

The National Academy of Sciences, India

5, Lajpatrai Road, Prayagraj-211002, India



Summary of the Activities, held in the month of May 2023

1. The National Academy of Sciences, India (NASI) organized a day-long workshop on “Popularization of Science with special reference to Biodiversity” as part of its Science & Society mission on May 02, 2023 at Gangtok, Sikkim. A large number of students, researchers, faculty members from Sikkim University as well as other (nearby) colleges of Sikkim; and several Senior Scientists, Fellows, Members and officials of the NASI participated in this event. The event commenced with the Welcome Address delivered by Shri B. P. Pradhan, IFS, Secretary, Department of Science & Technology, Government of Sikkim. Several other informative & illustrative lectures focusing on the subjects related to diverse areas of Biodiversity, were delivered by the eminent scientists from all across the country. The Secretary, N-E Chapter of the NASI (Prof. S R Joshi) was instrumental in getting the event organised successfully; Prof. S K Barik, former Vice-President, NASI represented the NASI-HQ there. The programme was designed by Prof. Manju Sharma, Chair, NASI-New Initiatives; and Ms Archana Pant, YWS, NASI coordinated at NASI-HQ, Prayagraj (a brief report is enclosed herewith as **Annex. 1**).
2. Every year, on May 11, National Technology Day is organised across the country to celebrate the various technological developments undertaken by Indian scientists, engineers, and others. On May 11, 1998, India successfully tested nuclear bombs in Pokhran. National Technology Day demonstrates the need for an entrepreneurial spirit that offers a cost-effective solution to India’s development challenges. This year also, the NTD was celebrated in the Academy at Prayagraj on May 11, 2023; and also by its Chapters (please see the copies of the programmes/brochures, enclosed herewith as **Annex. 2 & 3**). A large number of students, teachers, Fellows & Members (total around 350), participated in the whole day programme; Prof. Ashok Misra, Past President, NASI & former Director, IIT Bombay, and Prof. Jayesh R. Bellare, GS (OS), NASI, were the Conveners of this year programme.
3. The Academy organised its Local Chapters Meet (12th in continuation), in which 18 Chapters participated on May 12, 2023. They presented the annual activity reports, which were very encouraging, as about more than 250 programmes were organised by these Chapters in a year, to pursue the mandate of the Academy-‘Science & Society’ (a brief report is enclosed herewith as **Annex. 4**).
4. An Annual Meeting of the Editorial Board of the NASI was also held on May 12, 2023, in which several important policy decisions were taken to enhance the status of the NASI’s journals qualitatively & quantitatively. More than 25 Members participated in the meeting from all across the country, including the representative of the Springer India Pvt. Ltd., New Delhi. Several important decisions were taken.
5. World Biodiversity Day was also celebrated by some of the DNA Clubs earlier established by the NASI. The 93rd Annual Session/Meetings of the NASI (to be held at BARC, Mumbai), was planned, and the second Meeting of the NASI-Council of the year 2023 was also held on May 13, 2023. Several Chapters of the Academy also organised Science-Society Programmes of the NASI; and the publication of the NASI-Journals also achieved their time-lines.



The National Academy of Sciences, India (NASI)

Programme on ‘Popularization of Science with special reference to Biodiversity’, jointly organized by NASI HQ, NE Local Chapter & SSCS & T, Govt. of Sikkim on May 2, 2023

A Report

The National Academy of Sciences, India (NASI) organized a day-long workshop on ‘**Popularization of Science with special reference to Biodiversity**’ as part of its *Science & Society* mission on **May 02, 2023** at Gangtok, Sikkim.

A large number of students, researchers, faculty members from Sikkim University as well as other (nearby) colleges of Sikkim; as well as some Senior Scientists, Fellows, Members and officials of NASI participated in this event. Several lectures focusing on the subjects, related to diverse areas of *Biodiversity* were addressed by the eminent scientists from all across the country.

The event commenced with the *Welcome Address* delivered by **Shri B. P. Pradhan**, IFS, Secretary, Department of Science & Technology, Government of Sikkim. While extending a warm welcome to all the distinguished guests and participants, Shri Pradhan stressed on the need and importance of Biodiversity and its conservation by depicting some statistics on the floral and herbal species of NE region and describing the efficacy of the medicinal plants in curing various ailments.

Prof. Paramjit Khurana, JC Bose National Fellow, Department of Plant Molecular Biology, Delhi University, South Campus gave a *Brief Introduction of Women’s Programme of NASI*, its genesis, execution, the various events organized under this initiative under the Chairmanship of Dr. Manju Sharma, the former President of NASI and the future strategies.

Prof. S R Joshi, Department of Biotechnology & Bioinformatics, NEHU, Shillong; Secretary, N-E Chapter of NASI gave a *Brief Introduction of the NER Local Chapter’s activities* and the endeavours made by the Chapter in taking Science to the people of the NE region. He stressed on the need for popularization of Science and role of NASI in propagating the same in different strata of society.

Prof. S K Barik, Centre for Advanced Studies in Botany, Department of Botany, NEHU, Shillong; Former Director, CSIR-NBRI, Lucknow while delivering the *Inaugural Address*, appreciated NASI’s efforts in disseminating Science to the people of society. Stressing on the relevance of Science, he expressed that doing good Science is crucial and keystone for innovation; and in its more applied forms is a basic component of our economy. This innovation must come from the students and researchers. Innovation should also be applied for sustainable utilization of biodiversity.

Ms Archana Pant, YWS, NASI proposed a **Vote of thanks** to all the distinguished guests, speakers and the students who participated in the programme. She expressed her profound gratitude to Dr. Manju Sharma, Chairperson, NASI New Initiatives for her concerted efforts to develop the programme and also the efforts of the Secretary and the Chairman of NER Local Chapter as well as Dr. B.C. Basistha, Principal Director, DST, SSCS&T, Govt. of Sikkim for coordinating the whole programme. The Session was conducted by Dr. B.C. Basistha.

The Technical Session on ‘**S & T Interventions for Conservation and utilization of Biodiversity**’ was Chaired by **Prof. Avinash Khare**, VC, Sikkim University and Co-Chaired by **Prof Paramjit Khurana**.

Prof. Arun K Pandey, VC, Mansarovar Global University, Bhopal, M.P. spoke on ‘**Himalayan Flowering Plants: Diversity and strategies for conservation and sustainable utilization**’. He explained in detail about India Biodiversity Zone stating that the ecosystem diversity of the country is enormous ranging from sea level to highest mountainous ranges in the world. While portraying the figures pertaining to the total number of plant species (including virus, bacteria, algae, fungi and lichens) and their status in India, he also portrayed the statistics on endemic vascular plants mentioning that Indian Himalayan Region supports nearly 50% of the total flowering plants (so far recorded in India) of which 10% flora is endemic to the region. The region also supports world’s richest alpine flora with maximum endemism. He discussed and mentioned about various

threats to Himalayan diversity including Global Climate, alteration of habitats and land use change, land fragmentation due to road construction and infrastructure, human induced changes such as biomass, harvesting, deforestation, livestock grazing, agriculture expansion into forest land, indiscriminate use of chemicals and fertilizers. He further expressed that Himalaya is the store house of most rare and medicinal and aromatic plants. 280 plants are being used by pharmaceutical sector out of which 175 are from Himalaya region. India exports herbal medicines to foreign countries to the tune of 3000 crores. Acontium having 26 species and two varieties is confined to Himalayan region only. He also described about Indian 'Sausserrea' and related genera concluding that understanding biodiversity is essential for a better and more realistic appreciation of our planet.

Prof. Utpal Bora, IIT, Guwahati spoke on '**Insect Biodiversity**'. Underlining the concept, Prof. Bora elucidated that the insects are most abundant animals on our planet. Further, the number of named insect species is 1,013,825 and over 50% of the described eucaryotes are insects. Insects are the most significant link between plants and other animals in the food webs. The loss of insect life from the food chain has direct consequences for the human food supply. Insects are useful for us in various ways viz. in cleaning the environment, cosmetics, in processing high protein food, quality feed, medicines, textile, pollination vector (majority of pollinators in plants are insects) and organic excreta of insects is the rich source of nutrients for the soil. He cited a few examples of silk producing insects like honey bees, silkworms, spiders etc. useful for textile industry; and mentioned about the lac culture stating that Indians have been using lac for ages. Lac is the resinous secretion of a number of species of lac insects; the most cultivated is *Kerria lacca*. The epic Mahabharata mentions the detail of the famous Lakshagriha, a house built of lacquer, which was built to burn the Pandavas. So, this is the evidence to show that Indians knew the inflammable nature of lac and its other uses also. He also talked about 'Termites preventing desertification' and Insect based meat and how the insects are contributing to circular economy. The insect population is declining at the rapid rate-insects have declined by 75% in the past 50 years and the consequences may soon be catastrophic. He portrayed the statistics revealing the percentage decline in selected global insect populations over the past decades expressing that the rate of insect extinction is eight times faster than that of mammals, birds and reptiles. Extinction of insect population may lead to catastrophic collapse of nature's ecosystem and also highlighted the importance of bees, devastating consequences of world without bees. He cited various reasons for insect decline like storm intensity, forest fire, global warming, pollution, drought, urbanization etc. and suggested ways to save them by growing plants, providing habitats, eating organic foods and also elucidated the concept of Seri biodiversity and Wild silk moths of North-East India.

Prof. S K Barik, Centre for Advanced Studies in Botany, Department of Botany, NEHU, Shillong; Former Director, CSIR- NBRI, Lucknow spoke on '**Adding Value to Biodiversity**'. Biodiversity loss itself is an important environmental problem and its conservation could be a panacea for many environmental problems. By protecting and restoring natural areas, we are protecting and ensuring the health and prosperity of every one of us who ultimately depends on nature's clean air, water and food for survival. At least 40% of world's economy and 80% of the needs of the poor are derived from biological resources. The richer the diversity of life, the greater the opportunities for medical discoveries, economic development and adaptive responses to such new challenges as climate change. He mentioned about the use of biodiversity in personal care such as use of herbal toothpaste and discussed about the deployment of post-harvest processing technologies. He stressed on the utilization of biodiversity in dietary supplements such as Turmeric based dietary supplements most important for health and well-being; and other usage such as Plant based bio plastics used for plastic printing, writing lamination, preservative, cutlery and packaging material. He also discussed about the threats associated with biodiversity such as its extinction, natural causes, end of Permian period, human caused reduction etc.

The session on '**Women's Involvement in Protecting Ecosystem**' was **Chaired** by **Prof. Tarun Chandra Bora**, VC, Krishnaguru Adhyatmik Visvavidyalaya, Nasatra, Barpeta, Assam and **Co-chaired** by **Dr. Suchitra Banerjee**, NASI Senior Scientist, CSIR-CIMAP, Lucknow.

Dr. Rajendra Dobhal, Director, Strategic Planning, Research, Shri Ram Himalayan University, Jollygrant, & Former DG, UCOST, Dehradun spoke on '**Women's role in conserving the ecosystem**'. He thanked NASI, NE Local Chapter and SSCS&T, Govt. of Sikkim for organizing such important event. Discussing the role of women towards prevention of the ecosystem, he mentioned that women, particularly the tribal, landless and rural poor have participated in great numbers in people's movements because of the survival issues viz. land, water, fuel, fodder and their livelihood from forests. Many of these struggles have catapulted leaders into national prominence but some of these are women. This reveals that women formed and still form the

backbone of such movements. He cited some of the references revealing the success stories/ role of women in conserving the biodiversity viz. the contribution of Rajasthan Bishnoi Community (led by Amrita Devi) for sacrificing their lives to safeguard the environment and wild life. *Chipko Movement*-the women led indigenous struggle. The Chipko movement thus began to emerge as a peasant and women's movement for forest rights. Another reference was *Salt Satyagrah* in which Gandhiji exhorted women to take part, on par with men; and this observed large scale participation of women. Further, in 1970s, lots of women were involved in *Tehri dam movement*. Ms Sugata Kumari was on the forefront of environmental movements. She received Indira Priyadarshini Vriksha Mitra Award from the Government of India for her efforts in environmental conservation and afforestation as well as her contribution towards the *Silent Valley Project*. He also mentioned about some of the initiatives towards conservation of ecosystem such as Biodiversity Conservation Act, National Environment Policy (2000), The Water (Prevention and Control of Pollution) Act. Lots of efforts are being made by the start-ups and entrepreneurs on bioeconomy, such as developing products using materials from biological resources, but we need to conserve ecosystem by educating more and more people, providing them with proper training and generating awareness.

Prof. Latha Rangan, Department of Biosciences and Bioengineering, IIT, Guwahati spoke on '**The Role of Women in Protecting the Ecosystem**'. Referring to the Ecosystem of Northeastern India, she told that the NE region of India consists of eight states covering 8% of India's total area and home to around 50% of flora. Elucidating the concept of Ecosystem which includes tropical and sub-tropical, alpine meadows, grasslands, wetlands and Riverine she told that the region is also home to several endangered species such as the one-horned rhinoceros, Asiatic elephant, clouded leopard, and Hoolock Gibbon. The efforts have been made to conserve biodiversity in NE India fall under two categories- 1. Regulations and policies; 2. Community-based conservation for which the Indigenous communities and the local NGOs are playing a crucial role in conservation of the ecosystem through community-based initiatives. But there are several challenges also which include limited resources, human-wildlife conflicts and lack of awareness making it difficult to conserve the ecosystem. There are threats to ecosystem in NE India, viz. deforestation, climate change, hunting and poaching and infrastructure development; however, a few steps have been taken for its conservation such as protecting the areas like National parks, wildlife sanctuaries, and biosphere reserves. A total of 29 national parks and wildlife sanctuaries situated in the North-East region; Community-based Conservation which includes sustainable approach for conservation. Eco-tourism, traditional fishing, organic farming, Ecosystem Restoration and Awareness programmes for locals as well as sensitization through education. She further expressed that Women have important role in Ecosystem Conservation as managers of natural environment, rehabilitators of natural environment and as innovators in the use of appropriate technology. *Bodo* women conserve about 48 different plants (leaves, stems and tubers) for their utilization as well as socio-cultural and religious purposes in the BTC area. She portrayed the success stories of a few women like Purnima Devi Barman, Rupjyoti Saikia Gogoi, Bano Haralu Haralu who took part in conservation initiatives; and also cited a few Examples of successful programs that have empowered women in conservation of ecosystem.

Sri Bharat Kumar Pradhan, Sikkim Biodiversity Board, Forest Department, Govt. of Sikkim spoke on '**Women, Biodiversity, Conservation and Livelihood**'. Highlighting the role of rural women in conserving the ecosystem, he stated that rural women play a major role in conserving the biodiversity. They are the custodian of bio resources and interact with the nature on daily basis. They collect fodder for livestock, firewood, drinking water, wild food and medicine for the household use; and act as the guardian of the traditional knowledge associated with these bio resources. He gave the pictorial glimpses of the activities being carried out in NE region showing the involvement of women in agricultural farming such as Subsistence farming in Lachung, North Sikkim for their survival, Planting of Peddy in Dzongu, North Sikkim showing they are engaged in lot of other activities apart from their house hold works and this must be acknowledged. According to 2013 UN Environment Publication, Biodiversity for the well-being of women, women provide almost 80% of total wild vegetable food collected in 135 different subsistence-based societies. They often have more specialized knowledge of various local and neglected species. He mentioned about some of the evidences in the history showing women's role in protecting biodiversity such as Amrita Devi led Bishnoi Movement, Chipko Movement (1973), Save Silent Valley Movement (1978), Jungle Bachao Andolan (1982), Narmada Bachao Andolan (1985), Tehri Dam Conflict (1990s). He added that most of our bioresources are under-valued and underutilized and majority of bio-resources are going waste in the wild such as *Hippophae salicifolia*, *Rhus chinensis*, *Baccauria ramiflora* are some of the underutilized plant species of Sikkim.

Women are employed in Hand-made Paper Factory, Borong, South Sikkim; and other activities such as Chuk extraction from *Mel (Docynia indica)* for their domestic use. However, sometimes the women lack privileges also. We are losing more than 10,000 species to extinction, per year. Rural women are the care givers and land managers. They have been playing important role in biodiversity conservation and protecting associated traditional knowledge. But they are neither invited nor given the opportunity to share their views on development initiatives within the community. Hence, women's role in biodiversity conservation needs to be better recognized.

The session on '**Flora and Fauna of North-East**' was **Chaired by Prof. Pramod Tandon**, NASI Honorary Scientist; Formerly Vice-Chancellor, NEHU, Shillong; & CEO, Biotech Park, Lucknow and **Co-Chaired by Dr. G Narahari Sastry**, Director, North-East Institute of Science & Technology, Jorhat. **Dr. A A Mao**, Director, BSI, HQ, Kolkata spoke on '**Plant Wealth of North East India and its bio-economy prospects**'. He expressed that North-East India with its unique geographical location is home to about 40-50% of total floristic wealth of the country. Over 250 tribes of different ethnic groups speaking more than 200 different dialects with distinct cultural entities inhabit the region. Agriculture is their main occupation and the distinct tribes have rich indigenous traditional knowledge. He portrayed a detailed statistics of plant wealth (with plant groups and taxa) of India as per the latest documentation of plant diversity of India in BSI Publications; and current estimation of angiosperm diversity of country as per BSI documentation. As well as plant discoveries made during last 10 years from India. North-East India is rich in flora with many medicinal and wild edible vegetable and fruits and wild horticulture potential plants such as orchids, rhododendrons, balsams, primulas, bamboo, ferns zingibers etc. He also portrayed the data pertaining to the floristic diversity in different states of eastern Himalayas mentioning that 40% of the country's floristic wealth is present in the NE region and also the data pertaining to bioeconomy growth in India and mentioned about the diverse areas of bioeconomy viz. agriculture, floriculture, horticulture, medicinal plants etc. Several other plants having medicinal and commercial use were depicted. He concluded with proposing some of the future strategies for the region such as strengthening the innovation capacity and human resource, strengthening national and international collaboration, increasing policy support and capital investment.

Prof. Partha Pratim Baruah, Department of Botany, Guwahati University spoke on '**Algal Diversity in North-East India: Looking ahead**'. Briefing on the concept of Algae, which supposed to be the aquatic, primitive, most synthetic organism ranging from unicellular to multicellular forms and generally poses, he mentioned about Spirogyra, a genus of filamentous charophyte green algae of the order Zygnematales and supposed to be a typical group. The amount of algal growth varies with environment, nutrients, temperature, light, concentrations pH etc. In the aquatic system, the algae are found as attachment (growing on the clay, sand, rocks, plants and animals' bodies), but basically these are the Phytoplankton, found in water bodies which are the major source of oxygen needed by the aquatic animal life; and algal abundance in water bodies always reflects as the ecological conditions. He mentioned about the health benefits of Spirulina (the blue green algae) and the oil contaminated water bodies like oil spills which are destroying the water sources and destroying marine life. Some photographs depicting algae of different regions/ areas of North-East were projected. Prof. Baruah also mentioned some harmful aspects of algae causing parasitic diseases and use of algae as research material in space technology.

All the lectures were very much appreciated and well received by the participants, who later on interacted with the experts and raised several queries on different aspects of biodiversity. All the queries were satisfactorily answered by the experts.

The **Concluding Session** was **Chaired by Dr. Manju Sharma** and **Co-chaired by Prof. Paramjit Khurana**. **Dr. Manju Sharma** very much appreciated the efforts of NASI, NER Local Chapter and the Officials of SSCS&T, Govt. of Sikkim in organizing this event. She expressed that the event is very much fruitful for all; specially the students who are the real beneficiaries. While mentioning about the '**Science & Society**' mandate of NASI, she informed that NASI has been organizing such awareness programmes all across the country since its inception. She said, "While planning an event for a particular place/region, we take into account the issues/problems pertaining to/ faced by the people of that particular region. That's why while we planned to organize this event in North-East region, we thought of taking all the related aspects of Biodiversity, so that the youngsters will be able to understand the scenario of flora and fauna in that particular region, its utilization, conservation and other related aspects, the role of biodiversity and most importantly, linking biodiversity indicators with national economy and mainstreaming biodiversity into economic planning and monitoring processes towards national development; and this is the crux of the whole event".

The *Concluding Remarks* were shared by the eminent scientists. **Dr. Amit Ghosh**, Chief Editor, NASI Publication appreciated NASI's efforts in organizing this event and told that this event has benefitted several students in enhancing their knowledge regarding biodiversity and its conservation. The students must find something interesting to innovate further, in Science. He further expressed that such programmes on popularization of science are extremely relevant; but unfortunately, the newspapers or the local dailies hardly talk or mention about such scientific contents. Such messages must be published so as to reach many people of society and they can reap the benefits of Science. He also appreciated NASI's efforts in establishing Brahmaputra Gallery in Guwahati which are very much needed to attract the young students. **Prof. Anupam Chatterjee**, Department of Biotechnology & Bioinformatics, NEHU, Shillong; Chairman, N-E Chapter of NASI mentioned that this event was planned three years ago, but could not be materialized due to the pandemic. He appreciated NASI's efforts and sincerely thanked the people from Sikkim to participate in this event focused on conserving the nature.

Dr. Bharat Basistha, Principal Director, Department of S&T, Govt. of Sikkim thanked Dr. Manju Sharma for her major contribution in making the event fruitful. He told that all the lectures addressed by the distinguished speakers from different perspectives, provided valuable insights on different topics/ aspects related to biodiversity and this will definitely add to the knowledge of the youngsters. **Prof. S R Joshi**, Secretary, N-E Chapter of NASI thanked Dr. Manju Sharma and the entire team of NASI for making sincere efforts and all the organizers from the NE local Chapter as well as those from the Govt. of Sikkim, especially Dr. Basistha, to make this event successful. The speakers were requested to submit their manuscripts to NASI for the compilation of their lectures to felicitate the implementation of fruitful recommendations on biodiversity, particularly in the NE region.

The day-long event concluded with the *Vote of thanks* proposed by **Dr. Santosh K Shukla**, Assistant Executive Secretary, NASI. He expressed his gratitude to Dr. Manju Sharma for all her support as well as the other dignitaries for their contribution to make this event successful.



The National Academy of Sciences, India (NASI)

(The first Science Academy of India estb. In 1930; A Professional Body (AI) of the Department of Science & Technology, Govt. of India; and SIRO recognized by the DSIR, Ministry of Science & Technology, Govt. of India)

Celebrating the National Technology Day

(MAY 11, 2023)

Registration & Assembly on Lunch (12.45 pm)

Welcome - Prof. U. C. Srivastava, Coordinator, Science Communication Programme (2.00-2.10 pm)

Introductory Remarks - Prof. Ashok Misra, Convener, NTD & Past President, NASI (2.10-2.30 pm)

Invited Talks by-

1. Prof. Siddhartha Panda, Centre for Flexible Electronics, IIT Kanpur (2.30 - 3.10 pm)

2. Prof. Ranjan Mallik, Electrical Engg Dept., IIT Delhi
(3.10 - 3.50 pm)

Concluding Lecture by Prof. Jayesh R. Bellare, IIT Bombay, Mumbai
(3.50-4.10 pm)

Interaction with the Participants (4.10-4.30 pm)

Remarks by the Past President- Prof. Manju Sharma,
Chairperson, NASI-New Initiatives (4.30-4.45 pm)

Felicitation

Vote of thanks

High Tea

1st Invited Talk

Dr. Siddhartha Panda

Dr. S. Sampath Chair Professor

Department of Chemical Engineering

Nat. Cent. for Flex. Electronics Tel: +91(512)2592040

Samtel Centre for Display Tech. E-mail: spanda@iitk.ac.in

IIT Kanpur, 208016

Title: "Flexible Electronics - a New Paradigm for Devices"

Abstract:

Large area flexible electronics is an emerging segment of electronics that opens up new possibilities of developing conformal, flexible, lighter and more robust applications. This talk will present examples of flexible electronics, discuss how this field is different from conventional electronics and the activities undertaken globally. This field has the potential to contribute in a large number of sectors. The industry is growing and this opportunity is to be seized by India to derive various technological, scientific and strategic benefits; and the strengths of India which make it well positioned to realize this opportunity will be presented. This is an opportunity to provide solutions to several unmet needs of India. Then an overview of the activities in the National Centre for Flexible Electronics, established with the support of the Ministry of Electronics and Information Technology (MEITY), Govt. of India, and IIT Kanpur, will be presented.

Speaker:

Dr. Siddhartha Panda is a Professor of Chemical Engineering, and a participating faculty in the Materials Science Programme, and is the former Coordinator (i.e. Head) of the National Centre for Flexible Electronics (NCFlexE), at IIT Kanpur. His research focuses on chemical sensors for various applications (including healthcare) and the accompanying transport, reactions, transductions, materials processing, and intelligence -- utilizing flexible printable platforms. Prior to joining IIT Kanpur in 2006, he was a Staff/Advisory Engineer at the IBM Semiconductor R&D Center, New York, for over six years. He obtained a Ph.D. from the University of Houston in 1999, an M.S. from the University of Cincinnati in 1995 and a B.Tech. from IIT Kharagpur in 1992, all in Chemical Engineering.

Dr. Ranjan K. Mallik

Institute Chair Professor

Department of Electrical Engineering

Indian Institute of Technology Delhi

Hauz Khas, New Delhi 110016, India

Tel.: +91-(11)-2659-1049

E-mail: rkmallik@ee.iitd.ernet.in, ranjankmallik@yahoo.co.in

Title: "Journey of Communications: From Smoke Signals to 5G and 6G"

Abstract:

The evolution of communication networks has been a fascinating journey spanning several decades. Early communication techniques were primarily focused on voice communication and relied on circuit-switched technology. With the advent of packet-switched networks, communication networks evolved to support digital data communication. Introduction of the internet and wireless communication technologies further revolutionized the way we communicate, leading to the creation of complex communication networks that can transmit vast amounts of data in real-time. The development of communication systems has changed our personal and professional lives, allowing us to collaborate across geographical boundaries and create new opportunities for businesses and social interactions. Looking into the future, this evolution is likely to continue with the emergence of new technologies such as 5G and 6G networks, internet of things (IoT), and artificial intelligence (AI). These advancements are expected to bring about further changes to the way people and devices communicate and interact with each other, ushering in a new era of connectivity and innovation.

Speaker:

Ranjan K. Mallik is an Institute Chair Professor in the Department of Electrical Engineering, Indian Institute of Technology (IIT) Delhi. He received the B.Tech. degree from IIT Kanpur and the M.S. and Ph.D. degrees from the University of Southern California, Los Angeles, all in electrical engineering. He has worked as a scientist in the Defence Electronics Research Laboratory, Hyderabad, India, and as a faculty member in IIT Kharagpur and IIT Guwahati, prior to joining IIT Delhi as a faculty member. His research area is wireless communications. He is a fellow of I-triple-E (IEEE); the Indian National Academy of Engineering; the Indian National Science Academy; The National Academy of Sciences, India; the Indian Academy of Sciences; The World Academy of Sciences; the West Bengal Academy of Science and Technology; The Institution of Engineering and Technology, UK; The Institution of Electronics and Telecommunication-

Engineers, India; The Institution of Engineers (India); and the Asia-Pacific Artificial Intelligence Association. He is a recipient of the Shanti Swarup Bhatnagar Prize (by CSIR), the Hari Om Ashram Prerit Dr. Vikram Sarabhai Research Award, the Khosla National Award (by IIT Roorkee), the IEI-IEEE Award for Engineering Excellence, and the J. C. Bose Fellowship (by DST). He served as an Area Editor and an Editor for the IEEE Transactions on Wireless Communications, and as an Editor for the IEEE Transactions on Communications. He was the Treasurer of the IEEE Delhi Section during 2005-2006, and served as a member of the IEEE Communications Society Awards Standing Committee during 2015-2017.



Department of Science & Technology
Ministry of Science & Technology, Government of India



उत्तराखण्ड राज्य



NATIONAL TECHNOLOGY DAY - 2023

Theme - Integrated Approach in Science and Technology for a Sustainable Future

(11th May 2023)

Organized by:

Uttarakhand State Council for Science & Technology (UCOST)
Department of Information & Science Technology (Govt. of Uttarakhand)
Vigyan Dham, Jhajra, Dehradun-248015

The National Academy of Sciences, India

12th Annual Meet of the NASI Local Chapters

The 12th Annual Meet of the NASI Local Chapters was held on May 12, 2023 at NASI, Prayagraj. Prof. Balram Bhargava, President, NASI presided over the Meet; and it was also attended by the Past Presidents-Dr Manju Sharma, Dr Ashok Misra, Dr Akhilesh K. Tyagi and Dr J. P. Mittal, Vice-President-Dr Amit Roy, General Secretaries-Prof. Madhoolika Agrawal and Prof. Jayesh R. Bellare, Foreign Secretary- Prof. Vinod Kr. Singh, and other officials of the NASI. The Chairpersons/Secretaries/Coordinators/Office-bearers of about 12 Chapters presented their annual report (on ppt with their physical presence); the Academy also received the reports of other 6 active Chapters, while the reports from 4 non-functional Chapters could not be received, as these Chapters need reorganization/rejuvenation.

All the presentations were picturesque, concise and comprising of the details of the annual activities, after which discussions also took place. The crux of the presentations/discussions is as follows-

1. There is a great enthusiasm in the Chapters and now they are the true representatives of Academy's Character & Mandate in their respective regions, encompassing almost the entire country, in totality.
2. It was also realized that the 'Science-Society' programmes earlier assigned to 12 Chapters, have been organized very effectively by the Chapters, and a lot of ground level works were done by the respective Chapters in the field of scientific

intervention to solve the nutrition, health and socio-economic problems of the rural/tribal population. The Chapters have also developed several programmes on their own as per the mandate of the Academy, and they are now connected/collaborated with several like minded organizations/agencies in and around their respective regions.

3. However, there is still some need of reorganization/rationalization of their activities to make them more forceful/impactful in their respective regions as per geo-socio-economic conditions of the areas being represented by them. Further, the non-functional Chapters are to be reorganized/rejuvenated. (Action: There be a separate meeting of all/a few Chapters with the Office-bearers of the Academy before the August Meeting of the Council at Lucknow, to think over these issues, as well as identify future course of action for attaining the goals).
4. Prof. Bhargava further suggested to identify & focus on the work catering to the need of the local population of respective regions, as the efforts to solve the malnutrition menace, awareness about the snakes & treatments of snake-bite, awareness regarding the treatment of communicable diseases, our vast natural resources, as edible greens, fruits & flowers, natural resources and their sustainable utilization for socio-economic development and so. He also emphasized to enlist such major works being done by these Chapters so that after further discussions in August, the representatives of the Chapters could be invited in the 93rd Annual Session to be held at Mumbai to express their views on such topics; which will be reflection of India @75.

- 5. Dr. Manju Sharma appreciating the performance of the Chapters suggested to evolve a mechanism/guidelines for better presentation of their work, which would be concrete, concise and more systematic; a proforma be developed for the same. She further suggested that the Academy will soon devise the reactivation mechanism/process for the non-functional Chapters as well as to reorient the work of a few Chapters as per mandate.**
- 6. Dr. Ashok Misra praising the efforts of the Chapters, stressed on Academia-industry collaborations and focused on the emerging technologies for the advancement of the scientific know-how.**
- 7. Dr J. P. Mittal also expressed that the Chapters are doing very good work, but it would be nice if their programmes be more focused and include the evolving technologies and transformational science.**
- 8. Dr Akhilesh K Tyagi appreciating the efforts of the Chapters advised on for more systematic approach and better presentation of their (chapters) work.**

It was also felt that the Academy should develop its website in such a way that all the Chapters could be linked to it; and the Chapters activities could be focused prominently on that. The use of social media is also necessary for proper reflection of the multifold activities of the Chapters.

Prof Madhoolika Agrawal and Prof. Jayesh R. Bellare made their introductory/welcome remarks before the onset of the meeting; and vote of thanks were expressed by Prof. SheoMohan Prasad, Council Member, NASI.