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NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

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## NESSA Award 2019 Notification No. 3

# APPLICATIONS ARE INVITED FOR THE FOLLOWING AWARDS - 2019

LAST DATE EXTENDED TO **30<sup>th</sup> September 2019**

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**AGE** 45 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal, and can suffix F.N.E.S.A. after their names.

### (2) NESA EMINENT SCIENTIST AWARD

**AGE** 40 and above. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

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**AGE** 35 and above. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

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### (5) NESA GREEN TECHNOLOGY INNOVATIVE AWARD

**AGE** 35 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

### (6) NESA YOUNG SCIENTIST AWARD

**AGE** : Up to 35. The recipients shall get Citation, Certificate, Memento and

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**AGE** : Below 35. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

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## SERICULTURE AN AGRO-BASED INDUSTRY FOR WOMEN ENTREPRENEURSHIP

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### Abstract

Sericulture is an agro-based enterprise and because India lives in village, sericulture offers gainful employment to the rural masses and also to the educated youth in semi-urban and urban areas. Sericulture growth will certainly lead to income generating entrepreneurial opportunities, enabling poverty reduction and arresting rural to urban migration of the rural poor. Silk is made of proteins secreted in the fluid state by a caterpillar, popularly known as silkworm, *Bombyx mori*. Silk industry is mainly a cottage industry in India providing livelihood to more than 9.42 lakh families. Nearly 7.56 million people are currently engaged in sericulture and silk production.

### *The various entrepreneurial opportunities in sericulture industry are-*

**Production of high yielding mulberry saplings** - Cultivation of mulberry is necessary to do silkworm rearing, as the mulberry leaf is the only food plant for silkworm larvae. Saplings are rooted-cuttings and have many advantages over direct plantation of Mulberry cuttings. Hence production of saplings in a large scale can be taken up as one of the income generating activity. By following standard nursery techniques from one acre of nursery about 1.28 lakhs of good saplings can be raised with the cost of production of Rs.0.50/sapling. A net profit of approximately Rs. 50,000-60,000/- can be obtained by raising saplings in one acre considering the selling rate of one rupee per sapling.

**Silkworm egg preparation and supply**- The silkworm seed is produced in grainages (egg production centres) which is used to produce cocoons to get quality silk yarn. To produce quality seed, it is very important to adopt scientific methods of egg production process, right from seed crop rearing to egg incubation. There are not only government grainages but also licensed seed producers under private sector to meet the existing demand of silkworm seed production. The venture is highly profitable, each rupee of investment will fetch one rupee as net profit.

**Young age (chawki) silkworm rearing centres**- Chawki rearing (young age silkworm rearing) -The first and second instars of silkworm are considered infant (or) young age silkworms are called chawki worms. Chawki worms are delicate and susceptible to diseases. Scientific rearing of young silkworms is critical for successful harvest of cocoon crops. Hence they have to be reared with utmost care on scientific lines. The young age larvae occupy 8-10 days of the larval period. Careful rearing at this stage is crucial for the health and hardiness of latter instars. Efficient maintenance of chawki centres and the supply of healthy worms after completion of 2nd instar will fetch high dividends, improve the cocoon crops and reduce the drudgery to the sericulturists. As an enterprise it will provide remunerative self-employment to the rural and educated women and youth for successful cocoon crops.

**Cocoon production** - Under ideal conditions the silkworm completes cocoon formation in 24 to 28 days from the day of hatching. At the end of 5th instar it ceases its feeding and spins a golden cocoon. By marketing the cocoons the farmers earn money. It is ideally suitable for the rural folk.



**Silk reeling** - The silk production an industrial activity, it is best suitable for educated youth to produce quality silk, to earn their comfortable livelihood and to provide employment to others.. Reeling is the process of unwinding the silk filaments from the cocoon and combining them together to make a thread of raw silk. The filament of the cocoon is too fine for commercial use, therefore three to ten strands are combined together for silk reeling to produce the desired diameter of raw silk which is known as 'reeled silk'. Presently silk reeling is carried out by using three types of reeling devices viz., charka, cottage basin and filature reeling machines. The cost and benefit ratios are more or less same in the cottage and Filature reeling units as compared to charka units. The raw silk produced by the silk reelers is marketed through silk exchange.

**Silk twisting**- After the process of reeling and re-reeling, the next step before weaving is twisting. The raw silk cannot be directly used for weaving. The raw silk is to be twisted before they are fed into looms. Twisting of silk yarn may be done in single thread (or) double thread depending upon the type of yarn required for weaving. It gives more strength to the fabric. It improves the quality, appearance, feel and elasticity of the silk fabric. Twisting facilitates easy weaving, degumming of yarn and further chemical processing. Certain fabric constructions such as chiffon, georgette, crepe, crepe-de-chine etc. need highly twisted silk yarn. Twisting is undertaken either by separate entrepreneurs or by the weavers themselves.

**Silk weaving (handlooms and power looms)** - It is done either on handlooms or power looms. The handloom sector is one of the largest employers in India. The biggest items of production on handlooms as well as power looms in India are sarees. The handlooms weave sarees with all types of designs including complete motifs with the help of dobby and jacquard and also some designs that can be performed better only manually. The traditional silk sarees and dhotis are made on handlooms, whereas the printed sarees, dress materials etc are made on power looms.

**Dupion silk** - Raw silk reeled from double cocoon is known as Dupion silk. It is usually a coarse uneven and rough silk thread. Dupion silk fabric is in great demand in temperate countries, due to their warming character and soft feel. Dupion silk with even and uniform size is used for weaving dupion silk fabrics of plain, twill, matty and satin classes. Such fabric is used as dress materials both for men and women. Small quantity of dupion silk yarn is commonly used for carpets, furnishing cloths, curtains and shawls. Indian dupion, has captivated the western world where it is in great demand as a dress material, furnishing fabric for cushion covers and beautiful jacquard designs and as bed spreads. Dupion is a popular name among the overseas silk importers.



**Spun silk-** About 30-35 percent of silk waste on the weight of raw silk reeled is being produced in the reeling industry. Besides this reeling waste, pierced, inferior, cocoons which are not suitable for economic reeling can be utilized for the production of spun silk yarn which is nothing but pure silk thread of course with less evenness. Spun silk is used for shantung, pile fabrics, dress trimmings and linings, elastic webbings, sewing silk, summer wear silks, velvets, umbrella fabrics and insulation. This waste is converted into a fine spun silk yarn, in the process; the droppings are collected and spun into noil yarn. The noils can be spun from coarse counts ranging from 2's to fine counts such as 20's depending on the quality of droppings. Indian noils are consumed in large quantities in Kashmir for carpet manufacture.

**Silk dyeing and printing-** Dyeing is the process of imparting colour to a textile material. The first step in silk dyeing is the "boiling off" or scouring process. This removes the gum that is found in all natural silks. Silk, as it comes from the scouring, is ready for any dye tint or shade. After dyeing, the skeins are again dried, run through another equalizing machine similar to the stretcher, and then rewound into the form in which they are wanted by consumers. The silk is now ready for the weaving. Silk dyeing is an important commercial activity to fetch the good dividends. Printing is described as localized dyeing. Printing produces the colorful effect on the fabrics. Printing can be done by hand or by machine. Block printing and screen printing are the examples of hand printing and Direct roller, discharge, resist and pigment printing are the examples of machine printing. Painting can also be used to decorate fabrics but these need special care, creativity, skill and treatment. Printing process involves preparation of printing paste, printing, fixation of prints, washing and finishing. Printing is one of the best enterprises especially for women.

**Finishing** - Both dyed and printed silk fabrics have to undergo treatments, known as finishing treatments. The conventional finishing treatment is calendaring, weighting, scrooping, starch and glue finish. It is to impart or improve certain desirable qualities like drape, fall, handle, feel, stiffness, weight etc. This enhances aesthetic value, utility and enables the fabric to fetch a better price in the market. Latest special finishing treatments include anti-crease and flame retardant finishes.

**Knitting-** It is an important activity to produce wide range of clothing articles. Knitted fabrics are constructed by interlocking a series of loops made from one or more yarns. The needle is the basic element of all knitting machines. Silk knit fabrics contribute 5-10% to the total export of silk materials, currently worth Rs.1500 crores from the country.

**Zari manufacturing-** The gold coated sliver thread containing the silk core is called "ZARI". Surat is the main centre for its manufacture by the house-hold zari units. An estimated 85% of the zari produced is used in India and only 15% of the left over zari finds export. Zari is used to enhance and adorn dress materials, purses, scarves, collars and finds use in many decorative articles. Zari textiles and embroidered zari goods like purses, bags etc., are sold mostly in the European markets and the United States of America. There is ample scope for the new entrepreneurs in this industry.

**Sericulture by-products-** In sericulture and silk industry nothing goes as a waste. All the leftovers i.e. by products whether it is litter, pupa, cocoon or silk waste are well utilized in the industry.

**Cocoon and silk-based handicrafts** - Cocoon handicrafts generate additional employment and revenue by utilizing waste



cocoons and silk generated in the production process. Cocoon and silk based handicrafts like flower bouquets, garlands, dolls, greeting cards, wall hangings etc. Handicrafts industry could be developed in the rural and urban areas by having tie ups with various marketing agencies.

**Vanya sericulture** - Vanya sericulture is an exclusive craft of tribal and hill folks inhabiting the Central and North Eastern India. In the recent past, this tribal tradition assumed importance and attracted attention at National level. Steady demand for vanya silk products outside, eco-friendly nature of the production and processing activities and women participation, promoted commercial exploitation of this craft, which resulted in the transformation of this age old tradition to an industry of immense employment potentiality.

**Silk trade** - The estimated world trade in silk is about US \$ 6 billion with India's share of about 6.6 per cent. There is scope for further development in total world trade as well as Indian exports. Exports of Indian silk products have grown during last few years, rising from Rs 1250.55 crores in the year 1998-99 to Rs 2421.98 crores in the year 2011-12.

**Conclusion:** It is obvious that sericulture industry is an excellent avenue for employment with various entrepreneurial opportunities.

#### References

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## URBAN WILDLIFE AND IMPLICATIONS

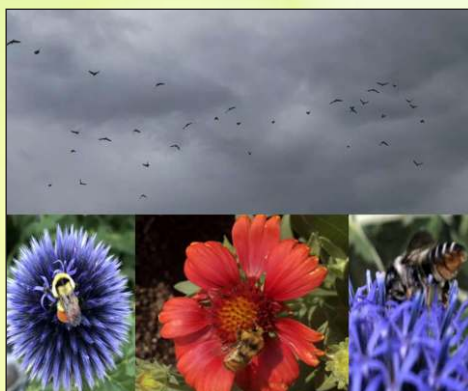
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We often miss out the diversity of wildlife that we can see in the urban landscape. In our mind most of the times animals in the urban jungle mostly means our pet animals such as dogs and cats or birds and ornamental fishes to refer to the most common species that we encounter on our day to day life. Some of us will certainly notice urban birds such as the raptors, pigeons, crows, sparrows, bulbuls, oriental magpie robins or waterfowls and aquatic birds in city wetlands and parks. We may also notice if we

deer and antelopes like black buck and blue bull or gaur, elephants, leopards and other large mammals in India. Another animal that has successfully made urban landscapes their home are different species of monkeys as widely observed in many tropical and subtropical countries of the world. Bats around the world are showing a trend of general decline; however, they used to be a common urban mammal at night across the world.

The point is that if we keep our eyes open and our consciousness and sensitivity focused towards nature and conservation; we



are careful enough animals like the bunnies, jack rabbits, tree and ground squirrels, mice and rats, weasels, hedgehogs, mongoose, civets, snakes, tortoises and turtles, indigenous fish species in local water bodies to mention only a handful.



Depending on which part of the hemisphere we are located in this green planet and depending on developing or under developed nations in which we decide come at a local biodiversity also impacts the presence of more spectacular wildlife in Brazil than Canada.

While one is fortunate to encounter wildlife such as grizzlies, black bears, elk and moose, deer etc in Canada within the city limits depending upon the season; while someone in India may even encounter an occasional

would notice there is still a wide diversity of wildlife even with in the urban landscape across the planet irrespective of developed or developing or under developed nations. What are the implications of observing wildlife within our city limits whether it is a vertebrate like a mammal or a reptile or an amphibian or bird or fishes or invertebrates like arthropods and molluscs; they are important stakeholders of our immediate natural environment. Therefore it is important for us to work towards a common platform to protect and conserve these unique animals that share the space of our urban landscape. While we work towards the growth and expansion of our metros, cities, townships and municipalities; we should not only cater to the citizens of the country but also have provisions within the framework of city development to protect and conserve local wildlife. It is important to plan for developing open spaces within the city to serve as an oasis or island of biodiversity in the form of artificial forests, waterbodies, parks and gardens. Such artificial habitats even within an extremely busy city can serve as refuge and sanctuary for urban wildlife.



## Dr. S.Z. QASIM ORATION - CLIMATE CHANGE AND ITS EFFECT ON HUMAN HEALTH

A guest lecture on Climate Change and its effect on Human Health was organized at Bioactive Natural Products Laboratory (BNPL), School of Pharmaceutical Education and Research, Jamia Hamdard, New Delhi (NIRF Rank 1, Pharmacy Institute of India) which was Dr. S.Z. Qasim oration delivered by Dr. (Mrs.) Malti Goel, Fellow, NESA and Former Scientist 'G' & Head STAC the students and faculty members. The lecture was organised by National Environmental Science Academy (NESA) and Jamia Hamdard, New Delhi on 4th July 2019, Thursday at 10:00 AM in Auditorium, SPER, Jamia Hamdard, New Delhi.

The speakers were:



**Prof. Javed Ahmad**, President, NESA, New Delhi who addressed the audience about the programme and also briefed about the academy telling the effect of fluctuations in temperature and other environmental factors on change of climate which is further responsible for

producing adverse effects on human health by illustrating various examples such as Cyclone Fani in Orissa, Floods in Mumbai and many more.

**Prof. Arif Ali**, Former Head, Department of Biotechnology, Jamia Millia Islamia, New Delhi gave an orientation about an eminent personality i.e. Dr. Syed Zahoor Qasim, an Indian Marine Scientist, he mentioned that he had pioneering contributions in the domain of Marine science and Antarctica Research. He also specified that his accomplishments transcend beyond quest for individual achievements to realise larger nationalist objectives considering minorities more a liability than an asset to the nation.



**Dr. (Mrs.) Malti Goel**, Former Advisor and Scientist "G", Department of Science and Technology, Government of India gave an Oration lecture of Dr. S.Z. Qasim on the topic, Climate Change and its effect on Human Health elaborating various causes and factors responsible for



Climate change, the effects on human health, various preventive measures to minimise the hazardous effects on human health.

It is an honor for me to deliver the first Dr. Qasim ORATION lecture. Dr. Qasim

as a visionary scientist he inspired many and it is a privilege for me to talk on the topic of Climate Change and its Effect on Human Health.

Dr. Qasim has made very many contributions on the national scene. A Marine Biologist turned into Oceanographer he led the first expedition to Antarctica in 1981. Antarctica is highest, coldest and windiest of seven continents. Lot of new knowledge was generated from the expedition based on the data monitored. It displayed strengths of India in global scientific community and his contribution has been recorded in Polar Science in 2018.

Rising temperatures due to global warming is giving rise to extreme weather events more frequently, such as; heat waves, floods, tropical cyclones etc. Climate change is having number of impacts from health to agriculture to energy to water resources to biodiversity and coastal areas. The health risks of climate change arise from the interactions of three factors:

- i) How climate change will alter the ecosystem that support mosquito populations;
- ii) Who is exposed most to these changing weather patterns; and
- iii) The underlying vulnerability of the exposed populations

### The risks arise due to

**(I) Degrading Air quality** - Air quality affects health as fine particulate matter change in response to climate change. Increased burden of PM<sub>2.5</sub> is associated with respiratory diseases, cardiovascular disease, as well as ischemic heart disease. Increasing level of Ozone causes direct, reversible lung injury and is associated with acute myocardial infarction.



Woodlands and wetlands can both serve as important breeding, nesting and foraging sites for urban wildlife. Often it is important to develop perimeter forest areas outside city limits to restrain big wildlife from entering busy roads and highways to avoid security and accident issues. It is also

necessary to develop special wildlife rescue centers, wildlife rehabilitation centres as well as many zoos or revamp videos for urban wildlife within the city limits. Can you stream wildlife that has ventured into the city or has made with an unfortunate accident or if someone would have found a wildlife at someplace

within the city limits can bring them to the centres for safe handling, veterinary treatment, scientific research and/or safe release or relocation of specific species at ideal sites to reduce human-animal conflicts and help conserve wildlife populations.

With little care and some funding every level through government and the government sources as well as generous donations from the public could easily help building funds for conservation of urban wildlife. It clean and a green city is not only important for our long-term health and prosperity, it is also necessary for helping to protect our natural ecosystems that environment. A green city but managed urban wildlife populations and quality natural vegetation will not only help in the curbing pollution; but will also help in the city beautification and long-term conservation by attracting beneficial insects such as pollinator insects into the city environment.



- (ii) Frequent Heat wave- Heat waves cause cramps and muscular pains or spasms. Body fluids lost through heavy sweating result in Heat exhaustion. Heat stroke incidences increase with increasing temperature and can be life threatening to vulnerable population. Indirect impacts of heat waves are on ecosystem, water, food, disease-carrying vectors, lifestyle, community resilience and result in job losses. According to the UN study it could cost 80 million jobs in 2030.
- (iii) Vector borne diseases – New Vector born diseases cause by plasmodium and new virus are emerging due to climate change.
- (iv) Food and water borne diseases–Food and water borne diseases are caused by effect of increasing frequency of drought impacts crop yield and results in increase in crop pests such as aphids, locusts, and whiteflies, as well as the spread of the mould *Aspergillus flavus*. More virulent strains of existing pathogens occur with emergence of new pathogens due to ocean acidification caused by increased CO2. Seafood borne diseases are associated with *Vibrio* infection, *V. vulnificus* & *V. parahaemolyticus*. Frequent droughts and floods compromise food security and can cause Malnutrition.
- (v) Mental healthproblems- Weather and climate have psychological effects on human body. Extreme events and violent weather causes Stress and Anxiety, Depression and Distress, Post traumatic stress disorders especially among the aged.

Scientific assessment of future rate of health impacts at a place can be computed using the formula.

Future rate of health impacts =Baseline health status x Expected changes in exposure x Response function of population.

Climate Change induced health concerns require more efforts to address many different persistent and emerging health issues. The indicators at the intersection between the environment and health should be identified for corrective action.

Lastly she concluded by focussing on the sustainable use of natural resources without compromising the needs of future generation.

The session was concluded by **Dr. Sayeed Ahmad**, Associate Professor, and Incharge: Bioactive Natural Products Laboratory (BNPL), School of Pharmaceutical Education and Research, Jamia Hamdard, New Delhi by extending a Vote of Thanks and honouring the distinguished speakers with a token of appreciation.



## Glimpses of Dr. S.Z. QASIM ORATION 2019





## KNOWING ABOUT THE ENVIRONMENT FROM THE GURU GRANTH SAHIB

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### INTRODUCTION

*“Knowledge is not gained through one means alone.  
Whether that is talked of as Science or Religion”*

(From the poem “Years of Pilgrimage” by Tim Cloudsley)

One of the oldest sciences on this planet is the “study of the organisms and their surroundings”. This was an essential requirement for man who had to “look for food and other needs as well as to protect them for the future generations”. This science was referred to as “Natural History” because it was meant to help mankind to know about “Mother Nature”. In the nineteenth century, the term “Ecology” was introduced by the German scientist Ernst Haeckel (1866). This was defined as “the comprehensive science of the relationships of the organism to the environment”. About a hundred years later, the biologist Ricklefs (1973) suggested that the term ecology should be redefined as “the study of the natural environment, particularly the interrelationships between organisms and their surroundings”. This has led to the need to understand the environment for the betterment of mankind.

On the other hand, when we examine the ancient religious texts, we come across a vast amount of information about different aspects of “Mother Nature”. For example, Guru Nanak Dev Ji's Shabad in the Guru Granth Sahib (Ang 877) reminds us as follows:

*“Maran Jeevan Kau Dhartee Deenee ete Gunn Visaree”*

This is translated as follows:

(Along with numerous other gifts) The Divine gave us the Earth to live on and to die, but all these are forgotten.

The important “ocean of knowledge” (in the ancient texts) has served as a very useful guide for various aspects of everyday needs and the relationships between man and his surroundings. Thus, there is knowledge about natural phenomena, plants, birds and animals, and the importance of proper balance for ensuring continued availability of the “bounties of Mother Nature” for future generations.

Through the centuries, mankind has taken everything needed for sustenance from the earth, and man lived in harmony with his surroundings. However “modern man” started modifying the environment for his “progress”. This resulted in the destruction of nature in different ways. We have cut forests, degraded land, polluted the waters, and fouled the atmosphere in many ways. This has led to drought, floods, depletion of ozone layer, global warming, climate change, etc. An important consequence of this has been an awakening which tells us that “we must remember that we don't own the natural resources that we use, but have merely borrowed them from our children”. Realizing the significance of this meaningful statement, the “Nobel Peace Prize Committee” in 2004, decided that

*“Peace on Earth depends on our ability to secure our living environment”.*

Therefore, the 2004 Nobel Peace Prize was awarded to Ms Wangari Maathai who established the “Green Belt Movement” in Kenya. This organization has overseen the planting of tens of millions of trees across Africa. It has resulted in making “sustainable development a very important international concern”.

Thus, understanding the environment becomes crucial for our survival. Some important aspects of this can be easily recognized by referring to the Guru Granth Sahib, and this has been presented in the

paragraphs below.

The very first aspect of understanding the environment has been beautifully explained in the following Sloak: (Guru Granth Sahib - SGGs, Ang. 8)

*“Pawan Guru Paani Pita Mata Dharat Mahat  
Divas Raat doe dayi daya khele sagal jagat.”*

“Air is the Guru, Water is the Father, and Earth is the Great Mother of all.

Day and night are the two nurses,  
in Whose lap all the world is at play.”

This Sloak at the end of the 'Jap Ji' (the daily morning prayer), compares the air with the teacher (Guru), water with the father (Pita), earth with the mother (Mata); day and night as the attendants, allowing the whole world to play. This explains the need to maintain a balance. Environmentalists stress the importance of maintaining equilibrium in nature so that there is sustainable development. This passage from Guru Nanak Dev Ji's 'Jap Ji' emphasizes the importance of this equilibrium. Thus, when we respect the air, water, earth, and the day and night schedule we can understand the significance of the natural balance.

The importance of understanding natural phenomena is also brought out in very simple terms in the following Shabad:

Raag Aasaa Mehalaa 1 || (SGGS 12)  
Sooraj Eaeke Ruth Anaek ||  
Naanak Karathae Kae Kaethae Vaes ||2||2||

And the various seasons originate from the one sun;  
O Nanak, in just the same way, the many forms originate from the Creator. ||2||2||

The above examples provide a strong foundation for initiating the “learning process” to explore the Guru Granth Sahib and obtaining meaningful insights about different aspects of the environment.

The earth was referred to as “a green planet” because of the presence of various kinds of plants. However, the concept was changed to emphasize the importance of water in sustaining plant life, and we now refer to our earth as the “blue planet”. This aspect of science has also been presented in Gurbani (SGGS 472) as follows:

*“Pehla pani geo hai jit harya sab koi”  
“First, there is life in the water,  
by which everything else is made green.”*

In the daily Kirtan - 'Asa di Var', Guru Nanak Dev Ji enlightens us with the fact that 'water is the first form of life, and the green earth is a result of the presence of water on this planet'.

It is also significant to mention that importance of water was recognized when Guru Ramdas Ji founded the town named after Him as *Ramdaspur* (now called Amritsar) around a large man-made pool called *Ramdas Sarovar*. Guru Arjan Dev Ji continued with the development of Amritsar and added many infrastructure projects such as water reservoirs called Santokhsar (lake of peace) and Gangsar (lake of Ganga). Interestingly, this recognizes a very significant aspect of the environment. There are 3 ancient trees of the Ber (*Zizyphus jujuba/Zizyphus mauritiana* - The Indian Jujube/Indian Date) growing in the parikarma of the Darbar Sahib (The Golden Temple). This species of plants is known to grow in semi-arid/arid regions, and Guru Sahib understood the need to have a source of “life-giving water” for establishing the new town. Fortunately, these trees have continued to grow and are now more than 400 years old. For the past few years, there was a decline in the growth of these ancient (heritage) trees, probably due to concretization of the area where they grew. However, recent efforts of the *Shromani Gurudwara Prabandhak Committee* (SGPC) and the scientific expertise provided



by the Panjab Agriculture University (Ludhiana) have led to a major revival of the trees. The marble floor slabs around the base of the ancient trees were removed and the soil was replenished. This has led to the aeration of the roots and proper uptake of water along with essential mineral nutrients. Thus, the ancient trees have started bearing large quantities of fruit.

Besides water, it is also significant to know about the plant and animal life on the planet for a proper understanding of our planet. Thus, there are three basic aspects of Mother Nature which play a very significant role in understanding the importance of the environment. These are (1) plants; (2) animals; and (3) the surroundings in which these organisms live. Each of these must be examined carefully for a proper evaluation of the environment.

## PLANTS

Plants are a very important component of our planet. They help all organisms to breathe because green plants release “life-giving oxygen” when they perform photosynthesis. This process provides not only food but many other useful items for use by man and other organisms. Besides this significant feature, plants serve in many other capacities. For example trees provide valuable shade for all kinds of organisms. The roots of the plants bind the soil particles and help in retaining water in the soil. They thus become significant for understanding the environment.

There is a very beautiful composition by Guru Arjan Dev Ji describing “the garden created by The Almighty”:

*Aasaa Mehalaa 5 || (SGGS 385)*

*Eaek Bageecha Paedd Ghan Kariaa ||  
Anmrith Naam Thehaa Mehi Faliaa ||1||  
Aisaa Karahu Beechaar Giaanee ||  
Jaa Thae Paaeeai Padh Nirabaanee ||*

*Aas Paas Bikhoosaa Kae Kunttaa Beech Anmrith Hai Bhaae Rae  
||1|| Rehaao*

*||Sinchanehaarae Eaekai Maalee ||  
Khabar Karath Hai Paath Path Ddaalee ||2||  
Sagal Banasapath Aan Jarraae ||  
Sagalee Foolee Nifal N Kaaee ||3||*

*Anmrith Fal Naam Jin Gur Thae Paaeiaa ||  
Nanak Dhaas Tharee Thin Maaeiaa ||4||5||56||*

There is a garden, in which so many plants have grown. They bear the Ambrosial Nectar of the Naam as their fruit. ||1|| Consider this, O wise one, By which you may attain the state of Nirvaanaa. All around this garden are pools of poison, but within it is the Ambrosial Nectar, O Siblings of Destiny. ||1|| |Pause| There is only one gardener who tends it. He takes care of every leaf and branch. ||2|| He brings all sorts of plants and plants them there. They all bear fruit - none is without fruit. ||3|| One who receives the Ambrosial Fruit of the Naam from the Guru - O Nanak, such a servant crosses over the ocean of Maya. ||4||5||56||

Besides this spiritual awareness about The Creator and His diverse creations, there are numerous compositions on specific plants on this planet. Only a few of these can be included here.

1. “Simal rukh saraya ath deeragh ath muuch. Oye jo aawe aas kar jaye nirasaa kith. Phal phike buckbucke kam na aawe pat. Mitath neevi Nanaka, goond changia thaat” (SGGS 470)

“The simmal tree is straight as an arrow;  
it is very tall and very thick.

But those birds which visit it hopefully, depart disappointed.

Its fruits are tasteless, its flowers are nauseating,  
and its leaves are useless.

Sweetness and humility,  
O Nanak, are the essence of virtue and goodness.”

Guru Nanak Dev Ji has again referred to the “silk cotton tree” in another Shabad as follows:

2. *Soohee M. 1 Ghar 6 (SGGS 729)*

*Sinmal Rukh Sareer Mai Maijan Dhaekh Bhulannih ||  
Sae Fal Kanm N Aavanhee  
Thae Gun Mai Than Hannih ||4||*

My body is like the simmal tree;  
seeing me, other people are fooled.

Its fruits are useless-just like the qualities of my body. ||4||

3. *Bhagat Ravidas Ji, (SGGS 486)*

*Thum Chandhan Ham Eirandd  
Baapurae Sang Thumaarae Baasaa ||  
Neech Rookh Thae Ooch Bheae  
Hai Gandhh Sugandhh Nivaasaa ||1||*

You are sandalwood, and I am the poor castor oil plant, dwelling close to you. From a lowly tree, I have become exalted; Your fragrance, Your exquisite fragrance now permeates me. ||1||

4. *Guru Arjan Dev Ji, (SGGS 1360)*

*Mailaagar Sangaen Ninm Birakh S Chandhaneh ||  
Nikatt Basantho Baanso Naanak  
Ahan Budhh N Bohathae ||5||*

The lowly nim tree, growing near the sandalwood tree, becomes just like the sandalwood tree. But the bamboo tree, also growing near it, does not pick up its fragrance; it is too tall and proud. ||5||

5. *Bhagat Kabir Ji, (SGGS 1365)*

*Kabeer Chandhan Kaa Biravaa  
Bhalaa Baerrihou Dtaak Palaas ||  
Oue Bhee Chandhan Hoe Rehae Basae  
J Chandhan Paas ||11||*

Kabeer Baans Baddaaee Booddiaa Eio Math Ddoobahu Koe ||  
Chandhan Kai Nikattae Basai Baans Sugandhh N Hoe ||12||  
Kabeer, the sandalwood tree is good, even though it is surrounded by weeds. Those who dwell near the sandalwood tree, become just like the sandalwood tree. ||11||. Kabeer, the bamboo is drowned in its egotistical pride. No one should drown like this. Bamboo also dwells near the sandalwood tree, but it does not take up its fragrance. ||12||.

6. *Bilaval M. 4 (SGGS 834)*

*Bhaar Athaareh Mehi Chandhan Ootham Chandhan Nikatt Sabh  
Chandhan Hueeaa ||*

Of all plants, the sandalwood tree is the most sublime.  
Everything near the sandalwood tree becomes fragrant like sandalwood.

7. *Gourree Kee Vaar M. 5; Salok M. 5 || (SGGS 319)*

*Khakharreeaa Suhaaveeaa Lagarreeaa Ak Kanth ||  
Bireh Vishhorraa Dhhanee Sio Nanak Sehasai Ganth ||1||*

The fruit of the swallow-wort plant looks beautiful, attached to the branch of the tree; But when it is separated from the stem of its Master, O Nanak, it breaks apart into thousands of fragments. ||1||

The above Shabads (compositions) indicate that there are descriptions/references to different kinds of plants in Gurbani. Thus there are references to the “madder plant or swallow-wort (Calotropis procera), the sandalwood (Santalum album), the castor seed plant (Ricinus communis), the bamboo (Bambusa and many others), the margosa (Neem) tree (Azadiractha indica), the silk cotton (Simmal) tree (Salmalia malabarica), and others. The Shabads also correlate the plants with everyday life and spiritual understanding. This results in the need to seek guidance from the scripture for knowing different aspects of the environment.

Besides the references from Gurbani, the following quotations are mentioned to substantiate the correlation of man with nature.



Knowing trees, I understand the meaning of patience. Knowing grass, I can appreciate persistence. -Hal Borland, an American author, journalist and naturalist (1900–1978).

Someone is sitting in the shade today because someone planted a tree a long time ago. - Warren Buffett

This leads us to the fact that plants are important in our daily lives, and it is necessary that we ensure that they continue to grow to balance the environment.

## ANIMALS

Having learnt about different kinds of plants, it becomes necessary to understand the other organisms living on the planet. There are simple microscopic organisms as well as large easily visible animals. They live in harmony with the plants and together interact with the other components of the environment.

In addition to the different plants, there are numerous references to the diverse kinds of animals and birds in the Guru Granth Sahib. A very interesting compilation is presented by Guru Arjan Dev Ji in the following Shabad (SGGS 176). This also takes us through the process of biological evolution.

*Gourree Guaaraeree Mehalaa 5 ||*

*Kee Janam Bheae Keett Pathangaa||  
Kee Janam Gaj Meen Kurangaa||  
Kee Janam Pankhee Sarap Hoeiou||  
Kee Janam Haiver Brikh Joeiou||  
Mil Jagadhees Milan Kee Bareeaa||  
Chirankal Eih Dhaeh Sanjareeaa||*

.....

*Lakh Chouraaseeh Jon Bhramaeeiaa||*

In so many incarnations, you were a worm and an insect.  
In so many incarnations, you were an elephant,  
a fish, and a deer.

In so many incarnations, you were a bird and a snake.

In so many incarnations,  
you were yoked as an ox and a horse

Meet the Lord of the Universe –  
now is the time to meet Him

After so long, this human body was fashioned for you.

.....

You wandered through 8.4 million incarnations

Several other compositions also refer to different birds and animals. Some of these are provided below.

1. *Gourree Kee Vaar M. 5; Salok Ma 5 || (SGGS 319)*  
*Chirree Chuhakee Pahu Futtee Vagan Bahuth Tharang ||*  
*Acharaj Roop Santhan Rachae Naanak Naamehi Rang ||1||*

The sparrows are chirping, and dawn has come;  
the wind stirs up the waves.

Such a wondrous thing the Saints have fashioned,  
O Nanak, in the Love of the Naam. ||1||

2. *Raag Asa, Bhagat Ravidas Ji. (SGGS 486)*  
*Mrig Meen Bhiring Pathang Kunchar Eaek Dhokh Binaas ||*  
*Panch Dhokh Asaadhh Jaa Mehi Thaa Kee Kaethak Aas ||1||*

The deer, the fish, the bumble bee, the moth and the elephant  
are destroyed, each for a single defect.

So the one who is filled with the five incurable vices - what  
hope is there for him? ||1||

3. *Malaar Mehalaa 4 Parrathaal Ghar 3 (SGGS 1265)*  
*Chaathrik Mor Bolath Dhin Raathee*  
*Sun Ghanihar Kee Ghor ||2||*

*Jo Bolath Hai Mrig Meen Pankhaeroo*  
*S Bin Har Jaapath Hai Nehee Hor ||3||*

The rain birds and the peacocks sing day and night, hearing the  
thunder n the clouds.

Whatever the deer, the fish and the birds sing they chant to the Lord,  
and no other.

4. *Raag Bilaaval Mehalaa 1 Choupadhae Ghar 1 || (SGGS 795)*  
*Eaethae Kookar Ho Baegaanaa Bhoukaa Eis Than Thaaee ||*  
*Bhagath Heen Naanak Jae Hoeigaa Thaa Khasamai Naao N Jaaee*  
*||4||1||*

Among so many dogs, I am an outcast;  
I bark for my body's belly.

Without devotional worship, O Nanak, even so, still,  
my Master's Name does not leave me. ||4||1||

5. *Goojaree Mehalaa 5 || (SGGS 496)*

*Bhavar Thumhaaraa Eihu Man Hovo*  
*Har Charanaa Hohu Koulaa ||*

*Naanak Dhaas Oun Sang Lapattaaeiou Jio Boondhehi Chaathrik*  
*Moulaa ||4||3||4||*

Let this mind of yours be the bumble bee,  
and let the Lord's feet be the lotus flower.

Says servant Nanak, attach your mind to them, and blossom  
forth like the song-bird, upon finding the rain-drop. ||4||3||4||

The compositions referred to above mention the bumble bees, the song-bird, the dogs, the rain bird, the peacock, the fish, deer, moths, elephant, and sparrows. All these play an important role in Nature and each species has been related to man's need to understand spirituality. When we extrapolate the knowledge, we can appreciate the significance of this understanding of the environment.

## THE SURROUNDINGS

As indicated in the introduction, all three aspects of Nature must be understood for knowing the importance of the environment. Therefore, after knowing about different kinds of plants and animals, it becomes necessary to appreciate the significance of the surroundings of the organisms.

One very significant aspect of life on this planet is the presence of water. This life-giving Blessing has been referred to in numerous Shabads in the Guru Granth Sahib. There is an urgent need to understand the fact that this valuable resource has to be used very judiciously. Guru Ramdas Ji has indicated the importance of water in the following words:

*Gourree Bairaagan Mehalaa 4 || (SGGS 167)*  
*Sabh Jeeo Pindd Mukh Nak Dheeeaa Varathan Ko Paanee ||*

He (The Almighty) gave all beings souls, bodies, mouths, noses  
and water to drink (use).

Another important facet of the environment is the soil which provides the habitat for growth and nutrition of the plants. Many references to “mother earth” tell us about the significance of this component of our planet. It is important to remember that the roots of the plants help in binding the soil particles.

Many kinds of soils are found in different parts of the world. Each type of soil has distinct properties and allows some kinds of plants to grow easily. However, when the soil contains excessive quantities of salts, it becomes unproductive or barren. There were large areas of such soils called “usar” where agriculture or farming was not economical. This aspect finds mention in the following Shabad:

Guru Nanak Sahib, Asa M. 1, (SGGS 419)



*Kallar Khaethee Beejeeai Kio Laahaa Paavai.*  
If one sows in the salt barren soil,  
how can one earn a profit?

The following Shabads provide us with some aspects of the surroundings in which the organisms dwell.

Aasaa Mehalaa 1 || (SGGS 350)  
*Poun Oupaae Dhharee Sabh Dhharathee Jal Aganee Kaa Bandhh Keeaa* ||

He created the air, and He supports the whole world;  
he bound water and fire together.

*Raamakalee Mehalaa 1 Asattapadheea (SGGS 902)*

*Soee Chandh Charrehi Sae*  
*Thaarae Soee Dhineear Thapath Rehai* ||  
*Saa Dhharathee So Poun Jhulaarae*  
*Jug Jeeaa Khaelae Thhaav Kaisae* ||1||

The same moon rises, and the same stars; the same sun shines in the sky. The earth is the same, and the same wind blows. The age in which we dwell affects living beings, but not these places. ||1||

Maaroo Solehae Mehalaa 5 || (SGGS 1078)  
Simarai Dhharathee Ar Aakaasaa  
||Simarehi Chandh Sooraj Gunathaasaa ||  
Poun Paanee Baisanthar Simarehi  
Simarai Sagal Oupaarajanaa ||1||  
Simarehi Khandd Dheep Sabh Loaa ||  
Simarehi Paathaal Pureeaa Sach Soaa ||  
Simarehi Khaanee Simarehi  
Baanee Simarehi Sagalae Har Janaa ||2||  
Simarehi Brehamae Bisan Mehaesaa ||  
Simarehi Dhaevathae Korr Thaetheesaa ||  
Simarehi Jakhyy Dhait Sabh  
Simarehi Aganath N Jaee Jas Ganaa ||3||  
Simarehi Pas Pankhee Sabh Bhoothaa||

The earth and the Aakaasaa ethers meditate in remembrance.

The moon and the sun meditate in remembrance on You,  
O treasure of virtue.

Air, water, and fire meditate in remembrance.

All creation meditates in remembrance.

All the continents, islands and  
worlds meditate in remembrance.

The nether worlds and spheres meditate  
in remembrance on that True Lord.

The sources of creation and speech meditate in remembrance; all  
the Lord's humble

servants meditate in remembrance.

Brahma, Vishnu and Shiva meditate in remembrance.

The three hundred and thirty million  
gods meditate in remembrance.

The titans and demons all meditate in remembrance;

Your Praises are uncountable – they cannot be counted,

All the beasts, birds and demons meditate in remembrance.

*Sorath Mehalaa 5 Ghar 2 Dhupadhae (SGGS 617)*  
*Sagal Banasapath Mehi Baisanthar*  
*Sagal Dhoodhh Mehi Gheea* ||  
*Ooch Neech Mehi Joth Samaanee*  
*Ghatt Ghatt Maadhho Jeeaa* ||1||

Fire is contained in all firewood,  
and butter is contained in all milk.

God's Light is contained in the high and the low;  
the Lord is in the heart of all beings.

Bhagat Kabir Ji refers to the plants, the bumble bee, the earth, the sky and water in the following Shabad, indicating the significance of all the components of the environment.

Raamkali Baneer Bhagat Kabir Ji, (SGGS 970)

Tharavar Eeek Ananth Ddaar  
Saakhaa Puhap Pathr Ras Bhareeaa ||  
Eih Anmrith Kee Baarree Hai  
Rae Thin Har Poorai Kareeaa ||1||  
Jaanee Jaanee Rae Raajaa Raam Kee Kehaanee ||  
Anthar Joth Raam Paragaasaa Guramukh Biralai Jaanee ||1||  
Rehaao ||Bhavar Eeek Puhap Ras  
Beedhhaa Baareh Lae Our Dhharieaa ||  
Soreh Madhhae Pavan Jhakoriaa Aakaasae Far Fariaa ||2||  
Sehaj Sunn Eik Biravaa Oupajiaa  
Dhharathee Jalehar Sokhiaa ||  
Kehi Kabeer Ho Thaa Kaa Saevak  
Jin Eihu Biravaa Dhaekhiaa ||3||6||

There is a single tree, with countless branches and twigs; its flowers and leaves are filled with its juice. This world is a garden of Ambrosial Nectar. The Perfect Lord created it. ||1|| I have come to know the story of my Sovereign Lord. How rare is that Gurmukh who knows, and whose inner being is illumined by the Lord's Light. ||1|| Pause || The bumble bee, addicted to the nectar of the twelve-petalled flowers, enshrines it in the heart. He holds his breath suspended in the sixteen-petalled sky of the Akaashic Ethers, and beats his wings in ecstasy. ||2|| In the profound void of intuitive Samaadhi, the one tree rises up; it soaks up the water of desire from the ground. Says Kabeer, I am the servant of those who have seen this celestial tree. ||3||6||

#### CONCLUSION

A relatively recent and important development has been the need to spread awareness about the environment and the significant role of the religious institutions in this direction. An International Organization called **EcoSikh** ([www.ecosikh.org](http://www.ecosikh.org)) having an office in Ludhiana (268-B, Bhai Randhir Singh Nagar, Ludhiana – 141012, Punjab) has been celebrating March 14th as “Sikh Environment Day”. This date has been recognized as important in Sikh History as the “Gurgaddi Diwas of Guru Har Rai Ji. The Seventh Nanak (Guru Har Rai Ji) is recognized for his deep sensitivity to nature and its preservation. Several programmes are being organized for spreading awareness about nature conservation, planting trees, organic farming (especially for growing food plants for use in “Guru-ka-Langar”), and other facets of the environment. It involves the community at large and reaches out to all sections of society. The dedicated community of EcoSikh volunteers also initiated a “Millet Mission” on the occasion of Baisakhi of the year 2018, by introducing these important grains in preparing the “Prasad”. Thus “Raagi or Pearl millet” ladoos, and “Kangni or Fox millet” khichdi was provided at various Gurudwaras in Panjab along with lassi.

The significance of having a stable environment for future generations has led to the idea of planting 550 million trees around the world to commemorate the 550th Gurburab of Guru Nanak Dev Ji's agman in 2019. Thus several “Guru Nanak Sacred Forests” are being promoted in different parts of the world. This wonderful concept initiated by EcoSikh must be pursued with devotion.

In conclusion, it becomes important to mention that our sacred scripture – the Guru Granth Sahib - provides us with numerous compositions about the different components of the environment. These Shabads help us to understand “mother nature” and offer our gratitude to “The Almighty Creator” as indicated in the composition of Bhagat Kabir Ji narrated above.

Finally, when we realize the significance of Gurbani, we learn to appreciate the importance of the Sloak at the end of the morning prayer, Guru Nanak Dev Ji's Japji Sahib. This should serve as an important “wake up” call for saving the environment for future generations.

*Salok* ||

*Pavan Guroo Paanee Pithaa Maathaa Dhharath Mehath* ||



*Dhivas Raath Dhue Dhaae Dhaaeiaa Khaelai Sagal Jagath ||*

Air is the Guru, Water is the Father, and Earth is the Great Mother of all. Day and night are the two nurses, in whose lap all the world is at play.

Thus, through different compositions, Gurbani provides us with the need to maintain equilibrium in the environment.

**A Success Story of river cleaning for a Better Environment**

The “Kali Bein”, a 160 km long rivulet in Hoshiarpur District of Panjab is a tributary of the River Beas. It is closely linked with the life of Guru Nanak Dev Ji, the founder of the Sikh religion, and is therefore held sacred. Due to many years of indifference and neglect, it became a narrow polluted drain on the verge of death. This led to non availability of water for many villages along its course. In the year 2000, an effort to restore the “sacred river” to its pristine glory was initiated. This was led by Baba Balbir Singh Seechwal, and was purely voluntary. It serves as a good example of *sewa*. The village folk, along with the volunteers of the Baba started removing the large amount of the plant called water hyacinth (*Eichhornia crassipes*) from the river water. This plant forms a dense surface layer preventing exchange of gases, leading to depletion of oxygen in the water. As a result, aquatic life gets affected. At the same time, large amounts of dead material gets deposited on the river bed, clogging the natural springs which release fresh

water. Therefore, after removing the floating plants, the volunteers excavated the silt from the river bed. This led to a revival of the natural springs resulting in the normal flow into the river. The banks of the river were also cleared of all waste, and proper embankments were constructed. This was followed by the plantation of a variety of tree species (including fruit trees) which helped in beautifying the surroundings. Donations provided by volunteers enabled the purchase of equipment for treatment of industrial waste and sewage. A low cost “underground sewage system model, called the *Seechwal Model*” was developed. The treated water was used for agricultural and irrigational purposes. In about 6 years, the entire length of the “almost dead” river was fully revived and restored to its pristine glory.

This effort was recognized nationally and internationally. Our former President, Dr. APJ Abdul Kalam would refer to this excellent voluntary work and praise the efforts in his speeches. The TIME Magazine, New York, (24 September 2008) referred to Balbir Singh Seechwal as the “Eco Baba” and honoured him as the “Hero of Environment”. He became not only the only Indian but also the only Asian to get this distinction.

Baba Balbir Singh Seechwal has now been approached by the present Government of India’s “Ministry for Water Resources, River Development and Ganga Rejuvenation” to help in cleaning the Ganga.

**NESA IN NEWS**

**Welcome of Newly Appointed Vice Chancellor of Jamia Millia Islamia, New Delhi**

President NESA welcomed the newly appointed Vice Chancellor Professor Najma Akhtar, Jamia Millia Islamia, New Delhi and briefed her about the ongoing activities of the Academy.



**AS CHIEF GUEST AT THE AL FALAH UNIVERSITY FUNCTION**

Prof. Javed Ahmad, President NESA was invited as the Chief Guest at the Al Falah University, Dhauj, Faridabad, Haryana. Prof. Javed distributed awards to awardees and also shared his thoughts for betterment of the students for their future endeavours.





From the Editor's

Dear Readers,

It is indeed a great honour and immense pleasure to be the Newsletter Editor for the National Environmental Science Academy, New Delhi.

In this issue, we recount the various projects and activities, awards in which Academy members were actively involved or to be organised by the Academy. Furthermore, NESA is well known for the hard work, dedication and motive for its environmental awareness activities.

As we all know that the Newsletter mirrors a vision and mission of environmental society. The purpose of the newsletter is to disseminate in a convenient form news about the activities and developments, achievements of the members, events organized and attended, competitions participated and won, current technological developments, and above all, to provide a platform to other members, research scholars and academicians to dig out and expose their hidden literary talents and creativity with the sole aim of encouraging diversity in authors, articles - technical & philosophical in nature with moral messages and any other material of academic importance. We hope that it encourages many more to use as a platform and express their creations

A huge thank you to all the persons who contributed writing the wonderful and inspiring articles, without which there wouldn't have been this newsletter issue.

Last but not least, I would like to thank President and General Secretary, NESA, New Delhi, and the Editorial team including Print, Designer and Publication committee for their everlasting support and efforts throughout the creation of this edition.

Hope this edition makes an interesting read. Please feel free to offer any suggestions for improvement.

Dr. R.S. Tomar  
Editor-in-Chief

Dr. Sushma Tiwari  
Associate Editor

## WELCOME OF NEW MEMBERS IN THE ACADEMY

- 2066 Dr. Ravikiran Ningappa Kulloli**  
Acharya Jagdish Chandra Bose  
Post Doctoral Fellow  
Botanical Survey of India  
Arid Zone Regional Circle (AZRC)  
Jodhpur, Rajasthan
- 2067 Mr. Ram Dayal**  
M.Sc. LS, M.Sc. BT, PGDCA & Pursuing Ph.D.  
Sr. Embryologist  
Nitin IVF Centre, Nitin Hospital Patiala, Punjab
- 2068 Dr. Manojit Bhattacharya**  
Project Coordinatior, Vidyasagar University,  
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- 2069 Dr. Balaraman Ekambaram**  
Department of Chemistry, IISER-Tirupati  
Tirupati-517507
- 2070 Dr. Monika Sachdeva**  
Principal, Department of Pharmacy  
R.K.G. Institute of Technology, Ghaziabad, U.P

To,

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