uttar Pradesh and Advisor, CGES was invited as the Chief Guest in the function. Shri Jhunjhunwala planted *Mimusops elengi* (Molshri) in the park. Senior citizens, ladies, and children of the colony planted the saplings of the pollution tolerant plant species in the park. Dr.Sharma, Secretary General, delivered a lecture on Vrahsh Mahima. Dr.S.C.Sharma described the salient trees mentioned in Ramayana and Mahabharata and their economical and medicinal importance. Flowering Rajnigandha (Tube Rose) were planted in the ground, and the park was christened as "Rajnigandha Park". Special thanks were given to Er.S.P.Sharma for providing the logistic support for organizing the program.



## World Environmental Day Celebration June 9, 2016

CGES celebrated world environment day on June 9, 2016 at the PacknChew Restaurant, Gomti Nagar, Lucknow. The theme of the event was water conservation. The idea was, WED celebrations only on June 5, will be just a ritual. WED should be celebrated whole month of June followed with Tree Plantation Drive during July-September then only it will be meaningful. Water is one of the Panch Tatvas. One can live without food for a week but without water, human beings will suffer from dehydration and can not live more than 1-2 days. It has been proved that Life has started from water to the land. For the dense forest, water is essential. If there is sufficient water then only forest and wild life will be protected. Expert members, Prof. Jamal Nusrat, Director, Water and Land Management Institute, Lucknow, Er. Sumer Agarwal, Chairman, LEVANA Group, Er. Ravinder Verma, Jain Irrigation Systems Ltd. Jalgaon, Dr. Amit Gupta, Joint Director, Ministry of Forest, Environment and Climate Change, Govt. of India, Lucknow Region, Dr. Rajan Johri, Managing Director and Ms. Tunika Chatterji, LEADwyn, New Delhi shared their experiences on the Water Conservation and Management.

The august gathering comprised of professors, environmentalists, engineers, progressive farmers, builders, hoteliers, house wives and media persons, who actively participated in the program. The message was well conveyed to the society that water is precious and we should not waste our natural resources. In the end Dr. P.V. Sane, Chief Guest, Former Director CSIR-National Botanical Research Institute Lucknow and Director, R & D, Jain Irrigation Systems Ltd. Jalgaon, summarized the views of the speakers along with his own remarks. He explained the benefits of the drip irrigation system in the agricultural crops eg. Sugarcane, onion, potato, which is quite popular in the Maharashtra. Let us adopt the philosophy One Drop More Crop. The event was well covered in the local newspapers: Jal Hi Jeevan Hai.



### Concluding Remarks of Dr. P.V. Sane, Chief Guest on the World Environment Day Celebrations

Scientists and Engineers who made detailed presentations on the subject through the slides have more or less covered all the aspects that I also had in mind. Keeping in view the time delay, I would mention about two projects that have made the news from the Jain Irrigation related to the theme: Water is Life. A competition was held under the aegis of USAID and Bureau of Reclamation in USA in April 2016 to find out which team had developed the best system for conversion of brackish water into drinking quality water. Of the several teams, Jain Irrigation got the first prize of US\$ 14,000 as the prize money. For further development of the technology and its commercialization the USAID will be giving an additional grant of \$1,50,000. The technology is further being improved so that it can produce clean water at a very small cost and then could even be useful for agriculture purposes. Jain Irrigation Systems are hoping that this technology has a potential to convert brackish water into drinking water very cheaply. The other thing, about the proposal is the Jain Irrigation has been working on the pet project of the recently departed Chairman, Jain Irrigation. It relates to the establishment of an Institute of Water for Food in collaboration with the Nebraska University, USA. I appreciate that the presentations made, have enlightened the audience with several important aspects of the water conservation and efficient use of the available water. The Program on Water Is Life had been very successfully organized and message has gone well to the masses. I congratulate the CGES for organizing the events at the regular intervals to create environmental awareness among the cross section of the society. I thank Er. Sumer Agarwal, President and S.C. Sharma, Secretary General, CGES for inviting me as the Chief Guest in this program and for sharing my experiences with the distinguished gathering.

**Dr. P.V. Sane FNA**

Director R & D

Jain Irrigation Systems Ltd.

Jalgaon (Maharashtra)

## Forthcoming Conferences

### 4th Annual Sustainable Development Conference

7th to 9th July 2016  
Kuching, Sarawak, Malaysia  
Website: <http://www.sdconference.org>

### 5th International Renewable Energy and Environment Conference (IREEC-2016)

11th to 13th July 2016  
Madrid, Spain  
Website:  
<http://sciconference.net/viewjc.php?id=c2>

### 6th International Conference on Environmental Pollution & Remediation

18-19 August, 2016  
Budapest, Hungary  
E-mail: [info@icepr.org](mailto:info@icepr.org)

### 6th International Conference on Environmental and Agriculture Engineering (ICEAE 2016)

14th to 16th August 2016  
Porto, Portugal  
Website: <http://www.iceae.org/>

### World Conference on Climate Change

24-26 October, 2016  
Valencia, Spain  
E-mail:

### 2nd International Conference on Green Energy & Expo

28-30 November, 2016  
Atlanta, Georgia, USA  
E-mail: [greenenergy@conferenceseries.net](mailto:greenenergy@conferenceseries.net)

## Books

### Biodiversity & Education for Sustainable Development

Castro P, Azeiteiro UM, Bacelar-Nicolau P, Leal Filho W, Azul AM (Eds)  
Springer International Publishing

### Energy, Environment and Sustainable Development

Uqaili MA, Harijan K (Eds) Springer

### Green Chemistry for Environmental Sustainability

Sharma SK, Mudhoo A (Eds) CRC Press

### Environmental Management, Sustainable Development and Human Health

Eddie NLN, Fred CS, Ahmed A, Mattheus FAG (Eds) CRC Press

### Energy, Sustainability & the Environment Technology, Incentives, Behavior

Sioshansi F P (Eds) Elsevier

### Sustainable Development Linking Economy, Society, Environment

Strange T, Bayley A (Eds) OECD Insights, OECD Publishing, Paris

### Genetic Manipulation in Plants for Mitigation of Climate Change

Jaiwal PK, Singh RP, Dhankher OP (Eds)  
Springer, India

### Bioformulations: for Sustainable Agriculture

Arora N K, Mehnaz S, Balestrini R (Eds)  
Springer, India

### Bougainvilleas in India

Shrama S C, Economic Botany Information Service, CSIR-National Botanical Research Institute, Lucknow-226 001 (India)

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