



# CGES Newsletter

CLEAN AND GREEN ENVIRONMENTAL SOCIETY

LUCKNOW (INDIA)

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## VISION

Clean and Green Environment for Healthy Life

## CGES PLEDGE

To Strive for A Clean and Healthy World

## MISSION

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### Clean and Green Environmental Society

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### PRESIDENT'S MESSAGE

Dear CGES members, Executive Councilors and Advisors, my personal greetings on the occasion of 2nd Foundation Day.

I am happy to inform that during the last one year, Clean and Green Environmental Society was sincerely active for fulfilling the Aims and Objectives of the CGES. As the President of the Society, I feel proud that the CGES has organized so many meaningful environmental programs like tree plantation, environmental education and awareness besides lectures by the renowned environmentalists, which were very fruitful to the cross section of the society. I heartily congratulate the members of the society for the successful and eventful completion of the last one year of CGES. My special appreciation is to Dr. S. C. Sharma, Secretary General for his sincere commitment, hard work and innovative ideas for making the CGES a vibrant society.

The biannual CGES-Newsletter has become a scientific publication in the last two years. Many important articles written by eminent scientists and professors on various environmental issues have been published in the newsletter. I wish the CGES-Newsletter will turn into a Mouthpiece of the Society and will reflect the opinion and provide useful information to the readers in coming years.

I welcome the new Life members of CGES and hope that they will contribute significantly to carry forward the aims and objectives of the Society. My special thanks to Prof. S. K. Barik, Director, CSIR-National Botanical Research Institute, Lucknow for his strong support and providing facilities for the promotion of the activities of the society.

I am very happy to announce that CGES is going to organize a "National Conference on Climate Change, Environmental Pollution and Biodiversity Conservation" in February, 2018. This would be a remarkable activity of the Society to showcase the commitment of CGES to bring together many renowned scientists, technologists, environmentalists, entrepreneurs and policy makers from all over the country at one platform for the cause of environmental protection and biodiversity conservation.

I appeal to all of you for wholehearted support to make it a grand success.

I wish all the best for the grand celebration of the second Foundation Day of the CGES on July 08, 2017.

Green regards,

**Er. Sumer Agarwal**  
President

**Clean and Green Environmental Society, Lucknow-226 020**

## Welcome to the New Life Members

Mr. Rajiv Varma, Strategic Business Advisor, ADP, UK and Former Executive Director LMA, Lucknow.  
Dr. R. K. Roy, Former Head, Botanic Garden and Floriculture Division, CSIR-NBRI, Lucknow.  
Dr. R. S. Katiyar, Head, Botanic Garden and Floriculture Division, CSIR-NBRI, Lucknow.  
Dr. S. K. Tewari, Head, Distant Research Centre, CSIR-NBRI, Lucknow.  
Dr. Shankar Verma, Sr. Horticulture Officer, Botanic Garden, CSIR-NBRI, Lucknow.  
Er. N. D. Sharma, Chief Engineer, Public Works Dept. Uttar Pradesh, Lucknow.  
Mrs. Suman Sharma, Gomti Nagar, Lucknow.  
Dr. Devika Nag, Neurologist, Sarvodaya Colony, Lucknow.  
Mr. Bedaruis Shylle, Publication Officer, NEHU, Shillong, Meghalaya.  
Dr. V. P. Sharma, Head, Quality Research Assurance, CSIR-IITR, Lucknow.  
Dr. Rajesh Tiwari, Assistant Professor, Botany Department, Lucknow University, Lucknow.  
Dr. Madhu Srivastava, Research Fellow, Botany Department, Lucknow University, Lucknow.

## MESSAGES

I am glad to learn that Clean and Green Environmental Society (CGES) will be celebrating its Second Foundation Day on 8th July, 2017. It is satisfying to note that the CGES is progressing very well and fulfilling the aims and objectives of the society to the best of its capacity. In the past one year, several quality members from all over the country have joined the CGES. Eminent Professors, Scientists and Doctors have shared their experiences on CGES platform on various scientific and societal relevant issues. The biannual CGES Newsletter has been highly informative and spreading awareness among the common man through publishing articles on crucial environmental problems and solutions. CGES has been a vibrant organization from the day of its inception and its ever growing activities in environmental domain indicate that the organization would soon carve a special niche for itself in near future. I congratulate the CGES team members for their sincere and hard work for bringing the society to this level.

My best wishes for the grand success of the 2nd CGES Foundation Day Celebration.

**Prof. S.K.Barik**  
Director

CSIR-National Botanical Research Institute, Lucknow  
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As we celebrate the Second Foundation Day of the Clean and Green Environment Society (CGES), it is appropriate to assess, what CGES has achieved in the last two years. To my mind, first and foremost, CGES has enhanced awareness of the environmental issues,

including climate change. More particularly, alerted people to the ill effect of tobacco, smoking and gutka chewing, which is very common among the illiterate and literate population. Tree plantation drives, around Lucknow, have contributed towards increased green cover in the city. Dr. S. C. Sharma, Secretary General, and the members of CGES deserve congratulations for their all efforts. An interaction with the farmers for increasing their income was very well organized. This is highly relevant in view of the Government Think Tank Neeti Aayog's target of doubling the farmer's income in next five years. Besides, population, both poverty and affluence are the main cause of the environmental changes. However, in a free society like ours, neither poor can be stopped from cutting the trees for cooking their food, nor the affluent to reduce their over consumption of natural resources. Universal Basic Income (UBI) for poor farmers, as an alternative to subsidies and loan waivers, can eliminate environmental ill effects caused by extreme poverty. At the Second Foundation Day, CGES may also consider planting at least two hundred trees to be increased at each following years to come.

**Dr. C. R. Bhatia, FNA**

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In the present times environmental pollution is the biggest health issue. Almost all diseases be it pulmonary, cardiovascular, neurological even cancer can be linked to some environmental chemical or

***Seven billion People one Planet, Leave no Foot Print. - Anonymous***

matter. The City of Lucknow is fast growing and unfortunately so is the pollution. Our Prime Minister Shri Narendra Modi has emphasized for "Swachh Bharat and Swasth Bharat". About two years back on a free evening, Dr. S. C. Sharma and I had some discussion about the environmental health issues. We felt that a platform was needed for doing something to keep the environment clean and green and undertaking activities for a better tomorrow. Dr. Sharma, being from botany background padded for a green environment and I felt that it should not be a body of just scientists but all stake holders of environment like engineers, doctors, administrators, judiciary, housewives and public at large be involved. Following several informal meetings and exchange of views, it was decided to give it a shape. A meeting was convened at Biotech Park, on June 11, 2014. Over 25 persons representing all segments of the society, engineers, corporates, scientists and administrators participated in the meeting. A great enthusiasm was expressed by all and a Clean and Green Environmental Society (CGES) was born. It is a matter of great rejoicement and satisfaction that with the meticulous planning, commitment and hard work of Dr. S. C. Sharma, Secretary General and guidance of Er. Sumer Agarwal, President and several other members, the CGES has grown fast and it is going to celebrate its Second Foundation Day on July 8, 2017. With almost no funds, the CGES has organized a number of activities in the last two years, ranging from tree plantations, environmental awareness, lectures etc. Also a biannual CGES-Newsletter with lot of useful information was brought out. On the eve of Foundation Day while we look at the accomplishments and appreciate them, one also feels that lot more is to be done to realize the cherished goals and objectives of the Society. There is a need to brain storm and come out with an action plan. Society may also consider joining hands with Rotary Club, Lions Club, Club of Lucknow and other like minded organizations and involve schools and colleges in spreading the message for the significance of Clean and Green Environment for a "Better Tomorrow". I conclude with my best wishes for the grand success for the forthcoming Foundation Day of the Society on July 8, 2017.

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### **CGES represents making of a Carvan, not superheroes**

During the last two years, the nearly lone journey started by a few of us, has got transformed into a Carvan of more than a hundred individuals. Enormous passion to work for healthier living has been driving the Society very effectively. Congratulations to all the members and a big cheer for the extra effort put by the office bearers!

The two flagship traits chosen by CGES are essentials of healthy living: clean and green environment. The Society is a reminder of efforts needed every day, to make sure that the mother Earth remains livable forever. This task requires a large dedicated team of silent contributors, not a few superheroes. That is what CGES has been trying to silently create. A team to carry out a variety of outreach programmes, both indoors and outdoors. The efforts of CGES have been in perfect orchestration with the national renaissance in making Bharat Swachh and Swasthya. Given the significance of technology in making the environment clean, CGES has an excellent membership of subject experts. In the coming year, CGES will hopefully popularize such clean technologies further. Scale up and innovation, make the technologies more affordable. That is how, solar power today has become 10-fold cheaper over the last 30 years. It is available in India at as low as Rs 2.50 per KWh, at least two-fold lower than conventional power! Solar Rickshaw could be taken up by CGES as one representative project to upgrade E-Rickshaw in Lucknow. Popularizing Roof Top solar heaters and their cost effectiveness and availability, could be another project to be take up. Intelligently planned plantation drives and training workers for good gardening are some of the most powerful technologies taken up by CGES in the last two years, to clean air of several pollutants. These tasks are for teams of achievers, not superheroes!

Hence, it is a pride to join the celebrations of CGES on its Second Foundation Day. Those, like me, who are not able to reach Lucknow on this occasion are the losers.

My best wishes to all of you for taking the Society to greater heights.

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***Let us save the self inflicted pollution. - Anonymous***

## **FOOD PRODUCTION, PROCESSING AND COOKING LEAVE THE LARGEST ENVIRONMENTAL FOOT PRINTS.**

**C. R. Bhatia**

The vision of CGES is to work for clean and green environment for a healthy life. Good health and adequate amount of nutritious food are necessary for happy life, which we all aspire for. Besides the environmental issues, the country faces major problems of population, jobs for the growing population, poverty, inequality of incomes, food, water and energy security considering limited natural resources. In fact, these problems are interlinked, interdependent and all affect environment. Many of these problems are global. Even rich countries, like US, face large income inequalities where the wealth of the rich continue to grow, while poor keep struggling to move out of the vicious circle of poverty with little hope. The anticipated changes in climate are expected to further enlarge these problems. Among different human activities, food production has the largest environmental footprints, as a large number of farmers are involved, and the entire population needs food for its survival. Most food grains after harvest, need further processing and cooking for human use. This is not new, these have always been there, even before the dawn of agriculture, when our ancestors, as food gatherers and hunters, were collecting grains from natural stands of cereals and hunting for animals. Increased awareness of the environmental issues has brought them in the forefront.

After existing as food gatherers and hunters for centuries, some ten thousand years back, it was discovered by the women that the grains, their men folk have been collecting from far off places, can grow in their own backyard. Enterprising ones started putting some of the collected seeds into soil. They germinated to produce plants and grains. This was the beginning of agriculture, and more settled life for humans that led to the development of several cradles of civilizations in different parts. Plants were domesticated soon after animals. However, large crop production

was possible only after clearing of the natural vegetation and associated loss of carbon capture and biodiversity. The human population, as well as its growth rate, was small. Even in these times, acute shortages of food, occurred periodically when the crops failed.

It was soon observed that growing of crops on the same plot, year after year, reduced the harvest size. Hence, the old fields were abandoned and new land areas were cleared of the natural vegetation, and brought under cultivation. Later, adding of bird droppings, alternating with legume crops, and using niter were practiced. In the early decades of the 20th century, the Nobel prize-winning German chemists Fritz Haber and Carl Bosch developed the process for fixing nitrogen from air into ammonia in an economically sustainable synthesis. In 1999, scientific journal Nature selected them as the most influential persons of the 20th century over Hitler, Gandhi and Einstein. Chemical fertilizers revolutionized food production in the western world. It is also said that the chemical fertilizers detonated the population bomb. At that time, the World population was less than 2 billion. Synthesized nitrogenous and phosphatic fertilizers, and mechanization of farm operations increased productivity in US and Europe. Development of hybrid maize enhanced the genetic yield potential that could be realized with the application of synthetic fertilizers and good management practices. In India, use of chemical fertilizers was minimal, till the independence in 1947. Though there were no large famines after the Bengal famine of 1940-43, the food shortages were common. Only the imports from United States under Public Law 480, rationing, and a good public distribution system prevented large famines.

The introduction of the so called "Green revolution" technology in the mid 1960's made the country produce enough cereals, wheat and rice. The green revolution technology included

***Healthy Environment makes Healthy Heart, Healthy Mind and Healthy Body. - Narcolepsy***

cultivation of semi-dwarf plant types, both in rice and wheat, and application of synthetic fertilizers and irrigation, beside other management practices to control pest and diseases. The new technology provided the way to produce enough food for the growing population. Maize and Sorghum followed. Country's population at the time of independence in 1947 was 340 million, as compared to the current population of 1.32 billion. Thus, the current farm production is feeding a nearly fourfold increased population. Pulses and oilseeds or oil are still imported.

FAO has estimated that by 2050 the world's population will increase to 9.1 billion; and per capita income will rise by 150 per cent; and global consumption of high quality food (meat, milk and eggs) would increase. World would need 100 per cent more food, and 70 per cent of it must come from increasing productivity and enhancing use efficiency of water, nutrients and other inputs. Increased productivity, needs water, and energy inputs for farm operations, synthesized fertilizers, pesticides and other agro-chemicals..

### **The environmental impact**

The environmental impact of human activities was first given by Ehrlich and Holdern (1971) in their IPAT equation where the impact (I) is the product of population, affluence of the population (A), and the technology (T).

$$I = P \times A \times T$$

A more elaborate Kaya identity, was given by the Japanese energy economist Yoichi Kaya in 1997.

$$\text{Where global emission of carbon dioxide (F)} = P \times G/P \times E/G \times F/E$$

Where P is global population, G is world GDP, and E is global energy consumption.

The above, clearly establish the important role of population and the technology employed in the overall environmental impact or even the CO<sub>2</sub> emissions that are responsible for global warming. It is common knowledge that population increases demand, and affluence

enhances consumption of food as well other luxuries. Coal and other fossil fuels increase carbon emissions compared to solar and other renewable sources that shows the importance of the technology.

Water, and soil are the other essentials for food production. Water is a limiting resource with competing demands from industrial and other non-agricultural uses. Hence, water use efficiency is an important determinant. Available technologies such as sprinkler or drip irrigation enhance water use efficiency several fold compared to flood irrigation.

Loss of fertile top soil, by ploughing, and other conventional methods of planting, weeding are well known. Cover crops and mulching are known to prevent soil degradation. Maintaining, and improving fertility of soil, the most vital natural resource is the top priority for environmental sustainability.

### **Climate change and food production**

Increase in ambient temperature and associated changes are globally accepted on science based evidence, though some influential leaders do not accept this. Global warming is expected to increase the uncertainties of the climate, with increased rainfall in some areas causing floods, increase in ambient temperatures prolonged drought or dry spell in others, flooding in the coastal areas due to rise in sea level. As all these are connected to agricultural production, it is bound to be adversely affected. The climatic changes will have local effects, and are extremely difficult to predict for a specific location. Inter Government Panel on Climate Change (IPCC) has made extensive consultations based on global and regional efforts and modeling, their reports can be followed for details. Crop duration will be shorter in low latitudes, but may increase at the temperate regions. Flowering time for crops will change, causing shorter periods for grain filling. Higher temperatures during the grain filling period will lead to reduction in productivity. The incidence of insect pests, diseases and weeds will be altered; new ones may emerge. It comes out from these studies that crop productivity as well

*If you want to be happy forever, be a gardener. - Chinese Proverb*

as the nutritional quality of the harvest would decline. Soil erosion is likely to increase with decline in soil fertility.

Thus, the anticipated climatic changes would decrease the income of farmers, and aggravate poverty. Food surplus regions may be able to endure the climatic changes, but those with precariously balanced between food needs and production, and food deficit ones are will be adversely affected. It would also change the international trade in food commodities.

Climate resilient genotypes are known, but development of new productive, climate resilient, cultivars is not easy. Further, their evaluation, in view of the changing climatic uncertainties of the region is even more difficult and time consuming.

### **Genetically modified crops**

In recent times, an unwarranted controversy has arisen on the environmental safety of genetically engineered (GE) crops commonly referred as genetically modified (GMO). In fact, all crops are genetically modified. During the domestication from the wild, humans selected for the desired characters. Easy to thresh and convenience of separating the grain from the covering chaff was considered as the most useful trait. These selections were based at the level of entire organism. The rare spontaneous mutants where it was easy to separate the grains, were selected. Later, the cellular methods were employed, where pollen from the desired types was used to hybridize with the selected female genotypes. Then in 1967 it was discovered that using specific restriction enzyme, isolated genetic material-DNA, can be cut at specific sites; and the cut pieces can be joined with heterologous DNA from another source. This was the beginning of genetic engineering. The molecular technique made it possible to introduce genes from any organism in the vast biodiversity, or even synthesized genes, into a microbial, plant, animal or human DNA. It opened the possibility of transferring human insulin gene into bacteria and producing insulin in fermenters, instead of obtaining from bovine or porcine sources. Genetic engineering of the

plants followed.

First GE crop approved for commercial cultivation in 1996 was Flavr Savr tomato with enhanced shelf life, though it is no longer under commercial production. Brookes and Barfoot (2017) have analyzed, in depth, the socio economic advantages of the GE crops that currently include maize, soybean, cotton, canola, sugar beet, egg plant and rice. The traits incorporated are insect and herbicide resistance and improved nutritional value (in rice). GE crops are grown in many countries, including US, Canada, Australia, Brazil, Argentina, China, India, Bangladesh, Philippines. Many more crops and ornamentals are under development. All crop cultivars developed using molecular techniques for gene transfer must undergo mandatory bio-safety evaluation. Clearance from the Institutional Bio-safety Committee is necessary for initiating the experiments. Growing in open, outside of the containment facilities and field trials are approved after assessing all the environmental risks involved. In India Genetic Engineering Appraisal Committee examines the data on scientific merits to make the recommendations. However, the final decision is left to the politically appointed Ministers.

In India, so far, only insect resistant cotton with the gene (s) from bacterium *Bacillus thurengiensis* has been approved for commercial cultivation. Progress from 2002 to 2014 has been extensively analyzed by Choudhary and Gaur 2015. Its cultivation by the farmers started in year 2002. The area under Bt. Cotton increased to 11.6 million hectare covering 95% of cotton area in the country. In this period, cotton production increased from 13 to 39 million bales.

After extensive field trials egg plant with Bt gene was recommended by the GEAC. However, commercial release of the same was not approved by the environment minister. Bt eggplant is under commercial cultivation in Bangladesh and Philippines.

Currently, commercial release of GM mustard, Dhara Mustard Hybrid-11 (DMH-11) developed

*Future generation will judge us harshly if we fail to uphold our moral and historical responsibilities. - Ban Ki Moon*

at the Delhi University is under intense debate. The same has been recommended by GEAC, similar to their earlier recommendation for egg plant with Bt gene. The final decision by the minister is pending. Some of the politicians, including Chief Ministers of some states, and many celebrities are very much against the GE crops for reasons best known to them. Some believe that it is against nature or creation of a super power. However, those who believe in evolution, and the fact that all present life forms evolved from the last common ancestor, such arguments do not make a rational reasons based on scientific knowledge.

Lastly, in view of the above, what role can CGES play to have a large impact towards a more prosperous, and happy population living in green

environment? The society, as well as the individual members should create awareness in their own families, and public for:

1. The environmental impact of food production, transport and cooking.
2. Reduce consumption by limiting to the essential needs.
3. Prevent waste of food at ostentatious functions by projecting it as a crime against the environment.

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## **DEVELOPMENT OF URBAN GREEN SPACE AND LANDSCAPES: KEYS FOR CLEAN AND HEALTHY ENVIRONMENT**

**R.K. Roy and S.C. Sharma**

Urbanization is a global phenomenon. Migration of people from rural areas to towns and cities of a particular country is a common practice for better livelihood and opportunities. In developed countries, the rate of urbanization is comparatively slow than the developing countries. In the last decade, this kind of human migration has been increased in many folds. Urbanization, the spatial concentration of people and economic activity is arguably most important social transformation in the history of modern civilization. The timing and speed of urbanization have variations in different countries. The process of urbanization has taken place everywhere in the world and is an unstoppable manner.

According to a report by United Nations, 61% of the population will live in urban areas by 2025 especially in the developing countries. This uncontrolled urbanization has many fundamental, social and environmental consequences. In India, an estimated 340 million people (30% of the total population) lives in urban

areas. As per estimation, 590 million people (40% of the total population) will reach new towns and cities by 2030. If it is continued unabated, we will have to look for long term sustainability and future environmental consequences especially in the urban areas.

Urban green space and landscape refer planning, development and plantation of trees and other greeneries for achieving specific purposes. The plantation pattern, selection of plant species and designing of green spaces vary according to the situation. Landscapes and urban green space plays a critical for keeping our cities clean and healthy.

### **Importance of Urban Green Space and Landscape**

The consequences of rapid urbanization are quite prominent and have several adverse effects on environment. Development of urban green space and landscapes are one of the effective ways for improving air quality, aesthetics and environment. There are international norms for

*People need to stop financing denial of climate. - Al Gore*

development of urban green space and it is a mandatory. In developed countries, the standard of green space is 20 sq.m. area per capita which helps in maintaining a balance between CO<sub>2</sub> and O<sub>2</sub> for human wellbeing. As per WHO, the need for minimum availability of green open space is 9 sq.m per capita. There is wide variation both in coverage and per capita availability of green space globally. However, well planned cities have urban green space 20-40% of the total geographical area. Indian cities are far behind the standard recommended and adapted internationally. New Delhi, the capital city, has green cover about 20% of the geographical area which comes to about 20-22 sq.m. green space per capita. The value of green open spaces within cities for ameliorating local environmental conditions is widely appreciated. These were not only established for recreational needs but for ecological based requirement. They perform many functions for improving quality of life in the urban areas. Nevertheless, green spaces provide linkage between people and nature.

#### **Efficacy and Environmental Benefits**

- \* Development of urban green space as 'Greenbelt' serves as an effective means mitigating industrial and urban pollution. Studies have revealed that a green area having 500 sq. m width surrounding a factory is capable of reducing SO<sub>2</sub> concentration by 70%.
- \* Woodland over a hectare absorbs 3.7 tonnes of CO<sub>2</sub> from atmosphere and supplies 2.5 tonnes of oxygen.
- \* Reduction of dust particles (27%) in London (Hyde Park) by a green area of 2.5 sq. km. was also reported.
- \* Trees also provide supports to wild creatures, birds and biodiversity as a whole.

#### **Social Benefits**

- \* Urban green space and landscapes provide safe play space for children and contribute in physical, mental and social development.
- \* Plays an important role in the basic education of school children with regard to the environment and nature.
- \* Landscape and urban green space provide a

refreshing atmosphere with appropriate greenery in contrast to the structures of buildings.

- \* Provides healthy environment by improving quality of air, water and soil.
- \* Provides space for social activities, celebration and other performances.
- \* Provides a perfect outing place for elderly people and family as a whole.

#### **Economic Benefits**

- \* Reduce temperature effect and consequently less demand of air conditioning. The annual saving, thus made by a tree is estimated to be Rs. 10,000-12,000.
- \* The cost benefit ratio, a resident may receive back, is estimated to be around Rs. 1000 against annual investment of Rs. 500. Therefore, urban greeneries contribute significantly for reducing cost of environmental maintenance.

#### **Type of Urban Green Space and Landscape**

**Urban Forest/Greenbelt-** An urban forest/greenbelt is a collection of trees that grow within a city, town or a suburb. In other words, it refers growing of any kind of woody trees in and around human settlements. Urban forests play an important role in ecology of human habitats in many ways viz. filtering air, water, sunlight, provide shelter to animals and above all, recreational area for urban people. They moderate local climate, acts as wind break and provide shade. Moreover, they are critical in cooling the urban heat island effect. Urban trees, shrubs and wildlife help people to maintain their connection with nature. Preferably, evergreen and pollution trees with broad leaves should be selected for planting. *Eg. Bauhinia purpurea, Butea monosperma, Albizzia lebbek, Azadirachta indica, Dalbergia sissoo, Ficus infectoria, Ficus religiosa, Diospyros embryopteris etc.*

**Parks-** These occupy a unique position in our social life and a common facility to the community for pleasure and utility. Development of parks is the most common way of using urban open space. Usually parks contain all groups of plants. Besides, these are the good source of recreation, aesthetic and amelioration of

***Solution to global warming is reducing pollution and tree plantation. - Anonymous***

environment. A park over an area of 1-2 hectare creates a cooling effect by 2°C than the surrounding area. Proper planning of parks by selecting perennial ornamentals having pollution tolerant capacity will further accelerate amelioration of environment. In old cities, there may be less availability of space for developing new parks. However, the available open space may be converted into green space. In case of new cities, making provision for development of parks is now mandatory.

**Plantation on Footpath-** The footpaths of the main roads in urban areas may provide an opportunity for plantation of trees and development of greeneries. Proper planning and selection of species as per space available can make a green corridor. The trees planted provide shades, creates cooling effect and overall ambiance. Suitable plant species are *Acacia auriculiformis*, *Ailanthus excels*, *Albizia lebbek*, *Bauhinia acuminata*, *B. purpurea*, *Butea monosperma*, *Cassia fistula*, *C. marginata*, *C. siamea*, *Casuarina equisetifolia*, *Crataeva religiosa*, *Drypetes roxburghii*, *Ficus benjamina*, *Lagerstroemia duperreana* etc.

**Central Verge of the Roads-** In urban areas, the central verge of the two way roads provides scope for plantation and development of greeneries. Plantation scheme may be decided depending upon the widths and length. Plantation may be done in single or double rows by selection of flowering shrubs and dwarf trees. Following plant species are recommended. *Bougainvillea varieties*, *Caesalpinia pulcherrima*, *Cassia surattensis*, *Euphorbia millii*, *Lantana camera*, *L. depressa*, *Nerium oleander* etc.

**Traffic Islands-** These are in various shape and size. However, whatever may be the structure, these Islands should be planted with trees, shrubs, herbs, ground covers as per suitability depending upon the space. Preferably, pollution tolerant plant species should be selected for plantation.

#### **Bottom Line**

Clean and healthy environment is a primary requirement for the urban people. The incessant increase of population pressure on cities and towns has made the environment more polluted. Proper planning and development of urban green spaces and landscapes with tolerant trees and plants is an effective way for improving quality of urban life and environment as well.

#### **Dr. R.K. Roy**

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Prof. Rana Pratap Singh, Department of Environmental Sciences, BBAU, Lucknow and Joint Secretary, Clean and Green Environmental Society, was awarded the "Panjab Singh Vishishtha Krishi Vaigyanik Puraskar" on June 14, 2017 by the Governor of Uttar Pradesh Hon'ble Shri Ram Naik. The award was instituted by the Uttar Pradesh Academy of Agricultural Sciences. The prestigious award was given to Prof. Singh for his research and technological contributions on sustainable agriculture.

# MANAGEMENT AND CONSERVATION OF LIVING RESOURCES FOR SUSTAINABLE DEVELOPMENT

R. K. Kohli

Earth is the only planet where life is known to exist. Even though its dimensions are limited, yet man is continuously changing its resource budget. Because of the urge for better life style, today the man is confronted with the unplanned development, rapid industrialization and consequential pollution and the unprecedented growth in population coupled with poverty and consequential deprivation. The urge has also made the majority poor and the minority rich population to harvest the resources at a fast rate little realizing the very fact that their act threatens the survival of mankind.

Global concern towards environmental resources was first manifested in the form of a United Nations' sponsored conference on Human Environment held in Stockholm in 1972. It focused the attention of the world on the dangers posed to the quality of human life and even to its survival due to: a) continuous degradation of ecological assets and b) pollution due to industrial pollutants. However, it could not make much impact because of the divergent views of the rich developed and the poor developing nations. Later, giving due credit to the aspirations of the developing world, the Brundtland Commission on environment and development in 1983 recommended the concept of sustainable development and to blend the economic growth along with environmental protection. She concluded in her famous report "Our Common Future" 1987 - "If we continue to use natural resources as we do at the present and if we ignore the plight of the poor, then we can only expect a decline in the quality of our life". The concern for conservation of our earth's resources was also emphasized during the World Earth Summit 1992 of Rio de Janeiro. The recommendations as contained in the Agenda -21 adopted in this summit justify this concern very loudly.

Though the global concern is appropriate, in the developing societies, conservationist is

viewed as anti-development and contrarily, the developmentalist is seen as anti-conservation, even though, both are concerned for the betterment of human life.

Development refers to the modification of Biosphere and the application of human, financial and other resources for meeting the human needs and improving the quality of life. Conservation that is not hoarding, refers to the use of biosphere for long-lasting benefits for the present generation and to meet the needs and aspirations for the future generations.

The resources of the environment like the components of the environment can also be grouped as living and non-living. In the context of environmental resources, the conservation and management of living resources is relatively more important since living resources are renewable if conserved and destructible if not managed. And if properly managed, the non-living resources get automatically reserved and conserved.

For managing the Environmental resources, there exist two policies world over- a) Special Interest Conservation Policy and b) Total Ecosystem Conservation Policy. The former invariably leads to ecological backlash and creates more problems than it solves. In developed and ecologically conscious societies/countries, it is the Total Ecosystem Conservation Policy which normally gains credence over the other. On the other hand, because of over population, public misconception, over compartmentalization, lack of accountability apart from adequate prior studies and evaluation parameters, the developing or under developed nations /societies, unfortunately, adopt the special interest rather than total ecosystem conservation policy.

## Why to Plan Conservation of Resources:

- a) Demand of resources for better life are increasing fast, thereby the amount of limited resources is declining.
- b) Action is required to cure the past mistakes and for this time is taken to plan, educate, conduct research, train manpower and

*We have only one earth; don't let it burst a day. - Anonymous*

manage. And after corrective measures have been taken, nature also takes its own time to respond to the action.

- c) National and international potentialities are ill organised and highly fragmented and lack interaction.

#### **Aims of Conservation:**

- \* To maintain quality environment for the present and the future needs.
- \* To maintain continuous yield of living & non-living natural resources.
- \* To take due care of the process of evolution.

In order to achieve the aims of conservation of environment the emphasis on the management of living resources has been duly recognized.

#### **Objectives:**

- \* To maintain essential ecological process and life support system e.g. soil regeneration & protection, recycling of nutrients, food chain, food web, cleaning of water etc.
- \* To preserve genetic diversity for the purpose of breeding, evolution, scientific advancement, technical innovations and sustainability of industry based on living resource.
- \* To ensure the sustainable utilization of species and the ecosystem/biomass - fish, wildlife, forests, grazers, pastures etc.

#### **STRATEGIES/PRIORITY REQUIREMENTS FOR CONSERVATION**

- \* Reservation of prime quality cropland for crops.
- \* Adoption of management practices to maintain the productivity of cropland, grazing land and forests.
- \* Prevention of soil degradation, and restoration of land where soils were already degraded.
- \* Protection of watersheds, especially upper catchment areas.
- \* Maintenance of the support systems of fisheries.
- \* Control of pollution.
- \* Prevention of species extinctions.

- \* Preservation of as many varieties as possible of domesticated and other economic or useful plants, animals and microorganisms and their wild relatives.
- \* Regulation of living resource utilization so that it is sustainable.
- \* Reduction of indiscriminate fishing.
- \* Maintenance of the habitats of utilized species.
- \* Careful allocation and management of timber concessions.

#### **Priorities at the National Level**

- \* Preparation and implementation of national and/or sub-national conservation strategies.
- \* Adoption of anticipatory environmental policies.
- \* Inclusion of non-monetary indicators of conservation performance in accounting system.
- \* Preparation of ecosystem evaluations.
- \* Advance assessment of the likely environmental effects of all major actions.
- \* Adoption of a procedure for allocating land and water uses based on ecosystem evaluation and environmental assessment.
- \* Review and strengthening of legislation concerning living resources to ensure that it provides sufficiently for conservation, paying particular attention to enforcement.
- \* Establishment of a soil and water conservation body at the policy making level.
- \* Review and strengthening of training facilities at the professional, technician and use levels.
- \* Increased research to improve the management of living resources.
- \* Greater public participation in decisions concerning living resources.
- \* Environmental education campaigns and programmes, particularly for the users of living resources, legislators and decision makers school-children and students.

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***Stop cutting trees and reduce global warming. - Anonymous***

## **US PULL OUT: A VOID FOR INDIA TO FILL?**

**Rakesh Tuli**

On June 1, 2017, the US President, Mr Donald Trump gave an unpleasant surprise to the world by announcing withdrawal of the US from the Paris Climate Accord signed in 2015. The Paris Agreement was signed by 195 countries. Only two countries - Syria and Nicaragua abstained from signing. In fact, Nicaragua desired that the agreement be stronger and more abiding. Syria had a war going and hence, part of their delegation could not attend the negotiations. The Agreement had got an overwhelming support and was used to set up global goals to cut down emissions. Each country agreed to contribute to the goals. In honouring the country specific needs of individual countries, the Agreement left each country to find its own solutions. USA is the first country to have withdrawn from the Paris commitment.

The Paris agreement recognised the devastation that can be caused by the increasing greenhouse gases and associated increase in temperature. It recognised the need to curb such gas emissions and signed for the voluntary agreement to cut down emissions to ensure that the Earth's average temperature does not rise above 2 degrees centigrade over that in 1880. However, the Paris Agreement did set standards and processes to hold individual countries accountable and bind them for enhanced action over time. Though the Paris Agreement depends upon contributions of enabling technologies, it does not depend upon any one nation for driving the technologies or the goals. At the 2011, United Nations Climate Change Conference (COP17) held at Durban in South Africa, a Green Climate Fund (GCF) was established with a goal to raise US \$ 100 billion by 2020 to fund climate challenges in developing countries. By May 2017, an amount of US \$ 10.3 billion has been pledged to cover start-up costs. The US President Obama had committed \$ 3 billion to the GCF, but till laying his office, had contributed only \$ 1 billion to the kitty. President Trump is expected to

contribute the \$2 billion in balance, but was critical of GCF since he considered it a way to siphoned off wealth from the developed to developing countries. Hence, the contribution from US may not happen, given his announcement to withdraw from the Paris accord. India had not announced any commitment to the GCF. The withdrawal of US may therefore cause some difficulties in raising the requisite resources for the fund to meet climate challenges.

Since the accord is for global good, despite the withdrawal of USA, other major economies specially, European Union, China and India have committed to stay with the agreement. Withdrawal of USA may cause some discouragement to the countries who look at US as a global leader. Some countries may compromise on the serious global issue of climate change in interest of their bilateral alignment with the US and the inadequacy of funds. Hence, this is an occasion with need for a progressive big economy like India, to take leadership and develop affordable and appropriate technologies indigenously, and prove its might against the issues of pollution, greenhouse gases, climate change and resources.

Prime Minister Modi has clearly spelled out India's commitment to make the world a better place to live, irrespective of the decisions of any other country. The Foreign Minister Sushma Swaraj has given a befitting reference to thousands of year old Indian scriptures that repose highest reverence to nature and natural resources. Then where is the question of India wavering from its global commitment of a clean and green world. The CGES must rise to this occasion and contribute its might in building vision for a happier and healthier world. We must resolve to increase awareness of personally using energy efficient technologies, saving at the fuels

***Global warming is a man made warming. - Anonymous***

and wastages, saving natural resources and enhancing awareness for the need to develop and pay for greener technologies. If need be, CGES should support the cause for India becoming a contributor to the GCF, even if an additional cess is to be imposed by the government. This will be our resolved commitment to Vasudeva Kutumbakam, our age old cultural heritage that binds the whole world for common good.

Power Minister Piyush Goyal recently declared plans that all cars sold in India by 2030 will be electric. A high proportion of autorickshaw in Chandigarh and Delhi are already driven by electric batteries. This culture needs to be popularised. Soon, the era of hybrid public vehicles driven by solar cum electric cum manual power will take over the progressive Indian states, at least for short distance travel. Panjab University at Chandigarh has already developed prototypes of such hybrid rickshaw. Investments in such technologies need to be enhanced. If India can set examples in scale up of the transport and domestic power by solar, electric and wind energy, it will become a global model for leadership in giving affordable solutions to the future world. We have already quadrupled our solar generation capacity to about 13000 MW (13 GW) during the last 2 years. In 2015 COP21, Prime Minister Modi presented India's ambitious initiative to reach 100GW (including 40 GW of rooftop solar power) of solar energy by 2022, which is about the total current global solar power installation. In January 2016, PM Modi and French President Hollande laid the foundation of HQ of the International Solar Alliance (ISA) in Gurugram, an organisation to focus on promoting and developing solar products for over 120 countries. The alliance for ISA was announced at the Paris COP21 Climate Summit. India is already the proud owner of world's largest solar power plant at a single location. It has a capacity of 648 MW, covers an area of 10 sq Km at Kamuthi in Tamil Nadu, built at a cost of Rs 4500 crores. Last month, India made a globally historic record when two power companies (Phelan Energy and Avaada Power) in

an auction in Rajasthan based energy park, offered to supply electricity generated from solar panels at the world's lowest price of Rs. 2.62 per kilowatt hour. Hence, India has already established a leadership position in scaling up and affordability of solar power in the country.

Post industrial revolution, the records of global temperature show an increase in annual mean temperature after 1960, and then again around year 2000. This increase correlates well with the increase in atmospheric CO<sub>2</sub>. With increase in agricultural activities post 1980, the higher methane release by crops and cattle is also believed to have contributed to the increase in earth's temperature. Despite considerable uncertainty about future, all climate models indicate a rising trend in temperature. By 2100, a rise of 1.8 to 4°C is expected. Adverse impact of every one degree rise in temperature has been convincingly proven in models that lead to melting of ice, floods and droughts, change in distribution of biodiversity, change in disease patterns, crop yields, nutrition etc. Hence, major global corporations, including US giants like Pepsico, Coca cola, Dell, Walmart, Apple, Starbucks, Bank of America, Google etc. have been making investments in renewable power. Some US states like California and New York are targeting 50% of renewable power by 2030. They will continue to take great strides, with or without the help of federal government in USA. Technology development in climate related areas pays great economic dividends to US companies. They will continue to do good science around these in interest of their own business. The world will continue to move towards cleaner global environment. The demand for sustainable technologies and services will continue to grow and the global giants will continue to use those as opportunities for good investments. The energy efficient gadgets finally save billions of dollars globally for the users of new technologies. The cleaner energy sector creates new jobs and industries. Hence, it is to competitive advantage of any country to make investments in innovations and industries in this sector. With

the exit of USA, India should in fact, augment its investments to provide leadership in developing indigenous affordable technologies and thus, meet its own climate goals without expecting to get technology aids in future. This should be seen as an opportunity to develop clean planet related big business globally for Indian manufacturers.

For India, developing its own approach to clean planet is certainly a serious need, because we are the third largest contributors to global gas emissions. China being the first at 30% of total carbon dioxide emission, America being the second at 15% and India, the third at 7%. We are the most rapidly growing economy and the world's second largest nation. Therefore, we need

to continue our industrial growth while shifting to environmentally clean, energy efficient, sustainable and affordable systems. In order to reduce such emissions, an extraordinary innovativeness needs to be exhibited by our scientists and technologists. An extraordinary resolve to make good for the void left by the departure of US is required to help the world keep marching forward for a wholesome tomorrow.

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## **MICROBIOLOGICAL SOLUTIONS OF NON- BIODEGRADABLE PLASTIC WASTE**

**Vandana Yadav and Yogesh Kumar Sharma**

India is developing country with 16% of the world population and 2% of the total land area. The exponential increase in industrialization is not only consuming large areas of agricultural land but simultaneously causing serious environmental degradation. Industrialization and urbanization have resulted in discharge of large waste, rich in organic matter as well as nutrients. Waste materials can be biodegradable and non-biodegradable.

Biodegradable wastes like municipal solid waste, green waste, food waste, paper waste can be easily broken into carbon dioxide, water, methane or simple organic molecules by micro-organisms and other living things using various processes.

Non-biodegradable wastes like plastics cannot be decomposed by natural agents. They remain on earth for thousands of years without any degradation. Hence the threat caused by them is more critical. Plastics are man made long chain polymeric molecules. The word plastic comes from the Greek word "plastikos", which means

"able to be molded into different shapes". Plastic are synthetics or semi synthetic organic solid materials that are used for manufacturing of industrial products. They are considered to be vital asset for humanity, often providing functionally that cannot be easily or economically replaced by other materials. The most widely used plastics used in packaging are polyethylene (LDPE, MDPE, HDPE and LLDPE), polypropylene (PP), polystyrene (PS), polyvinyl chloride (PVC), polyurethane (PUR), poly (butylenes terephthalate) (PBT), nylons. The burning of polyvinylchloride (PVC) plastics produces persistent organic pollutants (POPs) known as furans and dioxins.

Certain microorganisms such as bacteria and fungi have the capability to degrade the both natural and synthetic plastics. During degradation the polymer is first converted to its monomers, then these monomers are mineralized. It includes bio-deterioration, bio-fragmentation, assimilation and mineralization. Non-biodegradable plastics are made natural

***Reducing the needs and reusing the things can help us to win the over global warming. - Anonymous***

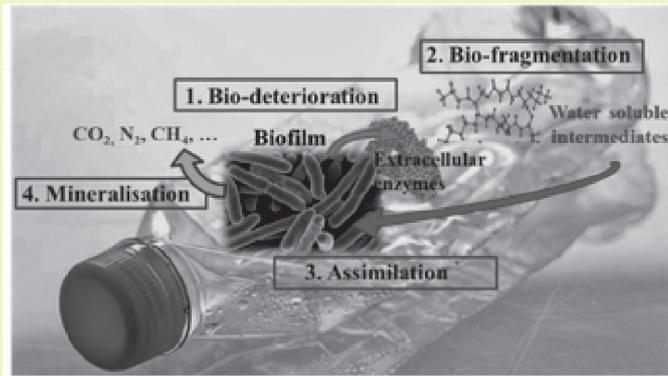


Fig. 1. The different steps of plastic biodegradation by microorganisms

materials in anaerobic (landfill) environments which result in the plastic lasting hundreds years.

In recent studies, it was observed that if Burd mixed landfill dirt with yeast and tap water, then added ground plastic and stewed, the plastic indeed decomposed more quickly than it would in nature; after experimenting with different temperatures and configurations, Burd isolated the microbial munchers. One came from the bacterial genus *Pseudomonas*, and the other from the genus *Sphingomonas*.

In a bid to find a solution to the wastage of plastic bottles, a new initiative has been taken by the many Municipal Corporations along with Arts Alive Foundation to recycle these bottles in the city. Twenty such centres will be installed across the city, where people can drop their plastic bottles to be scrapped and recycled.

DIY Drip Irrigator and Soda Bottle Sprinkler

delivers moisture directly to plant roots without over saturating the soil, which helps the plants root deeper and grow healthier since they don't experience moisture stress.

Strategically placed DIY recycled bird feeder may allow us to view the pretty feathered creatures up close and personal. Taking just a little time and very little money, one can make out of materials we might have otherwise thrown away - a plastic bottle and a couple of wooden spoons.

As per recent News in reputed Indian Newspaper, the T-shirts are to be made out of plastic wastes. It will be great if such technology is being developed.

If the reports are believed to be true, in Indian market artificial plastic rice, sugar, eggs and cauliflower are being circulated. This is most terrible, directly killing the people and animals. A recent study estimated an annual input of 4.8 to 12.7 million metric tons (MMT) of plastic waste into the ocean, thereby contributing 60 to 80 % of marine macro- and mega debris like killing of marine wildlife by plastic debris. It appears more obvious than for any other class of pollutants that our planet is not in balance regarding their environmental input and removal.

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***Earth provides enough to satisfy every man's need but not every man's greed.***

***-M.K.Gandhi***

***Talking about Ecology, Land or Water Conservation without controlling the Human Population is not going to make a difference. You can not cap Human activity because that will amount to capping Human aspirations. You can only cap Human population***

***- Satguru Jaggi Vasudeva***

## MICROBES ARE NOT ONLY FOE BUT FRIENDS TOO

**Jitendra Mishra, Tahmish Fatima and Naveen Kumar Arora**

The first living organism to inhabit our planet ubiquitously were the microorganisms. It is believed that all other life forms evolved from this tiny creature which are invisible to our eyes. As the invisible form, their presence can be sensed and questioned that whether they are our foe or friends? Microorganisms including bacteria, fungi, some algae, protozoans, and viruses have always been an integral part of all the ecosystems on earth. Microbiology has emerged as a specific branch of science for studying, culturing and characterizing the different type of microbes and it is no wonder to know that present day tools tell us that only 1% of them have been cultured and remaining 99% are yet to be explored. Most of the well-defined genera of microbes have been cultured in laboratory conditions and further studies pertaining to their life style diversify them in broader subdivisions. However, in simple words, the nature of microorganisms divides them both as beneficial and harmful. Beneficial, because they play an enormously important role on the earth and for the benefit of mankind. Whether it is our garden waste or the fermented food that we are using since ancient times, is only because of them. They are harmful because they have been the main culprits responsible for causing dreadful diseases in humans, animals, and plants. There are several instances in human history where the whole population of an area was affected or complete lyvanished and resulted in great number of deaths due to epidemics.

Microbes were first defined by a famous Dutch scientist, Antoni van Leeuwenhoek, in the seventeenth century, with his primitive but very effective microscope he saw normally invisible.

**Creatures:** The bacteria, yeasts, and protozoa that we now call microbes. However, in 1854 with the first outbreak of a water-borne disease, John Snow hypothesized, much before the postulation of germ theory, that contamination of water with human sewage harbored harmful microbes as

the cause of such outbreaks. The subject of microbiology is said to have been created in the late nineteenth century by a French chemist, Louis Pasteur. He, at that times, proved that fermentation and putrefaction, previously believed to be purely chemical processes, were due to microbes. The way he proved microbial existence challenged all previous tantrum associated with existence of microbes. Since microbes cause disease, this question becomes particularly important of other researchers. By certain experimental procedures also known as Koch's postulates, this dilemma was fully solved by Dr. Robert Koch of Berlin. With time, several other pathogens were also identified and some were reported to cause of epidemics including typhoid (*Salmonella typhi*), dysentery (*Shigella*), tuberculosis (*Mycobacterium tuberculosis*), anthrax (*Bacillus anthracis*), pneumatic plague (*Yersinia pestis*), malaria (*Plasmodium vivax*)etc. But thanks to some milestone discoveries happened in the field of microbiology which are still saving millions of lives every year. In this regard, the discovery of antibiotics by Alexander Flaming and soon after vaccines by Edward Jenner, were magnificent. With the expansion of newer knowledge, scientists are able to halt the spreading of epidemics which was otherwise a natural microbial disaster. But still, despite great technological advances, maximum number of human deaths occur due to microbes only.

Microbes have adapted resistance against several drugs and hence their eradication is challenging. The fatality of the disease-causing microbes lead to enhanced mortality rate. Apart from being a human and animal pathogen, microbes are reported as deteriorating agents of food, paints, walls, woods, seeds, crops etc. Every year tons of food and beverages are destroyed due to microbial contamination and some of them may lead to food poisoning. The potato famine of Ireland was one of the biggest plant epidemic. It

***Global warming is depleting the Ozone layer, let it be stopped. - Anonymous***

lasted for five years from 1845 to 1850 and caused loss of 1 million lives due to starvation and 1.5 million due to emigration. Even Ireland's 1845 population of 8 million dropped to 5.5 million by 1860 only because of this disaster.

The notorious behavior of microbes has always gained the attention of researchers and since last century keen observation on their mode of life has also decoded their beneficial traits. Even in ancient times without realizing their presence they had served humankind but now we are much confident and aware that without microbial assistance mankind or another organism cannot survive. Not only as the lifeguard of microbial diseases, their role in satisfying human hunger is another dimension that cannot be overlooked. Microbial production of fermented food (cream, yogurt, buttermilk, pickles, sauerkraut, bread, cheese), beverages (alcohol), vitamins, amino acids, enzymes, and growth supplements are a major part of our daily needs and also provide a large amount of revenue to corresponding industries. Microorganisms have become a good source of industrial enzymes and especially those which cannot be recovered adequately by plants and animal sources. They have proven their utility in industries such as food, leather, textiles, animal feed, and in bio-conversions and bioremediations etc. Since the early 1920s, for curing diabetic patients, insulin was obtained from bovine or porcine pancreas which was expensive and cumbersome. Again, it was genetic engineering that involved recombinant *E. coli* and yeast for cheap insulin production at global level. Not only lifesaving drugs but many of the products of our life styles are in existence only because of microbes for example alcoholic beverages including different types of wines or distilled products solely depends on microbial action to complete. Microbes in intestinal microenvironment help in the protection of colon from other pathogenic exogenous microbes and synthesized some vitamins like vitamin D, vitamin B12 folate and biotin. These microbes are known as prebiotics.

The skin microflora competes with the pathogenic microbes thereby irradiating the colonization of pathogenic microbes. With birth, the natural microflora start protecting newborn.

Microbial life is amazingly diverse and they tactfully cover the entire planet. Their omnipresence in the biosphere makes them an integral part of various ecosystems. By decomposing dead organic matter and using them as a source of nutrients, they help in recycling the organic compounds trapped in the dead matter. Apart from this production of oxygen, fixation of nitrogen, carbon, sulfur and phosphorous indifferent bio geochemical cycles provide stability to the environment and nutrient to plants and animals. Over the history of the Earth, 40% of the total oxygen produced due to cyanobacteria and 75% of nitrogen fixed and made available to plants and animals is due to bacteria. Owing to characteristics of degrading harmful chemicals and pollutants microbes alleviate the load of harmful pollutants contaminating our earth. Microbes are also essential in treating the large volume of sewage and wastewater produced by metropolitan areas, recycling it into clean water that can be safely discharged into the environment. Natural gas used as clean energy involves the role of microbes such as methanogens (methane-producing bacteria). Biohydrogen, biomethanol and microbially made biodiesel production also emerged as the sustainable ways of producing biofuels from microbes.

With agronomic perspective, microbial role is also of prime importance. Although a lot of microbes are phytopathogens many microbes are beneficial for plant health. Soil microbes (bacteria and fungi) are essential for providing nutrients like nitrogen or phosphorus to plant, improving soil texture and managing biotic stresses and abiotic stresses. In recent past efforts have been made to minimizing the negative impact of chemical fertilizers and pesticides on the soil. In this context, microbes have emerged as the new hope and their use in

the form of biofertilizers and biopesticides is proven reliable. Similarly, plant genetic engineering methods were also developed and by using microbial genome, genetically modified (GM) crops have prepared. In terms of hovering agricultural productivity, GM crops have shown great potential and reduce the reliance of harmful pesticides.

The existence of microbes and their relationship with other organism on this earth involvelove as well as hatred. The love parade is so interlocked that one's survivalis challenged without the other like lichens, legume's nodules, humans and their gut microbes. On the other hand, some relationship are so aggressive that there is no chance of survival of the microbial opponent like individuals infected by HIV virus, Zika virus, Ebola virus, *Clostridium botulinum*, *Clostridiumtetani* etc. But one fact can never be ignored that microbes actually were the first life

on Earth and they in fact designed this Earth and its environment suitable for us to live. The interlink between microbes and higher organisms is so mingled that their mitochondria and chloroplast, according to endosymbiotic theory regarded as bacterial cells which have somehow being engulfed in the cells and now are our powerhouse and kitchen respectively. Thus, our relationship with microbes is just as the relationship between one human with another human, where some are true friends and caretakers like family and some are foes.

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#### OBITUARY

Dr. S.C. Rai, Padmashree, an eminent Surgeon and former Mayor of the Lucknow City was an advisor of the CGES since its establishment. His whole hearted support and active advices made it very easy for proper functioning of the Society and to fulfill the objectives.

Dr. Rai left for the heavenly journey (1929-2016) after a brief illness. With heavy hearts we the members of the CGES pray to the Almighty that the departed soul may rest in peace. He will be remembered for his valuable contribution to CGES.



**Climate change is no longer some far-off problem; it is happening here, it is happening now.**

**-Barack Obama**

## Event on : Tobacco, Smoking and Gutkha Chewing



Clean and Green Environmental Society (CGES) organized an event 'Tobacco, Smoking and Gutkha Chewing: Challenging Threat to Health and Society' on April 21, 2017 at Hotel LEVANA, Lucknow. Around 60 people from different walks of life participated in the event. Prof.S.K. Barik, Director, CSIR-National Botanical Research Institute, Lucknow, was the Chief Guest, Dr.Qamar Rahman, Former Dy. Director, CSIR-Indian Institute of Toxicology Research, (IITR) Lucknow was the Guest of Honour while Prof.Surya Kant, Head, Department of Pulmonary Diseases and Medicine, King George Medical University, Lucknow was the Guest Speaker.



## Forthcoming Conferences

### National Conference:

National Conference on Climate Change, Environmental Pollution and Biodiversity Conservation will be organized by CGES in collaboration CSIR-NBRI, Lucknow on February 17-18, 2018. For details, please see the CGES website ([www.cgesindia.org](http://www.cgesindia.org)) and contact

Dr. S.C. Sharma, Secretary General  
E-mail: [scsharmagardener@gmail.com](mailto:scsharmagardener@gmail.com)

**Pre-registration by July 10, 2017**

### 6<sup>th</sup> International Conference on Environment, Energy and Biotechnology (ICEEB 2017)

20-22nd August 2017, Kitakyushu, Japan

Contact : Ms. Lydia Liu

Conference Secretary

E-mail : [iceeb@cbees.org](mailto:iceeb@cbees.org)

Website : <http://www.iceeb.org>

### Global Climate Change Congress 2017

24-26 August, 2017; Birmingham, United Kingdom

E-mail : [contact@alliedacademies.com](mailto:contact@alliedacademies.com)

Web: [www.climatechange/alliedacademies.com](http://www.climatechange/alliedacademies.com)

Contact Person: Helly

### 2<sup>nd</sup> International Conference on Pollution Control and Sustainable Environment

5-6 October, 2017; London, UK

E-mail : [pollutioncontrol@conferenceseries.net](mailto:pollutioncontrol@conferenceseries.net)

Website : [pollutioncontrol.conferenceseries.com](http://pollutioncontrol.conferenceseries.com)

### 4<sup>th</sup> International Conference on Environment and Bio-Engineering (ICEBE 2018) in Meiji University

Tokyo, Japan, January 18-20, 2018.

### 3<sup>rd</sup> International Conference on Environmental Sustainability, Development, and Protection,

April 8-10, 2018 | Budapest, Hungary.

## Books

**Ornamental Trees of India** by R.K. Roy, 2014. Published by Pointer Publisher, Jaipur, Rajasthan, p.1-452, ISBN : 978-81-7132-800-0 (Rs. 4000).

**Bougainvillea: Identification, Gardening and Landscape Use** by R.K., Roy, Shilpi Singh and R.R Rastogi. 2015. Published by CSIR-National Botanical Research Institute, pp 144, ISBN: 978-81-7236-346-8 (Rs. 600).

**Plant Taxonomy by O. P. Sharma** (2nd Edition) 2014, ISBN: 9780070141599 (Rs. 650).

**Climate Change and Sustainable Agriculture** by P Suresh Kumar, Manish Kanwat, P.D. Meena, Vinod Kumar, Rajesh A. Alone, 2017, ISBN : 9789385516726 (Rs. 3600).

**Plant Taxonomy and Biosystematics : Classical and modern Methods.** Edited by T.S. Rana, K.N. Nair and D.K. Upreti 2014. Published by CSIR-NBRI and New India Publishing Agency, New Delhi. ISBN: 9789383305414 (Rs. 3995).

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