



द्विवार्षिक प्रतिवेदन
2018-2020

Biennial Report
2018-2020

**CSIR-National Institute of Science, Technology
and Development Studies**

Pusa Gate, Dr. K.S. Krishnan Marg, New Delhi

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From The Director's Desk



Since its inception, CSIR-National Institute of Science, Technology and Development Studies (CSIR-NISTADS) has provided a critical appraisal of social, natural and engineering sciences and their impact on socio-techno-economic development at regional and country level. The period 2018-20 has seen several impactful efforts along these lines, which are reflected in this Biennial Report.

At the core of NISTADS mandate is research and activities associated with science, technology, innovation and development. The focus has been on translational research to expedite the transfer of benefits from R&D to the general populace and the Indian industry. It was realized that policy advisories need to be strictly evidence-based to ensure their acceptability. Keeping in view, several new initiatives & R&D projects were carried out that demonstrated proof-of-concept for establishing the suitability of their policy recommendations and implementation.

Major R&D projects of NISTADS during this period are 'A scientometric approach to study Arsenic, Fluoride, Nitrate and other heavy metals in drinking water during the 1995–2015 period: An outlook to treatment alternatives for removal of contamination', 'Capturing thematic intervention of Nano-technology in Water, Energy & Agriculture Sector in Asian Countries Approved', 'Techno-commercial study for production of value added products from by-products of 2G Ethanol Bio-

Refinery at Bargarh Odisha', 'Technology enablement of North East India', 'Economic Impact Analysis (EIA) study of CSIR Aroma Mission', Pilot study on 'Characterization and analysis of herbs for therapeutic uses', 'Intervention for herbal health and nutrition', 'Development of smart irrigation system for water efficient agriculture', and 'Interfacing Science and Traditional Knowledge (ISTK)', etc. To develop creativity, meaningful learning, critical reading and thinking skills that brings out the inherent abilities of the students, 'Knowledge and Awareness Mapping Platform (KAMP)' programme was developed and so far thousands of students have benefitted via on-line tests countrywide.

The Institute is committed to generating and disseminating knowledge on science, technology and innovation and their applications via policy recommendations. During the period, NISTADS organized several workshop/meetings and brainstorming sessions on futuristic area like 'Automated Smart Irrigation System' 'Ayur Vatika', 'Traffic Strategies for Management of Air Pollution over Delhi', 'Socio-Economic Impact of New Technologies: Policy Implications for India' discussion meeting on 'Intuitive Knowledge in Vedanta and Modern Science: Characterization, Evidence and Implications', Theme Meet on 'Knowledge and Awareness Mapping Platform (KAMP)', discussion Meeting on 'Economic Impact Analysis of Waterless Chrome Tanning Technology'. Faculty participated in Second



Sino-Indian workshop on ‘Science and Technology Innovation’ held at Beijing, China. A Lecture Series: Research Innovation and Sustainable Development was initiated and Inaugural Lecture on ‘CSIR and Its History’ was delivered by Hon’ble DG, CSIR Dr. Shekhar C. Mande. A large number of school students from various *Kendriya Vidyalaya Sangathan* visited NISTADS under The *Jigyasa* programme of CSIR which is intended for creation of scientific temperament among school children via institutional visits on open science day and on other occasions. It was an opportunity to provide young think tanks about programmes like *Ayur Vatika*-A herbal health care to home; WASIS-The Water-Efficient Automated Smart Irrigation System for agriculture and Intuitive Cognition, its characterization, evidence and implications.

The doctoral programme under Academy of Scientific & Innovative Research (AcSIR) at CSIR-NISTADS continues in thrust areas of Science and Technology Innovation Systems,

Enterprise Development, Policy Research, Intellectual Property Rights etc. Eleven students were admitted to Ph.D programme that impressively proved their ability to conduct research in the area of Science, Technology, and Innovation (STI) Policy.

I would like to thank Dr. Shekhar C. Mande, Director General, CSIR, for his constant support, guidance and encouragement in NISTADS endeavours. I sincerely acknowledge the valuable inputs and support of RC & MC and other divisions of CSIR headquarters. I would also like to thank our collaborators, including our CSIR laboratories, for their involvement and support in our various endeavours. Finally, I extend my thanks to all the members of CSIR-NISTADS for their hard work, dedication and active contribution in the Institute’s growth.

Dr. Ranjana Aggarwal
Director, CSIR-NISTADS

About CSIR-NISTADS

The roots of CSIR-National Institute of Science, Technology and Development Studies (CSIR-NISTADS) go back to August 1973 with the Council of Scientific and Industrial Research (CSIR) setting up Centre for the Study of Science, Technology and Development. On September 30, 1980, the Governing Body of the CSIR approved that the Centre “should function as an autonomous Centre with a separate budget”. Its objectives “would continue to be the same”, but it “will be autonomous, headed by a scientist of the rank of a Director of a National Laboratory, with its own infrastructure”. September 30, 1980 is therefore the foundation day of the Institute (even though the present name came into effect on April 1, 1981).

CSIR-NISTADS is a platform for multidisciplinary research integrating science, society and state and exploring continuously the interface between Science, Technology and Society. CSIR-NISTADS archives a wide range of datasets from environmental, industrial, health & health care, socio-economic, agriculture to techno-foresight. The data is collected via various primary surveys and secondary resources and contract R&D projects. The mission of the institute is to provide R&D database to the researchers so that they can create decision support system and policy recommendations leading to improvement in techno-socio-economic well-being of the people around the world.

Currently, the faculty consists of 16 members, drawn from a range of academic disciplines. This intellectual diversity is the mainstay of the Institute. Research students from different universities enrolled in the Institute and are awarded Ph. D degree via rigorous but leaning doctoral curriculum in various thrust areas under applied sciences.

Research Areas:

- S&T Application, Assessment and Planning (STAAP)
- Future Applicable S&T (FAST)
- Socio-Economics of S&T (SEST)
- Group Dynamics and Social Engineering (GDSE)
- Frontier Innovation and Research in S&T (FIRST)
- Climate Change, Adaption, Mitigation, Sustainability (CAMS)

The Institute has core competence in:

- Science and Technology policy Research
- Dedicated to the concern and problems of developing countries.

Among the diverse fields the Institute is involved in, some are:

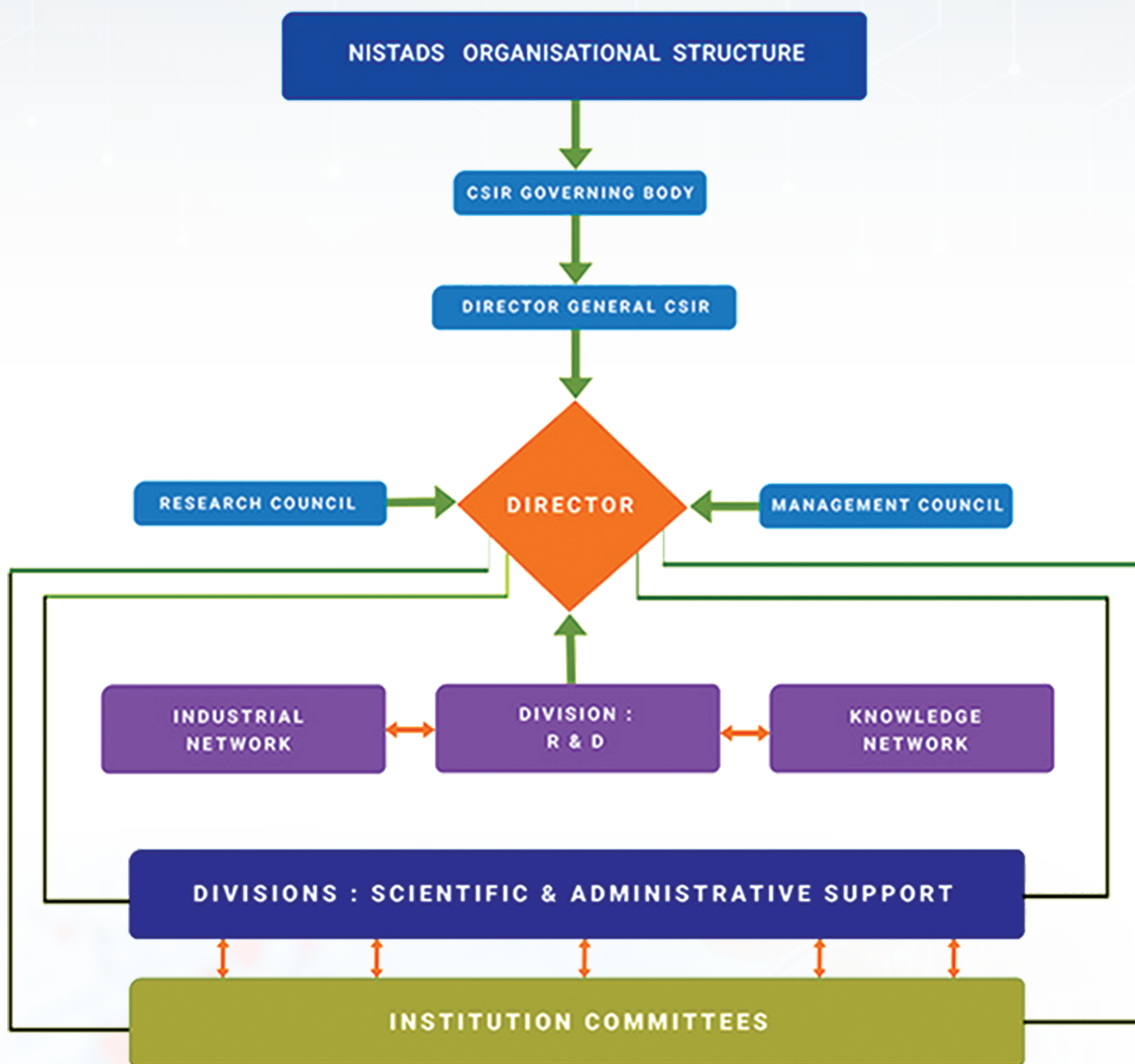
- Water
- Rural areas
- S&T mapping
- High Technology
- Entrepreneurship
- Public Science and Technology

Our Strengths:

- Interdisciplinary research teams.
- Multi-discipline in faculty.
- Long research experience.
- Field research: designing/collecting primary data.
- Students, visitors network partners Indian as well as international.
- Access to CSIR resources, technologies, knowledge and people.
- World class IT Facility.
- World-class computerized library: access to several thousands of research journals and database.

We have proven our capabilities in:

- Water-resources, economics, management and life science.
- Entrepreneurship and Micro-entrepreneurship development.
- Innovation-Strategy and management.
- Intellectual Property issues.
- Knowledge management; R&D management.
- Law, technology and economics.
- Science policy.
- Resource mapping/Geography.





Vision

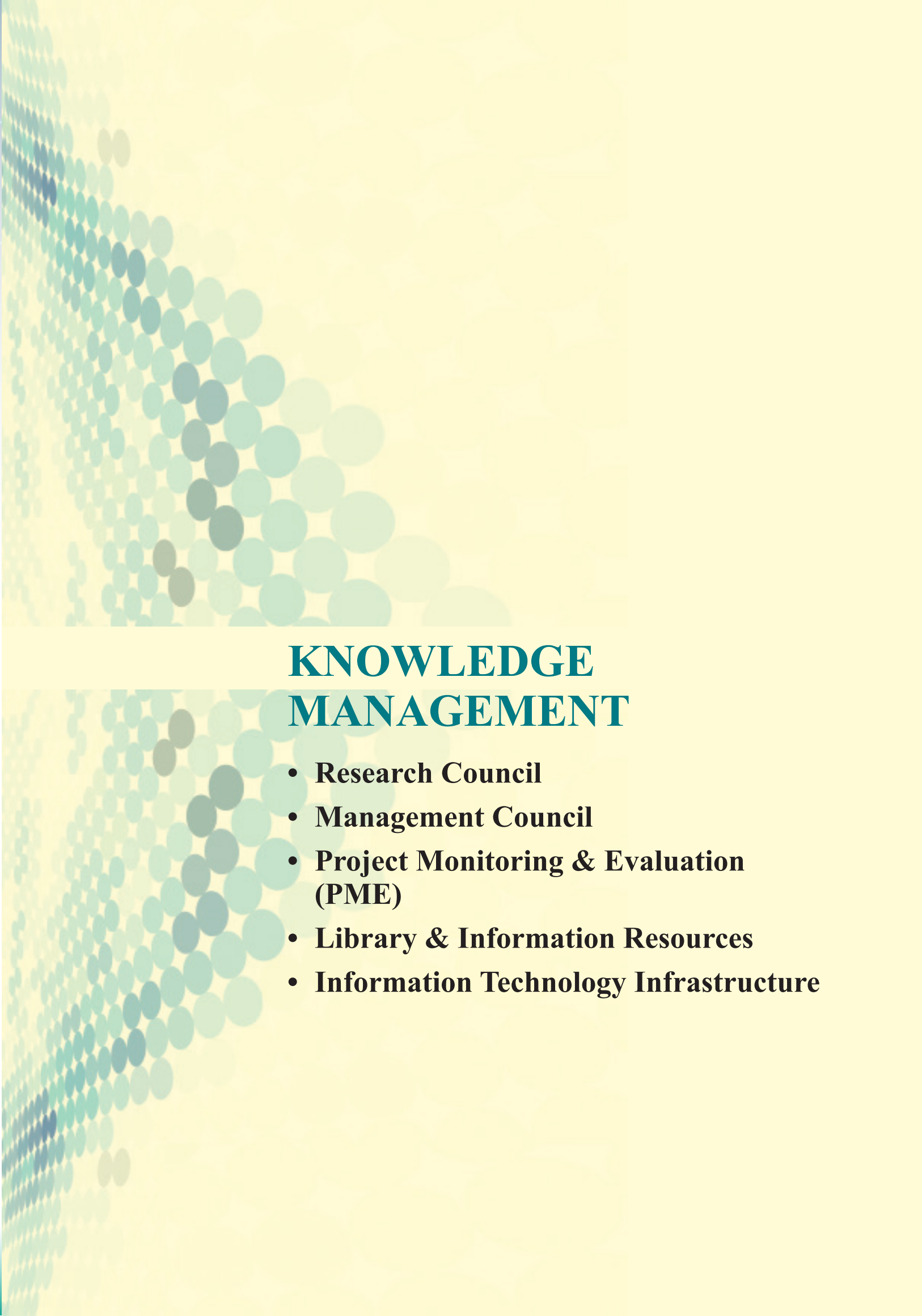
To act as both driver and toll for socio-economic transformation at regional, national and global scales with policy and decision support, S&T design and Translation



Mission

Creation of techno-socio-economic platform to enable sustainable goals through development and application of acceptable, relevant, and commercialization of S&T products through policy advocacy





KNOWLEDGE MANAGEMENT

- **Research Council**
- **Management Council**
- **Project Monitoring & Evaluation (PME)**
- **Library & Information Resources**
- **Information Technology Infrastructure**

RESEARCH COUNCIL

Chairman

Prof. Sachin Chaturvedi
Director General
Research and Information System
for Developing Countries
New Delhi



Prof. K.B. Akhilesh
Indian Institute of Science
Bengaluru,
Karnataka



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Prof. Manoj Changat
Department of Future Studies
University of Kerala
Kerala



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Scientist E
Technology Information
Forecasting and
Assessment Council
New Delhi



Dr. Neera Verma
Professor of Economics and
Director, HRDC
Kurukshetra University
Thanesar, Haryana



Permanent Invitee

In-Charge, RPPBDD or Nominee, CSIR Hq.
Council of Scientific and Industrial Research
New Delhi

Dr. Pinaki Dasgupta
Professor,
IIFT
New Delhi



Dr. Ranjana Aggarwal
Director
CSIR-NISTADS
New Delhi



Prof. S. Khanna
Professor,
IIM
Kolkata



Dr. L.S. Rathore
Former DG Meteorology
IMD,
New Delhi



MANAGEMENT COUNCIL

(from 1 January 2018 to 31 December 2019)

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Dr. Ranjana Aggarwal
Director
CSIR-NISTADS,
New Delhi



MEMBERS

Dr. Mohd. Rais
Sr. Principal Scientist
CSIR-NISTADS,
New Delhi



Dr. Y. Madhavi
Sr. Principal Scientist
CSIR-NISTADS,
New Delhi



Ms. Sandhya Wakdikar
Principal Scientist
CSIR-NISTADS, New Delhi



Shri Avinash Kshitij
Scientist
CSIR-NISTADS, New Delhi



Shri Anil Kumar Sharma
Sr. Technical Officer(3)
CSIR-NISTADS, New Delhi



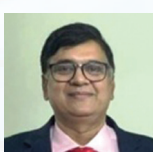
Dr. Anurag Agrawal
Director,
CSIR-IGIB, New Delhi



Dr. Naresh Kumar
Sr. Principal Scientist & Head,
Business Development Group,
CSIR-NISTADS, New Delhi



Shri Raj Hans Gautam
COFA
CSIR-NISTADS, New Delhi



MEMBER-SECRETARY
Shri Surender Kumar
COA
CSIR-NISTADS, New Delhi



MANAGEMENT COUNCIL

(from 1 January 2020 to 31 December 2021)

CHAIRMAN

Dr. Ranjana Aggarwal
Director
CSIR-NISTADS,
New Delhi



Dr. D.K. Aswal
Director,
CSIR-NPL,
New Delhi



MEMBERS

Dr. Sujit Bhattacharya
Chief Scientist
CSIR-NISTADS, New Delhi



Dr. Naresh Kumar
Chief Scientist and Head, BDG
CSIR-NISTADS, New Delhi



Dr. Yogesh Suman
Sr. Principal Scientist
CSIR-NISTADS, New Delhi



Dr. Madhulika Bhati
Sr. Scientist
CSIR-NISTADS, New Delhi



Dr. Shiv Narayan Nishad
Scientist
CSIR-NISTADS, New Delhi



Shri A.K. Bhardwaj
Sr. Technical Officer(3)
CSIR-NISTADS, New Delhi



Shri Raj Hans Gautam
COFA
CSIR-NISTADS, New Delhi



MEMBER-SECRETARY
Shri Surender Kumar
COA/AO
CSIR-NISTADS, New Delhi



PROJECT MONITORING & EVALUATION (PME)

NISTADS has a PME Division with following activities:

- Monitoring and Evaluation of Grant-in-aid projects.
- Monitoring and Evaluation of CSIR projects i.e. MLP, OLP, etc.
- Organizing Training programs of Students from BITS, IIT and other reputed institutions
- Arranging training programs for faculty.
- To act as Nodal point between the Institute and CSIR Head Quarter for the timely delivery of the queries related to projects, Parliament questions and any other issues pertaining to R&D activity of CSIR-NISTADS.
- Preparation and timely maintenance of databases for all intramural and extramural research projects.
- Dissemination of information on all relevant National & International Research Program Requests including fellowships and maintenance of NISTADS' required registration with such agencies as mandatory, and liaison with grant-giving agencies.
- Guiding fresh scientific personnel in the preparation and submission of project proposals.
- Preparation of RC Agenda, convening RC meetings and keeping the record and database of all the RC activities. Participation in institute's annual plan and budget preparations, as well as annual reporting, are mandatory activities of the Division.



LIBRARY & INFORMATION RESOURCES

CSIR-NISTADS library is playing central and impartial role to meet the requirement of scientific, technical and other staff according to changes in research environment. Library is well equipped with organisational expertise and well placed advisory committee.

CSIR-NISTADS library is a national resource centre in Science Technology Society/Science Technology Innovation areas. It has diverse collection of books, archival materials, reports and handbooks in this area. The library subscribes primarily to journals covering the key contemporary trends in this area. The book and journal collection has built up over the years. At present the library has 28272 books including books in Hindi and some in other languages. Keeping the increasing research focus on innovation and growth, sustainability, climate change, health among others, the library this year has focused on expanding the

collection in these domains. During the years 2018-2020 more than 1100 books including handbooks primarily focusing in these areas and some new journals and scholarly magazines have been added this year. In addition library also has subscribed four newspapers in Hindi and English language along with a few popular magazines in Hindi and English language. KOHA software is being used for computerised circulation and cataloguing.

Knowledge Resource Centre Advisory Committee

- | | |
|---------------------------|--------------------------|
| 1. Dr. Sujit Bhattacharya | : Chairperson |
| 2. Dr. Y. Madhavi | : Member |
| 3. Dr. Naresh Kumar | : Member |
| 4. Dr. Kasturi Mandal | : Member |
| 5. Dr. Suman Ray | : Member |
| 6. Dr. Praveen Sharma | : Member |
| 7. Sh. Kashmiri Lal | : Member |
| 8. Dr. Suresh Kumar | : Convener and Head, KRC |

INFORMATION TECHNOLOGY INFRASTRUCTURE

CSIR-NISTADS has self-designed and hosted bilingual website which is running on Linux Server, an Open Source Software (OSS) and is on Joomla platform. Joomla is Content Management System (CMS) and open source software that supports pictures, texts and videos. Our website is being regularly updated. We have our own Linux based DNS Server hosted in the institute. Our institute has email for all staff members from NIC with nistads.res.in domain name.

We have HP 40 Gbps Core Switch and Edge switches for our network infrastructure. The network backbone is on optical fiber & end to end connectivity is 10 Gbps. The optical fiber network is from Server Room to Umbrella, Administrative Block, Second Floor and Library. This Institute has controller based Wi-Fi internet connectivity in the campus through secured login. We also have 30 KVA Three Phase online UPS in Server Room which provides uninterrupted power supply to IT equipment round the clock.

The Institute has One Gbps leased line from National Knowledge Network (NKN). The NKN is a state-of-the-art multi-gigabit pan-India network for providing a unified high

speed network backbone for all knowledge related institutions in the country.

CSIR-NISTADS has Sophos Cyberoam, Unified Threat Management (UTM) Appliance. We are having about 150 desktops, 40 laptops as well as few workstations having secured internet access. The systems and servers are protected with Trend Micro Worry Free Business Security which is client based antivirus that prevents the system from being attacked by unauthorized entities and helps them running smooth and safe. We have excellent video conferencing and audio visual facility with the latest equipments. We also have state of art conference hall. CCTV and Biometric Attendance System have been installed in the Institute. The Institute has Video Wall at the Reception.

This institute has Intel Xeon 12 core processor based Servers. These Servers are used for variety of services like Website, FTP, DNS, Antivirus and application Servers. These servers are running on Windows and Linux operating system to meet the requirements of our organization. We are using various application software to meet the requirements of our research and analysis.



CSIR-NISTADS Initiatives

- **Knowledge And Awareness Mapping Platform (KAMP)**
- **Holistic Health**
- **CSIR-NISTADS Outreach Programme**
- **Corporate Social Responsibility (CSR)**

Knowledge and Awareness Mapping Platform (KAMP)

CSIR-NISTADS is one of the premier institutes of the country to provide inputs to policymakers for formulating the policy of Science, Technology, Innovation (STI) and entrepreneurship. Knowledge and Awareness Mapping Platform (KAMP), aimed to develop and map the scientific temperament of children, will help nurture innovation and creativity from an early age. The analyses of the mapping data would be used to create inputs for S&T policy so as new generation of scientific leaders are produced in the country.

Knowledge and Awareness Mapping Platform “KAMP” is an international intellect E-based assessment platform to evaluate cognizance of 21st century skills, awareness and knowledge of Science, Technology & Humanities among students.

KAMP is an initiative of CSIR-National Institute of Science Technology and Development Studies (NISTADS), it intends to develop creativity, meaningful learning, critical reading and thinking skills that brings out the inherent abilities of the students.

Objectives

- To help students identify their awareness and aptitude for Science, Technology and Humanities.
- To create awareness among students in emerging technologies like Robotics, Internet of Things (IoT), Artificial Intelligence (AI) etc.
- To infuse a healthy competitive spirit through rewards, based on performance levels.
- Track student progress through a dynamic system.
- To create a performance index for all the participating schools.

Impact & Outcome

- Mapping of learning outcome levels of students in India.
- Transforming classroom into interactive, practical and innovative sessions.
- Developing new educational tools, teaching methodologies based on the performance outcomes.
- Create an enabling environment to identify students with unique skills.

Visit: <http://kamp.nistads.res.in/>

Theme Meet KNOWLEDGE AND AWARENESS MAPPING PLATFORM (KAMP)

April 03, 2019

Principal Scientific Advisor to Government of India, **Prof. K. VijayRaghavan** on Wednesday emphasized that the government is pushing rebuilding of scientific temperament among its aspiring populace through their mother tongue so that through their abstractive imaginations desire to learn science is captured in their formative years.

The Government is trying its best and making successful attempt to rope in CSIR and other similar institutions to propagate building scientific temperament within the Indian masses, particularly in their formative years so that original thinking is promoted and scientific applications are put in place through vernacular, added Prof. Raghavan.

Speaking at a Theme Meet on Knowledge and Awareness Mapping Platform (KAMP) in which PHD Chamber of Commerce and Industry was the event partner with CSIR-NISTADS, Prof. Raghavan pointed out that education being a concurrent subject was largely dominated by States for primary, secondary and college level education whereas the Centre invested a great deal in promoting science and technology through Central Universities.

In this process, the necessary linkages were missed even after independence between Centre and States and science did not grow naturally in to minds of students of formative parts just as a natural feeling and desire



inculcated for art, fine art, music and branches of humanities, felt Prof. Raghavan.

That is one of the reasons, the science and scientific application could not be consequential and therefore, the government of the day has begun to push scientific temperament within its intended lot through filling in excitement by way of the mother tongue of the aspiring students, concluded Prof. Raghavan.

Among other who were present on the occasion comprised Dr. D.K. Aswal (Director, CSIR-NISTADS), Dr. Shekhar C. Mande (DG CSIR), Mr Mukul Kanitkar (Akhil Bharatiya Joint Organizing Secretary of Bharatiya Shikshan Mandal), Dr. V.M. Bansal (Co-Chairman, Education Committee, PHDCCI), Dr. Prashant Goswami (Former Director CSIR-NISTADS), Dr. Tabassum Jamal (Head BDG, CSIR-NISTADS), and Mr. Rajeev Gupta (Project Director, KOCO).

CSIR-NISTADS Holistic Health

India has a rich tradition of herbal remedies, practiced through Ayurveda and other disciplines. While herbal healthcare backed by the deep-rooted ancient science of Ayurveda had been widely practiced and accepted in India, there are several challenges that hinder its practice today. The first is the dwindling knowledge among the new generations about the herbs and their properties. The second, related hurdle is the lack of a mechanism of creating awareness in a systematic manner. However, the biggest obstacle is the easy accessibility to these herbs, especially in an urban environment. There are herbs, many known but may be less known, for essentially all major ailments. However, due to lack of information and constraint in space, these herbs are not easily available in an urban environment. The CSIR-NISTADS 'AyurVatika' is an attempt to bring this herbal healthcare to home.

To know more about data portals visit: <https://nistads.res.in/data>

CSIR-NISTADS Outreach Programme

CSIR-NISTADS OUTREACH PROGRAMME: COMMUNICATING S&T POLICY ISSUES

Team: Dr. Mohd. Rais (PI)

With rapid changes that are taking place in S&T, there is an urgent requirement for appropriate communication of these developments to various stakeholders to disseminate these development and policy issues, as well as to take feedback from them. One such initiative taken up by CSIR-NISTADS is the NISTADS Outreach Programme (NOP) for effective communication. The focus of the programme is to engage S&T stakeholders and public at large. In the early stages of the programme *Vitarka*-Policy Debates were held, which included discussions on various relevant and current issues in the Indian context. "*Jigyasa*" is another programme conducted by the institute to provoke young students towards scientific thinking. Continuing with the aim of effective communication and discussions among CSIR Scientific Community, a workshop titled "Application of Information Sciences in Technology Development and Marketing" was held for discussions on the development of the CSIR Information Sciences group. The deliberations during the workshop, led to future directions for paths to be followed for the communications related to S&T issues. Other initiatives such as short film making are also in the process for appropriate communication on various developments in science and technology. The aim of the outreach programme is to keep communicating and sharing at regular intervals for better understanding of the development in science and technology in various fields. The aim of this programme is to understand the current status of the dissemination and to further delineate as to how in the future public understanding of S&T issues are promoted.

Corporate Social Responsibilities (CSR)

INVITATION TO INDUSTRIES AND PSUs FOR CSR ACTIVITIES

Over the years CSIR has made significant contribution in scientific and industrial research and committed to pay more in nation building. CSIR and its laboratories aspire to join hand with industries and PSUs to tap Corporate Social Responsibility (CSR) funds for mobilizing S&T intervention as corporate sector is looking to channelize Corporate Social Responsibility (CSR) fund into research and development. The expansion of the scope of CSR fund can play a vital role in enhancing R&D activities in the country and will help to open a new window for large investment in research and development in the country to boost research and technology to meet desired solution of the societal problems.

CSIR-NISTADS, is seeking opportunity to work with the corporate to tap CSR fund for R&D activities/programmes. The institute has faculty and researchers of multidisciplinary background and has undertaken various sponsored studies for Government agencies such as DST, DBT, NITI Ayog, State S&T Councils and international agencies namely

ILO, WAITRO, UNESCO etc. NISTADS has a vibrant visiting scholars' programme, under which researchers from India and abroad are encouraged to spend time at the Institute.

CSIR-NISTADS, being a policy advocacy institute, has been working in diverse areas encompassing Government of India Policies and Sustainable Development Goals (SDGs); S&T Application, Assessment and Planning, Future Applicable S&T, Socio-Economics of S&T, Climate Change, Adaption, Mitigation, Sustainability, S&T Mapping, Socio-economic Impact Assessment, Public Science and Technology and so on.

NISTADS invite industries and PSUs for joint work in the following areas:

- Rural Development
- Environmental Sustainability
- Health Care, Sanitation, Safe drinking water
- Education, Vocational Skills
- Livelihood Enhancement
- Women Empowerment
- Socio-economic inequalities etc.



Research Projects

- **Sponsored Projects**
- **CSIR Funded Projects**
- **In House Activities & Other Lab Projects**

SPONSORED PROJECTS

Grant-in-Aid

A SCIENTOMETRIC APPROACH TO STUDY ARSENIC, FLUORIDE, NITRATE AND OTHER HEAVY METALS IN DRINKING WATER DURING THE 1995–2015 PERIOD: AN OUTLOOK TO TREATMENT ALTERNATIVES FOR REMOVAL OF CONTAMINATION

Team: Dr. Madhulika Bhati (PI)

Funding Agency: Department of Science and Technology (DST), New Delhi

Objectives: The objective of the current analysis is to identify removal of contaminants from water research trend since the year 1995 to 2015 with the aim to:

- To understand knowledge structures both quantitatively and visually by integrating keyword analysis and social network analysis of scientific papers.
- Comprehensive study of technologies available for these contaminants' removal from drinking water all together, worldwide.
- Catalogue the international and national collaboration of countries undertaken for study and Identify linkage of research interest
- Study the authorship pattern, degree of collaboration, highly productive authors in the field of study
- Identify the important stakeholders in public and private sector.

Major Findings/Achievements/Outcome: Publications

- Bhati M., & Rai R. (2018). Nano-phytoremediation Application for Water Contamination. In *Phytoremediation* (pp. 441-452). Springer, Cham.
- Bhati M., & Rai R. (2017). Nanotechnology and water purification: Indian know-how and challenges. *Environmental Science and Pollution Research*, 24(30), 23423-23435.
- Bhati M., & Rai R. (2018). Water Management System ancient v/s modern: A case study. International Conference on Sustainable Technologies for Intelligent Water Management, STIWM-IITR, (pp. 218)
- Bhati M., Goswami P., & Rai R. (2016). "Technology Intervention for Water Purification by CSIR and Other Stakeholders: An Overview" International Conference on water: From Pollution to Purification, ICW 2016, (pp. 48-50)
- Bhati M., & Rai R. (2016). Emerging Technologies Interventions to Solve Water Contamination Problems: An Indian Case Study, Proceedings of National Conference on Environmental Pollution: Consequences and control, ICSSR sponsored, (pp. 34)



No.	Patent Number	Title Of Invention	Stake Holders	Technology Focus	Inventor	Applicant	Class	Grant date
1	260343	An improved circular secondary clarifier for wastewater treatment	CSIR-NEERI	Waste water Treatment-Improved Circular Secondary Clarifier for Wastewater Treatment	Girish Ramesh Pophali Tapas Nandy Santosh Narain Kaul Sukumar Devotta (National Environmental Engineering Research Institute Nehru Marg Nagpur-440 020, India)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	B01D 21/1	24-04-2014
2	230839	An improved water filter	CSIR-NEERI	Improved water filter-granular activated carbon+iodine	Neeta Pradip Thacker Maya Vinayakrao Vaidya Sunil Puranchandra Pande Shrikumar Baburao Lakhe Waman Narayan Paunikar Prakash Shankarrao Kshirsagar Sudhakar Ramdas Sakhare (Water Technology Division, Neeri Nagpur-440020, India)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	B01D 35/00	28-02-2009
3	225291	A process for reducing total dissolved solids (tds) from pulp and paper Waste water Treatment effluents	CSIR-IGIB	Waste water Treatment-TDS	Ms. Deepa Kachroo Ms. Poonam Sharma Dr. (Mrs) Rita Kumar Institute of Genomics And Integrative Biology (Formerly Centre For Bio-chemical Technology, Delhi University Campus, Mall Road, Delhi-110 007, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	B01D 61/00	06-11-2008



4	257706	A novel catalyst useful for controlling microorganism in water and a process for the preparation thereof	CSIR-IICT-Mumbai	Water treatment-active silver deposited on carbon covered alumina catalyst-microorganism	Kamaraju Seetha Rama Rao , Burri David Raju, Aytam Hari Padmasri , Vasireddy Sivakumar , Adapa Naga Ratnakar , Veldurthi Shashikala , Bhari Mallanna Nagaraja , Podila Setharamulu , Sanapureddy Sreevardhan Reddy, Ponnappalli Nageswara Sarma , Katuri Krishan Prasad , Srinivasula Reddy Venkata Mohan Indian (Institute Of Chemical Technology (CSIR), Hyderabad-500 007, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/00	29-10-2013
5	231615	An improved treatment plant for textile wastewaters and an improved process thereof	CSIR-NEERI	Waste water Treatment	Santosh Narain Kaul Girish Ramesh Pophali Tapas Nandy (Wastewater Technology Division Neeri, Nehru Marg, Nagpur -440 420 Maharashtra, India)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/00	06-03-2009
6	242268	A process for the purification of water contaminated with escherichia coli	CSIR-CLRI	Water treatment-E. Coli-process of treatment	Ganeshan Sekaran Arumugam Gnanamani AmrithlingamShanmuga Sundaram Mary Babu Thirumalachari Ramasami Central Leather Research Institute, Adyar, Chennai-600 020, India	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/00	20-08-2010
7	267554	A process for the purification of inorganic nitrogen laden waste water and or water	CSIR-CLRI	Waste water Treatment-Biological treatment	Arumugam Gnanamani ThirumalachariRamasami Ganesan Sekaran Mary Babu (Central Leather Research Institute, Adyar, Chennai-600020, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/00	23-07-2015
8	232096	An improved process for the production of potable water from spent wash using marine sponge	CSIR-NCL-Pune	Waste water Treatment filter-marine sponge-pH and % balance	Pramod Prabhakar Moghe Vinita Vinay Panchanadikar Arvind Gajanan Untawale Vinod Kashinath Dhargalkar Baban Shraavan Ingole (National Institute Of Oceanography, Dona Paula, Goa-403 004, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/00	15-03-2009
9	232838	An improved process for the removal of phenols from Waste water Treatment	CSIR-IIP-Dehradun	Waste water Treatment	Amar Nath Goswami Sudip Kumar Ganguly Bachan Singh Rawat Surendra Mohan Aswal (Indian Institute of Petroleum, Dehradun-248005, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/44	21-03-2009
10	209448	An improved process for preparation of alum impregnated tea leaves carbon for defluoridation of drinking water	CSIR-ITRC-Lucknow	Defluoridation	Sanjay Kumar Prahald Kishore Seth Krishna Gopal (Industrial Toxicology Research Centre, Mg Marg, P.B. No. 80, Lucknow-226001, U.P. India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/58	30-08-2007
11	231768	A process for preparing arsenic free (<10 ppb) water from arsenic contaminated ground water and an equipment therefor	CSIR-CGCRI	Arsenic Filter	Sibdas Bandyopadhyay Dipali Kundu Somendra Nath Roy Himadri Sekhar Maiti (Central Glass & Ceramic Research Institute, Calcutta-700032, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 1/62	09-03-2009
12	241523	System and method for the treatment of wastewater	CSIR-NEERI	Waste water Treatment	Rakesh Kumar Sandeep Tayade And Rishi Narain Singh (National Environmental Engineering Research Institute, Nagpur, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 3/00	09-07-2010
13	242196	A device for the biological treatment of wastewater containing biodegradable solids	CSIR-RRL-Kerala	Waste water Treatment	Ajit Haridas Scientist, Regional Research Laboratory, Thiruvananthapuram (Kerla), India	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 3/00	18-08-2010



14	226259	A method for the preparation of modified bioadsorbent particles for the removal of toxic metals and other compounds from water	CSIR-RRL-Kerala	Heavy Metals-Bioadsorbent	Tholath Emilia Abraham Sudha Bai Radha Bai (Biochemical Processing & Waste Water Treatment Technology, Regional Research Laboratory (CSIR), Industrial Estate (PO), Pin Code-695 019, Kerala, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 3/00	16-12-2008
15	230551	An improved anaerobic reactor useful for treatment of biodegradable wastewater	CSIR-NEERI	Waste water Treatment	Anand Sureshchandra Bal Sandeep Yeshwantrao Bodkhe (National Environmental Engineering Research Institute, Nehru Marg, Nagpur, 440020, Maharashtra, India.)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 3/30	27-02-2009
16	209273	An improved process for the treatment to black liquor waste using marine sponge to produce potable water	CSIR- INSTITUTE OF OCEANOGRAPHY- Pune	Waste water Treatment-Marine sponge	Arvind Gajanan Untawale National Institute Of Oceanography, Donadian Vinod Kashinath Dhargalkar, National Institute Of Oceanography. Baban Shravan Ingole National Institute Of Oceanography. Pramod Prabhakar Moghe National Chemical Laboratory, Pune-411 008 Vinita Vinay Panchanadikar National Chemical Laboratory, Pune-411 008	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 3/32	23-08-2007
17	232512	An electronic device for on-line drinking water disinfection	CSIR-ITRC- Lucknow	Device- Disinfection	Vijay Kumar Sehgal Mahesh Chandra Tewari Jai Prakash Pratap Ajai Kumar Indrasan Industrial Toxicology Research Centre, Lucknow, A Constituent Laboratory of Council of Scientific And Industrial Research, New Delhi-110001	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C02F 5/00	17-03-2009
18	249319	An electrochemical method for the removal of arsenate from drinking water	CSIR-CERI	Arsenic removal	S. Pushpavanam G. Sozhan S. Mohan S. Vasudevan (Central Electrochemical Research Institute Karaikudi, India)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	C25C 1/00	17-10-2011
19	242687	An improved process for the treatment of paper mill black liquor to produce clean water	CSIR-RRL-Orissa	Waste water Treatment	Jitendra Nath Mohanty Bhaskara Venkata Ramana Murthy Hemanta Kumar Tripathy Regional Anil Kanta Tripathy Yerramselte Venkata Swamy (Regional Research Laboratory, Bhubaneswar-751013, Orissa)	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	D21C 11/00	04-09-2010
20	215771	An improved process for the treatment of spent wash using marine alga to produce potable water	CSIR-NCL-Pune	Waste water Treatment-Marine Alga	Pramod Prabhakar Moghe Vinita Vinay Panchandikar National Chemical Laboratory Pune- 411 008 Arvind Gajanan Untawale National Institute Of Oceanography, Dona Paula, Goa - 403 004 Vinod Kashinath Dhargalkar National Institute Of Oceanography, Dona Paula, Goa - 403 004	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001 India	D21C 11/00	03-03-2008
21	215383	A process for the preparation of a solid-state bio-sensor for urea	CSIR-BHU-Varanasi	Biosensor-Urea	Prem Chandra Pandey Chemistry Department, Banaras Hindu University, Varanasi. Rajiv Prakash Industrial Toxicology Research Centre, P.O. Box.80, Lucknow-226001. Ramesh Chandra Srivastava Industrial Toxicology Research Centre, P.O. Box.80, Lucknow-226001. Pralhad Kishore Seth Industrial Toxicology Research Centre, P.O. Box.80, Lucknow-226001.	Council of Scientific and Industrial Research Anusandhan Bhawan Rafi Marg New Delhi -110001, India	G01N 27/26	26-02-2008

CAPTURING THEMATIC INTERVENTION OF NANOTECHNOLOGY IN WATER, ENERGY AND AGRICULTURE SECTOR IN ASIAN COUNTRIES: A BIBLIOGRAPHIC APPROACH

Team: Dr. Madhulika Bhati (PI)

Funding Agency: Department of Science and Technology (DST), New Delhi

Objectives:

- Identify the nanotechnology and nanoscience-based publication analysis worldwide intervention in the agriculture sector

- Identifying top countries active in nanotechnology-based product development for agriculture industry
- Analyzing technology trends and collaboration analysis
- Identifying the prominent institute/stakeholders involved in the research

Major Findings/Achievements/Outcome

Bhati M., Bansal K., & Rai R. (2019). Capturing thematic intervention of nanotechnology in agriculture sector: A scientometric approach. In *Comprehensive Analytical Chemistry* (Vol. 84, pp. 313-359). Elsevier.

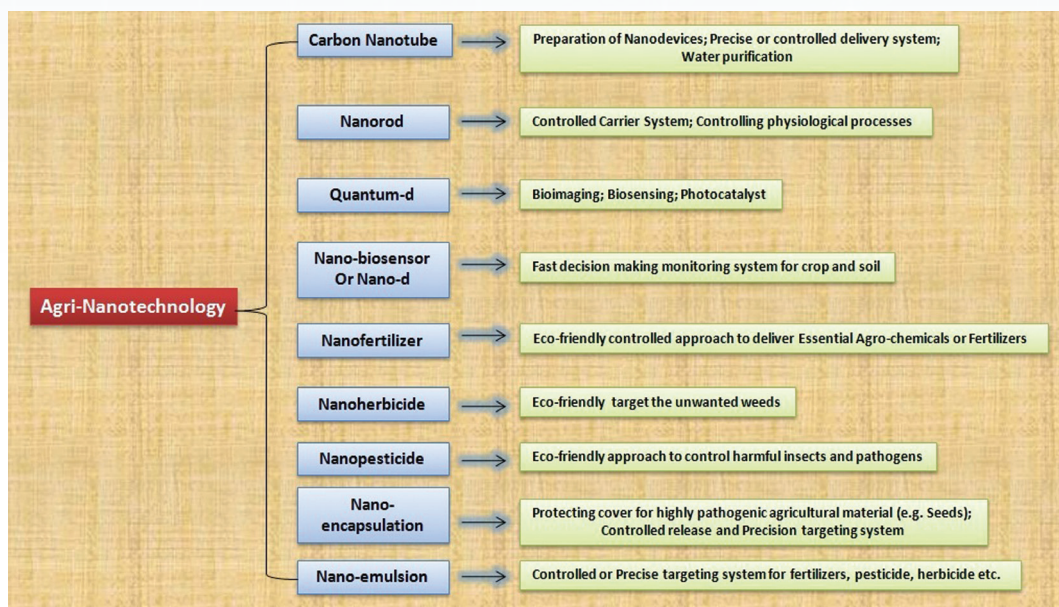
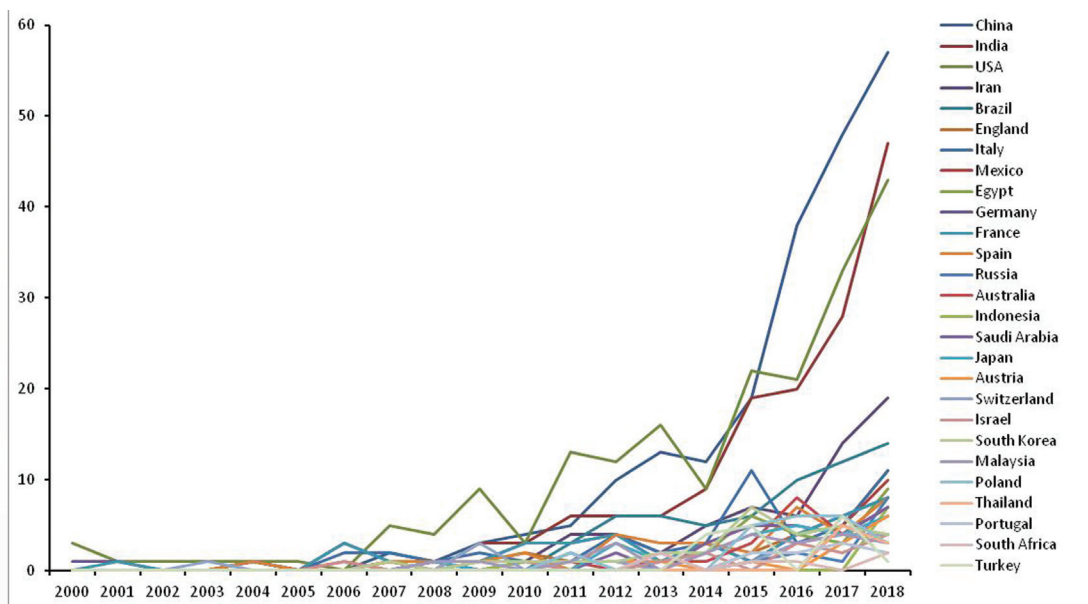


Figure 1: Major Agriculture Nanotechnology and their application



COLLABORATIVE PROJECTS

TECHNO-COMMERCIAL STUDY FOR PRODUCTION OF VALUE ADDED PRODUCTS FROM BY-PRODUCTS OF 2G ETHANOL BIO-REFINERY AT BARGARH ODISHA

Team: Dr. Yogesh Suman and Dr. Madhulika Bhati

In collaboration with CSIR-IIP Dehradun and CSIR-AMPRI Bhopal

Parent sponsoring agency: Bharat Petroleum Corporation Limited

Background: Bharat Petroleum Corporation Limited (BPCL) proposed to setup Second Generation (2G) Ethanol Bio-refinery in Odisha (Bargarh) for the production of Ethanol from Rice Straw. In the proposed Bio-refinery, the biomass would be converted to 2G Ethanol and some by products like CO₂, Ash, Lignin, Technical Alcohol and Fusel Oil would be generated in the process. BPCL proposed to carry out a market survey to study and recommend production of value added products from CO₂, Ash, Lignin, Technical Alcohol and Fusel Oil that would be generated from the Bio-Refinery; and to suggest suitable customers for the same at pan India level. Exports viability was also to be studied. It was required to recommend the most techno-economic process option, supply-demand scenario, pricing etc. for the bio- Refinery. Keeping in view the above background the summary of objectives may be given as below:

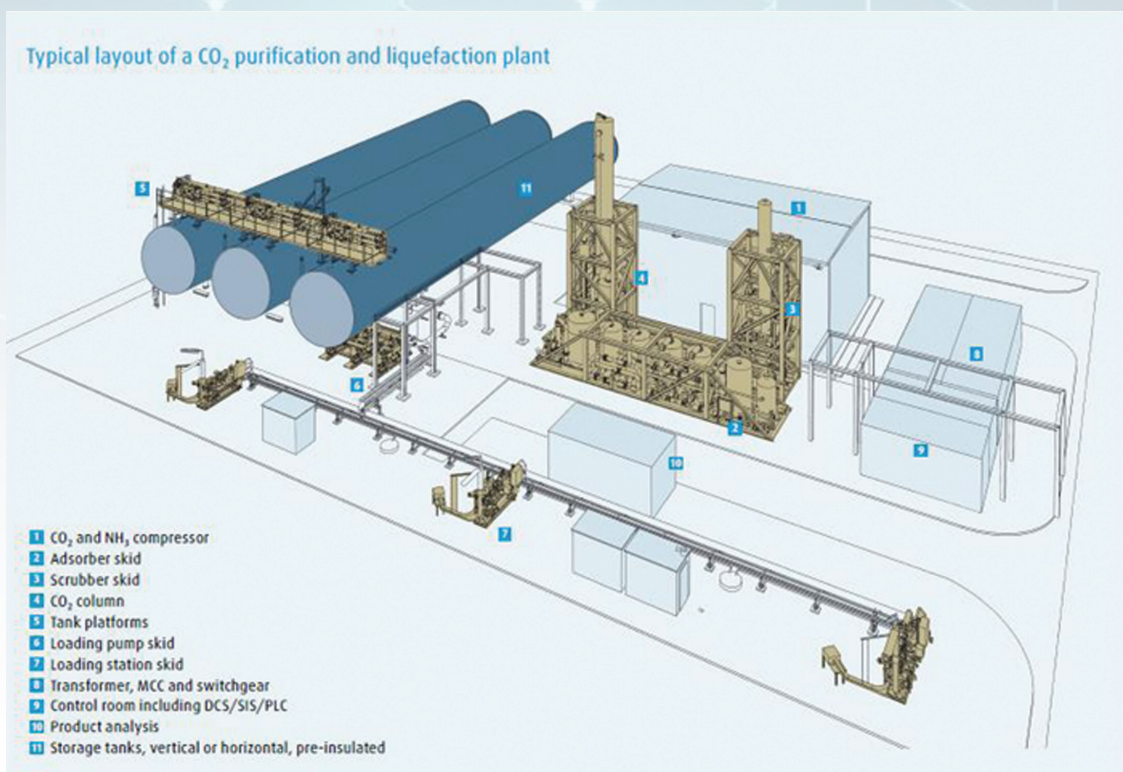
- To identify demand-supply scenario for liquefied CO₂ using both the primary and secondary data collection approaches
- To draw up a feasibility plan for BPCL for taking a decision about whether to go or not for establishing a CO₂ recovery plant for producing liquefied CO₂. This was based on Capital Expenditure, daily operational expenditure, profit accrued from the possible sale of the product and time required for recovery of investment.
- To develop understanding about the factors controlling the market price of the products produced using liquefied CO₂

- To identify storage requirements for liquefied CO₂
- To identify potential customers for liquefied CO₂ and preferred mode of liquefied CO₂ transport along with the cost
- To develop profile of existing major players involved in production of liquefied CO₂ and their geographical spread across the country

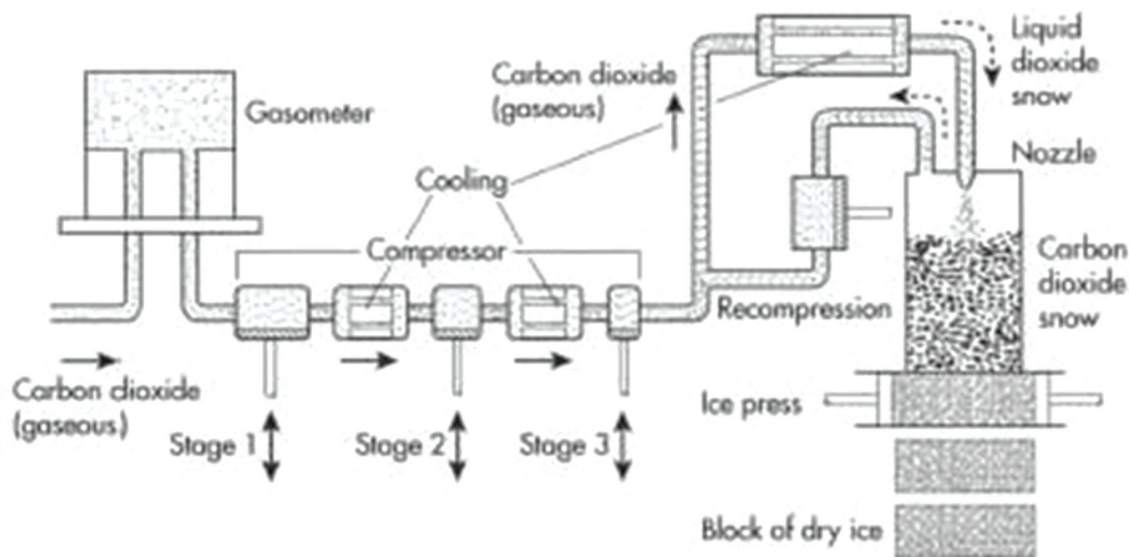
Major Findings/Achievements/Outcome

A detailed primary survey of liquefied CO₂ manufacturers and distributors was undertaken and visits to CO₂ recovery plants was made across the country. Discussions between potential CO₂ recovery plant manufacturers & distributors and BPCL officials were organized by CSIR team. The findings and outcomes of the project can be summarized as below:

- Based on the calculations and market assessments it was recommended that BPCL may go ahead with the installation of CO₂ recovery plant of capacity 60 MTPD (Metric Tonnes per day)
- The dry ice manufacturing unit may be added to this plant at a later stage once the demand for dry ice arises in the vicinity.
- Food grade CO₂ can be produced once proper demand arises by investing around additional ₹ 3 crores in CAPEX and minor increase in OPEX
- Profile of major manufacturers CO₂ recovery plants and distributors of liquefied CO₂ was generated
- Meeting of distributors for long term agreement with BPCL for sale of Fusel Oil and Technical Alcohol to be produced at proposed BPCL Plant was arranged and draft agreement was also discussed
- Various options were suggested to BPCL for choosing appropriate model for establishing CO₂ recovery plant and subsequent sales of liquefied CO₂ and other products produced from it, across the country
- Option for other by products like Fusel Oil, Ash, Lignin and Technical Alcohol were also studied and presented to BPCL for its consideration



Typical layout of CO₂ liquefaction plant, Source: Project Report



Dry ice production process, Source: Project report

EVALUATING THE MARKET DEMAND FOR THE THREE FRACTIONS OF BIOMASS - LIGNIN, CELLULOSE AND HEMICELLULOSE

Team: Dr. Yogesh Suman, Dr. Madhulika Bhati and Dr. Vinayak

In collaboration with CSIR-IIP Dehradun

Parent sponsoring agency: EID Perry India Ltd.

Objectives: EID Parry India Limited, a Chennai based private company, proposed to setup a fractionation unit that can convert sugarcane bagasse into cellulose, hemicellulose and lignin. They proposed to carry out a market survey to understand the supply demand scenario and selling price for industrial/ analytical grade cellulose, hemicellulose and lignin. In addition, it was required to provide an approximate cost of such a fractionation plant if available anywhere in the world. In view of the above the objective of the project may be summarized as below:

- To carry out a market survey to understand the supply demand and selling price for industrial/ analytical grade cellulose, hemicellulose and lignin.
- To provide an approximate cost of such a fractionation plant if available anywhere in the world

Major Findings/Achievements/Outcome

The project findings were able to throw light on various processes that may be used to convert whole lingo-cellulosic biomass into its various components namely cellulose, hemicellulose and lignin; along with their corresponding requirements and limitations.

- In India, the cellulose is mostly sold in the form of Micro Crystalline Cellulose (MCC) which is produced from wood/agro-based pulp. Therefore the Cellulose produced from Bagasse may not have that much market potential. The same was suggested to EID Parry India Limited.
- The cost of producing different streams such as cellulose, hemicellulose and lignin is different due to the differences in their separation process.

- Market prices of these items were found out using market survey
- Global cellulose market size was USD 219.53 billion in 2018 and is projected to reach USD 305.08 billion by 2026
- There are several applications of cellulose across diverse industries, including chemical, textile, polymer, food, pharmaceuticals, construction, paper & pulp, paints & coatings etc

TECHNOLOGY ENABLEMENT OF NORTH EAST INDIA

Team: Dr. Vipin Kumar (PI) and Dr. Madhulika Bhati (Co-PI)

In collaboration with All India Council for Technical Education (AICTE), New Delhi

The first project under the MoU between All India Council for Technical Education and CSIR-NISTADS to create an effective Academia-R&D interface platform for training, research and outreach is Technology Empowerment of North-East: Water, Energy and Communication Solutions (TENE-WECS) with the following Objectives:

- To develop projects and programmes with high science and technology inputs with active participation of local institutions
- To empower institutions in the north-eastern region through training, project development and project management for improved quality of research in critical areas like energy, water and communication

To catalyze and facilitate the process, CSIR-NISTADS organized three proposal development workshops in phased manner. The aim of these workshops have been to develop quality proposals by the institutions followed by evaluation and review of these proposals as per specification provided by AICTE. CSIR-NISTADS facilitated the participated AICTE approved institutes in the development of proposals as per specified format provided by AICTE. In all 56 institutes have participated in these workshops from the different states of North-eastern India. Statistics of Participation matrix indicated as follow

Table 1 : State wise Institutes participation in the workshops

Statistics		Participation			
State	Total	First	Second	Third	Total
Arunachal Pradesh	6	2	0	3	5
Assam	43	12	8	9	29
Manipur	4	1	0	3	4
Meghalaya	8	0	4	0	4
Mizoram	4	0	0	0	0
Nagaland	6	2	1	0	3
Sikkim	4	2	2	0	4
Tripura	9	0	4	1	5
	84	19	19	16	54

These workshops and a primary survey using the questionnaires to identify the needs of institutes in relevant areas and to cover the maximum institute the need of individual AICTE institutes in Water, Energy and Telecommunication sector. Expert in the workshop recommended the appropriate technologies for each participated institutes which can be categorized in as follow:

ES: Energy-Solar; EH: Energy-Hybrid; WH: Water Harvesting; WP: Water Purification; LAN: Information Technology.



TENE, Experts Meeting AICTE, New Delhi, October 04- 05, 2017



Proposal Development Workshop on Technology Enablement in Water, Energy and Communication sector (AICTE sponsored Project), 2017 in Jorhat, Assam November 02-05, 2017



Proposal Development Workshop on Technology enablement in Water, Energy and Communication sector (AICTE sponsored Project), 2017 in North Eastern Hill University, Shillong, December 21-22, 2017



Proposal Development Workshop on Technology enablement in Water, Energy and communication sector (AICTE sponsored Project), 2018 in Cotton University, June 05-06, 2018.

Following milestones were achieved during the project tenure:

- (i) Proposal development workshops at three locations: Jorhat, Shillong and Guwahati
- (ii) Three expert meetings with experts from different CSIR and other institutions
- (iii) Mobilization of project teams from 56 AICTE Institutions from eight states
- (iv) Expert Meeting at AICTE, New Delhi for technical specifications
- (v) Survey for site characterization and prioritization of 90+ institutes in the north east
- (vi) Expression of Interest (EOI) from around 20 firms

The project was thus ready to proceed to its next logical phase of procurement. A proposal for installations of solar and water units at 10 institutions along with training through CSIR-NISTADS to catalyze and to create a proof-of-concept may be done in the second phase.

NISTADS-KAZIRANGA UNIVERSITY JOINT PROGRAMME

Team: Dr. L. Pulamte (co-ordinator), Dr. Tabassum Jamal, Dr. Sujit Bhattacharya, Dr. Mohd. Rais, Dr. Kasturi Mandal and Mr. Avinash Kshitij

Objectives: This project was initiated subsequent to the signing of MoU with Kaziranga University, Jorhat (Assam). The scope of the MoU includes jointly conducting

programs of academic and societal values with focus on the North East; promoting a culture of multi-disciplinary research; jointly organizing national and international academic events; organizing students internship programs and faculty improvement programs; developing project proposals; jointly undertaking outreach programs; jointly setting up North-East Science, Technology and Entrepreneurship Platform; and jointly establishing Centre for Socio-Economic Studies, all for the inclusive and sustainable development of North-east India.

Major Findings/Achievements/Outcome

North East Sustainable and Inclusive Development Summit (NESIDS) 2018 was jointly organized by CSIR-NISTADS and Kaziranga University (KU) at Kaziranga University, Jorhat during 26-28 April, 2018. NESIDS-2019 with Bio-Economy as the major focused theme was jointly organized during 6-8 March, 2019 at KU. The three project proposals initiated by Kaziranga University faculty members were studied. Suggestions for improvement were made and potential sponsoring agencies were identified for these project proposals. A draft concept note for establishing Centre of Excellence for Socio-Economic Studies (CESES) at KU was prepared by CSIR-NISTADS. Initiatives were taken for establishing North East Science, Technology and Entrepreneurship Platform (NESTEP) at the University. The scope of training KU students and faculty members in CSIR and another national labs was explored.

CSIR FUNDED PROJECTS

ECONOMIC IMPACT ANALYSIS OF WAX PRODUCTION TECHNOLOGY

Team: Dr. Yogesh Suman; Dr. Vinayak and Dr. Kasturi Mandal

Objectives: The project was done to assess Economic Impact of paraffin wax production technology developed by CSIR-Indian Institute of Petroleum (IIP) and transferred to Numaligarh Refinery Limited (NRL), Assam. The objective of the project can be summarized as below:

- To assess the impact created by the technology in terms of:
- Revenue generated through the sales of the paraffin wax produced using the technology
- Employment generated due the commercialization of the technology
- Environmental benefits brought in by the commercialization of technology
- Import substitution achieved due to commercialization of technology
- Earning of foreign exchange through export of the product produced using the technology
- Business opportunities created for the industry at national and global level
- To find out industry feedback about paraffin wax technology
- To suggest future expansion plan for sale of Paraffin Wax
- To find out the challenges faced by CSIR in successful commercialization of the technologies developed by it
- To come up with policy suggestions to enhance the process of commercialization of CSIR technologies.

Major Findings/Achievements/Outcome

The field study undertaken during the project was able to bring to light many interesting findings in terms of the impact created by the technology which earlier were not in the knowledge of the technology developers at CSIR and also not in the knowledge of the industry. It also brought

out many useful facts which policy makers at national level can use for stopping the import of harmful wax in the country. It also provided many useful insights which if implemented at CSIR Level can make more effective the process of technology development and its subsequent commercialization by the industry.

The findings of the project were summarized in the form of report submitted to CSIR. The salient findings can be summarized as under:

- The technology helped the unemployed youth and women in North Eastern (NE) Region in setting up MSME/Cottage industries
- The technology resulted in generation of revenue for industry through the sales of paraffin wax produced using the technology
- The technology helped in creating and expanding the customer base for industry
- The technology helped in generating revenue for traders and retailers who bought paraffin produced by NRL using the technology
- The technology helped in reducing country's dependence on imported wax
- The technology helped in tackling the challenge of wax import from China
- The technology helped in increasing export of wax from India making it a recognizable player at global level
- The technology helped in generation of employment
- The technology helped in increasing the GDP
- The technology was able to improve the environmental surroundings for NRL by eliminating the use of furnace from solvent recovery system, thereby helping NRL to reduce carbon foot print
- The technology was able to trigger further R & D which was undertaken by the industry.

Policy recommendations for CSIR: The project provided many useful and positive insights about the commercialization of technologies developed by CSIR. These may be summarized as below:

- CSIR should focus on need based technology development involving the potential manufacturer/industry right from beginning of the technology development process
- CSIR should regularly take feedback from the manufacturer who is involved in the

manufacturing of the product using its technology

- There should be a clause in the technology transfer agreement that the manufacturer would provide the data on the sales revenue earned using CSIR Technology
- There should be mandatory periodical meetings between developers scientists of CSIR and the manufacturer
- CSIR should help the manufacturer to develop suitable market expansion plan for the product produced using its technologies.



Match box making factory using paraffin wax at Thirumangla, Tamil Nadu



Participants of the training programme organized by industry (Numaligarh Refinery Limited) for candle making in NE Region



Match box making factory using paraffin wax at Thirumangla, Tamil Nadu



Candle making factory using paraffin wax at Tuticorin, Tamil Nadu

ECONOMIC IMPACT ASSESSMENT OF BENZENE RECOVERY TECHNOLOGY

Team: Dr. Yogesh Suman; Dr. Vinayak and Dr. Kasturi Mandal

Objectives: The objective of the project was to assess Economic Impact created by technology developed to recover high quality pure benzene from gasoline. The technology was developed by CSIR-Indian Institute of Petroleum (IIP) and transferred to Reliance Refinery Limited Jamnagar (RRJ). The objectives of the project may be summarized as below:

- To bring out the challenges faced in development and commercialization of the technology.
- How the technology enabled industry to produce high quality pure benzene and environment friendly gasoline.
- The environmental benefits and reduced health risks brought in by the technology.
- To find out the impact created in terms of foreign exchange earned through export of product developed using the technology.
- To find out the Investment made by the industry to start production using the technology.
- To find out the revenue earned by the industry through selling of pure benzene recovered from gasoline.
- Business opportunities created for the industry at national and global level.
- To find out how technology helped the industry in earning national and international brand name.
- To find out the contribution made to GDP of the country as a result of the production made using the technology.
- To find out the contribution made to the export earnings of the country through the selling of the product abroad.
- To find customer base created for the industry.
- To find out the challenges faced in successful commercialization of the technologies developed by CSIR.
- To come up with policy suggestions to enhance the process of commercialization of CSIR technologies.

Major Findings/Achievements/Outcome

The project brought to focus many unforeseen outcomes and challenges faced by CSIR and by industry. The most important challenge faced during this project was the availability of data on revenue earned by industry by selling the product produced using CSIR technology. While it is difficult to collect this data, CSIR should devise some structured mechanism to collect this data on revenue earned by industry using its technology. The other findings of the project may be summarized as below:

- The technology for benzene recovery from gasoline helped industry to create substantial revenue for itself.
- It helped the industry to capitalize on the opportunities created through environmental regulatory agencies.
- It also helped industry in enhancing its brand name at national and international levels, in the field of petrochemicals; thereby enhancing India's image as a recognizable player at global level.
- Another important contribution of the technology was the addition to foreign exchange earning of the country through export of high quality gasoline having very less amount of benzene in it.
- The use of technology by the industry has established a successful example of public private partnership between Government funded R & D institution and industry.

Policy recommendations for CSIR

This study has thrown up many insights as well which could be useful for CSIR. These may be summarized as below:

- CSIR would be to keep in touch with the recipient industry even after the technology has been transferred to it.
- There should be mandatory periodical meetings between developer scientists of CSIR and the manufacturer to discuss the possible strategies for ensuring market sustenance of the product. This would help in keeping the technology up to date with the market and industry requirements.
- CSIR should keep a provision of royalty payment on the sales of products produced

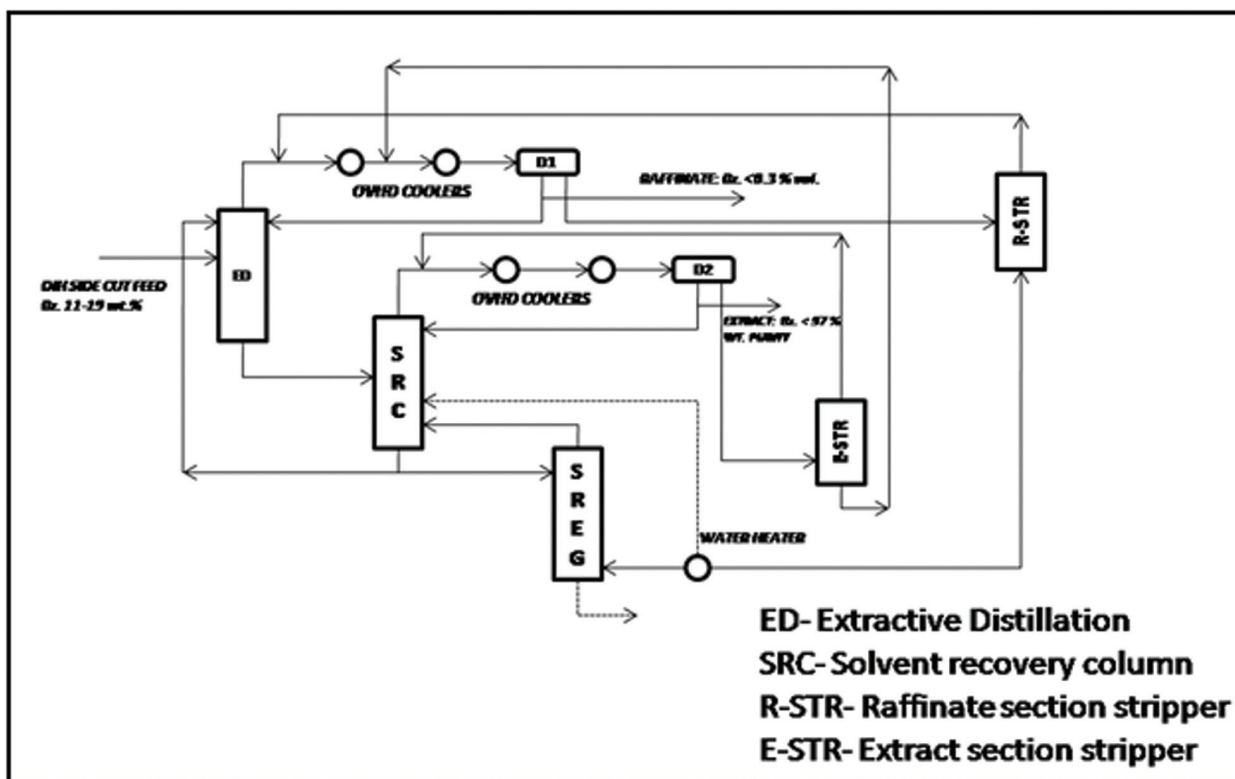
using the technologies developed by it. This should be in addition to the one time payment of license fee paid by the industry at the time of technology transfer.

- CSIR should make sustained and organized efforts to collect data related to revenue earned by industry through the sales of the products developed

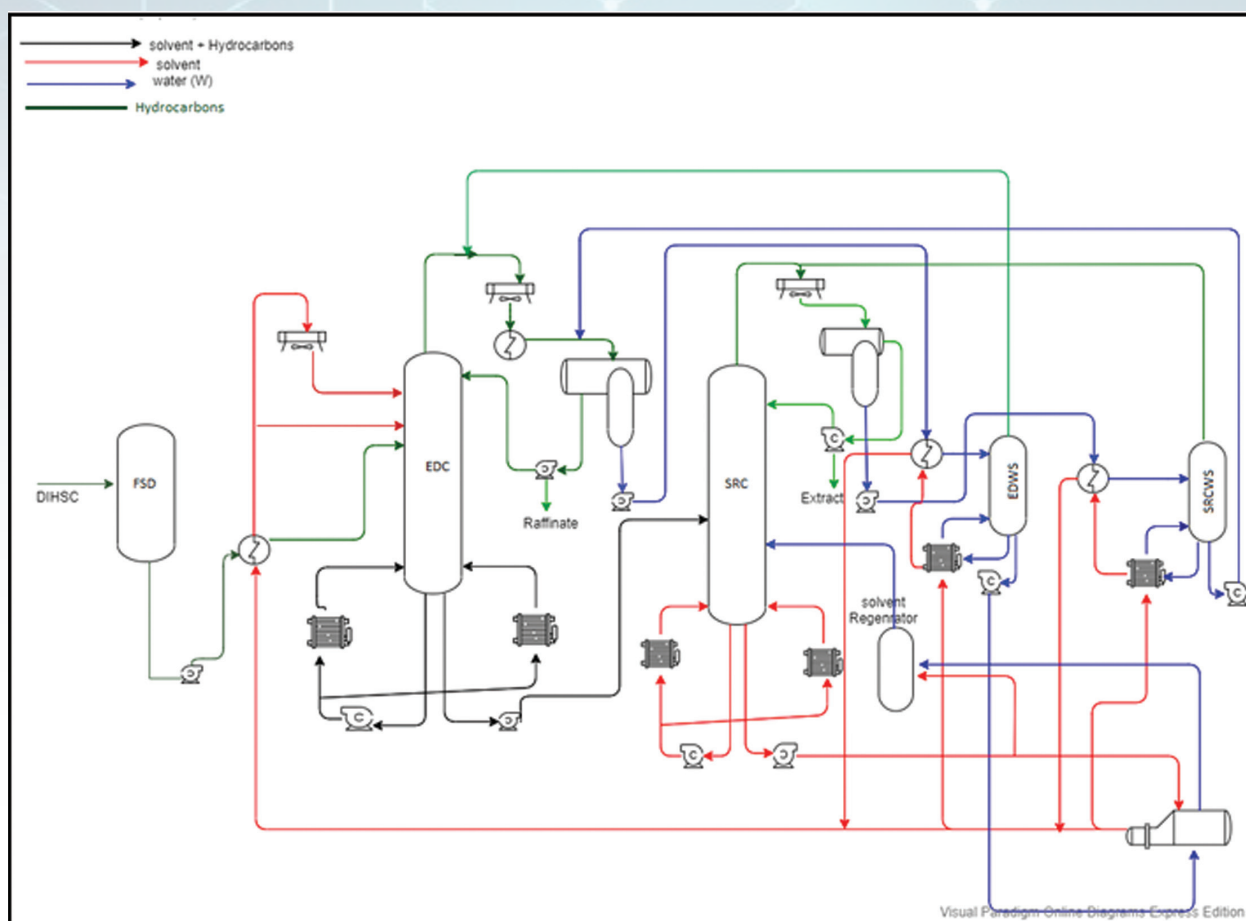
using its (CSIR's) technology. Industry might feel reluctant to provide such data but they should be convinced that this data would not be shared by CSIR with any third party but would be used only for highlighting CSIR's contribution in the socio-economic development of the country.



Benzene Recovery Unit *Source: ril.com*



Process Configuration, *Source: CSIR-IIP*



Process flow diagram, Source: CSIR-IIP

ECONOMIC IMPACT ANALYSIS (EIA) OF WATERLESS CHROME TANNING TECHNOLOGY

Team: Dr. Madhulika Bhati, Dr. Shiv Narayan Nishad and Mr. J.S. Narula

Objectives: CSIR-NISTADS is proposed to carry out the systematic, credible potential socio-economic impact of Waterless Chrome Tanning Technology developed by CSIR-CLRI. Project team identify and estimate of the population to be affected/benefited, an Estimate of the potential client base of the selected technology based on secondary data, an estimate the market potential of the technology, Quantification of Reduction of water foot print using this technology, Industrial feedback. Primary survey has been conducted; discussion meeting has been organized with industrial people for more insight about the technology, challenges/issue/by industries. Detailed case studies have been done through telephonic interview/ one to one meeting.

Major Findings/Achievements/Outcome Waterless Chrome Tanning Technology

CSIR-CLRI has developed “Water-less Chrome tanning technology” that is environment friendly technology for leather production with reduced use of Chromium in the process and zero use of water in the tanning process. This technology also reduce the water intake, waste water volume, chloride and total dissolved solids load in waste water. Penetration and fixation is achieved equivalent to conventional chrome tanning method. In addition, pickling and basification processes are averted. The quality of leather is also found to be better than conventional chrome tanning method. A tannery of processing 10 tons of skin/hide per day will be able to save more than 70 lakhs per year by using water-less chrome tanning technology.

Distribution of Water-less Chrome Tanning Technology

Total 61 tanneries out of 2000 tanneries have adopted Water-less Chrome Tanning

Technology for the tanning process in India. Mainly, CLRI has distributed this technology in Kanpur, Jalandhar, Erode, Trichy and Ranipet cluster.

CSIR-NISTADS team interacted with these industrial people through telephonic discussion, industrial visit as well as by conducting four discussion meetings. A series of discussion meetings and one to one interaction has been held with tanners

Final Recommendations CSIR-NISTADS

There is a need to un-learn the old process to re-learn this new technology and understand that new thing has emerged and it is necessary to adapt to this universal system.

- **Technology is a promising solution for significant reduction in water foot print and waste water discharge, reduction in chemical. As this is a process technology, therefore it requires educated industrial people** working on ground. This understanding needs to be created in the industry environment. Small Regular trainings to the supervisors and other workers of the industry and systematic follow-up from both the sides and with little more technical tailoring and tweaking in the process, the tanners will be able to adopt WCTT in a better way.
- Since there are issues regarding mismatching of drum capacity with motor/gear (resulting in alleged rise of temperature, burning of motor, etc.), it is imperative that thorough inventory of facilities available in each small tannery opting for WCTT be accurately documented. This will help in identifying and resolving bottlenecks, if any, before implementation of WCTT in the tanneries.
- Apprehension/ observations about the decrease in production are to be removed by sensitizing small tanners.
- Since most of small tanners sell wet blue to medium and large tanners, it is important

that forward-backward linkage is firmly established to remove any doubt about the quality of wet blue prepared by using WCTT particularly dark colour.

- An intensive interaction between CLRI and small tanners and demonstration in 4-5 small tanneries may be organized to allay all fears of small tanners.
- Pilot demonstration is not enough to build the trust, proper handholding required
- A proper feedback assessment mechanism is needed to be established.
- Continuous R & D is required based on the feedback received from Tanneries.
- A trouble shooting manual should be developed by CLRI using the feedback of industries and identification of common issues faced them. During the survey it came to the notice, some industry faced the same problem, still they manage to produce good quality leather through technical know-how of the operator. These industries may help to sensitise the other small tanner.
- Development of trouble shooting manuals in regional languages.

Technology in true sense is an ideal example of economic growth coupling with environmental gain. However, a need to establish a robust implementation mechanism was felt and actions required immediate attention from CLRI and from industry side are as follow;

- Development of dynamic web portal or social media tools such as Facebook, WhatsApp Group, etc having detailed information to resolve the following existing issues faced by industry and frequent updating of web site based on the issue /s raised by industries in the future.

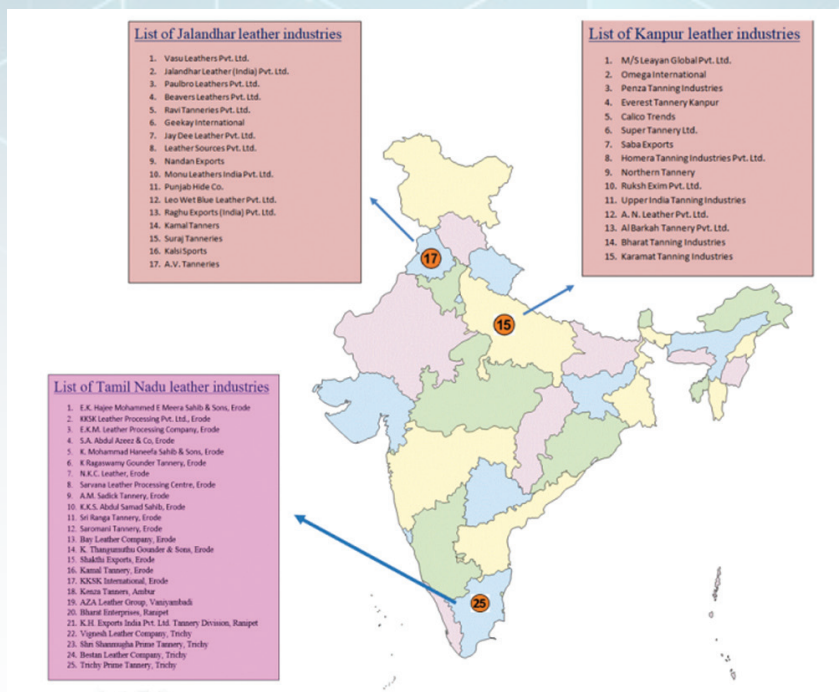


Figure 1. Geographical Distribution of Tanneries

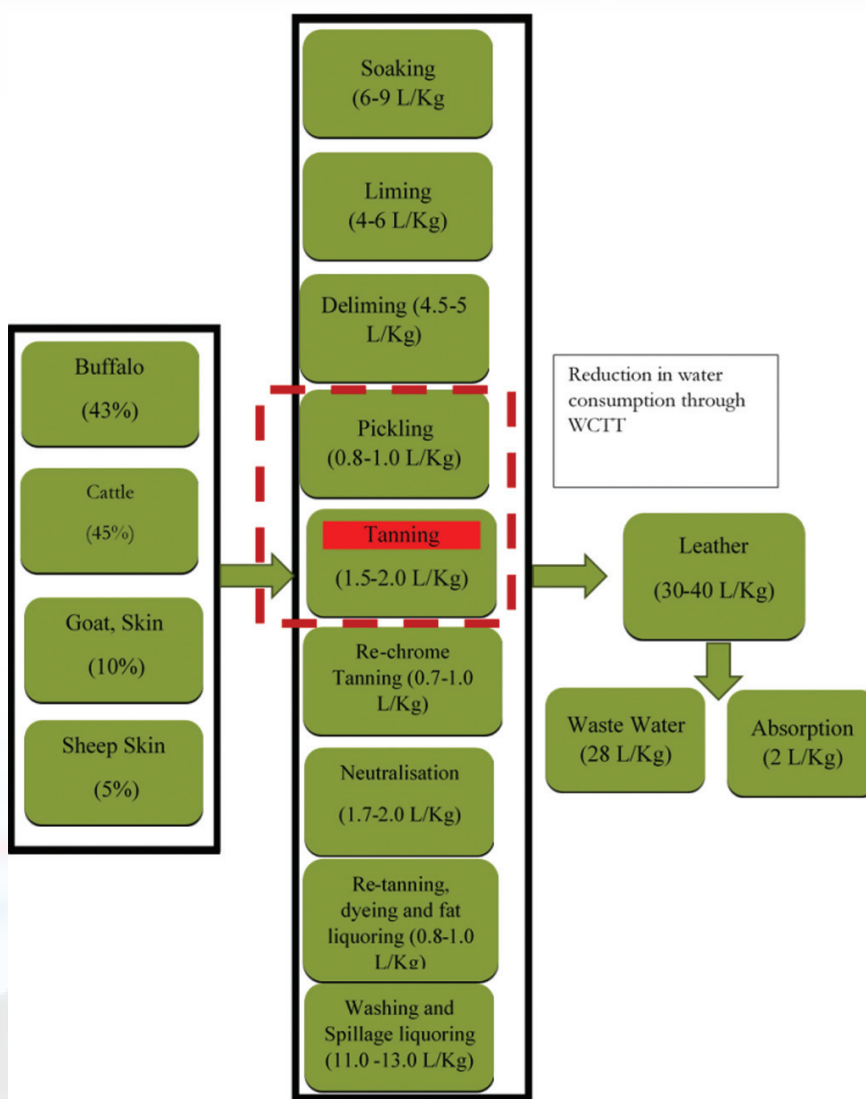


Figure 2. Tannery Process involved

ECONOMIC IMPACT ANALYSIS (EIA) STUDY OF CSIR AROMA MISSION

Team: Dr. Suman Ray (PI); Sh. Avinash Kshitij (Co-PI); Dr. Kasturi Mandal; Dr. Sandhiya Laxshmanan and Dr. Anil Kumar

Objectives: “Socio Economic Impact Assessment of CSIR Aroma Mission study aims:

- to assess the socio-economic impacts assessment of CSIR Aroma Mission in terms of its reachability, income generation, profit/loss by the farmers upon adoption of Aroma Mission.
- to assess the challenges to farmers upon adoption of Aroma Mission and to provide inputs/suggestions for its up scaling and replication.

CSIR Aroma mission has implemented aroma crop cultivations in regions/clusters across the country where the technology interventions work best in specific circumstances/conditions of that particular regions or village. The socio-economic impacts assessment deals with economic and social impacts of Aroma Mission in India with developing economies. The clusters selected for the field survey were based on the introduction of new intervention in the challenging areas such as barren, fallow up-lands, non-irrigated and scanty rain area, rainfed, coastal, flood affected, farmer suicides, drought affected, water scarcity, Aspirational districts, man-animal conflict, wild animal menace. Focus on the market analysis of the Aroma products developed by the farmers was taken into consideration to measure the impact.

Major Findings/Achievements/Outcome

- Farmer's income from crop produce: Comparative analysis based on Benefit-Cost analysis (B-C ratio) of aroma cash crops versus conventional crops shows the pattern of increased B-C ratio for aroma cash crops compared with that of conventional crop (Figure 1).
- Benefit of aroma cash crop cultivation has reached to all category of farmers i.e. marginal (18%), small (23%) farmers besides medium (24%) and big (35%) farmers (Figure 2).

- Annual income (farming and other sources) increased after Aroma Mission for all category of farmers and contribution of aroma crop cultivation is 60% to the annual income generation of the farmer household as compared to just 40% contribution to annual income of the farmer from conventional farming (Figure 2).
- Higher income generation of the farmer's leads to an improvement in the livelihood of the farmers as revealed by the socio-economic status of the farmers associated with Aroma Mission in terms of household assets, education, and access to internet (Figure 3).
- Aroma Mission has strengthened the livelihood condition of farmers and created employment opportunities.
- About 400 tribes benefitted from new variety of Lemongrass cash crop in Anamalai Tiger Reserve, Tamil Nadu where the tribes do not have any other alternative for income generation.
- Vetiver cultivation provides a stable income source to farmers in tsunami affected zone-Cuddalore, Tamil Nadu since Vetiver cultivation remains unaffected due to tsunami.
- Revival of Geranium cultivation in Ooty, Tamil Nadu after about 30 years is a boost to farmer's income generation.
- Educated youth returning back to farming due to encouraging income generation from aroma cash crop may reduce the burden on urban areas.
- Women empowerment and next generation of women empowerment under Aroma Mission has boosted economy of rural women:
- Total ~300 Women Self Help employees at Janseva Foundation, Loni BK, Tal. Rahata District Ahmednagar, Maharashtra, India.
- One tonne of flowers generate-one lakh incense stick (agarbatti), from the flowers offered at Sai Baba Temple each day and its sale is 100% back in the temple at their outlets. This gives them ~ 7,000/month salary to each employee. The incense stick (agarbatti) technology is given to them under CSIR Aroma Mission.
- Next generation women empowerment-1/10th of the salary goes to their daughters account.

- Indirect effect of Sai Nirmalaya Recyclers on farmer's income:
- Women empowerment through recycling of flowers offered at Sai Baba temple has enhanced the income of the farmers doing cultivation of flowers (e.g rose/marigold) from Rs. <10,000/month to Rs. >40,000/month.
- Development, nurturing and positioning of essential oil-based aroma industry leading to creation of an ecosystem benefitting the industry, farmers and next generation entrepreneurs (Figure 4).
- Industry response (n=13) reflected hike in the sales section of aromatic products and able to meet the demand of the market with much improved quality of essential oils (Figure 12.5). 21-40% of the demand is met by product purchase through Aroma Mission. There is 21-40% increase in percentage of growth revenue and 41-60% of total aromatic product is able to get exported in the international market after Aroma Mission.
- Entrepreneur's feedback: More than 75% entrepreneurs generated through Aroma Mission are successful as developing into industry.
- Skill development of all category of farmers (marginal, small, medium and big farmers) in cultivation of aromatic cash crops to production of essential oil and its value addition-a self-sustainable agriculture practice is adopted under Aroma Mission.
- Environment conservation due to adoption of aroma cash crop cultivation is a key advantage over conventional crop cultivation (low or negligible input of insecticide/fertilizer reduce the depletion of soil fertility, Vetiver roots increase the soil fertility and prevent soil erosion are few examples).
- Increase in the trend of diffusion of technology intervention under Aroma Mission as indicated by increase in the number of farmers adopting aroma crop cultivation and increase in the area under aroma crop cultivation since 2016 clearly demonstrate successful diffusion of this technology.
- The mission is a technological breakthrough due to enhanced resource use efficiency, reduced cost of production and improved resilience of agriculture to extreme climatic changes. However, it is important to overcome the farmer's distress due to price instability of the aroma oil.

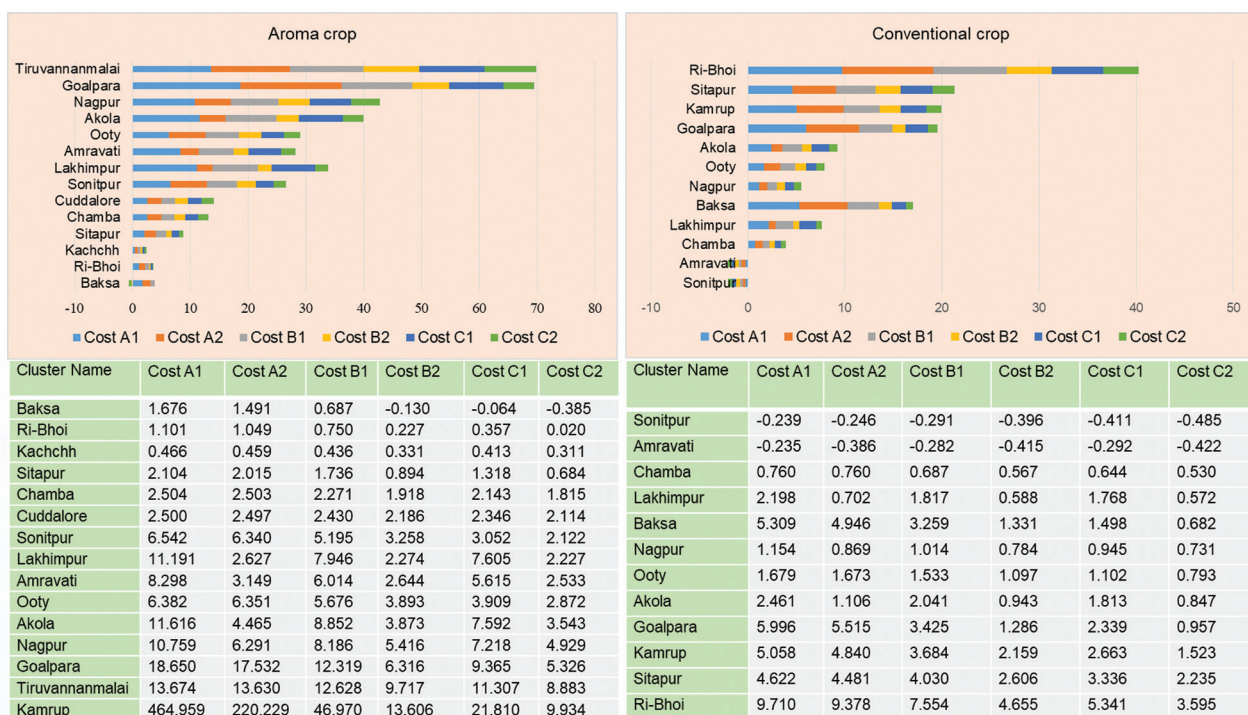


Figure 1. Cost-Benefit analysis (B-C ratio) of aroma cash crops versus conventional crops.

Size Group	Annual income before Aroma Mission (Rs.)	Annual income after Aroma Mission (Rs.)
Marginal Farmer	<50,000	50,000-2 lakh
Small Farmer	50,000-1 lakh	1 lakh-2 lakh
Medium Farmer	50,000-1 lakh	50,000-4 lakh
Big Farmer	50,000-2 lakh	2 lakh-6 lakh

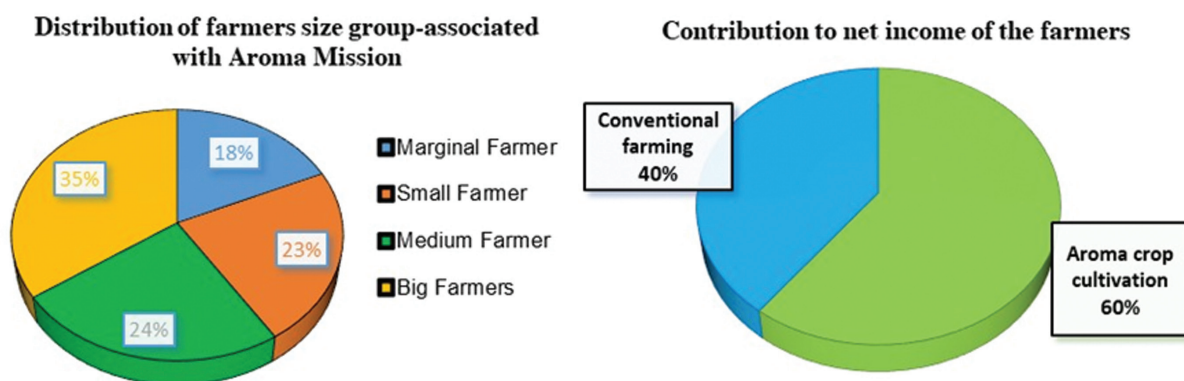


Figure 2. Annual income and size distribution of the farmers associated with Aroma Mission.

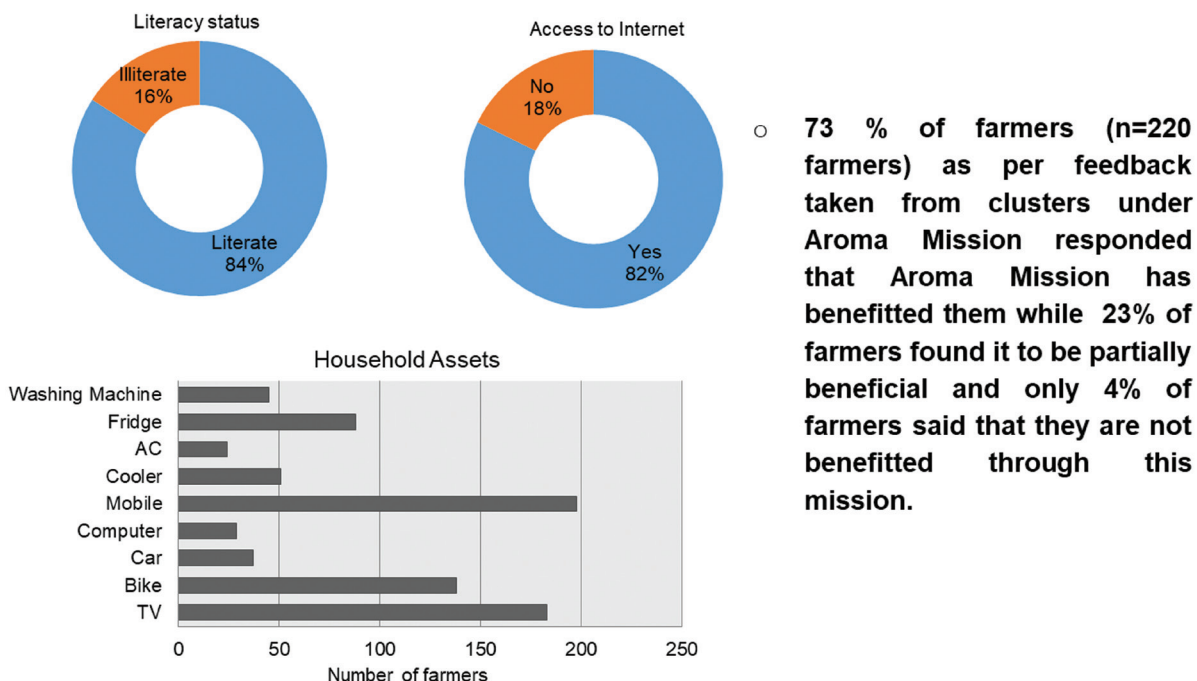


Figure 3. Socio-economic status of the farmers associated with Aroma Mission.

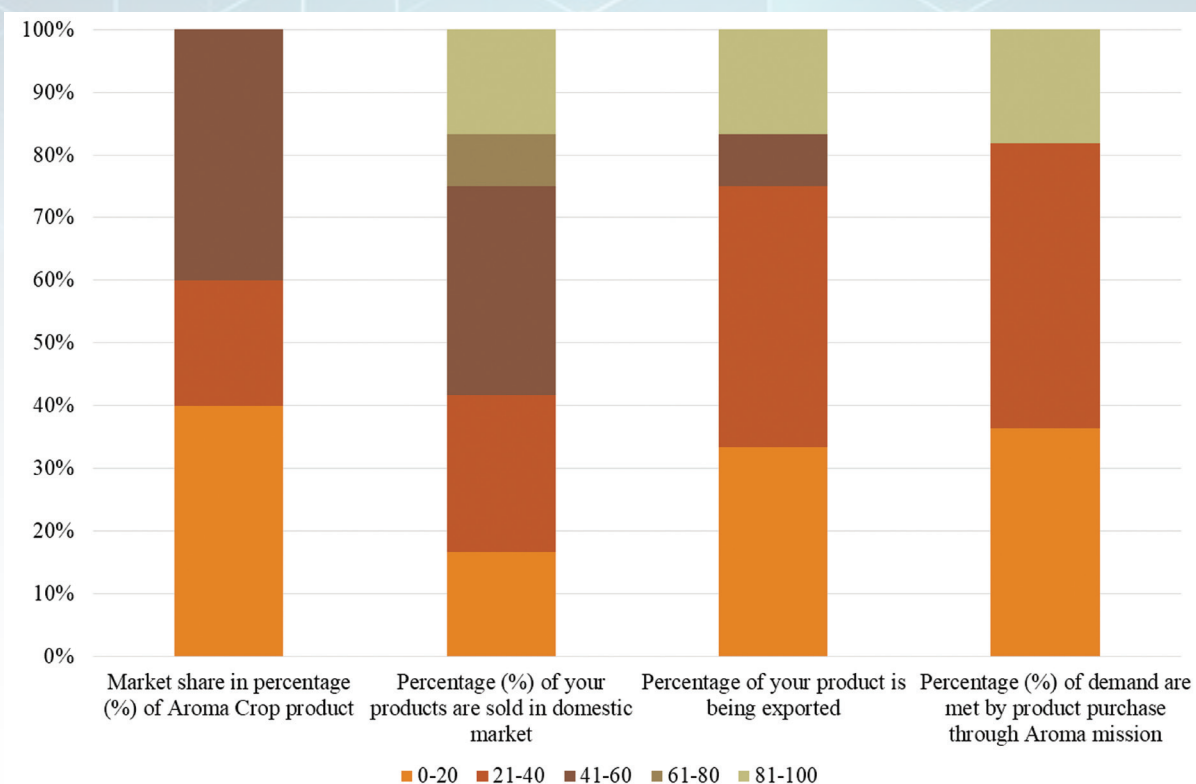


Figure 4. Feedback from industries associated with Aroma Mission (primary survey).



Image: Distillation unit installed under CSIR-Aroma Mission at Anamalai Tiger Reserve Extraction of lemongrass oil by tribes ; A) Distillation unit view, B) Distillation unit operated by a trained farmer, C) Oil collection process and D) farmer holding collected Lemongrass oil.

CSIR-Harnessing Appropriate Rural Interventions and Technologies (HARIT) Projects

INTERVENTION FOR HERBAL HEALTH AND NUTRITION

Team: Dr. Suman Ray (PI); Dr. Kasturi Mandal and Dr. Madhulika Bhati

Objectives: To install Ayur vatika at schools/colleges/public offices of Aspirational Districts of Uttarakhand (Haridwar/Udham Singh Nagar).

- To create awareness on the role of herbs for primary healthcare among students and public.

To provide comprehensive informatics through website at <https://nistads.res.in/herbs/csirnistad/>.

Major Findings/Achievements/Outcome

Web portal for Holistic Health developed by CSIR-NISTADS (<https://nistads.res.in/herbs/csirnistad/>).

- Discussion Meeting on dissemination of Health and nutrition awareness through 'Ayur Vatika': a herbal vertical garden (with web portal for holistic health), 19th March, 2019, at CSIR-NISTADS Conference Hall. Objective of conducting this workshop was to have discussions on usage of herbal medicine and their implementation in Indian Society. Experts in the field of herbal medicine and science took part in the discussion and gave informative lectures. Following eminent personalities have participated in the workshop and gave their insights:
 - o Dr. D. K. Aswal (Director CSIR-NISTADS, New Delhi)
 - o Dr. P. Goswami (Director IFSA, Bengaluru and Former Director CSIR-NISTADS, New Delhi)
 - o Dr. Poonam Kakkar (Chief Scientist IITR Lucknow)
 - o Dr. Shivani Ghildiyal (Assistant Professor All India Institute of Ayurveda, New Delhi)
 - o Dr. CH. V. Rao (Senior Principal Scientist, NBRI Lucknow)
 - o Dr. Bhavya Bhargava (Scientist, IHBT Palampur)

- o Dr. Naresh Kumar (Senior Principal Scientist, CSIR-NISTADS, New Delhi)
- o Dr. Chandra Mohan (Professor, Hamdard Institute of Medical Sciences, New Delhi)

- Awareness on the role of herbs for primary healthcare among students and public has been created through demo lectures/interactive sessions/meetings/publicity kit distribution (with brochures on the role of herbs in health and nutrition) involving students and teachers of different schools/college of Haridwar District.
- Key gaps were identified in health and nutrition scenario of school kids of Haridwar through the primer survey (Feedback of the students, n=224). Following are the key gaps identified in health and nutrition scenario of school kids of Haridwar through the primer survey (Figure1, Feedback of the students, n=224):
 - o Low BMI in students during the growth phase.
 - o Students missing school due to various illness
 - o More than 55% students were hospitalised at least once in the last 1 year.
 - o The cause of hospitalization and missing school were common diseases.
 - o Preference of participants towards Allopathic medicines and neglect of Ayurvedic herbal medicines by larger population.
- Solution of the gaps identified, through Ayur Vatika: Students are having low BMI due to lack of nutrition and frequently falling ill. Moreover, students are losing the precious time of school due to common illnesses. The hospitalization also incurs high economic burden on the student's family. All these issues can be solved up to a larger extent by the Ayur Vatika. As it will provide the source of herbal medicine in the local vicinity so that people will have access to it. Moreover, day to day usage of the herbal medicines will bring down the incidence of morbidity in the students and will surely increase the days of education a student gets at school. Awareness and information of herbal medicines will make them prefer the ayurvedic medicines more and save money and time. All of the efforts

made in the Ayur Vatika will bring positive changes in the lifestyle of people and would improve the health of the nation. If a child remains healthy during the growth period he'll be able achieve his full potential in life.

- To conclude, “Studies on sustainable integration of herbal health in conventional healthcare system of India are recommended to highlight the challenges in adoption of herbal medicines as preferred medical system.”

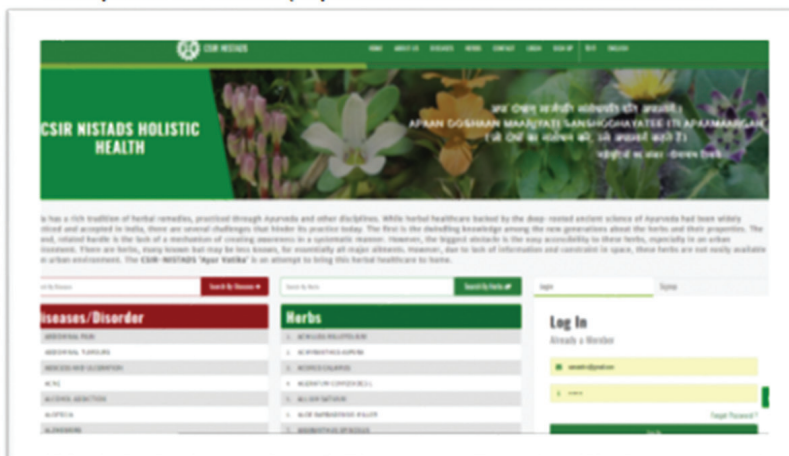


Image Awareness on the role of herbs for primary healthcare among students and public through demo lectures/ interactive sessions/meetings/publicity kit distribution involving students and teachers of different schools/college of Haridwar District

Proof of concept for herbal health: Ayur Vatika with automated water irrigation system



Web portal for herbs (<https://nistads.res.in/herbs/csirnistad/>)





Dignitaries and participants of the workshop on Ayur Vatika and Holistic health.

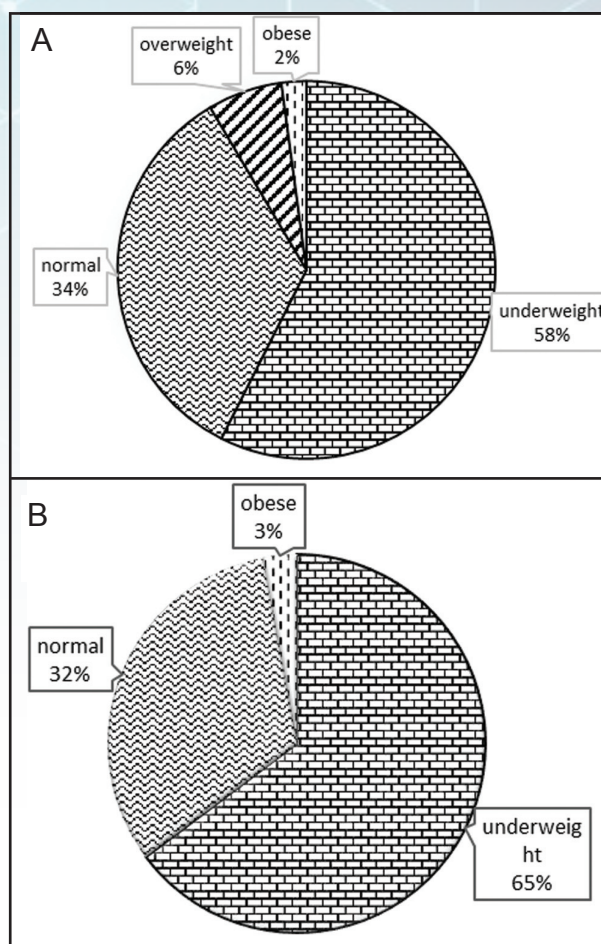


Figure 1. BMI status of the school kids of Haridwar (Feedback survey of the students, n=224).

INCREASED CROP PRODUCTIVITY AND ENHANCED INCOME GENERATION THROUGH SMART MICRO IRRIGATION SYSTEM (MORE YIELD PER DROP)

Team: Dr. L. Pulamte (PI) and Dr. Kasturi Mandal

Objectives:

- To increase crop productivity and income generation through the use of smart micro irrigation system in dryland areas.
- To enhance water use efficiency in dry land farming resulting in savings in the use of irrigation water and electricity, thereby reducing water and energy footprint in agriculture.

- To promote and disseminate smart micro irrigation technology for agricultural development.

Major Findings/Achievements/Outcome

The primary objective of the project was to develop a basic variant from the prototype “Water-efficient Automated Smart Irrigation System” (WASIS) and install this variant in the fields of the beneficiary-farmers. However, this could not be achieved because of non-release of the project fund for capital expenditures on which most of the project activities depended. As a result, all the objectives of the project could not be realized.

CSIR-JIGYASA Programme

Nodal: Dr. Mohammad Rais

The Jigyasa programme is inspired by Prime Minister Narendra Modi's vision of a new India and Scientific Social Responsibility (SSR) of Scientific Community and Institutions. Jigyasa, a Student - Scientist Connect Programme has been launched by the Council of Scientific and Industrial Research (CSIR) in collaboration with Kendriya Vidyalaya Sangathan (KVS) in 06th July, 2017.



JIGYASA is one of the major initiative taken up by CSIR at national level, during its Platinum Jubilee Celebration in 2017. CSIR is widening and deepening its Scientific Social Responsibility further with the programme. Council of Scientific and Industrial Research (CSIR), has joined hands with Kendriya Vidyalaya Sangathan (KVS) to implement this programme. The focus of this scheme is on connecting school students and scientists so as to extend student's classroom learning with well planned research laboratory based learning.

Objectives

The major objectives of the Jigyasa Programme are:

- 'JIGYASA' aims to inculcate the culture of inquisitiveness on one hand and scientific temper on the other, amongst the school students and their teachers.
- The program aims to enable the students and teachers to practically live the theoretical concepts taught in science by visiting CSIR laboratories and by participating in projects.
- The programme focus is to connect school students and scientists to extend student's classroom learning with a well planned research laboratory based learning.

- It also aims enable the students and teachers to practically live the theoretical concepts taught in science by visiting CSIR laboratories and by participating in mini-science projects.

Major Findings/Achievements/Outcomes

CSIR-NISTADS launched the JIGYASA programme on 18th April 2018, as one of the outreach programme. NISTADS organised 10 JIGYASA programmes during 2018-

2020 successfully with the participation of 845 students and 84 teachers from Kendriya Vidyalaya Schools (KVS) at CSIR-NISTADS. In the NISTADS JIGYASA programme 16 KVS school namely; (KVS, Janakpuri Delhi, KVS, Muradnagar U.P, KVS (Agra, Hindon 1,2, Muzaffarnagar, Ghaziabad, Basava, Greater Noida), KVS, Nahara Sonipat Haryana, KVS, Sadar Bazar Road, Delhi Cantt., KVS, Keshav Puram, Delhi, KVS, Agra and Lalitpur , U.P., KVS, Keshav Puram, Delhi, KVS, AFS Bawana, U.P., KVS, Vikaspuri, Delhi, participated under various themes of science, technology, and innovation. Students interacted with the scientists to introduce their research. The program intended to cultivate the interest of young students towards science and research. Jigyasa programme included following items:

- Scientists introduced their research areas and its relation to Science, Technology and Society (STS) issues.
- The students asked questions about research and did some hands-on tasks like debate, quiz etc.
- The program helped to cultivate scientific temper through student-scientist connect programme and introduced Science, Technology & Society (STS) issues.



Glimpses of Jigyasa Programme

❖ Ayur Vatika:

- Bringing Herbal Healthcare to your Doorstep.
- Ayur Vatika provides customized herbs for healthcare.
- Supported by Informatics on herbs on dedicated web portal.
- Backed by expertise of CSIR-NISTADS and other research organizations.



❖ Intuitive Cognition:

- Mapping of cognitive skill, narration and characterization of intuitive knowledge, modern scientific perspective.
- Development, Assessment and identification of cognitive skills can greatly aid learning.



❖ Water-Efficient Automated Smart Irrigation System (WASIS):

- An automated irrigation system that responds to crop water requirement and field conditions like soil moisture and rainfall. (More crop per drop).
- Delay in irrigation creates moisture stress leading to wilting while excess irrigation can lead to infestation of crops with diseases and waste of water.

❖ Water (Quality and Quantity):

- Awareness about water, water remediation technologies based on filtration, reverse osmosis, ozonation.
- Water contamination and technologies of water remediation by different labs of CSIR (approximately 15 labs).



❖ Air Pollution:

- Sources of air pollution, its impact and measures to curb increasing air pollution.
- A demonstration of a prototype of Air-Quality Linked Alert System (AQ-TAS) developed by CSIR-NISTADS.

**❖ Sanitation:**

- The Sanitation awareness session started with introduction to the organization, Friend in Need Trust, an NGO working on WASH for Health and Environmental Hygiene.
- The concept of World Toilet Day and Sustainable Development Goals (SDGs) were explained to the students, who were aware of their existence partially.



IN-HOUSE & OTHER LAB PROJECTS

PILOT STUDY ON HOLISTIC HERBAL HEALTHCARE: SOCIOECONOMIC IMPACT ANALYSIS OF RARE, ENDEMIC, ENDANGERED AND THREATENED (REET) MEDICINAL PLANT SPECIES OF NORTH-EAST REGION OF INDIA

Team: Dr. Prashant Goswami (Nodal officer); Dr. Suman Ray (PI) and Dr. Madhulika Bhati (Co-PI)

Objectives:

- Identification and compilation of REET medicinal plants for holistic health care
- Socioeconomic benefit analysis of REET medicinal plants for holistic health care
- Impact analysis and quantification of REET medicinal plants for holistic health care

Major Findings/Achievements/Outcome

Medicinal plant resources are being harvested in increasing volumes, largely from wild populations. Several medicinal plants are already threatened, rare, or endangered. Overexploitation, indiscriminate collection, uncontrolled deforestation, and habitat destruction all affect species rarity, but are insufficient to explain individual species susceptibility or resilience to harvest pressure. Multiple biological characters correlate with extinction risk, such as habitat specificity, distribution range, population size, species diversity, growth rate, and reproductive system. Due to over harvesting or unskillful harvesting in the wild, several medicinal plants have been assessed as endangered, vulnerable

and threatened and many of these plants endemic i.e. Rare, Endemic, Endangered and Threatened (REET) status.

- For brain related disorders synthetic drugs have only partial answers. Medicinal plants sector in India operates in policy vacuum. Immediate action is needed to produce clearly defined policies to regulate medicinal plants conservation, cultivation, marketing and trade, exports, domestic drug production and coordination efforts and information. Although the sector is largely informal but it works in practice. However the constraints are likely to have an increasing impact, resulting perhaps in a crisis situation in near future.
- Medicinal plants occupy a vital sector of health care system in India and represent a major national resource. The dedicated medicinal plants are used by various tribes and local people of North-East India to cure different ailments. Promotion of herbal plant based therapies need more research and science based approach. There is a need to create awareness among local communities regarding rare and endangered plants. The endemic medicinal plants may get extinct if proper strategies are not adopted for their conservation. Lack of policies for medicinal plant conservation further adds to their depletion. Hence, there is an immense need for clearly defined policies for regulation of medicinal plant conservation in North-East region.

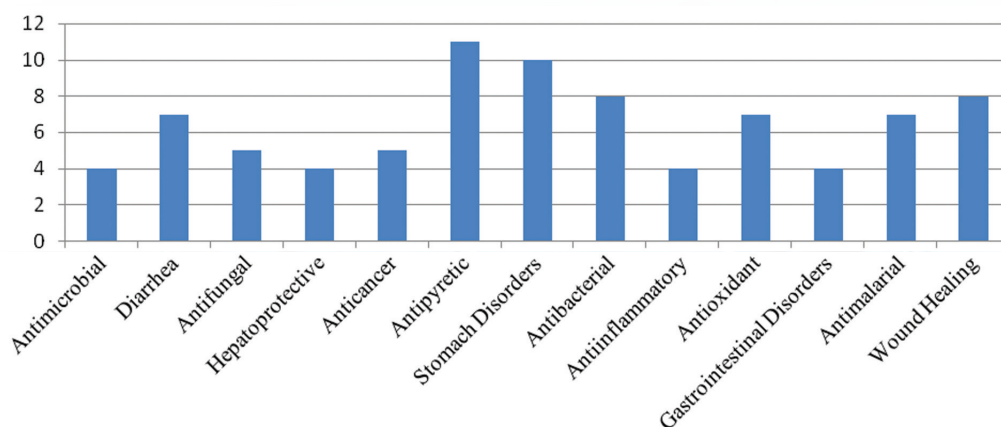
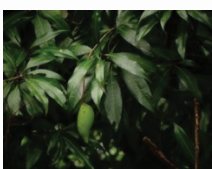


Figure 1. Number of REET plants identified with particular medicinal property.

Table 1: List of REET medicinal plants from Tripura

S. No.	Name	Family	Category	Medicinal Use	Picture	Reference
1	<i>Cycas pectinata</i>	Cycadaceae	Rare & Threatened	Anti-diabetic		Laishram et al., 2015
2	<i>Podocarpus neriifolius</i>	Podocarpaceae	Rare & Threatened	Anti-cancer activity		Shrestha et al., 2001
3	<i>Gnetum montanum</i>	Gnetaceae	Rare & Threatened	Anti-bacterial activity		Martin et al., 2011
4	<i>Mangifera sylvatica</i>	Anacardiaceae	Rare & Threatened	Leaves possess thrombolytic properties that could lyse blood clots. The leaves can also be used as antidiarrheal drugs		Akhter et al., 2016

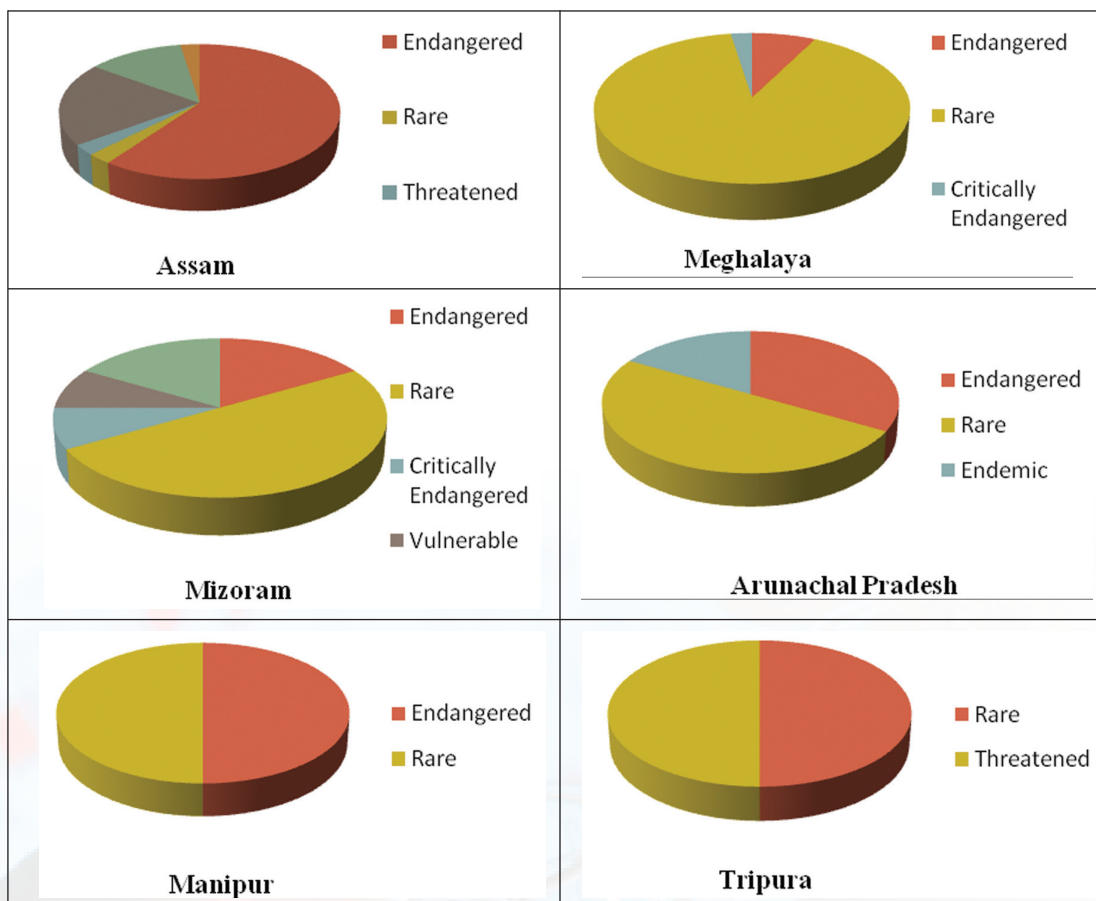
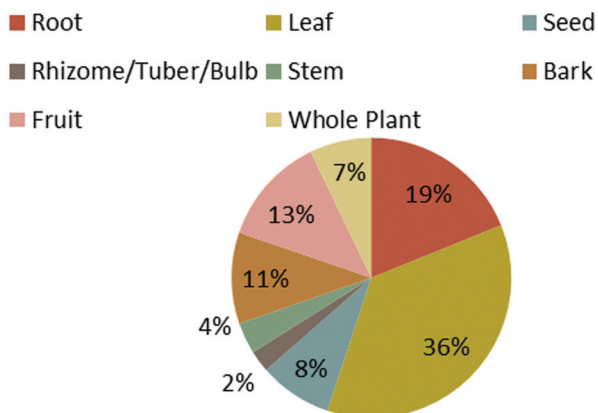
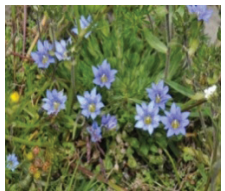


Figure 2. REET Category wise distribution of medicinal plants from seven states of North-East India.

Plant parts of the medicinal plant species used by tribal communities of Tripura



S. No.	Name	Family	Category	Medicinal Use	Picture	Reference
1	<i>Acer oblongum</i>	Aceraceae	Endangered	Effective in the treatment of rheumatism, bruises, hepatic disorders, eye disease, and pain, and in detoxification.		Bi et al., 2016
2	<i>Coptis teeta</i>	Ranunculaceae	Rare, Endangered and Endemic	Used in the treatment of fever, malaria, backaches and also as a tonic		Tandon and Rathore, 1992
3	<i>Gentiana crassuloides</i>	Gentianaceae	Rare	Decoction of leaves and young shoot is used to cure cough and cold.		Tiwari et al., 2009
4	<i>Rhynchoglossum lazulinum</i>	Gesneriaceae	Rare	Leaves are pounded and the juice is taken as appetizer		Gupta, 2006

PILOT STUDY ON COMPILATION OF CHARACTERISTICS OF MEDICINAL PLANTS FOR THERAPEUTIC USES

Team: Dr. Suman Ray (PI) and Dr. Kasturi Mandal (Co-PI)

Objectives:

- Compilation of data on various characteristics of medicinal plants for therapeutic uses
- Analysis of characterized medicinal plants in term of various applications.

Major Findings/Achievements/Outcome

Herbs contribute to more than 60-70% in development of modern medicines in the world market either directly or indirectly. The herbal treatments for congestive heart failure, systolic hypertension, angina, atherosclerosis, cerebral insufficiency and venous insufficiency etc. has been known since ancient times. Generally ayurvedic medicines are considered safe unlike allopathic medicines as they belong to natural sources, however, adverse reactions of herbal drugs is also reported. Compilation of 128 herbs and their parts that have medicinal value to prevent, alleviate or cure heart disease related disorders was done. Jaccard Neighbour-joining cluster analysis using Free Tree software was used to assess the relative importance of plants in context with its healing potential for heart related disease. The ethno-medicinal knowledge may be useful for formulating safe herbal drugs.

- Comparative analysis of parts used of percentage of total plants showed that root and rhizome is the most frequently used plant parts followed by leaves, while gum being the least frequently used plant parts in context with ailment of heart disease (Figure 1). The order (maximum to minimum) of plant parts used for heart

disease ailment is root and rhizome-leaf-stem-flower-fruit and seed-other parts-gum (Figure 1). Analysis of plants used for various types of heart diseases showed that only one plant i.e. *Crocus sativus* L. have medicinal property to cure five diseases of heart disease-hypertension, heart attack and reduction in blood fat, anti-oxidant and cardiac tonic thus indicating its relevancy in context with cardiovascular diseases (Table 1). Similarly, plants having medicinal property to cure four heart disease category were also few (Table 1). Maximum number of plants were found to be in category of curing only one heart disease type. Very few plants were observed to have medicinal property capable of treating multiple heart disease type.

- Cluster analysis based on Jaccard Neighbour-joining dendrogram using collected dataset of 128 herbs useful for heart with the help of Free Tree software version 0.9.1.50 and FigTree version 1.2.2. and mathematical consensus tree was obtained after 1000 replicates of bootstrap (Figure 2). Five major clusters of the selected 128 herbs were observed on the basis of their medicinal value in context with heart. Correlation of the distance between herbs on the basis of its medicinal property revealed that most of these were found to have more than one medicinal property (Figure 2). This category of the herbs were closely related i.e. the distance between them were less.

The therapeutic potential of herbs needs to be explored in a modern scientific validation approaches for better therapeutic leads i.e. compounds of interest in these plants, which can be used as safe and effective medicines for cure heart diseases need further.

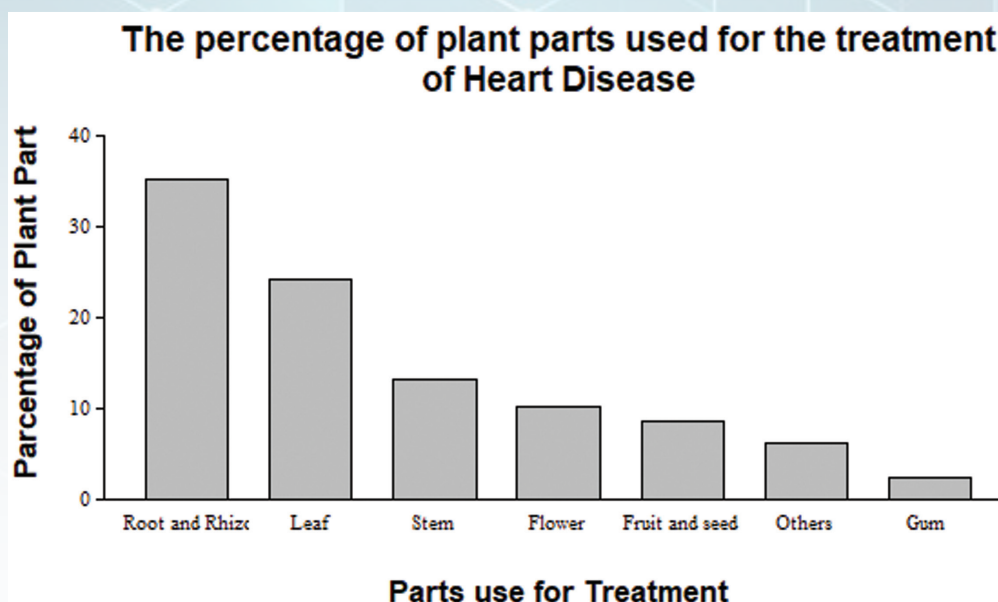


Figure 1. The percentage of plant parts used for the treatment of Heart Disease.

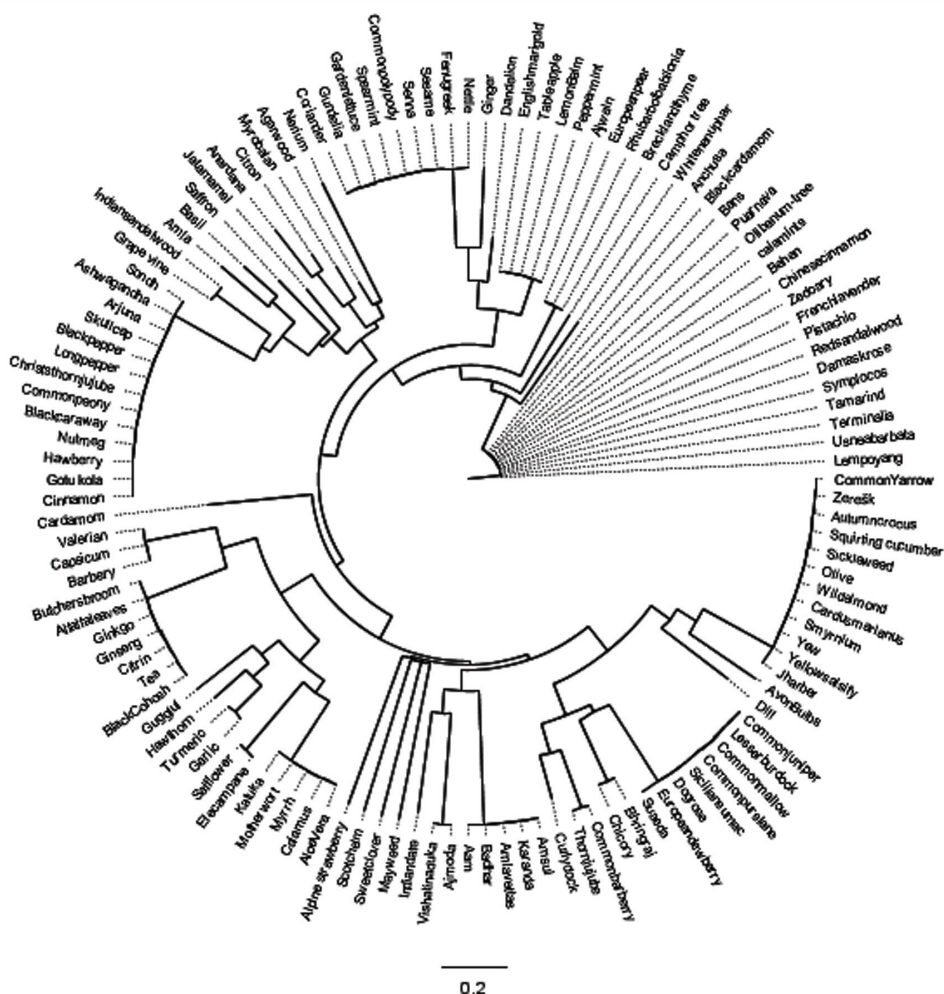


Figure 2: The dendrogram depicts 128 different medicinal plants having property to cure some type of heart disease/ ailment. The medicinal plants in one group shows that they have similar properties to cure same heart disease. The distance in dendrogram depicts closeness of properties curing heart disease; as less the distance between two medicinal plants or two groups they will more close to cure particular heart disease.

Table 1: Heart disease and the Plant Uses (A-C)

A. Plants used in only one disease of heart	
Reduction of Blood pressure	<i>Achillea millefolium</i> , <i>Ecbalium elaterium</i> , <i>Falcaria vulgaris</i> , <i>Prunus scoparia</i> (spach) Schneider, <i>Berberis integrima</i> , <i>Crocus haussknechtii</i> , <i>Olea europaea</i> , <i>Silybum marianum</i> , <i>Smyrniium cordifolium</i> , <i>Taxus baccata</i> , <i>Tragapogon caricifolius</i> , <i>Ziziphus nummularia</i>
Angina	<i>Actaea racemosa</i> , <i>Camellia sinensis</i> , <i>Garcinia cambogia</i> (gaertn.) Desr., <i>Genus panax</i> , <i>Ginkgo biloba</i> , <i>Medicago sativa</i> , <i>Ruscus aculeatus</i>
Anti-oxidant	<i>Amomum subulatum</i> Roxb, <i>Anchusa italica</i> Retz., <i>Bambusa arundinacea</i> Retz., <i>Boerhavia diffusa</i> , <i>Boswellia carteri</i> Birdw., <i>Calamintha acinos</i> (L.) Clairv., <i>Centaurea behen</i> L., <i>Cinnamomum cassia</i> (L.), <i>Curcuma zedoaria</i> (Bergius), <i>Lavandula stoechas</i> L., <i>Pistacia vera</i> L., <i>Pterocarpus santalinus</i> L.f., <i>Rosa</i> × <i>damascena</i> Mill., <i>Symplocos racemosa</i> Roxb., <i>Tamarindus indica</i> L., <i>Terminalia horrida</i> Stoud., <i>Usnea barbata</i> Ach., <i>Zingiber zerumbet</i> (L.) Sm.
Treatment of blocked arteries	<i>Anthemis gayana</i> Boiss.
Cardio myopathies	<i>Apium graveolens</i> , <i>Strychnos nux-vomica</i>
Blood purification	<i>Arctium minus</i> hill., <i>Juniperus communis</i> , <i>Malva neglecta</i> , <i>Portulaca oleracea</i> , <i>Rhus coriaria</i> , <i>Rosa canina</i> , <i>Rubus caesius</i> , <i>Suaeda aegyptiaca</i>
Congenital heart disease	<i>Carissa carandas</i> linn., <i>Garcina indica</i> choisy, <i>Garcinia pedunculata</i> roxb., <i>Gmelina asiatica</i> linn., <i>Magnifera indica</i> linn.
Heart attack	<i>Carthamus tinctorius</i> , <i>Inula helenium</i>
Hypertension	<i>Centella asiatica</i> (l.) Urban, <i>Cinnamomum verum</i> , <i>Crataegus pontica</i> c. Koch., <i>Myristica fragrans</i> , <i>Nigella sativa</i> , <i>Paeonia officinalis</i> L., <i>Paliurus spina-christi</i> miller., <i>Piper longum</i> , <i>Piper nigrum</i> , <i>Scutellaria pekinensis</i> , <i>Terminalia arjuna</i> (roxb.), <i>Withania somnifera</i> , <i>Zingiber officinale</i>
Reduction in blood fat	<i>Coriandrum sativum</i> , <i>Gundelia tournefortii</i> , <i>Lactuca sativa</i> , <i>Mentha spicata</i> , <i>Polypodium vulgare</i> L., <i>Senna alexandrina</i> mill, <i>Sesamum indicum</i> , <i>Trigonella foenum-graecum</i> , <i>Urtica dioica</i>
Nourishing of the heart	<i>Fragaria vesca</i> L.
Increase in venous blood	<i>Melilotus indicus</i>
Cardiac tonic	<i>Nerium oleander</i> L.
Cardiac disorders and arrhythmias	<i>Ulmus glabra</i> Hudson.
B. Plants used in two diseases of heart	
Hypertension, heart attack	<i>Acorus calamus</i> , <i>Aloe vera</i> , <i>Commiphora myrrha</i> , <i>Leonurus cardiac</i> , <i>Picrorrhiza kurroa</i>
Reduction of blood pressure, reduction in blood fat	<i>Anethum graveolens</i>
Anti-oxidant, cardiac tonic	<i>Aquilaria agallocha</i> Roxb.

Angina, hypertension	<i>Berberis darwinii</i> , <i>Capsicum annum</i> , <i>Valeriana officinalis</i>
Reduction of blood pressure, blood purification	<i>Berberis vulgaris</i> , <i>Ziziphus spina-christi</i>
Reduction in blood fat, anti-oxidant	<i>Calendula officinalis L.</i> , <i>Melissa officinalis L.</i> , <i>Melissa officinalis L.</i> , <i>Mentha × piperita L.</i>
Blood purification, reduction in blood fat	<i>Cichorium intybus</i>
Angina, anti-oxidant	<i>Cinnamomum camphora L.</i>
Angina, heart attack	<i>Commiphora wightii</i>
Blood purification, reduction in blood fat	<i>Eclipta prostrata</i>
Reduction in blood fat, anti-oxidant	<i>Malus domestica Baumg.</i> , <i>Trachyspermum ammi</i>
Reduction of blood pressure, treatment of hypolipidemia	<i>Nectaro scordeum tripedale</i>
Reduction of blood pressure, anti-oxidant	<i>Nymphaea alba L.</i>
Hypertension, cardiac tonic	<i>Phyllanthus emblica L.</i>
Hypertension, anti-oxidant	<i>Pyrus communis L.</i> , <i>Rheum ribes</i> , <i>Thymus serpyllum L.</i>
Hypertension, reduction in blood fat	<i>Santalum album L.</i> , <i>Vitis vinifera</i>
Angina, reduction in blood fat	<i>Zingiber officinale roscoe</i>
C. Plants used in three diseases of heart	
Angina, hyper-tension, heart attack	<i>Allium sativum</i> , <i>Curcuma longa</i>
Hypertension, anti-oxidant, cardiac tonic	<i>Nardostachys jatamansi</i>
Hypertension, reduction in blood fat, cardiac tonic	<i>Ocimum bacilicum</i>
Congenital heart disease, reduction in blood fat, cardiac tonic	<i>Punica granatum linn</i>
Reduction of blood pressure, blood purification, reduction in blood fat	<i>Rumex crispus</i>
Angina, reduction in blood fat, anti- oxidant	<i>Taraxacum officinale</i>
Reduction in blood fat, anti-oxidant, cardiac tonic	<i>Terminalia chebula Willd. ex</i>
Cardio myopathies, congenital heart disease, reduction of blood pressure	<i>Ziziphus jujuba(l) h.karst</i>
D. Plants used in four diseases of heart	
Congenital heart disease, reduction in blood fat, anti- oxidant, cardiac tonic	<i>Citrus medica L.</i>
Angina, hypertension, heart attack, nourishing of the heart,	<i>Crataegus monogyna</i> ,
Hypertension, cardio myopathies, reduction of blood pressure, anti-oxidant	<i>Elettaria cardamom</i>
E. Plants used in five diseases of heart	
Hypertension, heart attack, reduction in blood fat, anti- oxidant, cardiac tonic	<i>Crocus sativus L.</i>

(Source: Babak Baharvand-Ahmadi Pathophysi et. al., 2016)

PILOT STUDY ON “VULNERABILITY QUANTIFICATION OF DISASTERS AND RESILIENCE ASSESSMENT”

Team: Dr. P. Goswami (Nodal Officer) and Dr. Sandhya Wakdikar (PI)

Due to the increasing magnitude and frequency of extreme natural/environmental events like floods, landslides and drought, and man-made events like biological or chemical disasters, there is a need for extensive research to quantify the disasters, assess the level of risk that these events pose, as well as on the vulnerability and response capabilities of the people affected. For Disaster Management (DM), India needs to look into the entire technologies available world over to reduce Vulnerability and strengthen resilience. Preliminary study was on done on about thirty different types of disasters occurring or which have a possibility to occur in India and data on these was collected from secondary sources. These included Natural disasters, man-made and accidental disasters. The disaster management tools including the S&T tools available in India to manage these disasters were studied. Assessing the quantification of vulnerability is a crucial and decisive step in disaster risk analysis. This quantification of vulnerability has always been a challenge because of its diverse types and inherent complexities in the connectedness of vulnerability variables. In Indian context, vulnerability assessment methods vary significantly with each disaster and the area, the livelihood of people, the economic and environmental diversity, etc. The study of people's resilience in varied types of disasters, how they face and cope with them are not based on standardized tools since some would fare better than the rest in times of disaster. Research is required for exploring the constraints linked with various outcomes in the face of diverse problems, or what characteristics are good presumptions of resilience. It was felt to have a detailed quantification of the Vulnerability and assess the resilience capacity. This study tried to address these issues for various disasters. Based on the various aspects, policy measures were also suggested to minimize the damages for some of the disasters.

PILOT STUDY ON S&T APPLICATIONS TO PEOPLES' PROBLEMS (STAPP)

Team: Dr. Prashant Goswami (Nodal Officer) and Dr. Praveen Sharma (PI)

Objectives

- The project activity comprises building the S&T based methodology related to societal problems of the country.
- The work includes documentation of capabilities for S&T solution approach towards eliminating the societal challenges.
- The study has identified many peoples' problems grouped into broad topics. It is emphasized that S&T can offer operational solutions, which can contribute towards rapid and disruptive socio-economic transformation. The objectives have been documentation of S&T solutions in terms of their applicability in the existing socio-economic context; and analysis built on secondary data and web based data. We have aimed at looking into the enquiry towards identification and prioritizing of the concerns.
- This study includes collection of facts related to technology landscaping and technology outlook for the societal problems. The task of documenting the findings and attempts towards suggesting the feasible R&D Ecosystem has been done.

Major Findings/Achievements/Outcome

It is important to identify the approaches and evaluate the applicability and feasibility of the strategies towards interpreting the societal problems. The study includes building the S&T based methodology related to societal problems. There is vital requirement for standard and inclusive R&D ecosystem to address many public problems. It is highlighted that S&T can offer operational solutions, contributing towards speedy and resourceful socio-economic transformation. The goal of the study are listing S&T solutions in terms of their applicability in the socio-economic context; and analysis built on secondary data/web based data, including survey towards documentation and listing of the concerns.

A report on Adulteration Detection and Prevention has been published under the

institutes theme- “NISTADS Tracks in Policy Research”

Various reports on common societal issues have been uploaded on CSIR-NISTADS site. These reports provide an insight to the socio-economic context; and analysis based on secondary data and web grounded data. This might provide inputs to a deeper enquiry towards identification and prioritizing of the concerns.

Reports/Policy Bulletin

- Prashant Goswami, Praveen Sharma- S&T applications to peoples’ problems (STAPP): Agriculture, NISTADS Tracks in Policy Research, NISTADS/NTPR/STAPP/AGRI/2019/2.
- Prashant Goswami, Praveen Sharma. S&T applications to peoples’ problems (STAPP): Adulteration Detection and Prevention, NISTADS Tracks in Policy Research, NISTADS/NTPR/STAPP/Adulteration/2017-1.
- Prashant Goswami, Praveen Sharma. S&T applications to peoples’ problems (STAPP): Skill Development and Employment, NISTADS Tracks in Policy Research, NISTADS/NTPR/STAPP/Skills/2019/1.
- Prashant Goswami, Praveen Sharma. STAPP Case study: ADULTERATION, Policy Bulletin, NISTADS/NTPR/2017/1.

FOOD PROCESSING INDUSTRY IN INDIA: S&T CAPABILITY AND POLICY ISSUES

Team: Dr. Mohd. Rais (PI)

Objectives: Main objectives of the project are

- Science & Technology interventions for containing the price volatility of Indian perishable crops.
- Waste management in tomato, onion, and potato crops towards a cleaner environment: Insights and Future Perspectives.
- Indian Cold Chain Sector and its Contribution to Atmanirbhar Bharat and Global Supply Chain.

Major Findings/Achievements/Outcome

The main aim of the study has been to identify the gaps related to price shocks in essential

vegetables mainly Tomato, Onion & Potato (TOP) crops. Without a doubt, Tomato, Onion, and Potato (TOP) are the basic crops with wider production throughout the globe. Every plant, fruit, and vegetable possess a shelf life associated with it which can be improved by improving the storage conditions and giving suitable post-harvest treatment to the plants, fruits, and vegetables. Post-harvest management of the above-mentioned crops can be increased by incorporating the appropriate science and technology interventions in postharvest handlings and by using suitable preservation and storage methods such as refrigeration, optimal heat treatment after harvesting and modified atmosphere packaging (MAP). Despite the progression in the areas of science and technology, farmers are not acquainted to postharvest management methods for the crops due to which horticultural crops are suffering damage. The government of India has initiated many steps to have a check over the post-harvest loss to the crops such as, Tomato, Onion, and Potato (TOP). Despite the various initiatives of the Government towards post harvest loss management, farmers are still suffering from the losses. This may be due to the lack of knowledge and information among farmers regarding the schemes led by the government which is due to the lack of education and basic knowledge. Another reason which adds to the failure is the prevalence of the traditional means of farming and lack of knowledge about the modern agricultural practices, improper transport of the crops to the market owing to which the product most of the time turns bad because of the shelf life associated to it. Due to the lack of capital among the farmers, most of the modern storage facilities are lacking and farmers are not able to provide the proper temperature to the crops for storage and future downstream application. Due to the lack of information and communication among the farmers, they are unaware of the proper sorting, grading, production, packaging, and labeling facilities which are essential for the post-harvest storage of the selected crops. The wholesale price index and export value of fresh and processed Tomato, Onion, and Potato crops from India are given in Figure 1.

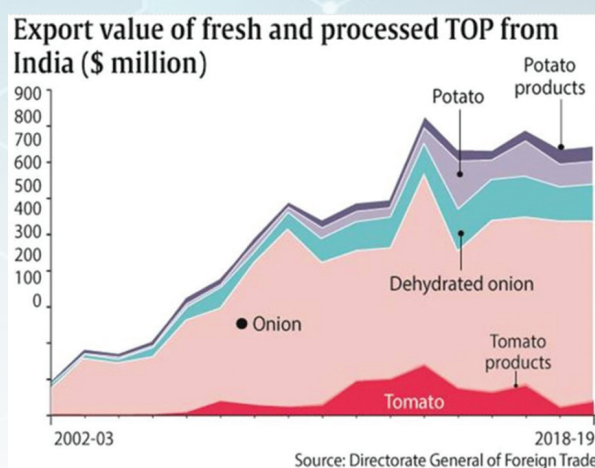
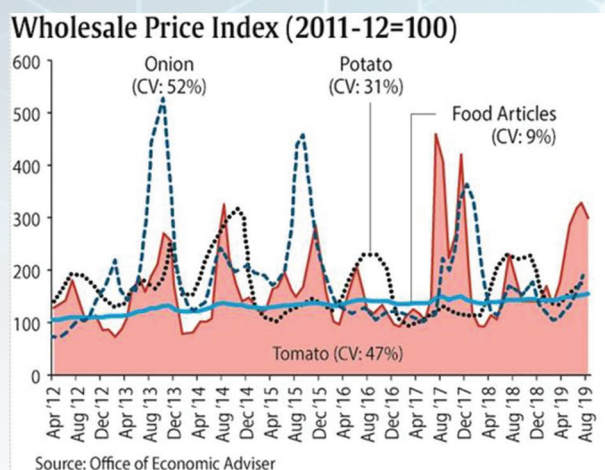


Figure 1 & 2: Wholesale price index and export value of fresh and processed TOP from India (\$ million) [Source Office of Economic Adviser and Directorate General of Foreign Trade]

Other factors that further adds to the failure are non-accessibility to the services of pre-cooling, pre-conditioning, waxing, ripening, labeling of fruits and vegetables to the remote area farmers and retail packing. Failure and cumbersome ways for the refrigeration machinery and fragments used for the fitting of cold room, cold storage, or refrigerated vehicle for the storage, preservation, transport. The government of India has started various initiatives for the post-harvest loss management of the crops but due to the above-mentioned reasons, there is not a successful outcome of the schemes which need to be resolved by having a check over the above-mentioned factors.

Furthermore, the waste generated from tomato, onion, and potato crops have tremendously increased due to rapid urbanization and industrialization. In India out of the total waste generated, approximately 31 million tonnes (MT)/year of wastes are simply dumped, while only 43 MT is collected. Industries and most of the people simply use 'throw-away' strategy to get rid of the waste problem. On the other hand, throwing away the waste leads to loss of the valuable resources, safety issues, and health hazards. Therefore, proper recycling or processing of these wastes is needed to get the benefit and boost the economy as well. The waste of tomato, onion, and potato also contains some toxic and hazardous substances which can pollute water bodies such as rivers

and lakes and kill off living things. Therefore, the management of waste is need of the hour. The losses of TOP crops at various stages is depicted in Figure 2.

INTERFACING SCIENCE AND TRADITIONAL KNOWLEDGE (ISTK)

Team: Sh. Avinash Kshitij, Dr. Kasturi Mandal and Dr. Shiv Narayan Nishad

Objectives

The success of modern science in the last few centuries can hardly be questioned; in a relatively short span of time modern science has built up a body of knowledge that is self-consistent, verifiable and often realizable as technology products. There exist, however, certain topics that may forever remain outside the realms of current scientific exploration, because of the very nature of the structure and approach of modern science. It is expected that interfacing of certain traditional knowledge with modern science would provide knowledge beyond the current scope of modern science. However, careful interpretation and certain methodological reorientation appear necessary. The present project explores the evidence of coherence in cognitive choices in otherwise random choices by people in the context of interfacing science and traditional knowledge. The objectives of the study is as follows:

- To explore evidence of coherence in cognitive choices in otherwise random choices by people

- Decision Making based on Cognitive coherence
- Social and Cognitive Coherence

Here we present results from a set of experiments centred around NPIT in the form of anticipatory cognition (precognition). The basis of the hypotheses is the ancient system of Vedanta as exposed in various Upanishads; the experiments are conducted with modern electronic instruments and analyzed.

Major Findings/Achievements/Outcome

Organized two Workshops

- **National Workshop on Mind, Consciousness and Beyond: Building on Vedantic Metaphysics 6th March, 2018 held at CSIR-NISTADS**



Dr. Goswami emphasized that the event was meant to be an initiation and ideation event, leading to a new and sustained initiative for a systematic understanding and exploration of Vedantic System of Knowledge and other metaphysical knowledge.

In his address, Dr Girish Sahni, DG, CSIR likened the body to the laboratory of the spirit. He also described the discovery of the mind is the greatest discovery and suggested that there was a pathway between the mind and some dimension which we must explore.



Prof Vijay Bhatkar, Chancellor, Nalanda University pointed out the relevance of Vedic Science in 21st Century and stressed that the interface between Modern Science and Vedic Science. Knowledge of heritage is essential for creating the future. Dr Sisir Roy (NIAS) emphasized the need to develop a common language between ancient science and modern science and the requirement of a scholarly atmosphere.

Major Recommendations

After detail discussions and deliberations, the following major recommendations were adopted:

- Creation of a comprehensive Vedantic Paribhasha and precise narrations, definitions
- Creating Science of Vedantic Knowledge: Structuring Vedantic System in scientific framework
- Extracting objective, verifiable and possibly applicable conclusions from Vedanta
- Reverse Engineering; Understanding (gyan of) the process leading to Ved (Knowledge)
- Design and development of an empirical vedantic system through actual/thought experiments
- Exploration of mechanisms/frameworks for attracting and engaging youths to vedic research.
- **National Discussion Meeting on Intuitive Knowledge in Vedanta and Modern Science: Characterization, Evidence and Implications on 29 November 2018 CSIR-NISTADS, Delhi**

In the address, Dr. Shekhar Mande, DG CSIR, shows interest in history of Science. He stated that the vedic period was the golden period. The philosophy emerged after vedic period and then science emerged. He also discussed the importance of vedic period in modern science.





Dr. P. Goswami, Director CSIR-NISTADS in his presentation on intuitive cognition and discussion about the importance of existence, persistence and prevalence of the intuitive cognition skill and compare with attention and logical skills. He also discussed the Nature of knowledge, nature and narration of knowledge in Upanishads, cognition, direct and acquired knowledge, casual and a-casual knowledge.

Major Recommendations

- Its application can be used in forensic science, training & learning
- Find co-relation between intelligence & cognition Logical aptitude test
- It can cover education point of view with vedantic explanation
- Cognition will be helpful in crime analysis.

Major conclusions drawn from the experiment

- Null hypothesis regarding intuitive cognition may be rejected, intuitive cognition exists, is prevalent & persistent.
- Intuitive cognition is robust does not depend on gender religion or faith of the participants and certain parameters like music effects.
- Intuitive cognitive ability is insignificantly co-related with logico-analytical ability.



Collage of the workshop

Major findings

Existence of Precognition: Distribution of number of responses in different score bins from the 33 sessions showed (Fig. 1) appreciable population above random score; significant percentage of responses were found at more than one and two sigma levels ($S_R + 1\sigma, S_R + 2\sigma$) above random expectation (Fig. 1). and σ represent the random score and standard deviation respectively.

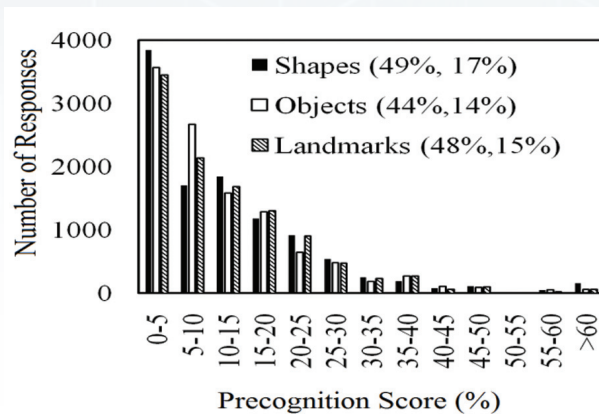


Fig.1: Distribution of precognitive responses among different score bins for three pre-cognitive targets. The total number of responses for shapes, objects and landmarks, respectively, were 10841, 10977 and 10735 from 33 pre-cognitive sessions with ten trials for each pre-cognition target. The first number in the bracket represents the % of responses above the random expectation ($S_R = 10\%$); the second number in the bracket represents responses above $S_R + 1\sigma$.

Independence of Precognition Participant:

The precognitive score was also found to be fairly independent of the age of the respondent (Fig. 2). A negative and generally significant correlation between age and precognition score was observed (Fig. 2).

It is clear (Fig. 3a) that precognition sessions with different participants showed comparable performance. Distribution of respondents (Fig. 3a) and precognitive responses (Fig. 3b) among different score bins for the average of the three cognitive targets for female (filled bars, Fig. 4a) and male (hollow bars, Fig. 3a) shows very similar distribution for the two genders (Fig. 3b). However, both in terms of the percentage of respondents/responses who scored more than 10% (the first number

in brackets) and more than $S_R + 1\sigma$, female respondents scored about 5% higher than the male respondents (Fig. 3).

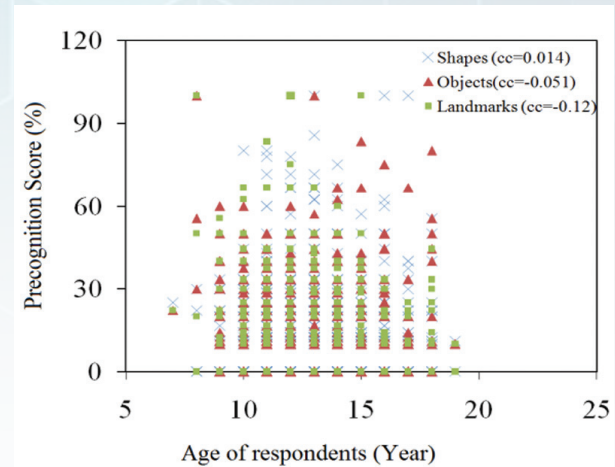


Fig. 2: **Objectivity (Age-Independence) of Precognition:** Scatter plot between age and pre-cognitive score based on all the pre-cognitive responses (~1200 respondents) from different sessions. The significance value of correlation coefficient at 95 % significance level is 0.05.

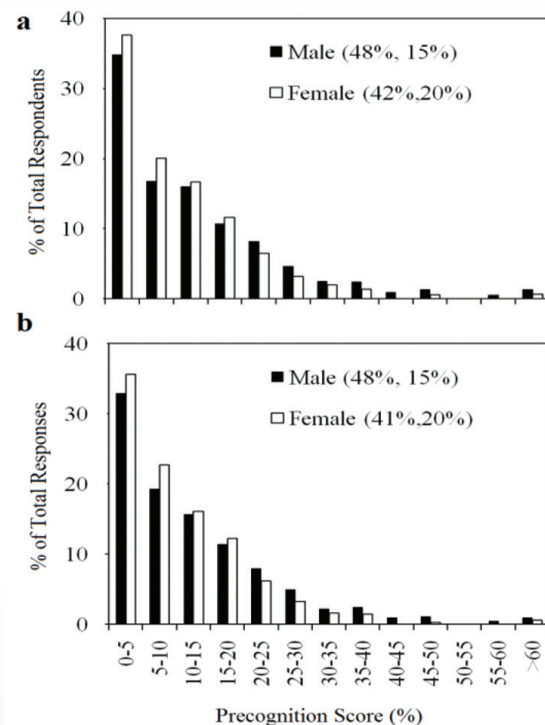


Fig 3: **Objectivity (Gender-Independence) of Precognition:** Distribution of respondents (a) and precognitive responses (b) in different score bins for the average of three cognitive targets for Male and Female respondents. The total number of responses was about 32597 from 33 sessions and ten trials for three cognitive targets and an average of thirty respondents for each trial. The first and the second number in brackets represents, respectively, the number of respondents/responses with score more than S_R (10%) and than $S_R + 1\sigma$.

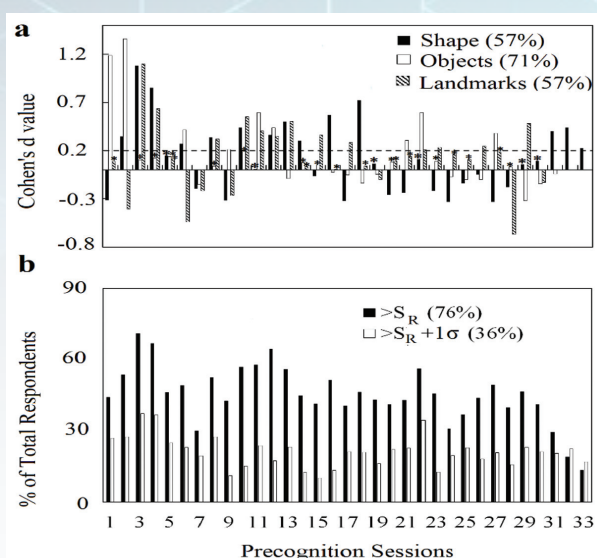


Fig. 4: **Reproducibility of Precognition:**

(a): Effect of size using Cohen's formula for the three different precognition targets. The number in the brackets represents the number of sessions as percentage of total sessions with $0 < d < 0.2$ (small effect size). The symbol '*' represents the d value less than $0 < d < 0.2$ and the precognition score above the random score (10%).

(b): Session-wise distribution of percentage of respondents above S_R (solid bar) and above $S_R + 1\sigma$ (hollow bar) for average of three pre-cognition targets: shapes, objects and landmarks. The number in the brackets represents the number of sessions (% of total sessions) with score above S_R and $S_R + 1\sigma$. The sessions with d value < 0.2 are marked with a *

Reproducibility: Examination of effect size revealed (Fig. 4a) that 57-76% of the sessions had Cohen's d value less than 0.2, with 16-27% of the sessions having d value between 0.2 and 0.5, indicating small size effect. It can be further seen that a number (12, all three precognition targets; figure 4a) of sessions are characterized by small d value (0.5) and high significant scores. Examination of precognition sessions as percentage of total sessions with Cohen's d value in the interval $d < 0.2$, (0.2,0.5), (0.5,0.8) and $d > 0.8$ for three precognition targets also lead to similar conclusions

Cohen's d value for the session i is calculated as

$$d(i) = \frac{\bar{X}_i - X_R}{\sigma_i}$$

Here $\bar{X}_i$ and X_R , respectively, represents the average score of the precognition session, i , and the random score. σ_i represents the standard deviation of the session.



Lectures Organised

- **Lecture Series: Research Innovation and Sustainable Development**
- **Lecture Series: NISTADS Faculty**
- **Seminar Series: AcSIR Students**

LECTURE SERIES: RESEARCH INNOVATION AND SUSTAINABLE DEVELOPMENT

Inaugural Lecture: CSIR AND ITS HISTORY

Speaker: Dr. Shekhar C. Mande, Director General CSIR and Secretary DSIR
NISTADS Vivekananda Conference Hall
January 09, 2020.

On the 9th of January 2020, Dr. Shekhar C. Mande, Director General, CSIR & Secretary DSIR visited CSIR-NISTADS, New Delhi to inaugurate Dr. Abdul Kalam Hall and

Vivekanand Conference Hall. On this occasion Dr. Ranjana Aggarwal, Director CSIR-NISTADS, gave a brief presentation about the institute's history, research work and future programmes. Dr. Mande also inaugurated the CSIR-NISTADS Lecture Series namely Research Innovation and Sustainable Development with his lecture titled "CSIR and its History". He interacted with CSIR-NISTADS Scientists and AcSIR Ph.D. students and provided his valuable suggestions and guidance for future work.



Lecture: THE STORY OF INDIA'S EARLIEST INDIGENOUS SCANNING TUNNELING MICROSCOPE (STMs)

Speaker: **Professor Pankaj Sekhsaria**, Associate Professor, Centre for Technology Alternatives for Rural Areas (CTARA), IIT Bombay
NISTADS Vivekananda Conference Hall
January 10, 2020.

Abstract: The presentation is based on Sekhsaria's doctoral research at Maastricht University, the Netherlands where he studied 'Cultures of Innovation in nanotechnology research for development in India'. The research spanning nearly five years was carried out in five nanoscience and nanotech labs across three cities of India and highlights how societal and cultural contexts deeply influence science, technology and innovation. It will draw on two case studies that make up his doctoral thesis and in particular on his new book *Instrumental Lives* - an intimate biography of an Indian laboratory (Routledge, xxii+126, (HB), ISBN: 9780367856298), which is an account of instrument making at the cutting edge of contemporary science and technology in a modern Indian scientific laboratory. The presentation will locate scientific research and innovation within the social, political and cultural context of a laboratory's physical location and ask important questions of the dominant narratives of innovation that remain fixated on quantitative metrics of publishing, patenting and generating commerce. It will simultaneously be the story of the labs as it will be a story of his own journey of engaging and understanding the lab and its constituents and eventually telling that story. It will also delve into related issues of the history of S&T in India and of the contemporary S&T policy landscape of the country.

Pankaj Sekhsaria is Associate Professor, Centre for Technology Alternatives for Rural Areas (CTARA) & Associate Faculty, Centre for Policy Studies (CPS), IIT-Bombay. His research interests lie at the intersection of technology, society, science and the



environment. He writes extensively on these issues for the Indian media and is also author of a number of books including most recently *Instrumental Lives* - an intimate biography of an Indian laboratory (Routledge, 2019), *Islands in Flux* - the Andaman and Nicobar Story (Harper Litmus India 2017, 2019) and his debut novel *The Last Wave* (HarperCollins India, 2014)
Email: psekhsaria@gmail.com

Lecture: ENDOGENOUS SYSTEMS OF INNOVATION IN COMPARATIVE PERSPECTIVE: SOME REELECTIONS ON AFRICA-INDIA RELATIONS

Speaker: **Professor Diran Soumonni**, Director of the Master of Management in Innovation Studies, Wits Business School, Johannesburg, South Africa
NISTADS Vivekananda Conference Hall
February 13, 2020.

Abstract: The dominant modern discourse on globalization masks the fact that the history of humanity itself is one of migration, exchange, and interpenetration in all facets of life. Furthermore, the prevailing apparatus designed to foster "development" in most of the world is economistic in its orientation, and tends to downplay the plurality of values that provide people with a higher sense of meaning and purpose. Thus, the task of formerly-colonized nations in Africa, Asia, and elsewhere, must be to not only problematize these discourses, but to offer alternative pathways for a more just global order. As a contribution to such an exercise, this paper first highlights the underpinnings

of endogenous knowledge, cursorily understood to signify that “knowledge of self” is the properly-suited basis for a reciprocal valorization of diverse knowledge systems. In contradistinction to the framing of Africa that was inherited from its arbitrary partition, however, the premise that serves as the basis for this paper is that which was defined by the preeminent Beninese linguist and cultural theorist, Ambassador Olabiyi Yaï, as “the sum total of African cultures as sedimented for millennia in philosophies, wisdoms, ways of being and doing things, as well as ways of relating to otherness”. Secondly, some salient examples of political leaders in India and Africa, who attempted to base the development of their emerging states on a critical appropriation of modern science, will be underscored. Thirdly, some notable contemporary models of endogenous knowledge-based, innovative initiatives in both territories will be highlighted. Finally, these building blocks, namely, endogenous knowledge generation, innovative organizational development, and nation-building, provide the basis for a three-tiered, but mutually-reinforcing model for South-South cooperation in general, and for Africa-India cooperation, in particular. There is a growing body of social science research on the role of innovation in socio-economic development in the Global South. In this regard, the Systems of Innovation (SI) framework, which has been embraced by numerous Indian and African scholars alike, offers insights that predominantly provide strategies for acquiring technological capabilities from outside sources and subsequently upgrading them for the purpose of economic development. Another orientation within the same systemic perspective emphasizes low cost, grassroots, and socially-inclusive innovation. The latter are roughly analogous to the early themes in the Appropriate Technology movement, which were largely inspired by the Indian economist, J.C. Kumarappa and the Sri Lankan scholar of Indian culture, Ananda Coomaraswamy, among others. However, despite the significant potential of applying scientifically-novel or

“emerging technologies” such as advanced Information and Communication Technologies (ICTs), biotechnology or nanotechnology to developmental challenges, the synthesis between the two main approaches largely remains elusive. Furthermore, only a few related studies in either perspective attempt to ground their work in the historical experience of African and Indian peoples, their intellectual heritage, or the viable innovative solutions that continue to emerge from their knowledge bases, both indigenous and contemporary. This paper, therefore, combines the concept of “Endogenous Development”, as developed by the late, renowned Burkinabé historian, Joseph Ki-Zerbo, in his 1992 book, “La natte des autres”, with selected analytical tools from the SI approach to propose an Endogenous Systems of Innovation (ESI) framework. Of specific interest, with respect to Africa-India knowledge exchanges, are the concepts of “alternative science” articulated by Shiv Visvanathan, as part of his critical reflections on the Swadesi movement in Bengal, and “alternative sciences” as propounded by Ashish Nandy. Far from being essentialist or nativist, these perspectives provide an enlarged set of insights for integrating diverse knowledge forms, while remaining true to “endogeneity” as a referential, though self-critical and evolving matrix. From the vantage points of gender inclusivity, social equity and ecological consciousness, the scholar-activists, Sunita Narain and the Late Wangari Maathai, provide cutting-edge Global South critiques and alternatives to contemporary environmental discourses and practices. Following the conceptual groundwork presented, some more experiential and programmatic models are offered that could provide blueprints for how reciprocal, knowledge-based exchanges might be strengthened. In the first set of examples, some of the core convictions of the Late Tanzanian president, Mwalimu Julius Nyerere, and the Late Indian Prime Minister, Pandit Jawaharlal Nehru, with respect to both harmonious science-based development and South-South solidarity, are presented.

The second set of illustrative cases relates to non-governmental organizations that offer much-needed developmental services in an “endogenous” manner. These include the Benin-based, innovation award-winning Songhaï Center, which promotes “authentic technology” based on sustainable agroecology, and the collaboration between the Mauritius-based Global Rainbow Foundation and the Indian not-for-profit organization, Jaipur Foot, in the manufacturing and fitting of artificial limbs. Lastly, some recommendations that emerge from the three-tiered endogenous development exchange model are offered for concrete, future engagement.

Diran Soumonni is a Senior Lecturer in Innovation Policy and Management, and Programme Director of the Master of Management in Innovation Studies at the Wits Business School, South Africa. He obtained his PhD in Public Policy from the Georgia Institute of Technology in Atlanta, Georgia, USA, where he focused on both innovation studies and energy policy. He is an active member of the Global Network for the Economics of Learning, Innovation and Competence Building Systems (GLOBELICS) and of the Society for the Social Studies of Science (4S). He serves on the scientific board of the African Network for the Economics of Learning, Innovation and Competence Building Systems (AFRICALICS), and is also a Steering Committee Member of the International Network on Appropriate Technology (INAT).

TWO INVITED LECTURES WERE ARRANGED AS A PRELUDE TO THIS LECTURE SERIES: RESEARCH INNOVATION AND SUSTAINABLE DEVELOPMENT

LECTURE: CHANGING SOCIAL CONTRACT BETWEEN SCIENCE AND SOCIETY: IMPLICATIONS FOR ASIAN COUNTRIES

Speaker: **Prof. V.V. Krishna**, Professorial Fellow, University of New South Wales, Sydney, Australia & Editor in Chief, Science, Technology and Society (Sage).

CSIR-NISCAIR Conference Hall August 14, 2019.

Abstract: Globalisation (and economic liberalization) is not something, which is just confined to economic, political and financial institutional spheres of society and economy. Its influence and impact already penetrated into the practice of science and technology system and the functioning of science as a social institution (as we know it from the last 200 years or so) including universities and higher educational institutions. Some basic fundamental values of open, academic science, advancing knowledge frontiers and science as public good (existing social contract) is being over taken by secrecy in science, creation of wealth from knowledge and science as market good (new social contract). John Ziman characterised this change as ‘science as undergoing cultural revolution’; and the current transformation of universities is drawing our attention to what has come to be known Triple Helix and entrepreneurial universities which in a large measure come to threaten academic science ethos. Overall, coping and adapting to the new social contract or the emerging science and society relations is not going to be all that smooth. Large and complex technological systems, increasing degrees of risk, regulation of new science based technologies and democratization of science are likely to pose different set of new challenges. For instance, advances in biomedical science and technology in the last few years has thrown up a big challenge in environmental, ethical and risk related factors. The last decade also witnessed a big shift towards ‘commodification’ of knowledge and encroaching the ‘public space of science’ by intellectual property rights (IPRs) threatening ‘scientific commons’. What are the implications for science and society relationships? Should we allow the market forces to take over the governance of scientific enterprise? How can we create a level playing field between ‘public good’ and ‘market good’ in science institutions and universities? Are IPRs and secrecy going to benefit advancement of knowledge or retard

its progress? What are the implications for Asian countries? These are some of the issues addressed in this presentation.

Venni V. Krishna is currently Professorial Fellow, School of Humanities and Languages at the University of New South Wales & Honorary Prof, School of History and Philosophy of Science, Sydney University, Sydney, Australia. He has a PhD from the University of Wollongong, Australia and has more than 30 years of research, teaching and consultancy experience in STI studies, history and sociology of science and technology, innovation studies and science, technology and developing world in leading academic and research institutions. He was Professor in Science Policy and Chair, Centre for Studies in Science Policy, School of Social Sciences, Jawaharlal Nehru University, New Delhi and Senior Scientist at CSIR-NISTADS.

Lecture: MEASURING AND CHARACTERIZING INDIAN SCIENTIFIC RESEARCH: NEW DIMENSIONS

Speaker: **Dr Vivek Singh**, Professor of Computer Science and Director, Computer Centre at Banaras Hindu University, Varanasi NISTADS Vivekananda Conference Hall November 11, 2019.

Abstract: The talk will attempt to address quantitative pursuits in Indian Science, addressing several traditional issues like

India's research output, global share and rank, disciplinary distribution of research output and international collaboration patterns. The main emphasis will be on quantitative methods and how they can be used to draw inferences useful for science policy. The talk will include discussion on issues of gender and research publishing as well as open access levels and patterns in Indian research. The University-Industry-Government collaboration in research would also be looked into. The talk will also discuss on a very important and emerging issue of social media attention of Indian research output, including characterizing the type of research output that gets significant attention in different social media and news platforms.

Guest lecture on the occasion of INTERNATIONAL WOMEN'S DAY 2020 jointly organized by CSIR- NISTADS and CSIR-NISCAIR under the theme 'I AM GENERATION EQUALITY: REALIZING WOMEN'S RIGHTS'

Lecture: WOMEN HEALTH: IT TAKES TWO TO TANGO

Speaker: **Dr. Uma Kumar**, Prof & Head Of Department, Rheumatology, All India Institute of Medical Sciences (AIIMS), New Delhi. NISTADS Vivekananda Conference Hall March 05, 2020.

Lecture Series: NISTADS Faculty

SCIENTIFIC MISCONDUCT: ISSUES OF PLAGIARISM, FALSIFICATION AND COPYRIGHT HOW THEY CAN BE ADDRESSED?

Speaker: **Dr. Sujit Bhattacharya**

NISTADS Vivekananda Conference Hall
February 12, 2020.

Abstract: The presentation will draw attention to how plagiarism, falsification and various other scientific misconducts is making science and its outcome questionable. The ethos and normative framework within which science is constructed and supposed to function is challenged by scientific misconduct. Plagiarism has taken various forms. Is it because researchers face increasing pressure to publish? Is it that they need to score on indicators that has become new normal to quantify and qualify research output? Understanding the different types of plagiarism, the copyright vis-à-vis plagiarism, and touching upon the larger issues of ethics, morality, and the changing context of science, the presentation explores some of the ways one can address these issues. The presentation also highlights the issues of plagiarism in India and approaches that are being taken to address them.

INNOVATIONS IN PREVENTING POST HARVEST LOSSES AND PROMOTING FOOD PROCESSING FOR PERISHABLE CROPS: AN EVIDENCE-BASED POLICY STUDY

Speaker: **Dr. Mohd. Rais**

NISTADS Vivekananda Conference Hall
March 04, 2020.

Abstract: The food processing industry in India is a sunrise sector that has gained prominence in the recent decade. This sector serves as a vital link between the agriculture and industrial segments of the economy. The food processing industry in India is a potential source for driving the rural economy as it brings synergy between the consumer, industry,

and agriculture. A well-developed food processing industry increases farm gate prices, reduce wastages, ensure value addition, promote crop diversification, generate employment opportunities as well as export earnings. However, the on-going challenges in this field are viz. poor supply chain linkages, infrastructure bottlenecks, lack of skilled manpower, low adherence to quality standards, etc. Many farmers and informal workers do their businesses in unprotected and unsecured places due to which they are prone to health hazards. Since a market is a primary medium for farmers to exchange their produce for money, but the lack of logistic connectivity and other problems do not safeguard their harvest to reach the market in time, and their minimal role in pricing decisions ultimately results in lowering of the farmers' ability to monetize their produce. This becomes even more critical in the case of perishable fruits and vegetables. Thus, there is a significant need to prevent post-harvest losses and simultaneously promote food processing industries for perishable produce. This study addresses the reasons for the losses of perishable fruits and vegetable crops specifically Tomato, Onion, and Potato (TOP) crops, how such losses can be prevented by adopting the Science, Technology & Innovation (STI) strategies and how to promote the processing of TOP crops. The study will carry out the primary and secondary data survey on various parameters of TOP crops produce, trading places (Mandis), processing plants, and assess the current status of STI in this subsector. This will recommend basket of policy options to the government and various stakeholders. The outcome of the study will help in reducing post-harvest losses; promote the value addition opportunities; management of price shocks in TOP crops; suggestions to implement relevant cold storages and cold chain technologies for these crops. This will not only prevent the losses but also lead to income and employment generation for all stakeholders of the value chain.

SEMINAR SERIES: AcSIR STUDENTS

The AcSIR Ph.D Programme at CSIR-NISTADS, New Delhi is more than 5 years old. The PhD students at the institute work on topics related to various disciplines and cover a vast repertoire of issues in science, technology and innovation studies. This seminar series is being conducted at the institute by collaborative effort of AcSIR Faculty, Institute Administration and PhD Students. It is our hope that the series will gather support from the institute and help the students improve their research work.

Purpose: This seminar series aims to bring the PhD students together on a shared platform. The interaction between them and the AcSIR faculty at NISTADS will be beneficial for the students. In addition, this will help create a collaborative academic environment among the students as well.

About the Series: In this series, a seminar will be held once every week where a PhD student will make about 20 minute long presentation to the audience. This presentation will be related to the work conducted by the student during their PhD research. The student is expected to present a brief overview of their work and/or choose a specific topic from their work to talk. Keeping the presentation short is strategically decided to promote longer follow-up discussions between the presenter and the audience.

Schedule: The Proposed start of Seminar Series is on Wednesday, January 29, 2020. The Seminar will be held in NISTADS Vivekananda Conference Hall from 3:00 PM. The seminars in this series will be conducted once every week on either Tuesday, Wednesday or Thursday.

ASSESSING THE NEED AND IMPACT OF NUTRACEUTICALS AS DIETARY SUPPLEMENTS

Speaker: **Priyamvadah Kinth**

NISTADS Vivekananda Conference Hall
January 29, 2020.

Abstract: Focus of the talk would be on assessing the need of nutraceuticals as dietary supplement. Trends emerging from the primary survey related to user's perception about the claimed health benefits of nutraceuticals/ health supplements would be presented. This is important in the light of rising market and growing public interest in these non-prescription based products. Questionnaire survey method was used to understand the prevalent understanding among consumers, the consumption pattern, reasons for consumption or non-consumption of these products and overview of regulations pertaining to nutraceuticals. The talk will be followed by a short discussion session of 15 mins between the presenter and the audience.

DEVELOPING A CONCEPTUAL FRAMEWORK FOR EVALUATING THE CASE OF GENETICALLY MODIFIED (GM) CROPS IN INDIA

Speaker: **Anurag Kanaujia**

NISTADS Vivekananda Conference Hall
February 06, 2020.

Abstract: New and Emerging technologies like GM crops have multidimensional issues that involve a complex technology-society market interface. This complexity leads to different perspectives of technology and its impact. Adoption and commercialisation are not simply market driven but involve issues of risk, ethics, ownership, societal acceptance etc. Understanding these different facets leads to designing of appropriate regulatory and governance framework. Conceptual framework provides a structure based on interlinked concepts to study a phenomenon. The presentation draws attention to developing a conceptual framework for GM crops. This framework the author applied for examining the innovation, regulation and commercialisation of GM crops in India. The talk will be followed by a short discussion session of 15 mins between the presenter and the audience.

EVALUATION OF SUSTAINABILITY STATUS FOR STATE MARINE FISHERIES OF INDIA

Speaker: **Sadhna Sahu**

NISTADS Vivekananda Conference Hall
February 13, 2020.

Abstract: Marine fisheries are developed to various extents in different coastal states of India. Optimal utilization of marine living resources has not been achieved in any of the states with most regions being either underexploited or heavily overexploited. Understanding the current status of sustainability is important for path correction towards a more sustainable system. As part of my research I have attempted to quantify the indicators for each of the attributes of sustainability (Ecological, Technological, Economic, Social, Ethical and Institutional) for all the coastal states of India by using a method called as RAPFISH (Rapid appraisal of fisheries). In this presentation I will discuss the results from data collected till date and share the errors I made in designing my study.

ENABLING INSTITUTIONS FOR CREATION OF AN ECOSYSTEM FOR TECHNOLOGY STARTUPS: A CASE STUDY OF NUTRIORG, JAIPUR

Speaker: **Umang Gupta**

NISTADS Vivekananda Conference Hall
February 20, 2020.

Abstract: Entrepreneurship has become the driving force of economic and social development throughout the world. In recent decades, research has produced new insights that have changed the prevalent view about the role of entrepreneurship in innovation and technological change. In this context, it is imperative to look at the context of how institutions can align themselves with the system and create enabling environment for innovation and entrepreneurship which requires a robust framework to study. The presentation is based on a case study performed by the author in the course of studying the entrepreneurship ecosystem in various regions

in India. Applying a framework based on the concepts from innovation systems and entrepreneurship studies, the case has been analyzed to study the development of the said ecosystem in the region. The talk will be followed by a short discussion with the audience.

RESOURCE POTENTIAL OF BIODEGRADABLE WASTE: QUANTIFICATION & PATHWAYS (A CASE STUDY OF FRUIT & VEGETABLE WASTE)

Speaker: **Priti**

NISTADS Vivekananda Conference Hall
February 27, 2020.

Abstract: The rise in the urban settlement is happening haphazardly and continuous reliance on the landfilling technology for waste management has serious consequences for the future; one of such foreseen consequences is shrinking land resources. Moreover, 90% of the landfills are just open dump and the indiscriminate disposal of mixed waste in landfill without scientific treatment poses serious environmental and social threat. Therefore, there is a need of a hierarchical approach of waste management for sustainable resource recovery, which is primarily based on the waste composition and characteristics. Most of the countries underwent reforms in waste management practices by following the hierarchical approach and keeping organic waste out of landfill. On the contrary, in India approximately 40-50% percent of the solid waste is organic, making the segregation of the organic portion unrecoverable. The presence of the high percentage of unsegregated organic waste reduce the efficiency of waste processing technology. In this context, study of fruit & vegetable waste which is present in large fraction as biodegradable waste in municipal solid waste (MSW). This study focuses on the improper waste management practices in Agriculture Produce Market Committee (APMC) and Municipal Bajar Samiti. The study determines the gap and

establishes a relationship between environment and sustainability practice to utilize waste as resource.

IDENTIFYING BARRIERS IN INNOVATION STRATEGIES OF NEGLECTED DISEASES: THE CASE OF CHIKUNGUNYA IN INDIA.

Speaker: **Dhruv**

NISTADS Vivekananda Conference Hall
March 05, 2020.

Abstract: WHO has defined Neglected tropical diseases (NTDs) as a group of communicable diseases that are prevalent in tropical and subtropical regions across 149 countries. The term 'Neglected' in NTDs can refer to neglect in terms of research initiatives or efforts taken in prevention, mitigation and cure of the disease. This presentation compares the global R&D scenario of neglected diseases with that of India by studying the case of *chikungunya* in India. I will discuss the results of my scientometric analysis which aims to study and analyse the current R&D status of *chikungunya* a tropical neglected disease prevalent in India and to compare it with R&D in HIV which is a global disease. Analysis of the results show that *chikungunya* remains a neglected disease in terms of R&D efforts in India and in the western countries. I will also discuss the successful innovation models emerging in other countries and compare it to the current R&D scenario in India.

EFFECT OF TELEMEDICINE INTERVENTION ON HEALTHCARE DELIVERY IN INDIA

Speaker: **Raj Kishor Kustwar**

NISTADS Vivekananda Conference Hall
March 12, 2020.

Abstract: There exists a huge inequality in healthcare distribution in India- 75% of qualified doctors are practicing in urban areas, 23% in semi-urban areas and only 2% in rural areas where 68.8% population live and patients from these areas have to travel 50-70 km to seek specialty treatment. India spends around 4.1% of GDP on health, of which government

contribution is only about 1.15%. Out of pocket expenses are high at over 60%, much higher than most of the countries in the world. In terms of mortality, deaths due to communicable, maternal, perinatal and nutritional conditions account for 28%, injuries 12% and Non-Communicable Deaths (NCDs) account for 60%, where NCDs accounted for about 45% of rural deaths. Telemedicine in India is started in 2000 to bridge the rural-urban healthcare divide. Telemedicine allows health care professionals to evaluate, diagnose and treat patients at a distance using telecommunications technology. Although telemedicine has benefitted a large population especially from underserved remote and rural areas through ISRO Telemedicine Network, NRTN, NTN, NMCN, SEHAT, OncoNet, CSC-SP and various state government telemedicine networks. However, majority of telemedicine projects are either stalled or are in early developmental stage. So far a little research exists on readiness, availability, accessibility, user-acceptance and functionality of telemedicine in India. Therefore, present study focused on the challenges of telemedicine and functionality of telemedicine centers in the current Indian scenario. Semi-structured questionnaire based survey of stakeholders was conducted to know their opinion on potential challenges to telemedicine and their possible solutions. According to the respondents telemedicine is underutilized in India and its unavailability could have moderate to severe effect on healthcare delivery in underserved areas. In terms of functionality, telemedicine centers were being utilized for continuing medical education, but, utility in terms of number of teleconsultations was inadequate. Identified potential challenges to telemedicine include-unavailability, unawareness, reluctance of doctors to use telemedicine and ethical, medicolegal and regulatory issues. Attention of policy makers, healthcare providers and administrators is needed towards sustained integration of telemedicine with conventional healthcare system.



Academy of Scientific and Innovative Research (AcSIR)

ACADEMY OF SCIENTIFIC AND INNOVATIVE RESEARCH (AcSIR)

Coordinator: Dr. Mohd. Rais

Academy of Scientific & Innovative Research (AcSIR) is a research Academy created by an Act of Indian Parliament to be an Institute of National Importance. Academy of Scientific and Innovative Research (AcSIR) has adopted the mandate to create and train some of the best of tomorrow's Science & Technology leaders through a combination of innovative and novel curricula, pedagogy and evaluation. AcSIR's focus will be on imparting instruction and providing research opportunities in such areas that are not routinely taught in regular academic universities in India. At NISTADS, students having interest in Science, Technology, and Innovation (STI) Policy are admitted to PhD programme. During the current year, 11 PhD students were admitted to AcSIR-CSIR-NISTADS. During, current session Students, presented their work progress in doctoral advisory committee (DAC) on topics, ranging, from tele-medicines, nutraceuticals as dietary supplements, resources potential of biodegradable, mathematical modelling and development of decision support (DSS) system.

AcSIR PhD Programme at CSIR-NISTADS

AcSIR was established in 2010 (by a resolution of GOI on July 17, 2010) and formalized by an Act of Parliament vide The Gazette of India (dated February 7, 2012) and notified on April 3, 2012 as an *Institution of National Importance*.

Mission:

The mission of the Academy is to create higher quality personnel with cross-disciplinary knowledge, aiming to provide leaders in the field of science and technology:

- Nurture a research-propelled, technology-enabled, industry-linked, socially conscious higher education platform.
- Achieve a seamless integration of intellectual strengths with current market needs with a people centric focus.

- Develop niche capability required to bolster research efforts in futuristic science.
- Provide the opportunity to work on the frontier and contemporaneously challenging areas for nurturing innovation.

Objectives

The major objectives of the AcSIR PhD Programme are:

- Disseminate advanced knowledge in science and technology, by providing teaching and research facilities in emerging and futuristic areas of inter-disciplinary and multi-disciplinary areas-whether the focus is natural sciences, life sciences, mathematical and computational sciences, medical sciences, engineering, applied art, humanities, social sciences, law relating to these areas.
- Adopt measures for innovations in teaching and learning processes.
- Create an ambience for learning and scholarship in advanced science and technology instead of exclusively focusing on marks or grades.
- Educate and train manpower in scientific and technological fields; science 2.0 e-enabled cloud environment.
- Establish linkages with industries in India and outside India for the promotion of science and technology.
- Collaborate, in appropriate areas in the field of science and technology, with reputed universities and institutions in India and outside India.
- Promote research in science and technology having a bearing on social, economic, cultural, and intellectual, welfare of the people.
- Organize and undertake extramural studies, training and extension services.

Major Findings/Achievements/Outcomes

CSIR-National Institute of Science, Technology and Development Studies

(NISTADS) offered the PhD programme under Academic of Scientific & Innovative Research (AcSIR) along with the various Science, Technology and Society researches/activities. NISTADS has vibrant PhD programme since August 2013 in Science Technology Innovation (STI) contributing to the evidence based policy input for the socio-economic development of the country. The first batch of the PhD programme started from August 2013 session, PhD admission take place every year (session wise) at CSIR-NISTADS. Currently 28 PhD students are pursuing their PhD programme at AcSIR-CSIR-NISTADS.

Courses taught:

- Introduction to Qualitative Research
- Indian Economy & Policy
- Innovation Systems & Development
- Science and Technology systems – India and the World
- Science, Technology & Innovation Policy
- Trade & Technology
- Enterprise Development through Value Chains Analysis
- Intellectual Property Rights in the Context of Research, Innovation & Development
- Resource Planning & Policy
- Global Warming: History, Trends & Politic
- Principle of Economics
- Social Studies of Science: An Introduction
- Introduction to Public Health Policy
- Science, Technology & Innovation Strategy
- An Introduction to Probability and Statistics
- Foundations of Mathematics.

List of AcSIR students

Since 2013

1. Debanjana Dey
2. Manjari Manisha
3. Priyamvadah Kinth
4. Shilpa

Since 2014

5. Praveen Rawat

Since 2015

6. Sadhna Sahu
7. Dhruv Mishra
8. Umang Gupta
9. Anurag Kanaujia
10. Priti

Since 2016,

11. M. Naresh Babu

Since 2017

12. Raj Kishor Kushtwar

13. Chandrashekhar Chavan

Since August 2018

14. Ishita Goyal
15. Suvita Rani
16. Suman Patairiya
17. Prajith K.K.
18. MeghaVaishnavi
19. Shudodhan Singh Thakur
20. Kaushalendera Kumar
21. Kunal Sanyal
22. Jyoti Mouriya
23. Mohd. Afsar Khan

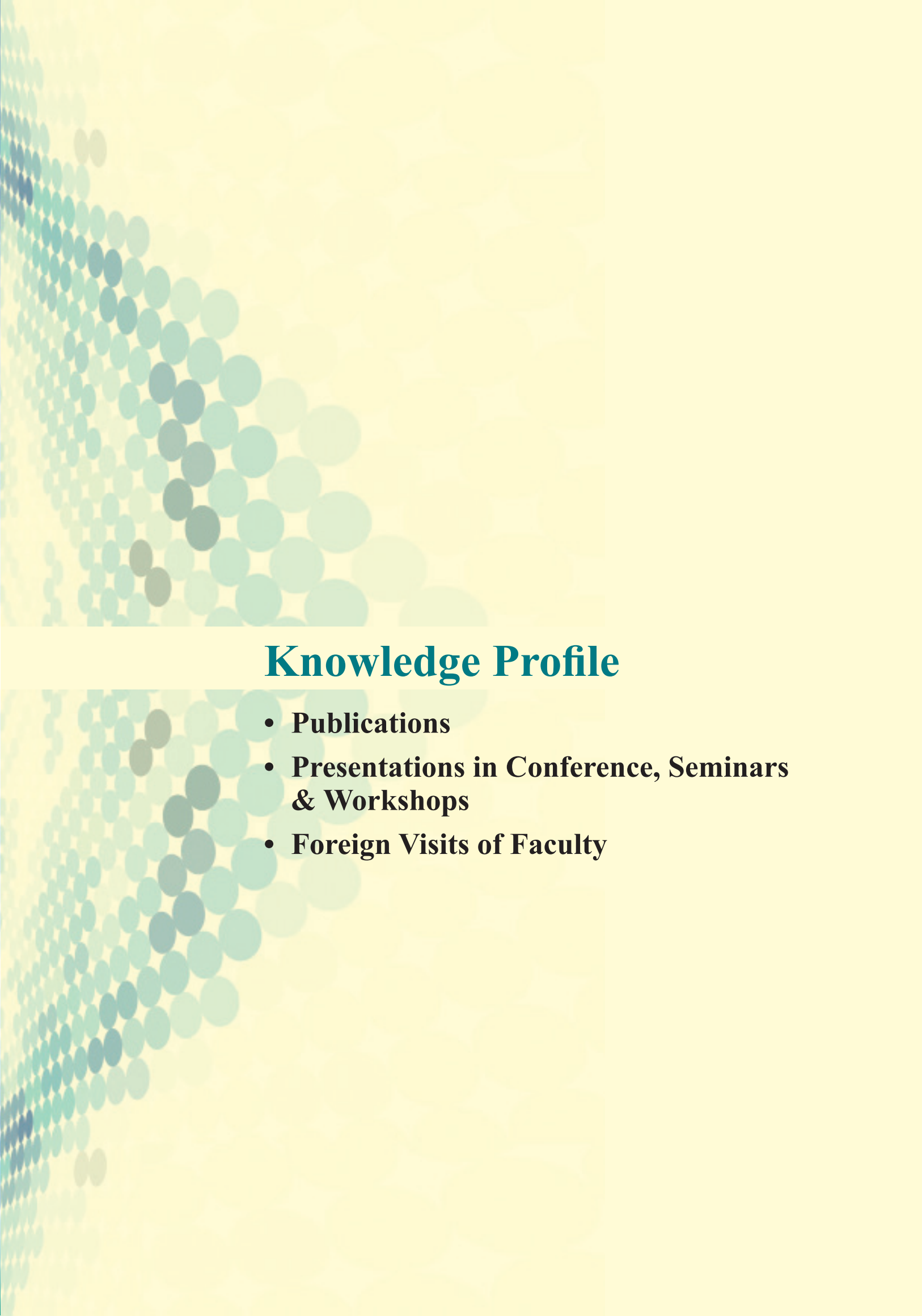
Since January 2019

24. Jyoti Sharma

Since January 2020

25. Anuj Raj Singh





Knowledge Profile

- **Publications**
- **Presentations in Conference, Seminars & Workshops**
- **Foreign Visits of Faculty**

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3. Goswami, Prashant and Nishad, Shivnarayan (2019) 'A dynamical model of growth of membership to an opinion', *Current Science*, 116(4): 357-391.
4. Jethi, Renu (2018) 'Components of the concept industry 4.0', *Journal of Material Science and Mechanical Engineering (JMSME)*, 5(4): 198-201.
5. Jethi, Renu (2018) 'Digital technologies', *Advances in Computer and Information Technology (ACSIT)*, 5(2): 81-85.
6. Kanajia, Anurag and Bhattacharya, Sujit (2018) 'The GM crop debate in India: Stakeholders interests, perceptions, trust and public policy', *Asian Biotechnology Development Review*, 20(1&2).
7. Kumar, Suresh (2018) 'Journal productivity of research literature on 'Jatropha'', *Journal of Library and Information Communication Technology*, 7(1): 29-39.

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8. Bhattacharya, Sujit (2019). 'Some salient aspects of machine learning research: A bibliometric analysis', *Journal of Scientometric Research*, 8(2s): 85-92.
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12. Rais, M.; Kaul, A, and Jain, A. (2019) 'Evaluation of public private partnerships in perishable food supply Chain in India', *Journal of Supply Chain Management Systems*, 8(2): 52-63.

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13. Bhattacharya, Sujit (2020) 'Science and innovation design in the 21st century: New paradigms and challenges for policy', *Current Science*, 18 (3): 348-349.
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2. Bhati, Madhulika and Rai, Radhika (2018) 'Commercialization of Large-Scale Perovskite Solar Energy Technology and Scaling-Up Issues', In *Perovskite Photovoltaics Basic to Advanced Concepts and Implementation*, (eds. Sabu Thomas, Aparna Thankappan), Edited by. Elsevier Publisher, chapter-13, pp.387-445.
3. Bhati, Madhulika; Bansal, Kirti and Rai, Radhika (2019) 'Capturing thematic intervention of nanotechnology in

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5. Madhavi, Y. (2019) 'Vaccines and vaccine policy for universal healthcare', in *'Universalising Health care in India: A Journey through Time from Care to Coverage'*, (eds. Qadeer, I., Saxena, K. B., and Arathi, P.M.) Aakaar Publications, pages 475.

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1. Naresh, Kumar (2019) 'Transforming S&T Policy in India: Changing Dimensions and Emerging Challenges', in Proceedings of International Conference on Innovation Driven Economic Growth in Asia Focusing on India, held at Goa University, Goa, 27-29 November, 2019, pp. 61-70.

POPULAR ARTICLES

1. Naresh Kumar (2020) 'Asadharan Ganitgya: Dr. Vashishth Narayan Singh', *Vigyan Pragati*, January, pp. 52-53.

REPORTS

2018

1. Goswami, Prashant and Sharma, Praveen (2018) 'S&T applications to peoples' problems (STAPP): Adulteration Detection and Prevention', NISTADS Tracks in Policy Research. NISTADS/NTPR/STAPP/Adulteration/2017-1.
2. Pulamte, L. and Rais, M. (2018). Project report on 'Opportunities of promoting MSEs in Northeast Region of India for Income and Employment Generation', by CSIR-NISTADS.

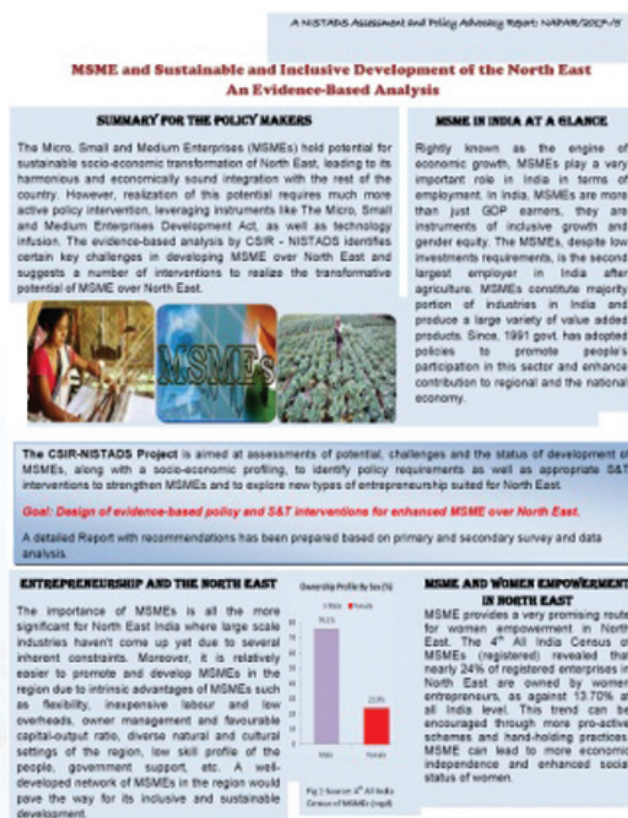
2019

1. Goswami, Prashant and Sharma, Praveen (2019) 'S&T applications to peoples' problems (STAPP): Agriculture', NISTADS Tracks in Policy Research, NISTADS/NTPR/STAPP/AGRI/2019/2.
2. Goswami, Prashant and Sharma, Praveen (2019) 'S&T applications to peoples' problems (STAPP): Skill Development and Employment', NISTADS Tracks in Policy Research NISTADS/NTPR/STAPP/Skills/2019/1.
3. Kumar, Vipin and Bhati, Madhulika (2019) Report on 'Technology Empowerment of North-East: Water, Energy and Communication Solutions (TENE-WECS)', by CSIR-NISTADS.
4. Kumar, Vipin and Kshitij, Avinash (2019) Technical report on 'Pilot study for assessment of ranking Index for Universities and R&D Institutes', by CSIR-NISTADS.

POLICY BULLETIN

2018

1. Goswami, Prashant and Sharma, Praveen (2018) 'STAPP Case study: Adulteration', CSIR-NISTADS, New Delhi.



2. Rais, M. and Pulamte, L. (2018) 'MSME and Sustainable and Inclusive Development of the North East: An Evidence-Based Analysis', CSIR-NISTADS, New Delhi.
3. Rais, M. and Pulamte, L. (2018) 'MSMEs as catalysts for economic development in NE India: Status, Challenges and Potential', CSIR-NISTADS, New Delhi.

2019

4. Kumar, Naresh; Bhati, Madhulika and Nishad, Shiv Narayan (2019) 'Control of Pollution Over Delhi through smart traffic management', CSIR-NISTADS, New Delhi.
5. Suman, Y.; Bhattacharya, S. and Jamal, Tabassum (2019) 'Employment Generation: Taking Indian SMEs upward in the Innovation Value Chain. Policy Bulletin', CSIR-NISTADS, New Delhi.
6. Suman, Y.; Bhattacharya, S. and Jamal, Tabassum (2019) 'Promoting innovation of SMEs of Assam', Policy Bulletin, CSIR-NISTADS, New Delhi.

A CSIR-NISTADS Assessment and Policy Advocacy Report NIPAR/2018-1

SMART TRAFFIC MANAGEMENT FOR CONTROL OF POLLUTION EVENTS OVER DELHI

SUMMARY FOR POLICY MAKERS

Control of air pollution over Delhi needs a multi-pronged approach; smart management can aid the overall effort. In a first-of-its-kind observation campaign by NISTADS, based on high-frequency mobile observation platform and analysis, it was found that Extreme Pollution Events (EPEs) in particulate matter, during which air quality is extremely degraded for short durations, were major contributors (up to 80%) to build-up of pollution; reduction of EPEs can thus improve the air quality significantly. It was also found that certain locations, like Delhi University, are hotspots of EPEs. As a measure to reduce the impact of such EPEs, an Air Quality-linked Traffic Advisory System (AQTAS) has been developed to issue real-time alerts and advisory to avoid EPEs; this system is currently in an open-environment demonstration at NISTADS campus. A Policy Advocacy is presented for deployment of AQTAS as well as other measures so as to reduce EPEs.



THE CSIR-NISTADS PROJECT: MISSION CLEAN DELHI

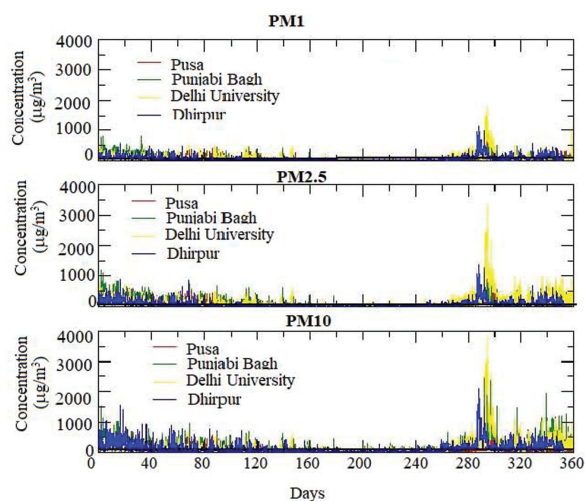


Data-Based Policy Advisory on Real-time Air Pollution over Delhi

The CSIR-NISTADS project is aimed at creation of an implementable, effective and non-disruptive traffic management system based on high-frequency co-located observations of pollution concentrations, traffic parameters and weather variables for maintaining pollution below safe limit.

Goal: A smart, dynamic traffic management system for reduced air pollution over Delhi

The effectiveness of the solution lies in creating a real-time traffic decision support for smooth traffic movement



Extreme Pollution Events: Concentration of PM1 (top panel), PM2.5 (middle panel) and PM10 (bottom panel) is recorded during the period from 10 January, 2017 to 15 January, 2018, at 20-minute interval at the four locations

A significant finding is that the prevalence and the intensity of EPEs are much higher over certain locations like Delhi University and Dhirpur; this offers possible avenues for control of EPEs.

PRESENTATIONS IN CONFERENCE, SEMINARS & WORKSHOPS

Dr. Sujit Bhattacharya

EDITOR-IN-CHIEF

• **Dr. Sujit Bhattacharya** is Editor-in-Chief of *Journal of Scientometric Research* (*J. Scientometric Res.*), which is an internationally targeted official publication of Phcog.Net. It publishes peer reviewed articles online in an open access format. The journal encourages both empirical and theoretical contributions that advance scientometric research and also reaches out to scholars of Science and Technology Studies (STS), sociology, economics and any other field, who use scientometric data as the 'object of investigation' or apply scientometric analysis in policy or innovation studies. The journal thus seeks to publish articles in all the different domains of scientometrics, including patent studies (techometrics) and web-based studies (webometrics). [ISSN: Print - 2321-6654, Online - 2320-0059].

Frequency: Rapid at a time publication - Triennial (3 issues/year)

- Invited as Keynote speaker for Innovation and Policy Conference, ASIP 2018 Bangkok Conference, 13-15 September, 2018.
- Invited speaker in the 7th National Conference of Institute of Scientometrics, at KLE University, Belgave, 22 September, 2018.
- Presented paper on 'Some salient aspects of new technologies: Policy implications for India', at the discussion meeting "Socio-Economic Impact of New Technologies: Policy Implications for India", CSIR-NISTADS, 10 October, 2018.
- Invited talk at the international conference "Planning for Industrialisation in 21st century", 15-16 November, 2018.
- Paper presented by my co-author Shilpa, 'Learning from Indian Nanotechnology Development: Exploring New Pathways for Effective Policy Interventions', at the 16th Globelics Conference, Ghana, Accra, 24-26 October, 2018.
- One of the plenary session speaker at the Session VI in the *India-ASEAN Inno Tech Summit*, at The Lalit Hotel, New Delhi, 29-30 November, 2018.
- Invited talk on 'IPR- Its implications in research, innovation and development', at the Asian-India Workshop on "Intellectual Property Rights & Technology Transfer", 1-5 April, 2019, at India Habitat Centre, New Delhi
- Invited talk on 'Exploring the Cross-disciplinary Impact and Implications of Scientometric', at the Indo-German workshop on "Information Retrieval, Informetrics & Scientometrics (IRIS)", at Cologne Germany, 11-13 June, 2019. *This paper invited for the special issue of the journal Scientometrics.*
- Invited talk on 'Scientific Misconduct: Good Science, Bad Science and Beyond', in 'Scientific Ethics Orientation Programme' at CSIR-National Botanical Research Institute, on 22 July, 2019.
- Invited Speaker & Moderator at the ASIP 9th Conference on Technology and Innovation for SMEs, at University of the Philippines, Diliman, Quezon City, Philippines 3-5 October, 2019.
- Presentation on 'Orientation and Changes in Emerging Industry Policies', as distinguished speaker in the Second Sino-Indian Joint Research Workshop on 'Science and Technology Innovation', at Chinese Academy of Science and Technology for Development, Beijing 16-18 December, 2019.
- Presentation on 'Some Salient Aspects of India's Innovation Ecosystem', as distinguished speaker, in the second Sino-Indian Joint Research Workshop on 'Science and Technology Innovation', at Tsinghua University, Beijing, 16-18, December 2019.
- Invited talk on 'Copyright, Ethics and IP Information: Scientometric Study for Academic Excellence', at Workshop on Intellectual Property Protection and Innovation Management of Academics & Industry', at GITAM, Deemed to be University, Vishakhapatnam, 10 February, 2020.
- Provided extensive training on 19th February on 'Issues of Innovation and Technology Assessment', at Training of Officials of the Bangladesh Council of Scientific and Industrial Research in R&D Management, 17-21 February, 2020.

Sandhya Wakdikar

- Delivered a lecture on ‘Swacchata hi sewa’ on the occasion of *Swacchata Diwas* at NISTADS, on 1 October, 2018.
- Delivered lecture on ‘Disaster Vulnerability and Resilience in NE India for Sustainable Development’, at NESID Summit 2018, on 26 April 2018.
- Attended training at Centre for Disaster Management- Lal Bahadur Shastri National Academy of Administration, Dehradun on “Role of Technology in Community Level Disaster Mitigation” from 20-24 August, 2018.
- Nominated to attended the programme of Centre for Climate Change and Stake holder meeting held on 20 July 2018 at Banker’s Institute of Rural Development (BIRD), Lucknow.

Dr. Madhulika Bhati

- Attended 5-day capacity-building program on Design and Evaluation of Innovation Policies (DEIP), jointly being organized by the DST-Centre for Policy Research at IISc Bangalore and the United Nations University -Maastricht Economic and Social Research and Training Centre on Innovation and Technology (UNU-MERIT), during 25-29 March, 2019, at IISc Bangalore campus.
- Invited as distinguished speaker and paper presented at Second Sino-India Workshop on Science, Technology and Innovation Policy, at Chinese Academy of Science and Technology for Development, Beijing, 16-18 December, 2019.
- KISTEP-ISTICS&T Innovation Training Program for High Level Policy Makers “STI Policy Making for National Growth: Korea’s P.I.E Framework and R&D Management Cycle”, 26 – 30 November 2018, Kuala Lumpur, Malaysia.
- Presented a paper in ISTIC4th Biennial International Conference on Women in Science, Technology and Innovation in collaboration Ministry of Energy, Science, Technology, Environment and Climate Change, Malaysia (MESTECC), United Nations Office for South-South Cooperation (UNOSSC) and UN Women.
- Paper presented in capacity-building program on Design and Evaluation of Innovation Policies (DEIP), jointly organized by DST-

Centre for Policy Research at IISc Bangalore and the United Nations University -Maastricht Economic and Social Research and Training Centre on Innovation and Technology (UNU-MERIT), during 25-29 March, 201, at IISc Bangalore campus.

- Paper presented in North-East Sustainable, Inclusive Development (NESID) Summit organised jointly by CSIR-NISTADS and Kaziranga University during 26-28 April, 2018 at Kaziranga University Campus, Jorhat, Assam.

Dr. Suman Ray

- Presentation on ‘Bio Economy with Herbal Remedies: Rare, Endangered and Threatened (RET) Medicinal Plants of North East India’, at Northeast Sustainable & Inclusive Development Summit Bio-Economy for Sustainable and Inclusive Development of North-East, Kajiranga University, Jorhat, 6-8 March, 2019.
- Prashant Goswami and Suman Ray (2018): poster presented on ‘Ayur Vatika: Bringing Herbal Healthcare to Doorstep for the entire family’, under the theme Swasth Bharat, at India International Science Festival, held at Lucknow, 5-6 October, 2018.
- Raj Kishor Kustwar and Suman Ray presented poster on ‘Opinion and perception of doctors and medical students towards telemedicine technology in India’, under the theme: Swasth Bharat, at India International Science Festival, Lucknow, 5-6 October, 2018.
- Deepti VS and Suman Ray (2018) presented poster on ‘Prevention and cure of epilepsy: action of herbs (English version)’, and दीप्ति वी.एस. तथा सुमन रे. मिरगी की रोकथाम एवं उपचार: जड़ी-बूटी का कार्य (Hindi version), at Workshop on Interface of Science and Society, CSIR-NPL, New Delhi, 14 December, 2018.

Dr. Shiv Narayan Nishad

- Presented paper on ‘Food Security in India Through the Lens of Sustainable Approach’, at International Conference on Green Justice: Contemporary Challenges of Environment & Sustainable Development 2020, held at GLS Law College, Ahmadabad, during 29 February to 1 March, 2020.

FOREIGN VISITS OF FACULTY

Participation in

Second Sino-Indian workshop on 'SCIENCE AND TECHNOLOGY INNOVATION'

Beijing, China, December 16-18, 2019.

The workshop was held in Beijing china at Chinese Academy of Science and Technology for Development (CASTED) which covered the following themes:

- Technology predictions and key National technology choices
- Orientation and changes in emerging industry policies (software or pharmaceutical industry);
- Agriculture and rural development and technological innovation;
- Science and technology innovation policies that promote social development;
- Construction and management of the Science and Technology Park.

The participants from CSIR-NISTADS: Dr. Ranjana Aggarwal, Director, (Head of delegation) Dr. Sujit Bhattacharya, Chief Scientist, Dr. Naresh Kumar, Senior Principal Scientist, Dr. Vipan Kumar, Senior Principal Scientist, Dr. Yogesh Suman, Senior Principal Scientist, Dr. Madhulika Bhati, Senior Scientist, (Co-ordinator).

Prof. R Tewari, Coordinator, DST- Centre for Policy Research Panjab University; Dr. M.H. BalaSubrahmanya, Professor, Indian Institute of Science; Dr. Vivek Kumar Singh, Professor, Department of Computer Science, Banaras Hindu University.

Representative of CASTED : Dr. SUN Fuquan, Vice President; Dr. Wang Shuhua, Director and Researcher, Institute of Foresight and Evaluation; Dr. SU Nan, Deputy Director

and Researcher, Institute of Science and Technology for Industrial Development; Dr. XU Zhuqing, Associate Researcher, Institute of Rural and Regional Development; Dr. WEI Shijie, Researcher, Institute of Science and Technology Investment; Dr. BI Liangliang, Second Secretary of the Science and Technology Section of the Chinese Embassy in India.

Representative of Greatwall Strategy Consultant (GEI) : Mr. WANG Fenyue, Partner, Vice General Manager, GEI Mr. WANG Mingyang, Partner, Director of International Affair, GEI, Mr. ZHANG Jizhe, Senior PM of International Affair, GEI; Miss. SHI Qi, Senior Consultant of International Affair, GEI; Experts from other Department of GEI, such as Enterprise Consulting, S&T Park Consulting, E-economic research etc.



Second Sino-Indian workshop: SCIENCE AND TECHNOLOGY INNOVATION
Beijing, China, December 16-18, 2019



FOREIGN VISITS OF FACULTY: SECOND SINO-INDIAN WORKSHOP

S. No.	Name of Scientist	Country	Duration	Purpose of the visit
1.	Dr. Ranjana Aggarwal Director	Beijing, China	16-18 Dec., 2019	to participate as a distinguished speaker in the “Second Sino-Indian Joint Research Workshop on Science and Technology Innovation” at Chinese Academy of Science and Technology for Development (CASTED)
2.	Dr. Sujit Bhattacharya Chief Scientist	Beijing, China	16-18 Dec., 2019	to participate as a distinguished speaker in the “Second Sino-Indian Joint Research Workshop on Science and Technology Innovation” at Chinese Academy of Science and Technology for Development (CASTED)
		Diliman, Quezon City, Philippines.	3-5 Oct., 2019	to deliver a talk as an invited speaker and moderator of a session in the Asian Society for Innovation and Policy (ASIP) 9th Conference-Technology and Innovation for SMEs
3.	Dr. Naresh Kumar Chief Scientist	Beijing, China	16-18 Dec., 2019	to participate as a distinguished speaker in the “Second Sino-Indian Joint Research Workshop on Science and Technology Innovation” at Chinese Academy of Science and Technology for Development (CASTED)
4.	Dr. Vipin Kumar Sr. Principal. Scientist	Beijing, China	16-18 Dec., 2019	to participate as a distinguished speaker in the “Second Sino-Indian Joint Research Workshop on Science and Technology Innovation” at Chinese Academy of Science and Technology for Development (CASTED)
5.	Dr. Yogesh Suman Sr. Principal. Scientist	Beijing, China	16-18 Dec., 2019	to participate as a distinguished speaker in the “Second Sino-Indian Joint Research Workshop on Science and Technology Innovation” at Chinese Academy of Science and Technology for Development (CASTED)

6.	Dr. Madhulika Bhati Sr. Scientist	Beijing, China	16-18 Dec., 2019	to participate as a distinguished speaker in the “Second Sino-Indian Joint Research Workshop on Science and Technology Innovation” at Chinese Academy of Science and Technology for Development (CASTED)
	Dr. Madhulika Bhati Sr. Scientist	Malaysia	26-30 Nov., 2018	To attend the KISTEP-ISTIC S&T Innovation Training Programme for High Level Policy Makers “STI Policy Making for National Growth: Korea’s P.I.E Framework and R&D Management Cycle at Malaysia
	Dr. Madhulika Bhati Sr. Scientist	Malaysia	22-23 July, 2019	ISTIC 4th Biennial International Conference on Women in Science, Technology and Innovation in collaboration Ministry of Energy, Science, Technology, Environment and Climate Change, Malaysia (MESTECC) United Nations Office for South-South Cooperation (UNOSSC) and UN Women.
7.	Dr. Kasturi Mandal Sr. Scientist	Diliman, Quezon City, Philippines.	3-5 Oct., 2019	To deliver a talk as a distinguished speaker in the ASIP 9th Conference-Technology and Innovation for SMEs
8.	Sh. Avinash Prasad Kshitij	Diliman, Quezon City, Philippines.	3-5 Oct., 2019	To deliver a talk as a distinguished speaker in the ASIP 9th Conference-Technology and Innovation for SMEs



Right To Information (RTI) Unit

RIGHT TO INFORMATION (RTI)

CSIR-NISTADS has implemented The Right to Information Act, 2005 as public authority under Department of Scientific and Industrial Research (Ministry of Science and Technology). For the year 2018-19 and

2019-20, the details of RTI applications, First Appeals and Second Appeals are given in the Table-1. Broad Subjects: Recruitments, Assessment & Promotions, Pay, Projects, HRA, Fellowships, Staff, PWD, and Others.

Table 1: RTI applications, First Appeals and Second Appeals received

Year	RTI Applications received	First Appeals	Second Appeals
2018-19	95	11	03
2019-20	76	07	-

Names, Designations and other particulars of the RTI Officials:

Appellate Authority:

Dr. Mohd. Rais
Senior Principal Scientist
Ph. (Off): 011-2584 3052
Email: rais@nistads.res.in

Nodal Officer:

Mr. Brij Bihari
Section Officer
Ph. (Off): 011-2584 3072
Email: brijbihari@nistads.res.in

Central Public Information Officer:

Mr Kashmiri Lal
Senior Technical Officer (3)
Ph. (Off): 011-2584 3094
Email: kashmirilal@nistads.res.in

Assistant Public Information Officer

Dr. Anil Kumar
Sr. Technical Officer (1)
Ph. 011-2584 3097
Email- ak.kushwaha@nistads.res.in



CSIR Budget



CSIR Budget Allocation: Last Five Financial Years

Financial Year	Total Budget (Rs. In Lakhs)
2015-16	1061.850
2016-17	2190.410
2017-18	1210.460
2018-19	1265.229
2019-20	1193.678



हिंदी की गतिविधियां

हिंदी की गतिविधियां

सीएसआईआर- राष्ट्रीय विज्ञान, प्रौद्योगिकी और विकास अध्ययन संस्थान, नई दिल्ली में दिनांक 01 अप्रैल, 2018 से 31 मार्च, 2020 की अवधि में विभिन्न अनुभागों द्वारा द्विभाषी (हिंदी-अंग्रेजी) रूप में जारी किए गए कार्यालय ज्ञापनों, परिपत्रों, प्रेस विज्ञप्तियों, निविदा सूचनाओं तथा अन्य कार्यालयों को हिंदी में भेजे गए पत्रों/ ई-मेल एवं फाइलों पर लिखी गई टिप्पणियों, लिखे गए चर्कों और अनुभागीय डायरी रजिस्ट्रों में की गई प्रविष्टियों आदि के अतिरिक्त, राजभाषा कार्यान्वयन से संबंधित गतिविधियां निम्न प्रकार हैं:

1. राजभाषा कार्यान्वयन समिति की त्रैमासिक बैठकों का आयोजन:
 - i) दिनांक 06-04-2018;
 - ii) दिनांक 06-07-2018;
 - iii) दिनांक 08-10-2018;
 - iv) दिनांक 08-01-2019;
 - v) दिनांक 10-06-2019;
 - vi) दिनांक 11-09-2019;
 - vii) दिनांक 10-12-2019; तथा
 - viii) दिनांक 16-03-2020.
2. वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, मुख्या., नई दिल्ली और उत्तरी क्षेत्रीय कार्यान्वयन कार्यालय-1(दिल्ली), राजभाषा विभाग, नई दिल्ली को निम्नलिखित तिमाही हिंदी प्रगति रिपोर्ट भेजी गई:
 - i) 01 अप्रैल-30 जून, 2018 (दिनांक 18-07-2018);
 - ii) 01 जुलाई- 30 सितंबर, 2018 (दिनांक 15-10-2018);
 - iii) 01 अक्टूबर-31दिसंबर, 2018 (दि. 23-01-2019);
 - iv) 01 जनवरी- 31 मार्च, 2019 (दिनांक 09-04-2019);
 - v) 01 अप्रैल-30 जून, 2019 (दिनांक 11-07-2019);
 - vi) 01 जुलाई- 30 सितंबर, 2019 (दिनांक 14-10-2019);
 - vii) 01 अक्टूबर-31 दिसंबर, 2019 (दि. 14-01-2020); तथा
 - viii) 01 जनवरी- 31 मार्च, 2020. (दिनांक 08-06-2020)

3. सीएसआईआर- राष्ट्रीय विज्ञान, प्रौद्योगिकी और विकास अध्ययन संस्थान, नई दिल्ली के अधिकारियों एवं कर्मचारियों के लिए निम्नलिखित हिंदी प्रतियोगिता/ हिंदी कार्यशाला का आयोजन किया गया:
 - i) 18 जून, 2018 को “स्वच्छता और स्वास्थ्य” विषय पर हिंदी में निबंध लेखन प्रतियोगिता।
 - ii) 25 फरवरी, 2019 को “राजभाषा नीति एवं कार्यान्वयन” तथा “प्रशासनिक और तकनीकी अनुवाद” पर हिंदी में विस्तृत चर्चा (वक्ता- डॉ. बिचारदास, पूर्व निदेशक, केंद्रीय अनुवाद ब्यूरो, राजभाषा विभाग(गृह मंत्रालय), नई दिल्ली और संस्थान में संचालित परियोजनाओं के बारे में हिंदी में विस्तृत चर्चा (डॉ. मधुलिका भाटी, वरि. वैज्ञानिक, सीएसआईआर-निस्टैड्स, नई दिल्ली)।
 - iii) 13 सितंबर, 2019 को “राजभाषा नीति एवं कार्यान्वयन” तथा “सरकारी कामकाज में सरल एवं सहज हिंदी के प्रयोग की आवश्यकता” पर हिंदी में विस्तृत चर्चा। (वक्ता- डॉ. बिचारदास, पूर्व निदेशक, केंद्रीय अनुवाद ब्यूरो, राजभाषा विभाग(गृह मंत्रालय), नई दिल्ली)
4. नगर राजभाषा कार्यान्वयन समिति (उत्तरी दिल्ली), पौधा किस्म और कृषक अधिकार संरक्षण प्राधिकरण, राष्ट्रीय जीन बैंक, एन.बी. पी.जी.आर. पुराना परिसर, पूसा, नई दिल्ली को सीएसआईआर-निस्टैड्स, नई दिल्ली की 01 अप्रैल, 2018- 30 सितंबर, 2018; 01 अक्टूबर 2018-31 मार्च, 2019; 01 अप्रैल, 2019-30 सितंबर, 2019; तथा 01 अक्टूबर, 2019-31 मार्च, 2020 को समाप्त अवधि की “छमाही हिंदी प्रगति रिपोर्ट” भेजी गई।
5. संसदीय राजभाषा समिति की दूसरी उप-समिति द्वारा दिनांक 10-09-2018 को सीएसआईआर-निस्टैड्स, नई दिल्ली का राजभाषा संबंधी निरीक्षण किया गया।
6. हिंदी दिवस (14 सितंबर) के उपलक्ष्य में सीएसआईआर-निस्टैड्स, नई दिल्ली में निम्नलिखित हिंदी पखवाड़ा आयोजित किए गए:
 - i) दिनांक 14 से 28-09-2018 तक हिंदी पखवाड़ा मनाया गया। इस अवधि में संस्थान के अधिकारियों एवं कर्मचारियों के लिए अनेक हिंदी प्रतियोगिताओं का आयोजन किया गया। “हिंदी पखवाड़ा समापन समारोह

“दिनांक 28-9-2018 को अपराह्न 2:30 बजे निस्टैड्स विवेकानंद हॉल में किया गया। इस अवसर पर कमला नेहरू महिला महाविद्यालय, भुवनेश्वर (ओडिशा) के हिंदी विभाग की अध्यक्ष, डॉ. वेदुला रामालक्ष्मी जी को मुख्य अतिथि के रूप में आमंत्रित किया गया।

दिनांक 13-09-2019 से 27-09-2019 तक हिंदी पखवाड़ा मनाया गया। इसका उद्घाटन दिनांक 13-9-2019 को प्रातः 10:30 बजे सीएसआईआर-निस्टैड्स की निदेशक डॉ. रंजना अग्रवाल जी ने किया। उन्होंने अपने उद्घाटन संबोधन में भारत सरकार की राजभाषा नीति के प्रभावी कार्यान्वयन के बारे में हिंदी में विस्तारपूर्वक चर्चा की। उद्घाटन के पश्चात संस्थान के अधिकारियों एवं कर्मचारियों के लिए “सरकारी कामकाज में सरल एवं सहज हिंदी के प्रयोग की आवश्यकता” विषय पर “हिंदी कार्यशाला” का आयोजन किया गया।

इस अवधि में अनेक हिंदी प्रतियोगिताओं का आयोजन किया गया। “हिंदी पखवाड़ा समापन

समारोह” दिनांक 27-9-2018 को अपराह्न 2:30 बजे निस्टैड्स विवेकानंद हॉल में किया गया। इस अवसर पर हरियाणा राज्य उच्च शिक्षा परिषद, पंचकूला के अध्यक्ष प्रो. बृज किशोर कुठियाला जी को मुख्य अतिथि के रूप में आमंत्रित किया गया। आमंत्रित मुख्य अतिथि प्रो. कुठियाला जी का सीएसआईआर-निस्टैड्स की निदेशक डॉ. रंजना अग्रवाल जी ने परिचय कराया। मुख्य अतिथि प्रो. कुठियाला, ने भारत सरकार की राजभाषा हिंदी के कार्यान्वयन के बारे में विस्तारपूर्वक चर्चा की। निदेशक, निस्टैड्स एवं मुख्य अतिथि ने हिंदी पखवाड़ा के दौरान आयोजित हिंदी प्रतियोगिताओं के विजेताओं तथा पिछले एक वर्ष में हिंदी में सरकारी कार्य करने वाले अधिकारियों एवं कर्मचारियों को नकद पुरस्कार वितरित किए।

नोट: अधिक जानकारी के लिए कृपया निस्टैड्स वेबसाइट www.nistads.res.in पर उपलब्ध हिंदी गतिविधियां देखें।



हिंदी कार्यशाला (दिनांक 25-2-2019) के दौरान मंच पर (दाएं से बाएं) डॉ. सुजीत भट्टाचार्य, प्रमुख वैज्ञानिक, श्री बिचारदास, पूर्व निदेशक एवं श्री सुरेन्द्र कुमार, प्रशासन नियंत्रक



हिंदी पखवाड़ा (14-28 सितंबर, 2018) का उद्घाटन करते हुए सीएसआईआर-निस्टैड्स के निदेशक डॉ. पी. गोस्वामी



संसदीय राजभाषा समिति की दूसरी उप-समिति द्वारा दिनांक 10-9-2018 को किए गए सीएसआईआर-निस्टैड्स के राजभाषा निरीक्षण में शामिल अधिकारीगण



हिंदी पखवाड़ा समापन समारोह (दिनांक 28-9-2018) के अवसर पर (दाएं से बाएं), डा. जी. डी. संध्या, प्रमुख वैज्ञानिक, डॉ. वेदुला रामा लक्ष्मी (मुख्य अतिथि), डॉ. मुहम्मद रईस, वरिष्ठ प्रधान वैज्ञानिक तथा प्रशासन नियंत्रक श्री सुरेन्द्र कुमार



मंच पर उपस्थित डॉ. बिचारदास, अतिथि वक्ता (बाएं), डॉ. रंजना अग्रवाल, निदेशक (मध्य में) एवं डॉ. सुजीत भट्टाचार्य, प्रमुख वैज्ञानिक (दाएं)।



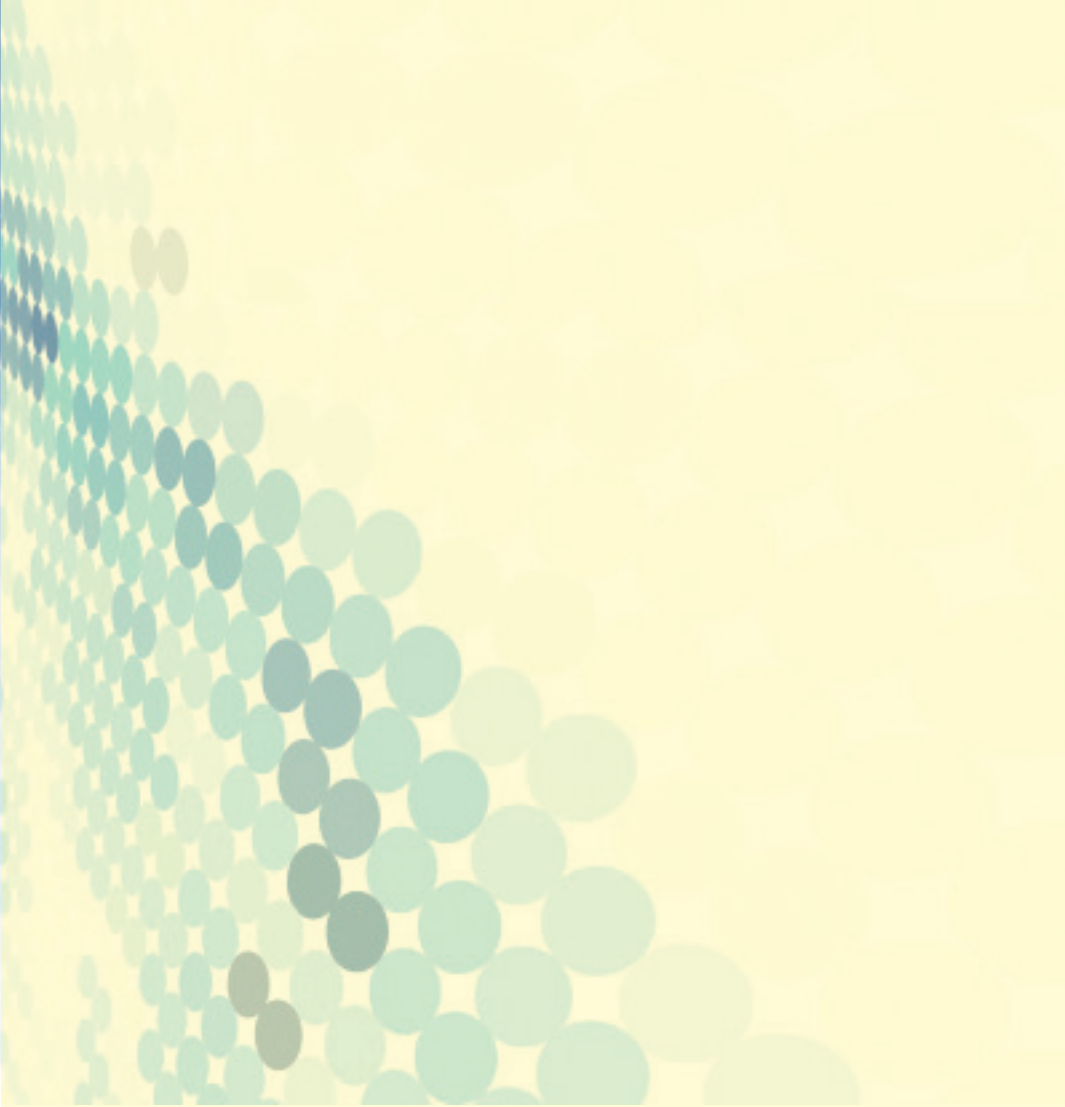
कंप्यूटर पर हिंदी में टाइपिंग प्रतियोगिता, दिनांक 18-9-2018 में भाग लेते हुए प्रतिभागी।



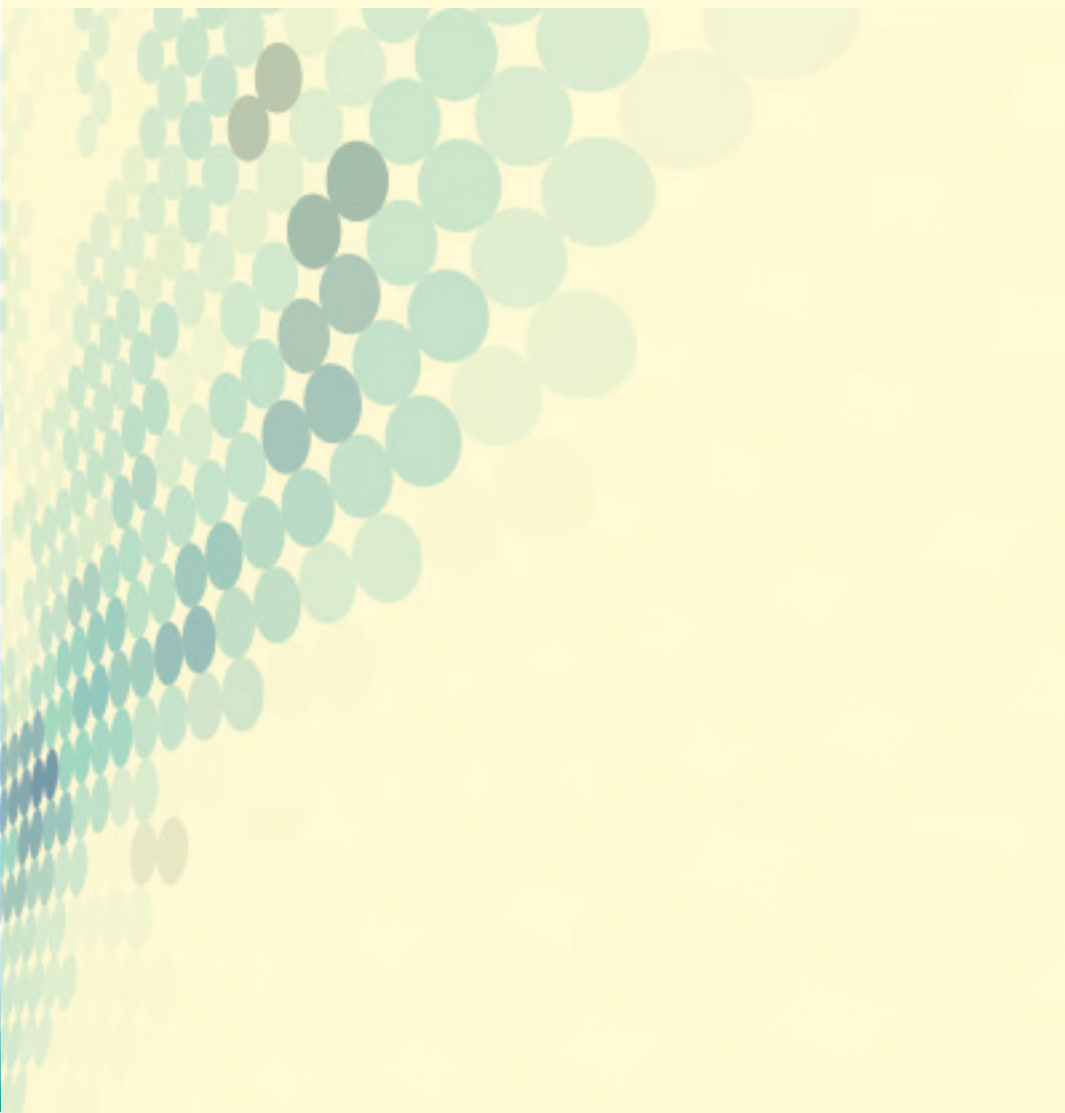
डॉ. रंजना अग्रवाल (निदेशक) पुष्पगुच्छ से मुख्य अतिथि प्रो. वृज किशोर कुठियाला जी का स्वागत करती हुई।



प्रतियोगिताओं के विजेताओं को पुरस्कार वितरण समारोह।



Staff List



STAFF LIST

Director

Dr. Ranjana Aggarwal (joined on 24.06.2019)
Dr. P. Goswami (retired on 31.12.2018)

Chief Scientist

Dr. G.D. Sandhya (voluntary retirement w.e.f. 30.09.2018)
Dr. Tabassum Jamal (retired on 31.05.2019)
Dr. Sujit Bhattacharya
Dr. Mohammed Rais
Dr. Naresh Kumar

Senior Principal Scientist

Dr. Y. Madhavi
Dr. Vipin Kumar
Dr. L. Pulamte
Dr. Yogesh Suman
Mrs. Sandhya Wakdikar

Sr. Scientist

Dr. Madhulika Bhati
Dr. Kasturi Mandal
Shri Avinash Prasad Kshitij
Dr. Vinayak (joined on 18.06.2018)

Scientist

Dr. Suman Ray
Dr. Shivnarayan Nishad
Dr. L. Sandhiya (joined on 21.06.2019)

Sr. Technical Officer (3)

Shri Anil Kr. Sharma
Shri A.K. Bhardwaj
Dr. Suresh Kumar
Shri Kashmiri Lal
Dr. Praveen Sharma

Sr. Technical Officer (2)

Ms. Renu Jethi

Sr. Technical Officer (1)

Dr. Anil Kumar

Technical Assistant

Shri Chand Mohammad

Sr. Technician (2),

Dr. (Ms.) Anita Bali
Ms. Tara Verma
Shri N.K. Prashar
Shri J.S. Narula
Shri R.K. Nagarwal

Lab. Assistant

Shri Madan Kumar
Shri Dheeraj Pal
Shri Ram Suphal
Shri K.C. Joshi

Lab. Attendant

Shri Shiv Singh Negi (retired on 31.03.2019)
Shri Murli Dhar

Controller of Administration

Shri Surender Kumar

Controller of Finance & Accounts

Shri Hans Gautam (joined on 13.08.2018)

Finance & Accounts Officer

Shri Jai Prakash Indora (transferred)

S & PO

Shri Laljasei Misao

Section Officer (Gen.)

Shri Brij Bihari
Mrs. Vijay Lakshmi (joined on 28.05.2019)

Section Officer (F&A)

Shri Ankur Jain

Section Officer (S&P)

Ms. Anita Joiya

Hindi Officer

Shri Virpal Singh

**Private Secretary**

Shri Harpal Singh
Shri Mohan Lal
Shri Ved Prakash

Assistant (Gen) Grade-I

Shri Anil Kumar
Shri Manish Kumar Mehta
Shri N.A. Khan (voluntary retirement w.e.f.
09.07.2019)
Shri Pretesh Kumar
Shri Mohd. Idrees
Shri Surinder Pal

Assistant (F&A) Grade-I

Shri Anisur Rehman (retired on 30.09.2019)

Assistant (S&P) Grade-I

Ms. Indira Jain
Shri Rakesh Kumar Mago
Shri Kanchan Singh Negi

Assistant (F&A) Grade-II

Shri M.S. Rawat
Shri Narender Singh

Senior Stenographer

Shri Pukhraj (Hindi)
Ms. Sunita Arora
Ms. Inderjeet Kaur
Ms. Dolly Kaushal (transferred to CSIO,
Chandigarh on 23.05.2019)

Staff Car Driver

Shri Surinder Prasad

Record Keeper

Shri Harbans Singh (retired on 31.12.2018)

Daftry

Shri Rajnath

Peon

Shri M. Kamrul

Multi Tasking Staff

Shri Mohit