

Edition
2022

MAY ISSUE

CREATORS

NEWSLETTER OF BIONEST-IASST

IN ASSOCIATION WITH ISVEC



EDITORS DESK

The May issue for the year 2022 is the collection of events and webinars organized by the scientific fraternity of IASST, Ghy. An article has been dedicated for recognizing the contribution of women in Science & Technology in consensus with this year's theme for International Women's day on Gender equality. We are in the era of paradigm shift where inclinations towards leveraging the natural resources like phyto-pharmaceuticals and botanicals are given utmost importance and the criteria for developing phyto-pharmaceuticals is well defined in this issue. Similarly, paths have been shown to the budding entrepreneurs in choosing agribusinesses as startup opportunities or e-waste management as a career option for driving towards *Atmanirbhar Bharat* and *#vocal for local*.

In short it is a phenomenal compilation of various articles that will motivate the reader with facts, figures and futuristic strategies in managements of resources and wastes to wealth through value added technologies.

Editor
Prof. Ashis Kr. Mukherjee
Director IASST, Ghy-35

Editorial Team:

Dr. Devasish Chowdhury, Dr. Tania Paul Das, Sagar Kumar, Minku Das, Dr. T.D. Goswami & Nayan Talukdar

EVENTS & WORKSHOPS

"Startup India Incentives for Start-ups." on 19th January 2022

BioNest-IASST in association with Startup-India has organized an online webinar on the topic "Startup India Incentives for Start-ups." on 19th January 2022 from 10 am onwards. The invited speaker of the event was Mr. Sagar Sengar, Assistant Manager-Startup India Team and total 51 participants attended the event. Mr. Sengar talk was on Startup India Initiatives, events, awards, fund of funds, ways of market access through Startup India flagship program of GoI.

In-house talk by Dr. Mojibur R Khan on 19th January 2022

For the lecture series "Talks by Scientists at AI" in the occasion of National celebration of 75th year of India's Independence- "Azadi Ka Amrit Mahotsav" an In-house talk by Dr. Mojibur R. Khan, Assoc. Prof. II, Bio-Diversity & Eco-System Research (LSD) was organized on 19th January 2022 at 2:30 pm in online mode. He delivered a talk on -'Gut feeling' on Darwinism: Microbiome and health.

Celebration of 73rd Republic Day of India at IASST, Guwahati, Assam

Institute of Advanced Study in Science and Technology (IASST), Guwahati, Assam, celebrated the 73rd Republic Day of India on the 26th January 2022 in the Institute with patriotic favor. The faculty, staff, and research scholars participated in the celebrations & the function started with the unfurling of the National Flag, followed by a review of the parade by Prof. Ashis K. Mukherjee, Director, IASST. Further, IASST virtually felicitated two eminent social workers, namely Dr. Digambar Narzary, Founder of NEDAN Foundation, who work with the poor and voiceless ethnic communities living in the far-flung un-reach villages of the North East Region of India, and Mrs. Yogabrata Dutta, Trustee of Amar Ghar, the old age home.

International Day of Women and Girls in Science on 11th February 2022

IASST celebrated International Day of Women and Girls in Science on 11th February 2022 at 10:30 am onwards. The theme of the event was "Equity, Diversity, and Inclusion: Water Unites us". The invited guest speaker was Dr. Mrs Atya Kapley, Chief Scientist & Head, Environmental Biotechnology and Genomics Division, CSIR-NEERI, Nagpur and Vice President of the Organization for Women in Science for the Developing World, a unit of UNESCO.

Invited talk by Prof. (Dr.) Ramesh Chandra Deka on 18th February 2022

A talk by Prof. Ramesh Chandra Deka, Department of Chemical Sciences, Director, Centre for Multidisciplinary Research, Tezpur University was organized on the topic- "Computational approaches for designing heterogeneous Catalysts and drug molecules." on 18th February 2022 at 3.00 PM in online mode.

Webinar on Innovation Management & Tech Commercialization and GI on 19th February 2022

Bio-NEST IASST in association with Technology Transfer Office at KIIT TBI organized a webinar on 19th February 2022 from 10:30 am on two interesting topics. The speaker for the first topic - Innovation Management & Tech Commercialization was Mr. Nitesh Kaushik, National Expert – Technology Transfer, UNIDO and Co-Founder of Vembryo Consulting & the speaker for the second topic - Geographical Indication: Overview, Importance and Benefits was Dr. Amaresh Panda, Lead-TTO, KIIT-TBI.

Celebration of National Science Day 2022 at IASST on 28th February 2022

IASST celebrated the National Science Day on 28th February 2022 at the institute premises under the Azadi ka Amrut Mahotsav celebrations. The theme for the National Science Day for this year is "Integrated Approach in Science and Technology for Sustainable Future". At the outset, Prof. Ashis K. Mukherjee, Director, IASST offered floral tribute to the statue of Sir C. V. Raman. On this occasion, motivational and inspirational talks were delivered by two eminent scholars Prof. Nashreen S. Islam, Dept. of Chemical Sciences, and Prof. Nayandeep Deka Baruah, Dept. of Mathematical Sciences from Tezpur University. To commemorate the National Science day, IASST organized various events, such as poster presentations, popular science story writing competitions, and science quiz competitions, a virtual laboratory visit and the program was attended by more than 300 students.

EVENTS & WORKSHOPS

International Day of Mathematics 2022 on 14th March 2022

IASST celebrated the International Day of Mathematics 2022 as part of the National Celebration of 75th Year of India's Independence - Azadi Ka Amrit Mahotsav on 14-March-2022 (online mode).9:30 am. The theme of this year was Mathematics Unites. Prof. Swaroop Nandan Bora, Department of Mathematics, IIT Guwahati graced the occasion as the invited guest and delivered a lecture on the topic- "Mathematics: Lingua Franca in Science".

IPR Awareness Programme under NIPAM on 17th March 2022

An IPR awareness webinar was organized by Bionest-IASST in association with The Patent Office, Kolkata under National Intellectual; Property Awareness Mission wherein the speaker of the event was Mr. Santanu Dey, Deputy Controller of Patents & Designs, The Patent Office Kolkata, DPIIT, GoI.

Celebration of World Water Day on 22nd March 2022

A talk by Prof. Arup Kumar Sarma, Department of Civil Engineering, IITG, was organized on the topic- "Impact of Climate change on Freshwater ecosystem." on 22nd March 2022 at 10:30 am in online mode. The theme for the year was- Groundwater: making the invisible visible.

Invited talk by Prof. Vinod K Tiwari on 24th March 2022

A talk by Prof. Vinod K Tiwari, Department of Chemistry, Institute of science, Banaras Hindu University, Varanasi was organized on the topic- "Hindi implementation: Increasing letter communication in Hindi." on 24th March 2022 at 10:30 am in online mode.

In-house talk by Dr. Gautam Choudhury on 29th March 2022

For the lecture series "Talks by Scientists at AI" in the occasion of National celebration of 75th year of India's Independence- "Azadi Ka Amrit Mahotsav" an In-house talk by Dr. Gautam Choudhury, Assoc. Prof. II, Mathematical and Computational Sciences (PSD) was organized on 29th March 2022 at 2:30 pm in online mode. He delivered a talk on -"Fun With Some Mathematical Patterns."

Invited Talk on National Lecture Series by Professor Bhagat Oinam on 30th March 2022.

A talk by prof. Bhagat Oinam, Centre for Philosophy, School of Social Sciences, JNU, New Delhi was organized on the topic- "Importance of Social Sciences." on 30th March 2022 at 3pm in online mode.

Invited Talk on National Lecture Series by Dr. Himangshu Kousik Bora on 8th April 2022

A talk by Dr. Himangsu Koushik Bora, Senior Scientist at CSIR- NEIST, Jorhat was organized on the topic- "Good Laboratory Practices (GLP) in Biomedical Research: Perspectives and Regulatory Aspects." on 8th April 2022 at 12 noon at IASST Auditorium.

In-house talk by Dr. Jagat C Borah on 20th April 2022

In-house talk by Dr. Jagat C. Borah, Assoc. Prof. II, Traditional and Modern Drug Discovery and Disease Diagnosis (LSD) was organized on 20th April 2022 at 2:30 pm in online mode. He delivered a talk on- "Common Sense, Science and Natural Product Drug Discovery."

SFE Zandu Award 2022

Prof. Ashis K. Mukherjee, Director, IASST Guwahati has bagged the prestigious SFE Zandu Award 2022 for his remarkable contribution for the development of drugs for the treatment of snakebite and thrombosis-associated cardiovascular diseases from plants and other natural resources. This award constituted by the Emami, and Indian Conglomerate Company was conferred to him during the 9th International Congress of Society for Ethnopharmacology held during 22-24 April, 2022 at Mysuru, Karnataka.

Celebration of World Intellectual property Day on 26th April 2022

Bio-NEST IASST organized a webinar on 26th April 2022 from 11 am onward. The topic for the webinar was "Strategies for Patenting" which was addressed by Shri Govind Sharma, Ex Chief of National Research Development Corporation. About 40 participants attended the webinar in hybrid mode. The inaugural speech was rendered by Prof. Neelotpal Sen Sarma, Head R&D, IASST and the meeting ended with the vote of thanks by Prof. Devasish Chowdhury, PSD, IASST.

Phytopharmaceuticals: A New Hope for Innovation and Development of New Drugs

- Dr. Jagat C. Borah, Associate Professor, LSD, IASST

Phytopharmaceuticals are new drug class that regulated in India by the DCGI. These are herbal medicines that rely on one or more plant components or active elements for their effectiveness. As defined by the regulatory guidelines, this must include a purified and standardized fraction with a defined minimum of four bio-active or phytochemical compounds of an extract of a medicinal plant or its part, for internal or external use of human beings or animals for diagnosis, treatment, mitigation or prevention of any disease or disorder but does not include administration by parenteral route. Phytopharmaceuticals are different from the Ayurvedic, Unani, Siddha and Homeopathy drugs as these drugs are regulated by the Central Drugs Standards Control Organization (CDSCO) and not AYUSH.

Phytopharmaceuticals largely work by targeting specific receptors, interrupting disease pathways, and disrupting pathogenic life cycles. According to Indian Pharmacopoeia Commission under Ministry of Health & Family Welfare-Globally, herbal medicines have been considered an important alternative to modern allopathic medicine. Around 80% of the population of developing countries uses herbal medicines for treatment of various diseases. India is one of the largest producers of medicinal herbs and is called as botanical garden of the world. There is unmet medical needs for the discovery and development of phytopharmaceutical drugs. The regulatory requirements for phytopharmaceuticals were notified by the Ministry of Health and Family Welfare, Government of India, which include the scientific data on quality, safety, and efficacy of an herbal drug on similar lines to synthetic, chemical moieties. For phytopharmaceutical drug, there is a lot of stress on identification, authentication, and source of the plant used for extraction, fractionation, stability etc.

India, due to both its history of herbal remedies and incredible biodiversity, offers a thriving market for phytopharmaceuticals. The global market for herbal medicines is projected to reach \$ 111 Bn by 2023. India is one of the only countries that has phytopharmaceutical drugs as a distinct category in its Drugs and Cosmetics Act, 1940 & Rules 1945,

which has helped to dispel ambiguities, spurring safer and higher quality products, which in turn further increases demand. The sector is also supported by various government initiatives which provide a fillip to the sector, across both R&D and manufacturing.

The Council of Scientific & Industrial Research, a government body dedicated to R&D, has launched a Phytopharmaceuticals Mission, running since 2018. The mission aims to improve the availability (through cultivation) of such medicinal plants which are in high demand by global and domestic industry. The mission aims to prevent promote cultivation, conservation and discovery of medicinal plants through identifying the elite germplasm and conserving it by cultivation and in a gene bank, while supporting R&D through collaborating CSIR laboratories working in the area of medicinal plants with other public and private enterprises to advance technologies.

Since under this mission, end-to-end technology for Pharmaceutical product development & commercialization is envisaged, therefore a large number of human resource from diverse field are required. Starting with production of quality botanical raw material under captive cultivation, the technology package will include, lab-scale technology for phyto-pharmaceuticals, establishing efficacy in animal models, to conducts pre-clinical studies as per DCG(I) / AYUSH regulatory guidelines to establish the safety profile and Phase I Clinical Trials in collaboration with Clinical Trial Centres. Project activity is also expected to generate new knowledge and intellectual space.

Additionally, providing further impetus, Department of Biotechnology has launched a 'Phytopharmaceutical Mission in the North East Region'. As the North East Region (NER) is highly rich in plant, animal and microbial resources (one of the 12 biodiversity rich zones globally), this mission is dedicated to promoting the cultivation



and conservation of medicinal plants in North East states, to ensure availability of authentic and quality botanical raw material for local manufacturers, such that they can become global leaders in production and export of phytopharmaceuticals.

Department of Pharmaceuticals has also launched a Production Linked Incentive Scheme 2.0, with an outlay of Rs. 15,000 Crore (~\$ 2 Bn), across a huge range of product categories, including phytopharmaceuticals, enabling fiscal incentives to be awarded to investors interested in this fast-emerging sector. The global interest in the Indian medicinal plants is evident from the inclusion of more than 100 Indian medicinal plants in the recent editions of US, European and British Pharmacopoeias.

Steps for developing phytopharmaceuticals:

- **Monograph Development:** To regulate the quality standards, various identification and quantification procedures are mentioned in herbal monographs of Indian Pharmacopoeia (IP). The specific monograph of IP of a herb details the Title and Synonym if any, Definition, Limits of active ingredient/Marker compounds, Description, Category, Identification, Chemical Tests, Assay of the marker constituents, Contaminants, Specific Tests, Storage conditions etc.
- **IPRS Development:** The next important objective of Phytopharmaceutical wing is to develop novel BRS (Botanical reference substances) and PRS (phytochemical reference substances).
- **Skill Development:** Training should be conducted for analyst, students, research scholars, on evaluation of physiochemical parameters and assay of Herbals Drugs by HPLC, HPTLC and GC.
- **Drug Testing:** Analysis of New Drug Samples (NDS) is mandatory which involves the identification of specific marker, heavy metal, adulterant and other qualitative and quantitative parameters.
- **Advance level R&D lab:** Advanced level natural products/phyto-pharmaceuticals laboratory should be set up to involve the identification, characterization, and standardization.
- **DNA bar coding:** Molecular identification of herbal drugs by means of DNA Bar-coding that help in ecological forensics, identification of traded materials, and species discovery.

Challenges of Phytopharmaceuticals:

The US-FDA has estimated that over 50,000 adverse events are caused by plant based medicines. For most herbal drugs, the efficacy is not proved and the quality is not assured. The WHO Traditional Medicine strategy 2014–2023 focuses on promoting the safety, efficacy, and quality by expanding the knowledge base and providing guidance on regulatory and quality assurance standards.

For the globally accepted botanical products, standardization and quality control of raw material and the herbal preparations is very important. In the cases where the active principles are unknown, marker substance(s) need to be established for analytical purposes. However, in most cases these markers have not been tested to see whether they really account for the therapeutic action reported for the herbal drugs. Apart from these variable factors, method of extraction, and contamination with microorganisms, heavy metals, pesticides etc. can also interfere with the quality, safety and efficacy of herbal drugs. For these reasons, pharmaceutical companies have to use cultivated plants instead of the plants harvested from the wild, because cultivated plants show smaller variations in their phyto-constituents. Furthermore, when medicinal plants are produced by cultivation, the main secondary metabolites can be monitored which facilitates in defining the best period for harvesting.

In recent years, due to the renewed interest in herbal products globally, inclusion of Indian medicinal plants in US and EU pharmacopoeias and opening up of phytopharmaceutical drug development pathway by DCGI has enabled a new growth trajectory for phytopharmaceutical drugs in India. This new regulation has given a new hope for innovations and development of new drugs from botanicals in a scientific way and would help in the global acceptance of the use of herbal products by modern medical profession.



CSIR, DBT and ICMR enters mutual MoU for phytopharmaceutical mission during January 2019. (Photo: Official website of DBT, Govt. of India)

Women in Innovation: Addressing real-world Problems”

Women in science are now occupying the most important positions, in realms one thought were unachievable before. From winning Nobel Prizes to heading NASA, women scientists have etched their names in history. This year the theme for International Women’s Day, 8 March, 2022 (IWD 2022) is, **“Gender equality today for a sustainable tomorrow” # Break the bias**, for recognizing the contribution of women and girls around the world, who are leading the charge on climate change adaptation, mitigation, and response, to build a more sustainable future for all.

Bionest-IASST under the Institute of Advanced Study in Science and Technology celebrated the International Women’s Day in association with NEATEHUB, AIC, Jorhat via virtual mode on 8th March 2021, Tuesday from 11am onwards. A total of 98 participants attended the Webinar titled: **“Women in Innovation Addressing real-world problems.”** The session was moderated by Mr. Sagar Kumar, Manager (Incubation and Outreach) who introduced all the eminent speakers of the webinar to the audience.

The inaugural speech was rendered by the honourable Director, IASST- Prof. Ashis K. Mukherjee emphasizing that Women’s Day should be celebrated every day to commemorate the significance of Women’s accomplishment and at IASST every employee caters for the equality in gender.

The session continued with the motivating talk by Dr. K. Karthikeyan, CEO of NEATEHUB, who focused on active participation of Women in NE with their innate ability to fortify the work force and how men-counterpart should create a conducive ecosystem for facilitating the showcase of feminine creativity, innovation and entrepreneurship spirit.

Dr. Tania Paul Das, Manager (S&T) at Bionest-IASST have highlighted about the incubation support in the form of physical space, funding, networking and prototyping that it provides for encouraging the women entrepreneurs in and around NER.

The session continued with the experience sharing session of real time women innovators.

They discussed on the opportunity and challenges of women specific to Northeast India. The session concluded with the valedictory session by Ms. Angira Sarmah, Admin/ HR Manager, NEATEHUB and she thanked all the eminent speakers for their valuable time and thoughts.



Ms. Bornali Sarma Boruah, founder of Easy Haat Pvt. Ltd who are into processing and preparation of ready-to-eat indigenous meals.



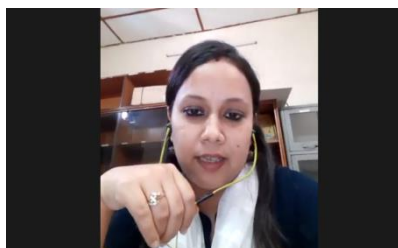
Ms. Watila Longkumer, founder of Naro Ki working on business and supply of fresh and dried floral products.



Ms. Sabina F. Saikia, Founder EcoWebLab that produces ecologically safe and economically viable biomaterials.



Dr. Anamika Kalita is a DST INSPIRE Faculty at Physical Science Division, (IASST).



Dr. Ananya Barman recipient of the BIRAC Biotechnology Ignition Grant (18th Call)

“Pradhan Mantri Formalisation of Micro Food Processing Enterprises” (PMFME) scheme

Bionest-IASST in association with India Accelerator organized an interactive session with the would-be & budding entrepreneurs of North East India.

The Guest of honor was Sri. Dhrubajit Sarma who is the state lead project Manager for- “Pradhan Mantri Formalisation of Micro Food Processing Enterprises” (PMFME) scheme, AIDC Ltd, Guwahati. He was accompanied by Mr. Chandrabhan Kakoty, Marketing Manager PMFME Scheme. They deliberated on the Agri-based startup opportunities in Assam which can be availed by the startups by utilizing the natural resources.



Potential Sector in Assam – Tea:

Assam is ranked 1st in Tea with almost 50% production as 618.20 million kg. Small Tea Growers contributes about 49% of production in Assam and there is tremendous scope for collaboration, investment and market for Organic Tea, Hand craft Tea, Aroma Tea, Herbal Tea, Flavoured Tea – example Manohari Gold, Golden Needle, Golden Butterfly.



Potential Sector in Assam – Ginger

Assam ranked as 1st in Ginger Production in the country contributing 18% with production of 168 thousand metric tone. Assam has Fibreless Nadia Variety Ginger which is with good export quality. The possible Products from ginger can be - dehydrated ginger, ginger candy, ginger powder, ginger oil and oleoresins. Infrastructures - Agri Export Zone for Ginger; Export Promotion Industrial Park (EPIP); Ginger Collection Centre; Ginger Processing Plant are existing.



Potential Sector in Assam – Fruits

Assam is Ranked 3rd in production of **Pineapple (3.09 Lakh MT, 18% of India)** and Litchi (6 % of India), **Jackfruit (10% of India)** **Oranges (7% of India; 2.03 lakh MT)**, **4% of Lemon** of Good Quality which can be processed into products. Assam produce **2.4% of Banana** (9.06 lakh MT) and Asia’s largest Market on Banana is at Darrangiri, Goalpara. Nearly 40 to 50 Trucks of bananas are sold in a single day. Products that can be prepared from these fruits are Chips, pulp, mixture, dehydrated – bites, chews, jam, juice, squash, pickle etc.



Potential Sector in Assam -Vegetables

Assam is the major vegetable growing states with 26.92 lakh MT and exporter to Bhutan, Nepal, Bangladesh. It is ranked 3rd in production of Cabbage (6.98 Lakh MT) and among top 10 states in production of carrot, pointed gourd, potato, radish.



Potential Sector in Assam – Rice

Among top 10 states in production of Rice, Assam has production worth Rs. 52.14 Lakh ton in 19-20. Assam have the unique rice varieties – Joha (aromatic), Black , Bao (Red), Sticky (Bora, Chokuwa)



Potential Sector in Assam-King Chilli

Assam has the wonder spice – Bhut Jholokiya (King Chilli) from which Dry chilli, powder, sausage, Pickle etc can be produced. **Assam's** Jorhat district has been selected as the district to produce Bhut Jolokia under the ODOP scheme.



PMFME SCHEME

PMFME scheme stands is a centrally sponsored scheme with an outlay of Rs. 10000 cr for coverage of 2 lakh micro enterprises over 5 years being implemented by MOFPI. Assam is having a target to set up 13964 Micro food processing enterprise till 2025. Individual and group micro food processing units of can avail credit –linked capital subsidy @35% of the eligible project cost with a maximum ceiling of Rs. 10 Lakh per unit. 35% capital subsidy grant would be provided to FPOs, SHGs, cooperatives, any govt agency, or private enterprises for setting up of common infrastructure. Existing entrepreneur can apply to expand the business and individuals can set up new units which will be supported by ODOP (One District One Product).

Email: contact.pmfmeassam@gmail.com
Mobile No.: 8876505574, 8209951639, 6901253466, 9678787996,
9172808108, 9957803417, 9706046118, 6002312013, 8721080990
For more information contact your District Industries & Commerce Centre (DICC) Office
Please log on to www.pmfme.mofpi.gov.in

E-WASTE: THE TECH GARBAGE ISSUES & OPPORTUNITIES

On the occasion of National Technology Day 2022 and as a part of Swachhata Pakhwada celebrations, BioNEST IASST organized a webinar on 11th May 2022 from 10:30 am onward. The topic for the webinar is "E-Waste: The Tech Garbage Issues & Opportunities" which was addressed by Mr. Achitra Borgohain, Founder & CEO – Binbag Recycling. A total of 46 participants attended the session. The inaugural speech was delivered by honourable Director, IASST, Prof Ashis Kr. Mukherjee emphasising on rebooting the economy by advancement in science & technologies and creating awareness on Re-use, Reduce and Recycle of E-waste. The guest speaker Mr. Achitra Borgohain vividly showcased how there is tremendous increase in the generation of e- waste just due to adversity of technology development and 90% of e-waste goes to informal sector. He opined that regulations should be there to increase the recycling rate through Awareness, Access to e-waste and Asset creation out of waste. He motivated the budding entrepreneurs to work on challenges like novel recycling technologies, digitalizing the supply chain and updating the recycling strategy for industry.

What is E-Waste?

E-waste is the waste that is formed by the disposal of electronic goods. In the electronic driven world with very fast changing technology, the electronic goods are discarded every couple of years. They include mobile phones, laptops tablet, computers, television, refrigerators and batteries among other things.

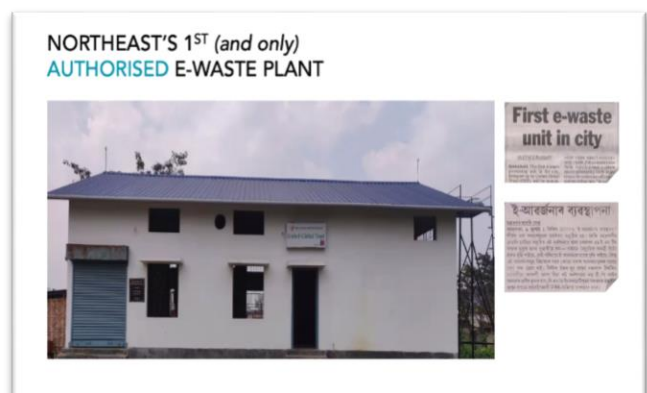


Problem with e-waste management:

Electrical and electronic equipment (EEE) contain valuable as well as hazardous materials and if the hazardous materials are not disposed of scientifically it may cause serious damage to the environment and public health. The presence of heavy metals (like Arsenic, Cadmium, Barium, Lead, Lithium, Mercury, Nickel, Zinc Sulphide) and other toxic substances like PCB (Polychlorinated biphenyls) etc. may cause extreme harm, if not disposed of in environment friendly manner. Challenges in managing electronic waste (E-waste) arise from a lack of technical skills, poor infrastructure, inadequate financial support, and inactive community engagement.

Safe methods for disposal of e-waste:

The safe method is recycling materials including metals and reusing them, which will include industry wide system for the collection of e-wastes. Implementation of proper rules to make mandatory wearing of protective masks and gloves and safety glass when dismantling and avoid easy methods of extraction such as incineration which results harmful fumes. Dumping and acid baths should be avoided, and implementing strict rules against dumping e-wastes in landfills as it could leach out towards ground water or may be released after long time. Construction of proper storage system for collected and extracted e-wastes until it is reused as products should be encouraged. action against unapproved illegal e-waste collectors and dismantlers, encourage research scientists in finding alternatives to hazardous chemicals and carcinogens, banning the electronic products with hazardous ingredients, monitoring the transportation of e-wastes within the state municipal limits as well as ports and harbors. Electronic manufactures should be given great responsibility to collect the products after their use and recycling them. It is also important to educate the public on handling and disposal of e-waste through awareness programs.



Binbag Recycling