

PROCEEDINGS OF

5TH

NORTHEAST GREEN SUMMIT 2020



northeast green
Summit



COLOMBIA
2020



VIBGYOR
N.E. FOUNDATION



PUBLISHED BY

VIBGYOR
N.E. FOUNDATION

VIBGYOR N.E. FOUNDATION
1/B ADARSHAPUR PATH, KAHILIPARA, GUWAHATI - 781019
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TABLE OF CONTENT

01	FOREWORD	1
02	MESSAGES	2 - 13
03	ACKNOWLEDGEMENT	15
04	EXECUTIVE SUMMARY	16 - 17
05	INTRODUCTION	18
06	INAUGURATION	20
07	SYMPOSIUM	23 - 61
08	ART WALK	62 - 63
09	RHYTHM OF THE HILLS	64 - 66
10	DECLARATION	68 - 82
11	ROLL OF HONOUR	83 - 85
12	VALEDICTORY	86 - 87
13	SNEAK PEEK	88 - 89
14	GLIMPSES THROUGH THE LENS	92 - 96

FOREWORD

As I write this foreword, the COVID-19 pandemic continues to rage and in fact, this has been the most challenging situation the entire world has faced in our lifetime! This is a huge, huge human crisis with severe health and socio-economic consequences and there's no guarantee that a pandemic of such a scale isn't going to erupt in the future. With the focus area of 'CORONA BIO-DISASTER AFTERMATH: SUSTAINABLE YARDSTICKS TO SAVE OUR PLANET' during the 5th Northeast Green Summit, our endeavor was to upgrade human-nature relationships and highlight scientific efforts on effective measures to confront another pandemic. The Summit, like always, of course pitches for climate neutrality but this time around, it also dwelt on preventing bio-disasters by protecting the environment.

The global impact of the COVID-19 outbreak has hit the whole tourism value chain in NE India very hard. The sector has to grapple with a sharp decline in tourist footfall and resultant loss of livelihoods. As such, revisiting NE India's tourism sector with a new roadmap was extensively discussed during the Summit, besides innovative yet sustainable strategies to boost this sector. As we believe that merely striving for climate-neutrality is not enough, the Summit- through various sessions-also focused on how to benefit people, businesses and, of course, the planet with emphasis on alternative skills and employability options for the retrenched, unemployed as well as the unemployable.

I would like to express our gratitude to all our co-hosts, our knowledgeable speakers, enthusiastic participants, efficient academic team and our ever-inspiring Advisory Board Members for their effort in bringing together this report despite the tumultuous period that we are all in. Factoring in government interventions, I am optimistic that the Summit's recommendations would definitely aid to "Build Back Better" encompassing the environment and development and in adherence with the Sustainable Development Goals of United Nations.

In these unsettling times, we need close cooperation among various international, national and regional organizations to work together to yield tangible results towards making a healthy planet.

Together, we have the power to Restore Our Earth !



Bitapi Basumatari Luhoe

(Luhoe is the Secretary of the Vibgyor NE Foundation,
the organizers of the summit)



DR. JITENDRA SINGH
Union Minister,

Ministry of Development of North Eastern
Region, Govt. of India

NORTH EAST: NEW ENGINE FOR INDIA'S GROWTH

As all of us know, we are meeting under peculiar circumstances under the shadow of Corona and therefore, this conference is also taking place in a different format. I would have personally liked to be amongst you but because of the constraints of the pandemic, this conference is being held in a semi- virtual mode, which means some of us are virtually connected and some are physically present at the venue.

And therefore, I am one of those about one thousand virtual participants connecting with you and even though in the common parlance, this is being described as social distancing, I would rather say it is not social distancing but physical distancing -

socially we are connected as much to each other as we are today. I must thank my colleague in the medical fraternity and my colleague also in the Lok Sabha, Dr. Rajdeep Roy because of whose persuasion, I had to make it to be amongst you. And I am glad that Vibgyor N.E Foundation along with IIT Guwahati has organized this 5th edition of Northeast Green Summit 2020, which also goes on to prove the point that the show goes on over here, corona or no corona, and nothing can deter our determination.. our commitment. I also have to apologise for not being there at the inaugural session but I am immensely satisfied to learn that it was a highly successful programme. The event this year has primarily focused on CORONA BIO-DISASTER AFTERMATH: SUSTAINABLE YARDSTICKS TO SAVE OUR PLANET. And, be blessed to say, it goes without saying that this theme of this event is very appropriate and keeping with the time we are passing

through, as I said at the beginning, I am sure that the organizers have chosen the topic with considerable thought and consideration. We are all on the recovery curve of this pandemic and institutes such as IIT Guwahati have now to take the lead in post pandemic era and the post pandemic resurgence in every sphere of life including economics as well as our social living. I am sure the deliberations conducted in this conference will facilitate confidence building in returning back to the lifestyle that we had been leading before the pandemic and also trying to adapt to the new norms to the extent necessary.

As we all know, Northeast is a region blessed with immense biodiversity and bioresources and this is a huge asset, rather, I would say unexplored potential not only for the Northeast region but whole of India. When we start thinking on those lines, obviously the biodiversity and bioresources of Northeast will come handy even in the resurgence of the post pandemic economy of India. As far as we are concerned in the Ministry of DoNER and North Eastern Council, we have already made a beginning through bamboo. I should remind you all that very recently, the Government of India has hiked the import duty on bamboo products coming from outside... about 20-25 per cent.. in order to promote the domestic production of bamboo products. At the same time, a year or so earlier, the 100-year-old Indian Forest Act was amended at the behest of Prime Minister Narendra Modi and now, the home grown bamboo has been exempted out of it, so that it could prove to be a source of livelihood for the youths over there. I am sure like bamboo, the other resources of Northeast are also going to play a lead role. As PM Modi once described, NE stands not only for North East but also for New Engine. I am sure, in the times to come, soon after this conference concludes and the pandemic is on its way out, Northeast will take a lead as the new engine of India and the bugle could have been heralded by way of the Northeast Green Summit.

(Extracted from the virtual speech of Dr. Singh during the Valedictory Function)

JAAN BHI, JAHAAAN BHI

It's a matter of immense pleasure to be present at the Valedictory ceremony of the 5th Northeast Green Summit at the IIT Guwahati campus. Holding of a summit at a time when the world is dealing with Covid pandemic provides us with an opportunity to delve deep into the way we are reacting, we are interacting with nature and using its resources for our survival. I am happy to learn that the Summit provided an opportunity for scientists, students and the administrators of Government departments and the political leadership to review and assess the state of the environment, changes in ecology and the steps needed to tackle or avert the worsening situation of global warming and climate change. Friends, Covid-19 is shaping to be the first major disruption in the global economy since the 2008 financial crisis in its scale, magnitude and outlook. However, analysts have termed it as one which will have a far greater impact both on human lives as well as the global economy. As we all know, the Covid-19 pandemic poses an unprecedented threat to both public health across the globe and the global economy. It has changed the way we interact, work and socialize. International Monetary Fund (IMF) estimates project that global GDP could suffer by 3% in 2020 and the pandemic will leave more than 117 countries with global GDP per capita by the end of the year. This could be worsened if this pandemic spills over or witness resurgence in 2021. Developing countries are among the hardest hit as they had to respond to the public health challenges posed by the pandemic not only in a very short period of time but also with limited resources and access to advanced technologies. Let me assure you right at the outset that Government of India has been not only proactive but also preemptive in our strategy for controlling this pandemic. The pandemic has also emerged as a great threat to the livelihood security of millions of people belonging to the lower middle income category, mainly due to the disruption of their normal economic activity. Therefore, GOI while working on effectively controlling the pandemic have transitioned from "Jaan hain to Jahan Hain" to "Jaan bhi aur Jahan bhi", emphasising the need to work on all frontiers, especially on livelihood and mitigating the negative economic impact as well taking advantage of opportunities brought by the current situation.

In the backdrop of the pandemic and the way it impacted our lives, we must all reorient our lifestyles to ensure that we do not give chance to such events in future or at least equip ourselves to fight it out in a better manner. Vaccine development is under way in most of the nations: India too is at the final stage of its trials. There is an urgent need to revisit the events that put us to a pandemic situation and take steps to ensure that such instances are not repeated in the future. I call upon the premier institutions such as the IIT Guwahati to work for providing innovative, affordable, feasible technological solutions to address disruptions caused by events such as the Corona virus pandemic and also evolve ways to protect the mankind better in such situations.

Dear friends, climate change is real and affecting every life on the planet- be it man or animal, aquatic lives or species of birds, every creature is adversely affected by extreme exploitation of Mother Nature. Adding to this is the changing lifestyle and dietary habits of people which accelerates the spread of lifestyle diseases. There is an urgent need to have a deeper understanding of the ties that binds us all on a global, national and regional scale to deal with the climate crisis. We need to promote conservation and sustainable development across the globe. No one should lose track of our commitments to sustainability in the process of addressing the pitfalls of the pandemic.



SHRI V. MURALEEDHARAN

Union Minister of State for External Affairs,
Govt. of India

All of us should be extremely cautious and take steps in this regard. We must not forget the fact that handling a pandemic like situation amidst floods or any natural disaster would be a nightmare. Regions such as Northeast that have witnessed the fury of nature must be agile and develop strategies in association with government for better managements of its natural resources.

This event has immense potential to influence policy making and effective ground level implementation of several developmental projects, especially in the Northeast which still has better forest cover, thanks to the efforts of the local communities.

Friends, India's approach to development and sustainability is derived from its tradition of preserving Mother Earth for the future generations. Sustainable development of our people remains at the centre of all our initiatives and programmes and I am sure..in fact, I must appreciate that the learned friend from the Garo Students Union, who came and explained that in the Tura region, the sacred groves are protected and the jhum cultivation is not applied in those areas. I appreciate the efforts by the people in preserving the Mother Nature, in preserving the ecology and especially in the Northeastern part of our country, this deserves more attention. Our aim is to achieve development in a sustainable manner by harnessing renewable energy and efficient use of resources. Despite our huge developmental challenges and limited availability of energy, we are taking leadership in this area. According to Nationally determined contributions (NDCs), India aims to achieve 175 Giga Watt of renewable energy capacity by 2022. As mentioned by Hon'ble Prime Minister Shri Narendra Modiji in his speech at the Climate Summit on September 23rd 2019 at the UN in New York, we aim to increase this further to 450 Giga Watt.

Given our common vulnerabilities to the vagaries of changing climate, it is pertinent that we come together to build a future that is resilient to climate change. As we work towards building partnerships within our country, at the local and regional level, it is also important for us to come together at the global level, exchange ideas and best practices and use them for a safer and shared future.

Friends, having understood the importance of Northeast in the overall development of the nation, the Government of India, under Shri Narendra Modi ji's guidance, has come up with Act East policy.

As you all are aware, the idea behind developing Act East policy is to boost the economic and social conditions of Northeast India. Other than rejuvenating the trading relations with neighbouring South-East Asian countries, the primary aim of the policy is to revive the political ties, receive regional security cooperation and developing trading relations for integration with South-East Asia. North East region has historical and cultural ties as well as strategic geographical positioning in South-East Asia. It can act as a catalyst for better relations with our neighbours. Undoubtedly, an effective Covid-19 control strategy combined with business- friendly policies would be useful in attracting foreign investors to the region but again, any plans for propelling of economic growth should consider the balance of social, economic and environmental impacts.

In conclusion, I must congratulate the Summit organizers for such a thoughtful initiative, especially at the time of a pandemic. I hope the participants had very fruitful deliberations during the Summit with tangible outcomes which would be beneficial for the entire Northeast region.

(Extracted from the virtual speech of Shri Muraleedharan,
the Chief Guest of the Valedictory Function)





RAJKUMAR RANJAN SINGH

Member of Parliament, LOK SABHA,
Manipur

NORTHEAST GREEN SUMMIT: SUSTAINABLE ROADMAP FOR PRESERVING ECOLOGY

The Fifth edition of Northeast Green Summit 2020 turned out to be a common platform for all stakeholders to deliberate and share experiences from all walks of life and propose solutions to some of the unique and common challenges being faced in the North Eastern region. One of the most interesting components this Summit had are the success stories from this domain and I am certain that VIBGYOR N.E. Foundation will relentlessly continue its efforts of better understanding of conservation and protection of Mother Nature.

This Summit, which I personally attended during its whole duration from 16-18 November, 2020 at IIT Guwahati, Assam,

is undoubtedly an appropriate platform projecting the rich biodiversity and natural resources of Northeast India into a new scale by boosting bio economic research and innovation, I understand that this Summit was initiated in 2016 to raise awareness and empower people of the Northeast with the knowledge of the rich and diverse natural habitats, biodiversity and cultural heritage that the region is bestowed with.

I must truly appreciate the efforts of the organizing committee for showcasing our indigenous culture and biodiversity which traditionally stresses on conservation of environment not just within North East India but also in contiguous biodiversity zones of Bangladesh, Myanmar and Bhutan.

The several technical sessions which were an important part of the Summit and covered a wide range of topics relevant to Northeast India related to conservation and sustainable livelihood will certainly help the region in solving some of the

unique challenges being faced after the corona bio-disaster aftermath.

I hope this Summit will dwell on various aspects of the environment and come up with ways to prepare the future roadmap so far as sustainable measures that can be taken up for preservation of ecology go. This pandemic taught us how important it is to preserve the sanctity of nature and why timely actions must be taken in this regard. Last but not the least, this Summit will make appropriate rooms in making Northeast the organic hub of the country, which is a dream of our honourable Prime Minister, Shri Narendra Modi.





DR. RAJDEEP ROY

Member of Advisory Board,
Northeast Green Summit
Member of Parliament, Lok Sabha,
Assam

Rajdeep Roy

ancient text where Lord Hanuman came down to this sub Himalayan belt for 'Sanjiveeni' to this day, we do not know what treasures lie buried here.

But then, for someone like me born and brought up and lucky to live in many places of the Northeast, it tickles me to delve into these treasure troves of the Northeast. Today, at Northeast Green Summit, we provide a platform for anything and everything under the sun, but related to Northeast and close to environment and its biodiversity to be showcased and taken to the next level. The five annual episodes so far has caught the imagination of the relevant players, not just within the Northeast but also at the national and international level.

ONE NORTHEAST, ONE HOME & OUR OWN NORTHEAST GREEN SUMMIT!

The very word Northeast has a lot of mysticism attached, more so for people who are not linked with it or seen it ever in their lives. For them, it is this unknown that evokes interest in all that is related to Northeast - from nature to orchids, blue hills to the mighty Brahmaputra, cloudy abode to misty hue, winding roads to waterfalls, one horned rhinos to hornbills. And actually, Northeast has it all !

The greenery that is seen in this part of the country is hardly seen anywhere else. It is so mesmerizing that one falls for it at first sight. This sub-Himalayan belt offers a varied range of flora and fauna. Of course, it is very difficult to know it all. From the

The debates and deliberations intertwined with arts and folk music during the summit days give us the requisite fillip to formulate policies of preservation of our natural habitat and promote our varied biodiversity. Every year in school during the 70's & 80's while observing the 'Van Mahotsav' during the first week of July, my thoughts would take shape to fly but invariably crash under the burden of studies and results! But today, I am a free man and under no pressure to perform. I can give flight to my ideas, the ideas of preserving our natural habitat and protecting our wildlife.

We have only one Northeast, only one home.
So come, let's join the voice of Northeast Green Summit.



UNEP, THE SUMMIT & NORTHEAST: ENVIRONMENT FIRST AGENDA

UNEP has been associated with the Northeast Green Summit since its inception and I must congratulate the organizers on managing to organize the Summit on such a massive scale despite the challenges of the pandemic. During these times, we need to realize that we are facing three crises in our lifetime -“the crisis of climate, the crisis of pollution and the crisis of nature”. These are all impacting our daily lives. Not many people realize the seriousness of the crisis of nature, and I was very happy to hear Hon’ble Chief Minister of Assam speak so passionately about biodiversity and the need to preserve the lives of even tiny creatures such as the ants and bees because the entire lifecycle of our planet gets impacted if even one species becomes endangered, which means fewer in numbers or becomes extinct.

Because of the pandemic raging worldwide and more intensely in our country, we are all meeting on this hybrid-online forum. There is an urgent need to transform our relationship with nature. Loss of biodiversity and ecosystem integrity has resulted in the global pandemic caused by COVID-19, a zoonotic disease, a disease transmitted from animal to human. This is the result of the fact that the finely-tuned system of the natural world has been disrupted. It has exposed humanity’s vulnerability and we need to use the pandemic as a turning point towards a more sustainable and inclusive world. In such a scenario, individuals such as Shri Jadav Payeng, the Forest Man of India, whom the Summit has felicitated, are our champions. They are the ones who have been working ceaselessly towards connecting humans and nature. And that is the biggest challenge we are facing- we need to connect humans with nature.

UNEP is very happy to support this Summit. Personally speaking, my love for the Northeast began in 1983 when I was allotted the Manipur cadre of the Indian Administrative Service. I served there for three years which was a truly memorable experience.

I am still closely connected with the Northeast and with Manipur through various institutions. We are keen to work on various environmental issues in the Northeast. I was very impressed to hear one of the speakers during the Summit speak about bringing together the sustainability aspects of the Northeast. Each one of us in India should realize that if we are talking about sustainability, Northeast can be a torch bearer. The sustainable practices existing for centuries in the Northeast need to be shared with the rest of the country, and with the rest of the world. I would request the Northeast Green Summit to undertake this documentation and UNEP would be very happy to support that.

I once again congratulate the organizers for being able to pull off the Summit despite the pandemic in a highly innovative manner by involving people not just from every nook and corner of the Northeast but also contiguous biodiversity zones such as Bangladesh, Myanmar, and Bhutan. I look forward to the recommendations of the Summit which would be extremely vital for post-pandemic greening both within and outside the region.



ATUL BAGAI

Head,
UN Environment Country Office, India

A handwritten signature in black ink, appearing to read 'Atul Bagai', with a large circular flourish at the end.



**DR. CHANDRASHEKHAR
P. DESHMUKH**

Chief Human Resources Officer,
Kokuyo Camlin Ltd.

sustainable livelihood options post COVID-19 pandemic through skilling and other employment avenues.

We at Kokuyo Camlin Ltd have been collaborating since 2018 with the Northeast Green Summit for art related activities and with the aim of showcasing the Art connect with the environment and culture of North East India.

During the fifth Summit, many artists and art students from Guwahati participated in the Art Walk & Plastic Waste Art Zone Workshop components. Their live paintings through various hues of colours and creative craft work, created based on the forgotten sustainable lifestyle practices of Northeast India during the Summit, have inspired many hearts and created wide awareness.

These were later displayed at the Summit's art gallery at the venue and witnessed

NE GREEN SUMMIT & THE ART CONNECT

It was indeed a great experience to attend the Fifth Edition of the Northeast Green Summit, held during November 16th till 18th, 2020, at IIT campus, Guwahati.

The Northeast Green Summit 2020 focused on "Corona Bio-Disaster aftermath: Sustainable Yardsticks to Save our Planet" by bringing together stakeholders from all walks of life to deliberate, share experiences and propose solutions to some of the unique challenges being faced in the region.

Overall, it was indeed an appreciable initiative by the organisers, not to mention the carefully selected topics which were the need of the hour to boost alternative

by thousands of participants both physically and through various online platforms. We were delighted at this overwhelming response and the awareness created through this Summit and wish to join hands with the organizers for future Summits.

Once again, we sincerely appreciate the sincere efforts of Vibgyor North East Foundation for their in-depth thoughts leading to choosing of insightful topics concerning green issues of North East India for the Summit, year after year.

**LOOK DEEP INTO NATURE,
AND THEN YOU WILL
UNDERSTAND EVERYTHING
BETTER.**

—ALBERT EINSTEIN



PROF. S.K. KAKOTY

Deputy Director, IIT Guwahati

A handwritten signature in black ink, reading "S.K. Kakoty".

TOWARDS A GREEN WORLD

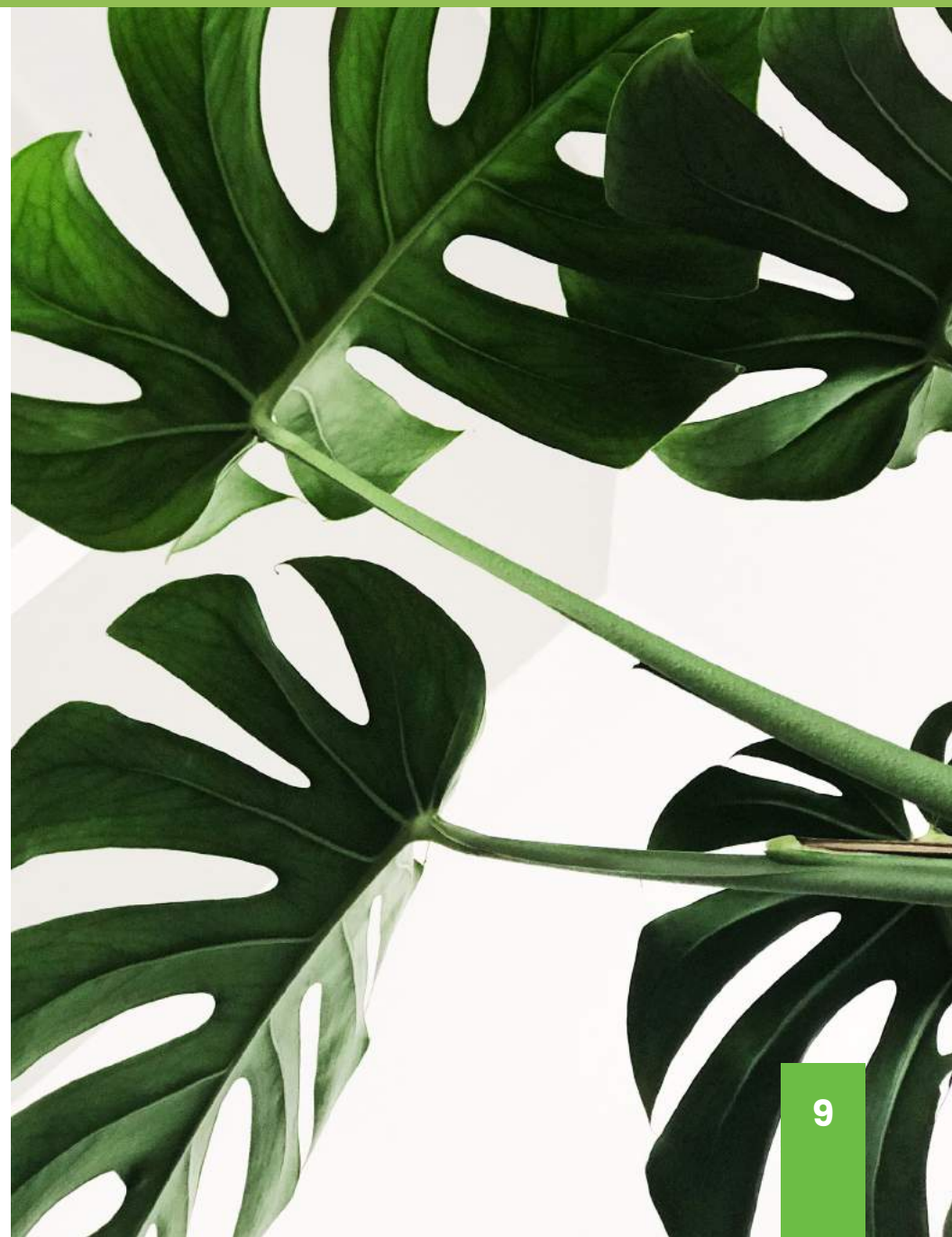
Northeast Green Summit is a platform to deliberate and share experiences and views of different stakeholders, focusing on a dream called Green World. This Summit is held every year and the last two Summits were hosted by IIT Guwahati.

I am fortunate to be part of the organizing team for last two consecutive years, 2019 and 2020. We have been passing through a difficult time since early 2020. Even then, we could successfully organize the last Summit during November 2020 maintaining all Covid-19 safety protocols. The Summit was held both physically and virtually in Spoke & Hub model. This is really a life time experience!

This Summit facilitates not only the experts, but also the common people to express their concern and ideas. Different panels consist of resource persons of varied subject areas as well as social entrepreneurs, farmers, artisans, students, industry personnel etc. Each panel comes up with a set of recommendations which are shared with the Government, both Central and State, and also other Non-governmental agencies.

Besides, art and paintings have also been part of the Summit, which attracts the youngsters. Efforts are also made to showcase different traditional practices and technology through a well-planned Exhibition.

NIT Silchar is going to host the Summit in 2021. I wish the organizers a successful culmination of this important Summit in this difficult time of Covid-19 pandemic.





SHRI C P MARAK

Member, Advisory Board
Northeast Green Summit and former
Principal Chief Conservator of Forest
and Head of Forest Force
Govt. of Meghalaya

A MEMORABLE SUMMIT DESPITE THE PANDEMIC

The North East Green Summit's forte since its first edition in 2016 has been array of eminent resource persons or speakers and selection of pertinent themes. The Summit evoked enthusiastic response and participants cutting across all sections of the people transcending North East India.

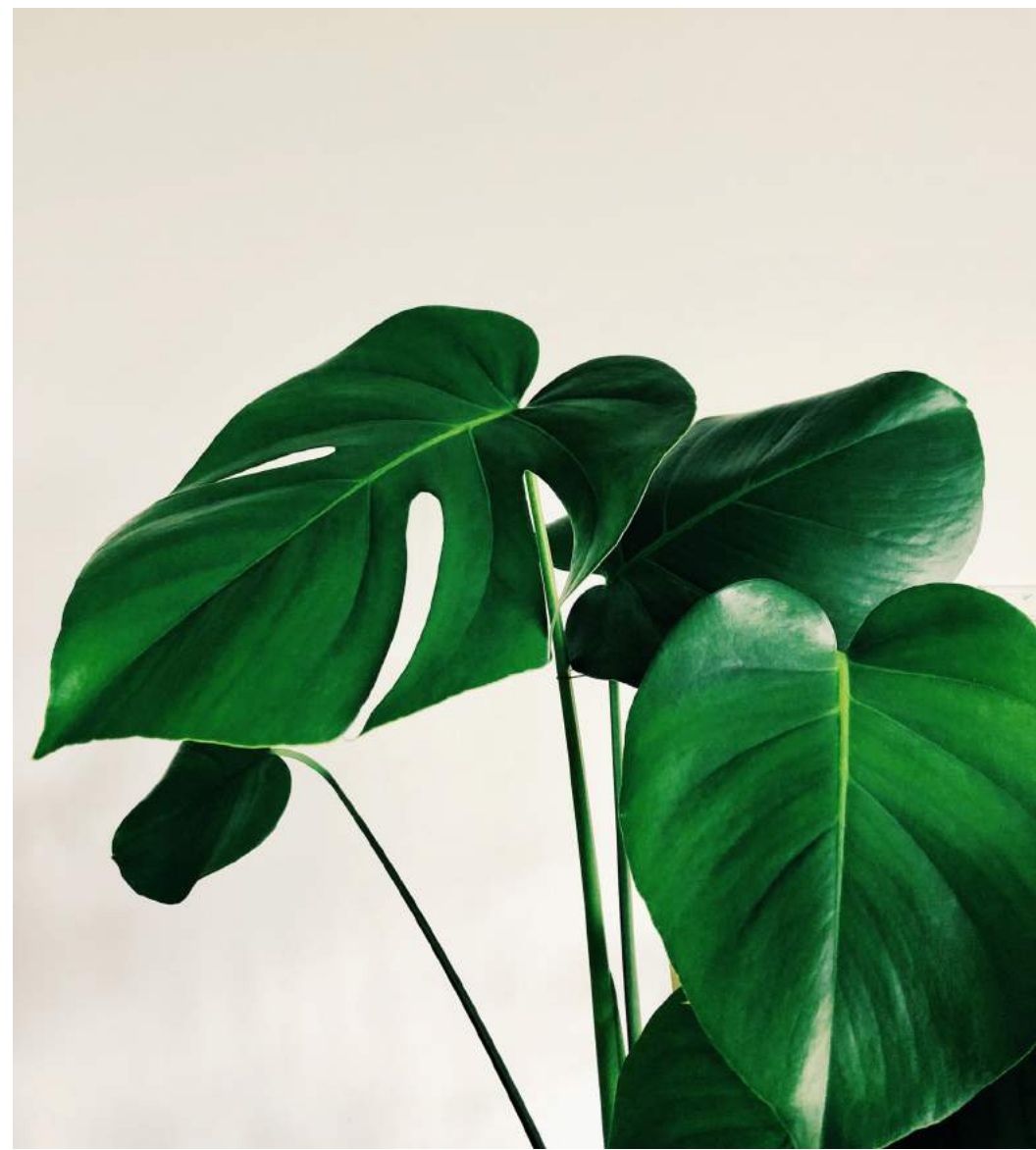
As you may recall, our normal life went out of gear in 2020. Covid-19 afflicted untold misery and suffering on a pandemic scale. Its ugly scars on the economy and personal lives still remain. Impending waves of viral infection and inevitable living under Covid-19's shadow prompted the selection of a focus area for the 5th Northeast Green Summit entitled

“Corona Bio-disaster Aftermath: Sustainable Yardsticks To Save Our Planet.”

Hybrid mode characterised conduct of the 5th Summit. Larger number of digital medium participants counterpoised smaller number of in person participation. Strict adherence to Covid protocol for conduct of the meeting ensured none tested positive both during and after the Summit and for which both the organisers and the participants deserve appreciation.

Life as we were used to pre-Corona virus has undergone radical change. It affected our social behaviour in our work place and at home. Tough times can either make or break us. The Summit focused at the bright side and spelt out steps that may be taken at various levels - individual, to highest echelon of Government to carry on albeit with certain new protocols. Emphasis was laid on local level solutions to the problem of sustainable development in tune with ‘vocal for local’.

I convey my heartfelt thanks to Vibgyor NE Foundation who initiated the Summit and compliment them for successful conduct of the programme with cooperation and active participation of co-hosts and other stakeholders.



SUMMIT 2020: CHALLENGES, ENTHUSIASM & SUCCESSFUL COMPLETION

After an unprecedented lockdown which started on March, 2020, the 5th North East Green Summit was nothing less than a breakthrough in the prevailing situation post Covid. And, needless to say, it is always overwhelming to see students, entrepreneurs, academicians, politicians, bureaucrats, scientists and policy makers gathering together in a single platform seeking a collective solution or roadmap. Northeast Green Summit, 2020 set the stage for fruitful deliberations related to several pertinent issues N.E States are enduring for long, particularly in relation with environment and cultural, tourism and developmental issues centring around environment. This year's theme for Northeast Green Summit-Corona Bio-Disaster Aftermath: Sustainable Yardstick to Save our Planet-was decided keeping a noble cause in heart and mind by the organizers to formulate some valuable yardsticks to save the life and livelihood of the people from different sections of the society. The focus was not just the Northeastern states but even adjoining neighbouring countries like Bangladesh and Myanmar.

Having associated as an organizing member during the 4th edition of Northeast Green Summit in 2019, I was given the additional responsibility in 2020 of Academic Coordinator of the Summit. This time, we ensured that the format of Northeast Green Summit was made a bit different with the introduction of the presentation of research papers. The situation was challenging due to the pandemic situation but all of us together could manage to conduct the summit in a unique way by setting up satellite centers in all Northeastern States. All stakeholders could participate and present their presentations in distance mode on a virtual platform and I believe that in the history of conducting academic conclaves, this was an unique way of conducting summits in both offline and online mode simultaneously with around 7 satellite centers from all Northeastern States.

No doubt, it was expensive business to conduct the summit through satellite centers and making all facilities available at all centres at par with the primary venue at IIT Guwahati but then, the effort ensured that the Summit was a grand success. Whenever participants were sceptical whether

they could make it or not to the Summit, the satellite centers paved the way for participation by thousands of stakeholders of Northeast Green Summit from all Northeastern States. Several resource persons of different technical sessions from across the country and even from Bangladesh and Myanmar took part in meaningful deliberations on virtual platforms.

All total, 12 technical sessions were successfully conducted on different themes by an experienced academic team from Handique Girls' College,

Guwahati and IIT-Guwahati, 45 selected research papers in various technical sessions from different parts of the country were presented by various stakeholders in presence of panellists, which were published in the form of an abstract during the Summit. In short, this Summit was successful in bringing together all the stakeholders, policy makers, bureaucrats, academicians and researchers through offline & online platform, besides formulating a roadmap for sustainable development of Northeastern states, particularly after the first wave of Covid pandemic. I believe Northeast Green Summit will eventually be the torch bearer in formulating unique region and ecosystem specific policies through extensive deliberations, case studies and previous experiences with different State and Central Government agencies including all relevant stakeholders. The policies and recommendations will surely highlight the developmental needs and issues of Northeastern States which might open up new vistas of opportunity with all the Southeast Asian countries in the days to come.



DR. DIP JYOTI HALOI

Academic Co-ordinator,
Northeast Green Summit, 2020 &
Assistant Professor,
Handique Girls' College

Dip Jyoti Haloi



Mama Natung

Minister of Environment and Forest etc.

Govt. of Arunachal Pradesh

SUMMIT A DELIGHTFUL EXPERIENCE!

It gives me immense pleasure to know that a Coffee Table Book is being released by Vibgyor NE Foundation, the organiser of the Northeast Green Summit.

The summit is an amalgam of art, music and brainstorming on environment. It provides a platform for academicians, research scholars, industry leaders, student organisations, civil society representatives, media persons, NGOs and institutions to brainstorm regarding various challenges on environmental issues of North Eastern states and to conserve and promote the rich biodiversity potential of the region. It was a delightful experience to be part of 5th edition of the NE Green Summit and I look forward to such events in future.

My best wishes! Jai Hind! Jai NE!

SUMMIT RIGHT EFFORT IN RIGHT DIRECTION

Northeast Green Summit is a right effort in the right direction and a step forward. The Summit has truly created an exemplary model that showcases to everyone across the globe that development and prosperity can be done in sync with nature. Sustainability and economic growth can actually go hand in hand. I am looking forward to attend more editions of the Summit in the near future.



Mevar Kr. Jamatia

Minister of Forest & Tribal Welfare etc.

Govt. of Tripura





Dr. R.K. Borah

Scientist-G & Group
Coordinator(Research) of
Rain Forest Research
Institute (RFRI), Jorhat

NE GREEN SUMMIT: EMPOWERING PEOPLE

At the outset, I offer my sincere gratitude to VIBGYOR NE Foundation, the organizer of the 5th NE Green Summit, for inviting me to the Summit.

NE Green Summit, as we all know, has been regularly organized since 2016 in various parts of NE India to create awareness and empower people with the knowledge of the rich and diverse natural habitat, biodiversity and cultural heritage that the NE region of India is bestowed with. In this process, the NE Green Summit has become a gateway for showcasing the rich tradition of culture and diversity of NE India to the rest of the world.

During this Summit, as one of the panelists of the technical session 'Sustainability in Horticulture and Medicinal plants in Northeast for national and international linkage', I shared my experience on Agarwood, particularly the scientific cultivation of Agar or Xanchi (*Aquilaria malaccensis* Lamk)

and artificial induction of Agarwood through fungal technology, with young researchers and students of various colleges from across the region.

Our organization, Rain Forest Research Institute (RFRI), Jorhat, a sister organization of Indian Council of Forestry Research and Education (ICFRE) under the Ministry of Environment, Forest and Climate Change (MoEF &CC), also set up stalls to popularize Agar cultivation in Northeast India. Under the banner of RFRI, D.M. Agarwood Stock & Sale Depot, Naharani, Golaghat as well as Maitrayee Tea, Namti, Sivasagar also exhibited different products related to Agar and received a very good response from those attending the Summit. Once again, I congratulate the organizer for successful completion of the Summit and take this opportunity to offer my best wishes for all future NE Green Summits.

NEED OF THE HOUR: MORE SUCH EVENTS, MORE REGULARLY

The Northeast Green Summit was a wonderful event which was a need of the hour. The best part of it was that there were online participants as well as speakers, which ensured that the impact and benefits of the programme could be successfully disseminated amongst the masses.

Holding micro events on the same lines and on a regular basis is required to inculcate interest amongst the upcoming generation on issues like renewable energy and sustainability, modern and recent technologies in the renewable energy field and prospects of entrepreneurship opportunities in the renewable energy field.



Mrinal Krishna Chaudhury

Additional Director,
Assam Energy Development Agency,
(Government of Assam)





ACKNOWLEDGEMENT

At the foremost, the organizers would like to express their deep gratitude to all the participants for their dedication and support to the 5th Northeast Green Summit 2020. The strong commitment of each one of them was the key to the success of the Summit.

Over 200 representatives of the central and state governments, research and academic institutions, non-governmental organizations (NGOs), international organizations, professors, researchers, government officials, private sector professionals and experts even from neighbouring countries like Myanmar and Bangladesh participated at the three-day event and discussed on issues pertaining to the theme, CORONA BIO-DISASTER AFTERMATH: SUSTAINABLE YARDSTICKS TO SAVE OUR PLANET. They shared experiences, best practices and lessons learnt, and discussed possible long-term strategies and identification of sustainable solutions towards a greener, healthier, and happier future. Our sincere gratitude goes to all the speakers, who shared their knowledge and experience, both virtually and physically.

Special thanks goes to the academic and organizing team at IIT Guwahati, including Prof T.G Sitharam, Prof SK Kakoty, Prof. Sudip Mitra and Dr. Siddhartha Singha, for their strong support, assistance, and cooperation, without which this year's Summit would never have been a reality.

EXECUTIVE SUMMARY

The 5th Northeast Green Summit 2020 was co-organized by Vibgyor NE Foundation and Indian Institute of Technology Guwahati, in association with United Nations Environment and North Eastern Council, Shillong. It was held during 16-18 November, 2020 at IIT Guwahati, Assam.

More than 1000 participants (both physically and virtually) from across the country, especially Northeast India and also its neighboring countries, attended the Summit. The attendees represented around 60 Central and State Governments organizations, research and academic institutions, non-governmental organizations (NGOs), international and national development cooperation organizations and private sector organizations, besides academicians, researchers, officials and students.

The participants explored various sustainable livelihood options and associated skills to achieve Sustainable Development of the region particularly SDGs 8,9,11 and 13, which focuses respectively on Decent work and economic growth, Industry, innovation and infrastructure, make cities inclusive, safe, resilient and sustainable and Climate Action.

The meeting consisted of the three-day summit, followed by case studies and successful stories from all across Northeastern region and its immediate neighbourhood were presented. (music, art etc can be added here)

Furthermore, various international speakers from Bangladesh, Myanmar, and Bhutan shared their experiences and views on Sustainable Development Goals, Environmental Policy and Regulation, Forest Management, Urban development issues, Waste management, Wildlife conservation, Disaster Management and Disaster Risk Resilience, Bio-resource Management, Water Resource management, Innovation and Incubation environment, Tourism growth and management and green economy was discussed in the five parallel working groups.

Based on the discussion, the participants agreed that:

1. Shutting down wildlife trafficking and markets and routes where wildlife trade is rampant is essential, both inside and adjoining NE India to further prevent spreading of zoonotic diseases and protect bio-resources.
2. Boosting alternative sustainable livelihood options post COVID-19 pandemic through skilling and other employment avenues is required, with emphasis on medicinal plants, agriculture, horticulture, food processing and allied sectors where NE India has an edge.
3. The region needs to start moving towards local, sustainable and resilient food systems...systems that not only produce more food but also integrates food production with the health of people and the planet, besides protecting farmers and ensuring for them a fair price.
4. Tourism sector revival in Northeast through eco-friendly alternatives is vital.
5. Economic revival with judicious intervention of biotechnology needs to be stressed upon.
6. Improved disaster mitigation preparedness for vulnerable NE India needs urgent attention.
7. Specific guidelines for bio-disasters need to be urgently developed and circulated.

At the end of the meeting, the participants adopted the Northeast Green Summit 2020 Declaration which sets the roadmap for the development of Northeastern region with detailed recommendations.



INTRODUCTION

Vibgyor N.E. Foundation organized the 5th Northeast Green Summit 2020 at IIT Guwahati from 16-18 November 2020. Co-hosted by IIT Guwahati and North Eastern Council, the Summit focused on CORONA BIO-DISASTER AFTERMATH: SUSTAINABLE YARD STICKS TO SAVE OUR PLANET.

The Summit set forth four broad set of objectives.

1. Several Technical Sessions covering a range of topics related to Northeast India and contagious bio-diversity zones after the corona bio-disaster. Areas covered included Disaster Management, Bio-resource Management, Sustainable Development Goals, Environmental Policy & Regulation, Forest Management, Wildlife Conservation, Water Resource Management, Agriculture, Horticulture, Medicinal Plants, Green Skills, Tourism growth and management, etc.
2. To appreciate and highlight the fact that our indigenous culture and conservation/ sustainability of the environment go hand in hand in Northeast India and its neighbourhood.
3. To stop illegal wildlife trade and protect bio-resources of the region.
4. To strive for climate neutrality and prevent bio-disasters by protecting the environment.

To address these objectives, the Summit brought together policy makers, industry leaders, academicians, researchers, representatives of the civil societies, NGOs, media and stakeholders from all walks of life on one platform to deliberate share experiences and propose solutions to some of the unique environmental challenges being faced in the region, with the underlying theme of 'Green Northeast, Clean Northeast' and also to explore sustainable livelihood options which would lead to conservation of the region's rich bio diversity and cultural heritage.



INAUGURATION

The inaugural session of the 5th Northeast Green Summit 2020 started at 10 am on November 16, 2020 at the Mini Auditorium of IIT Guwahati. A galaxy of dignitaries led by Chief Guest of the session, Shri Sarbananda Sonowal, Hon'ble Chief Minister of Assam, graced the occasion. The other dignitaries on the dais included Padmashri Jadav Payeng, Forest Man of India, Shri Rameswar Tell, Hon'ble Union Minister of State, Ministry of Food Processing Industries, Govt. of India, Shri Chandra Mohan Patowary, Minister, Industries and Commerce, Assam, Dr. Rajkumar Ranjan Singh, Hon'ble MP, Lok Sabha, Manipur, Shri C.P. Marak, IFS (Rtd.) and Advisory Board Member, Northeast Green Summit, Dr. Chandrashekhar Deshmukh, President, Kokuyo Camlin Ltd and Dr. Rajdeep Roy, Hon'ble Member of Parliament, Silchar, Assam & Advisory Board Member, Northeast Green Summit.

Moreover, since due to the pandemic, the Summit organizers had facilitated both physical as well as virtual participation, a few dignitaries joined during the Inaugural function on virtual platform while a few dignitaries, like His Excellency Major General Vetsop Namgyel, Ambassador, Royal Bhutanese Embassy, New Delhi, Shri Atul Bagai, Country Head, United Nations Environment, Prof. Ashutosh Sharma, Secretary, Ministry of Science & Technology, Govt. of India and Dr. Harsh Vardhan, Union Minister of Health and Family Welfare, sent video messages.

The dignitaries also released a commemorative Northeast Green Summit 2020 Postage Stamp during the inauguration programme while the indigenous Bodo girls' group, "Sifúng Harimu Afad" mesmerized all guests with their marvelous performance.

Besides, another highlight of the function was the live portrait sketching of Shri Sarbananda Sonowal by one of the artistes of the Art Walk component of the Summit, which was subsequently gifted to the Chief Guest of the session at the end of the function.



The background is a vibrant green color, densely decorated with a repeating pattern of white line-art leaves and small circular seeds. The leaves are of various sizes and orientations, creating a textured, organic feel. The seeds are small, simple circles scattered throughout the green field.

PART 1

SYMPOSIUM



SUSTAINABLE LIVELIHOOD OPTIONS AFTER CORONA PANDEMIC: POSSIBILITIES IN TOURISM, TEA TOURISM AND SKILL DEVELOPMENT

MS. MOITREYEE DAS (CHD, Tourism, Bodoland Territorial Council)

MR. PANKAJ KALITA (Proprietor, Kanhuwa Resort)

PROF. R M PANT (Director, National Institute of Rural Development, Guwahati)

MR. RANJIT DAS (Director, Landmark Group and President, Tour Operators Association of Assam)

MR. SANJAY ADITYA SINGH (Chairman and CEO of JETTWINGS group)

Ms. Moitreyee Das spoke on how the pandemic has dealt a crippling blow to the tourism industry, impacting all segments, including religion, business, pleasure, adventure, heritage etc. She mentioned that the pandemic has brought about economic and psychological changes as people cope with the new normal. She raised an important question - what is the sustainable livelihood option post corona, and how will the community-based practitioners adapt to it?"

She spoke on the importance of Manas National Park and how the survival of the elephant population through community participation in conservation practices was achieved. She also spoke about the Manas Maozigendri Ecotourism Society (MMES), which has modern huts and all adequate amenities for domestic and foreign tourists. MMES has proved to be a role model for several local youths to undertake similar park conservation and livelihood activities.

Further, she also spoke on Agri-tourism as a means for sustainable livelihood and the close relation between tourism and the environment.

She described the elements of Agri-tourism as,

Accommodation: Farmers can gain additional income by providing housing to tourists

Food: By providing food, farmers can capitalize on their agriculture production. Preparing food from own fields can offer a unique experience.

Entertainment: Traditional activities like farming, milking cow, plucking tea leaves.

Lockdown has allowed people to introspect, and people have decided to pursue their passions like cycling, hiking tours, fishing, etc. Agri-tourism can help generate revenue for the rural population, especially women. Through Agri tourism, tourists can buy produce directly from the local population.

This will have a direct impact on the economy. Exchange of dialogues between tourists and the local people will infuse new ideas into the minds of the rural population. With more tourists coming to the villages, connectivity will improve. Women in rural areas are still underpaid, under-utilized, uneducated and under-represented, but tourism is a sector that provides a path for betterment if implemented successfully. She concluded her speech by quoting Mahatma Gandhi, “India perishes if our villages perish”

Mr. Pankaj Kalita, who owns the Kanhuwa Resort Agriculture Tourism, has received many awards and accolades due to his achievements. He has been conferred the “Flowerman” title by Gurukul Grammar School, Guwahati; besides, he has bagged the Jagjivan Ram Abhinav Puruskar, ‘Best Farmer of NE States 2016’ by ICAR, as well as many other awards.

He spoke on his involvement in the cultivation of field crops like rice, rapeseed, mustard, sesame, black gram; horticulture crops like vegetables, Assam lemon and turmeric; floriculture, etc and the cultivation of such crops in the NE region. Further, he also spoke on the practices implemented as well as made a few suggestions to provide a source of livelihood for the youth of this region using means like, farming under zero tillage (e.g., pumpkin), high-density planting of vegetables (e.g., ridge gourd), use of organic inputs, cultivation of commercial fruits (e.g., papaya) and promotion of Riverbank Agro tourism etc.

Prof. Pant implored the Tourism Department to put more efforts into the region as the region has tons of resources, scenic areas and touristy places like the Deepor Beel, and many other such places which can be utilized for providing adventurous and fun activities like yachting, rowing, paddle boating and many such recreational activities, keeping in mind that the ecology is not hampered. He mentioned how the tourism sector is the first to be impacted and last to be revived. He also mentioned that the region is still heavily under explored and the NE region is still in its infancy as far as tourism is concerned.

Staying optimistic at a time when movement is restricted and tourists are not visiting the area, he suggested that this time may be devoted for thinking and planning, so that once the Covid period is over, good and sound plans can be implemented immediately.

Mr. Ranjit Das started his speech by mentioning that this is a grave and challenging phase for the tourism sector due to the COVID-19 pandemic. He pointed out that in Assam and the Northeast, tour operators are primarily first-generation entrepreneurs, and it is necessary to support them as they are not experienced and have only a couple of decades of experience as compared to others in the country who have been in the industry for quite a long time. He highlighted the lack of cash reserves as one of the prime reasons why the sector cannot revive in the region and mentioned how tourism, trade and travel would never be the same again and would create a new normal for the tourism sector. The need for collaboration between government, private and all other stakeholders was highlighted.



He highlighted a phase-wise change in the sectors, starting from survival to revival and finally focusing and emphasising on the travel and hospitality sector. He reiterated how it would help the local population gain employment and generate revenue and drive the economy directly or indirectly across a range of other sectors, including transportation, food and beverage, lifestyle,



culture, recreation, and sports. Though Covid-19 has brought the momentum of the travel industry to a halt, he felt that with the timely intervention of the government and the stakeholders, tourism is the sector that can help revive the economy and continue to support jobs. He mentioned how people are moving back to the rural areas from the urban crowded zones, which are affected mainly by COVID-19, and so, he felt that this is the time that we must try to protect our rural areas for community-based tourism projects.

He spoke on integrating local products with the supply chain and the possibility of homestays, campsites and local guides to provide a means of livelihood in rural areas. Also, the local culture, food and crafts can be packaged to give a wholesome experience to the tourists.

The speaker also provided segregation of any such project into two components: **Challenging Component:** Involves infrastructure to provide services, accommodation, infrastructure for activities and experiences etc.

Soft part: Involves activities, cultural traditions etc.

He highlighted the fact that Assam already has multiple home stay units - however, these need to be appropriately marketed and delivered to the right prospective customers to avail the package quickly and highlighted the importance of social media in this respect. He mentioned how the millennials are looking for inspiration and adventure, and in the Covid times, they are the ones who must be focused upon. They seek more natural and organic ways of living, which the NE region can quickly provide. He also compared the condition of tourism in Assam with other countries by taking the example of Haflong in Assam and Mt. Abu in Rajasthan.

Mt. Abu is well known as Haflong, and though Haflong has a lot to show, it is lagging primarily because of a lack of proper advertisement and marketing. He gave the example of a second home as practised in northern European countries where people spend a considerable amount of time in rural areas, close to nature and how such a practice can be implemented here.

He also spoke of how unique concepts like tours to unexplored regions of a region, for example, guided tour through the slums of Mumbai, can help fulfil the exploration desires of the tourists. Guides also need to be apt at storytelling as this allows for a much better and more involving experience for the tourists. The speaker concluded his speech by pointing out that there is an enormous scope of tea tourism in the region owing to the existing industry, the infrastructure like the tea gardens and tea bungalows, and it's only a matter of how it is marketed and advertised, which will decide how fruitful this sector becomes in the region.

Mr. Sanjay Aditya Singh is the CEO and Chairman of the JETTWINGS group of institutions and spoke about the skill development measures taken by his

organization in the travel and tourism sector for the emancipation of the NE region. His organization is an NSDC partner under the Ministry of Skill Development, New Delhi. He mentioned how the Department of Tourism, Manipur, has selected JETTWINGS as a private partner for running and managing the State Institute of Hotel Management, Catering and Applied Nutrition, Imphal. The institute has an average placement percentage of 97% and has placed more than 14,100 students in India and 14 other nations. NE India represents 75% of the country's population. Still, JETTWINGS stature in 5-star hospitality and airlines has helped NE India raise that figure to 40% of India's total employees working in the aviation and hospitality sectors.

The organization has opened training centers at Guwahati, Shillong and Gangtok with more than 4100 students. He described the institute's objective: to provide and promote training and research in the hospitality and tourism sector and generate employment post-COVID and create a Centre of Excellence for Food & Nutrition Research. The organization also aims to work for rehabilitation based on exclusive skill development and to work as a cloud kitchen training organization.

He concluded his speech by putting out some facts and numbers which revealed that aviation, hospitality and tourism are set to create 80 million new jobs over the next ten years. By 2030, one in nine jobs will be in travel and tourism.



SUSTAINABILITY IN HORTICULTURE AND MEDICINAL PLANTS IN NORTHEAST FOR NATIONAL AND INTERNATIONAL LINKAGE

MD. A. K. M. HARUNER RASHID (FCS, Ex-Registrar/Secretary, Bangladesh Board of Unani and Ayurvedic Systems of Medicine)

DR. B. C. DEKA (Vice Chancellor, Assam Agricultural University, Jorhat, Assam)

DR. B.C. NATH (Regional Director, RCFC-NER(NMPB), Assam Agricultural University, Jorhat, Assam)

DR. DHRUBA JYOTI SARMA (Owner, Daffodil Nursery, Khetri, Assam)

DR. MANISH DAS (Principal Scientist, Indian Council of Agricultural Research (ICAR), New Delhi)

DR. MANOJ KUMAR SARKAR (IFS (Retired), former Additional Principal Chief Conservator of Forests, Govt. of Tamil Nadu)

DR. MD. ASADUZZAMAN (Senior Scientific Officer, Olericulture Division, Horticulture Research Center, Bangladesh Agriculture Research Institute)

DR. R. MURUGESWARAN (Deputy Director, National Medicinal Plants Board)

DR. RAJIV K. BORA (Scientist and Group Coordinator of Research, Rain Forest Research Institute, Jorhat)

SAMACHIK DR. VIDYANISHT MARAK (Traditional Garo medicine practitioner, Tura, Meghalaya)

Md. A. K. M. Haruner Rashid, FCS, Ex- Registrar/Secretary, Bangladesh Board of Unani and Ayurvedic Systems of Medicine, shared his rich experience and brought an international perspective to the discussion. He expressed that we are passing through a pandemic period threatened by Corona Virus (COVID-19). There is no successful treatment available till-date. COVID-19 has some symptoms, such as fever, cough, headache, breathing problem, body pain etc. For managing these symptoms, there are effective preventive medicines in Ayurvedic treatment. Ginger, lemon, cardamom, bay leaf, cloves, star anise, embolic myrobalan, raisin, cinnamon, long pepper, black pepper, holy basil, garlic, turmeric, Masaka, honey etc. are used by many practitioners and showed promising results. These medicinal ingredients have a significant role in our daily lives. These medicinal plants are essential in South East Asia,

where a large portion of the rural population depends on these low cost and accessible medicines. Besides that, medicinal plants have high socio-cultural, symbolic, and economic values, providing income and employment to millions of people living in Northeast India and neighbouring countries. He concluded by wishing a grand success to the event.

Dr. B. C. Deka, Vice-Chancellor, Assam Agricultural University, Jorhat, emphasized the diverse nature of the soil, climate, and topography of Northeast India. The region is rich in many fruits, vegetables, and flowers, particularly orchids, spices, bamboo, and aromatic plants. Among the commercial fruits of the country, maximum diversity in citrus, banana and jack fruit are found in Northeast India.

Different tropical and subtropical fruits belonging to the genera *Garcinia*, *Artocarpus*, *Phyllanthus*, *Annona*, *Averrhoa*, *Aegle*, *Passiflora* and *Tamarindus* etc. are reported from the region. Northeast India is also rich in different genotypes of cucurbits, ginger, turmeric, bamboo, leafy vegetables etc. Among the different ornamental horticulture crops, the region has the maximum diversity in orchids, fern and other flowering shrubs. Indigenous and minor horticulture crops available in the area are, however, not being appropriately exploited. These crops have the potential to alleviate poverty, food and nutritional insecurity through processing and value addition. Most of these crops are rich in vitamins, minerals and other bioactive molecules suitable for medicine, aromatic and food processing industries. Protocols for preparing instant ginger candy; minimally processed ready-to-cook jack fruit; jam-jelly, fermented and non-fermented beverages from different indigenous fruits and quite fruity from chow-chow have already been standardized. These value-added products, if produced commercially, will go long way in increasing the area under these crops and thereby enhancing farm income and nutritional security of the farmers in the region. He reiterated that the region's youth must be correctly guided, trained, and employed to realize horticulture's potential.

Dr. B. C. Nath, Regional Director, RCFC-NER (NMPB), Assam Agricultural University, Jorhat, urged for a database of medicinal plants in the North East region. Presently, there is no available database for NE Region-specific medicinal plants, production volume, location, properties etc. There must be a master database system for medicinal plants in the North East region. All-State Governments of the NE Region must initiate the survey, documentation and creation of such a database by providing necessary infrastructure and facility.

Dr. Manish Das, Principal Scientist, the Indian Council of Agricultural Research (ICAR), New Delhi, in his brief introductory speech, focused mainly on startups and horticulture in North East India. He expressed his views on the prospects of the horticulture industry for the growth, development and prosperity of this region. Challenges like lack of road connectivity, poor financial inclusion, skill deficiency etc., are restricting the Northeastern Region. Addressing the gathering, Dr. Das stressed on developing new technology

specifically for the North East region by looking at its biodiversity. The underutilized foods and vegetables must be properly identified and must be cultivated systematically without disturbing the natural habitat. Biofortified rice, wheat and the pros & cons of biofortification were discussed. Lots of R & D work is going on in both public and private sector organizations to diversify the utilization of medicinal plants. For example, AMUL is planning to make Ashwagandha milk.

Dr. Manoj Kumar Sarkar, IFS(Retired), former Additional Principal Chief Conservator of Forests of Tamil Nadu, talked about the medicinal plant wealth of India, especially the North Eastern region. Medicinal and aromatic plants are of great importance in India and need of the hour as 70-80% of people still depend on traditional health care. In India, ISM (Indian System of Medicine) defines any part of a plant used in Ayurveda, Unani, Allopathy or Homeopathy as a medicinal plant.

The trade value of medicinal plants in the global market is about \$70 billion, whereas in India, the trade value is worth only Rs 153 million. Globally, India, China and Germany are the major exporters of medicinal plants, primarily sold in European markets.



As per available data, among 45000 biodiversity-rich plants, 7319 species are identified in the ISM system, out of which only 960 medicinal plants are being traded. Therefore, a vast market and associated economic growth is yet to be explored. Only 15% of medicinal plants are cultivated in the country, and the remaining 85% comes from forest sources. North East region is not getting the benefit of the biodiversity despite being very rich in medicinal plants. For example, the *Taxusbaccata* plant is naturally grown here. Still, it is exported to other countries because of lack of infrastructure, and they prepare the capsule and again sell to India at a higher price. So, proper infrastructure is required to boost medicinal plants in this region for appropriate economic growth.

Dr. Md. Asaduzzaman, Senior Scientific Officer, Olericulture Division, Horticulture Research Centre, BARI, BANGLADESH, was a special guest from Bangladesh who enriched the session with his valuable remarks. He pointed out that horticulture is one of the most critical sectors of agriculture in the world. Fruits and vegetable are the richest sources of vitamins, minerals and several bioactive compounds providing health benefits to mankind. During the Covid-19 pandemic, consumption of nutrient- dense fruits and vegetables are suggested to boost our immunity. The North-eastern part of India has a common border with Bangladesh and believed to be the centre of origin of

numerous popular and indigenous horticultural crops and medicinal plants. People of this region are utilizing these crops and plants for their nutrition and medicinal properties since time immemorial. Over time, these crops

and plants have been replaced by modern and improved crop varieties. Therefore, conservation programs are necessary to revive and sustain the horticultural sector in the area. Sustainability would be possible through the increased supply and appropriate use of these crops.

Modern techniques and improved method of propagation of endangered species is essential in this regard. National and international exchange and linkage would be another effective method of sustainability of horticultural and medicinal plants in Northeast India and parts of Bangladesh.

Dr. R. Murugeswaran, Deputy Director, the National Medicinal Plants Board (NMPB), shared his vast experience working in the Western Ghats and the Himalaya regions. He spoke about the classical medicinal system and folk therapeutic system. The classical methods are documented in different languages, mainly in Sanskrit, Unani in Arabic and Urdu and Siddha in the Tamil language. But the folk system is not recorded but practised widely in village areas and also in tribal areas. Invasive species, especially the exotic plants coming from other countries, pose a potential threat to indigenous plants,

FROM 2 TO 300 STAFFERS: GROWING NE INDIA'S LARGEST NURSERY



Daffodil Nursery started with two staffers and now, it has grown to a 300 staff nursery with a healthy turnover. Daffodil is producing lakhs of species of orchids, exotic fruits, medicinal and aromatic plants and delivering to different parts of Northeast as well as neighbouring countries like Bhutan and Nepal. Continuous development of commercially important varieties, good horticulture practices and smart management of the business process is behind the success of this entrepreneurship. Daffodil Nursery is supporting the livelihood of small farmers/labourers through the nursery business and capacity building. Instead of bringing plants in earthen pots, I started bringing seedlings in aggregates and planted them in Guwahati before sending them to Mizoram so that transportation cost can be reduced as well as livelihood can be provided to local villagers. Similarly, plums, apples from Kashmir, seedless hog plum and many more varieties were brought to the NE Region for development of exotic and medicinally functional plant varieties. I proudly remember a moment when my nursery presented orchids to His Excellency, the King of Bhutan. I have also established Daffodil College of Horticulture to develop well trained human resources for further development of the horticulture sector in the region and generate more employment.



Dr. Dhruba Jyoti Sarma
Owner, Daffodil Nursery.

including medicinal plants. For example, Lantana Camara grows in forest areas and does not allow other plants to grow in the vicinity, disturbing the natural habitat of other plants. Inferior quality of raw materials and impurity in the plant's materials are two major concerns in the medicinal plant industry. The Government of India is planning to launch the Vriksh Ayush Scheme to promote medicinal plant cultivation in India. As per this scheme, medicinal plants cultivation is to be carried out across the country with a 50% subsidy cost per hectare of cultivation. More than 600 projects are solely launched in the North-eastern region to promote medicinal plants awareness, growth and cultivation. The Government of India is providing funds up to Rs 5 lakhs for conducting national level workshops and seminars and up to Rs 10 lakhs for international programmes. Also, the National Medicinal Plant Board (NMPB) provides financial assistance to conduct IEC programmes, R & D programmes and herbal gardening at homes, schools, and various institutions.

Dr. Rajiv K. Bora, Scientist and Group Coordinator of Research, Rain Forest Research Institute (RFRI), Jorhat, delivered a detailed presentation on Agarwood and its medicinal benefits and economic value. In India, there are two species of Agarwood available, viz, Aquilaria Malaccensis and Aquilaria Khasiana. Aquilaria Malaccensis is available throughout the North East region. Aquilaria Khasiana is only available in some parts of Khasi Hills. Agar oil and Agar tea has many medicinal benefits and is very popular in South East Asia like Malaysia, Vietnam, etc. Agar tea served after blending with tea or coffee helps remove toxins from the body naturally. It is also an effective treatment of insomnia and blood sugar related problems.

In the presentation, the growth of Agar trees and the natural formation of Agar by insects were explained in detail. The three different Agarwood extraction methods, namely Water Distillation Process, Steam Distillation Process and Super Critical Extraction Methods, were illustrated. The problems faced by Agarwood traders are in regard to regulations on exports from India and lack of a proper grading system. A dedicated legal board for Agarwood is required for the economic benefit and sustainable growth of the Agarwood industry.

Dr. Vidyanisht Marak from Tura, Meghalaya, a practitioner of traditional medicine with a rich practical experience, shared valuable aspects of standard medical practice, medicinal plants and sustainability. He categorised the Garo Traditional Medicinal system under the umbrella of Ayurvedic Medicinal System or Grassroot Level of Ayurvedic Medicines, believed to be a divine gift in Garo Hills. As per mythology, the Ashwini Kumar brothers taught their experience to Devraj Indra, and Indra passed on this knowledge of Ayurveda to Atriya Muni of the world, and later to Charak, Jamuna, Chaaban, and so on. Currently, the teachings on Ayurvedic medicines are imparted through many institutions of Ayurvedic medicine system, research scholars, scientists, writers and the like.

But for the Garo Traditional Ethno Medicine System, there is no institution, laboratory etc., and learning is happening traditionally through ancestral knowledge transfer. During the last century, due to the influence of modern medicine systems, the practises and the identification of herbs and medicinal plants in Garo society was slowly getting lost. Owing to his concern about the vanishing rich traditional medicine systems in Garo tribal society, he organised an association named Meghalaya Samachik Association (MSA) in 1987. The MSA Society acts for the protection and promotion of traditional healers to preserve and conserve locally available traditional herbs, modernisation of the manufacturing processes of herbal medicine, establishment of hospitals, dispensary, pharmacy, herbarium and other institutions and for propagating the knowledge by conducting seminars, publication of journals, magazines and books on this traditional healing system. As the Founder Secretary of MSA, he described his long and continuous struggle for establishing the community hospital for traditional medicine in Meghalaya. Financial assistance was never there to support the initiative. He operates from a small medical facility he had started. The District Administration had given him funding from a particular scheme to the tune of Rs.10, 30,000 but due to scarcity of funds, he could not improve the facility to a well-managed hospital.



A background image of bamboo stalks and leaves, with a green rectangular overlay on the left side containing text.

BAMBOO FOR LIVELIHOOD AND COMMUNITY DEVELOPMENT TO STRENGTHEN RURAL ECONOMY

DR. ABHINAV KANT (In-charge, Bamboo & Cane Development Institute, Agartala, Tripura)

MS. DIMPI BORA, IFS (Deputy Mission Director, State Bamboo Development Agency, Industries and Commerce Department. Govt. of Assam)

DR KRISHNA KUMAR (Scientist, North East Centre For Technology Application & Reach (NECTAR), Department of Science & Technology, Govt. of India)

MR. PRIYAM B. GOSWAMI (Bamboo Architect & Director, Magnidus Design Pvt. Ltd)

MR. R. K. KALITA (Scientist 'F'. Rain Forest Research Institute, Jorhat, Assam)

MR. SAURAV SAIKIA (Business Development Manager, ESES Bio Wealth Pvt. Ltd. Jagiroad)

DR. SHAILENDRA CHOUDHURY (Managing Director, North East Cane & Bamboo Development Council (NECBDC))

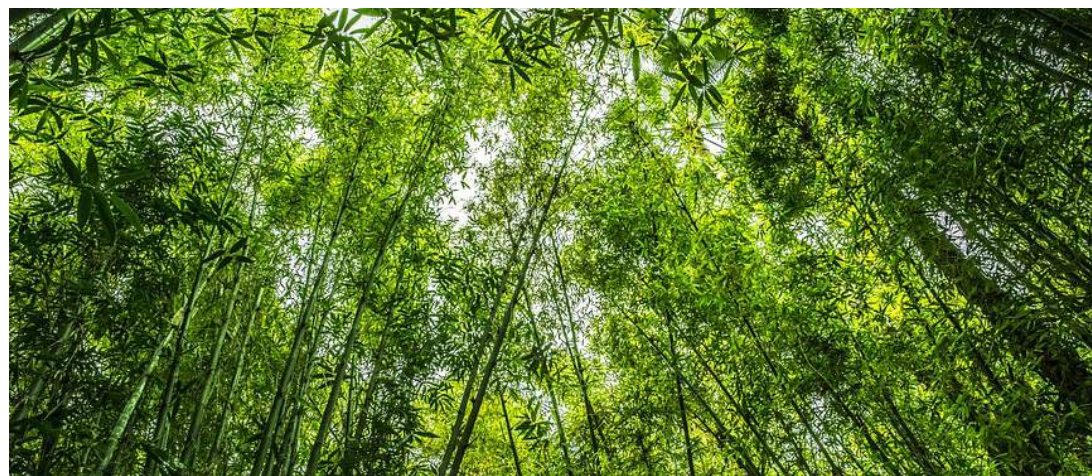
Dr. Kant stated that the prime objective of his institute is to skill artisans. Different types of services are provided by the institute like skill and capacity development, design services, product development, technical services, education and R&D. Skill training development programs as well as capacity development programs aim at improving the capacity of an existing artisan. The institute has in-house designers and they develop their designs. The institute also organises activities in which both technicians and designers participate. The speaker elaborated on the importance of technical aspects in designing. Designing is the first step but the questions on how to make the product production-friendly, sustainable and the most important aspect - how to cut down the production cost - requires technical support. And once the prototype is developed, they focus on scaling up that product. The technical services provide consultancy for the production services.

The institute with collaboration also provides a one-year post-graduate diploma course in bamboo cultivation and resource utilisation which focuses mainly on bamboo. Dr. Kant also spoke about the market of bamboo and its products. He discussed the domestic productivity of bamboo and constraints in bamboo production. He explained how indigenous bamboo resources are good in the Indian context, and recently how they developed a bamboo nut tree at the institute. Also, setting up processing units at the site itself is necessary to provide more benefits to farmers. Bamboo can be used as a livelihood resource for the young generation. Various developments in bamboo products were discussed.

Bamboo cookies and bamboo bottles were some of the newly developed products. To make products out of bamboo, processed and treated materials are required so that Self Help Groups can make good products out of it. He told in the context of bamboo that timely delivery, competitive price, and quality of the product are essential for a successful and sustainable business model. Students from all over the country come to the institute to learn the various uses of bamboo. Producing bamboo bottles and making bamboo cookies have also been initiated.

Ms. Bora initiated the discussion by sharing her experience on the ongoing projects, programs and initiatives under the State Bamboo Development Agency, Assam. The bamboo sector has huge potential for development; North East India has more than 40% of the entire bamboo resource of India as per the Forest Survey of India. But it requires a proper working plan and should be harvested sustainably. One of the primary requirements for this is to focus on three aspects namely, Plantation, Processing and Marketing. Regarding plantation, State Bamboo Development Agency, Assam is focusing on plantations outside the forest area i.e., in non- forest areas, especially on farmers' fields. Plantation means plantation in an organised manner. For this, the State Bamboo Development Agency, Assam has adopted the SPO Model. The benefit of using this approach is that there is no 'middleman' involved and farmers can directly go for marketing on their own and can be linked with industries and implementing agencies. For example, earlier, the Mission trained the farmers and procured quality planting materials from accredited nurseries of Tripura Bamboo Mission, along with a plantation expert to guide the State Bamboo Development Agency, Assam throughout the entire process. Also, she highlighted the importance of providing the farmers with quality material so that when after about 3-4 years they harvest bamboo, they can avail maximum benefit. In Assam particularly, the focus is mainly on two species namely *Bambusa Balcooa* (Bholuka Bah) and *Bambusatulda* (Jati Bah) in respect of which the State Bamboo Development Agency, Assam has also signed a licensing agreement with Rain Forest Research Institute (RFRI), Jorhat, Assam for providing four genotypes of *B. tulda* and two of *B. balcooa*.

Currently, with the support of RFRI, macro-proliferation of these two species is going on in 9 Krishi Vigyan Kendras (KVKS) and it is being funded by the SBDA. She also pointed out that apart from government nurseries, the State Bamboo Development Agency also provides incentives to private agencies as well as NGOs, SHGS or even individuals who want to go for exclusive bamboo nurseries. She also highlighted that the Farmer Producer Organization (FPO) approach has become so popular now that the Ministry Of Agriculture and Farmers' Welfare is planning to come up with schemes for the formation of 10,000 FPOs and very recently, the State Bamboo Development Agency has given a proposal to NERAMAC for the formation of 18 exclusive bamboo FPOs. She also expressed that many farmers have approached the State Bamboo Development Agency for devoting some area of their land exclusively for bamboo cultivation which earlier was grown as a secondary crop. The State Bamboo Development Agency has also received a proposal from Assam Bio-Refinery Pvt. Ltd. (ABRPL), Numaligarh. She also observed that it is always advisable to have the processing unit in the vicinity of the plantation area. Moreover, as the North-Eastern states are fulfilling the demands of many industries outside Assam, processing within the state will allow local people to get benefitted and as a result, it will strengthen the economy as well as the rural economy. She also talked about the formation of secondary processing units which will include incense-stick making, furniture making, handicraft, bamboo wood units etc. She shared how she recently received a proposal regarding the generation of electricity through bamboo. She stressed on the need for bamboo plantation clusters and processing clusters so that wherever there is a plantation in a particular area, processing units should also be established.



She explained how the main focus is currently on secondary product cluster development. For example, the demand of the Agarbatti sector is 1490 metric tons monthly whereas the domestic market is fulfilling only 760 metric tons, so there is huge potential and scope for not only Assam but other Northeastern states also to cater to these needs. The state of Assam has come up with the Assam Agarbatti project to set up around 15 to 20 clusters within 150 kilometers of Guwahati city so that transportation won't be a problem. They have trained artisans for furniture and handicraft making under the Bamboo and Cane Development Institute (BCDI) and provided toolkits to the already existing clusters of furniture and handicraft making. They have also started to empower women, especially tribal women of the state through programs like bamboo jewellery making and bamboo shoot processing. She explained how from a single bamboo, jewellery worth Rs 1 lakh can be generated. She also appealed to national research institutes like IITs and NITs to come up with innovative solutions as a means to cater to both national and international markets.

Dr. Kumar talked about the kind of developmental work NECTAR has been doing in the North Eastern Region and how they were collaborating with other organisations, labs, governments and entrepreneurs for evolving and supporting the different application of bamboo products or for developing the existing products. He said that some of these technologies were earlier not there in India and have been

adopted from China and Taiwan, and now, these were available in India.

He said that NECTAR, to demonstrate green building materials and to handhold the bamboo industry, has done 4.5 million sq. ft. of bamboo-based construction pan India. NECTAR has collaborated with National Design Centre (NDC), Ministry of Textiles, Govt. of India for the establishment of "NECTAR-BCDI Incubation cum Innovation & Technology Demonstration Centre (IITDC)." The bamboo technology hub set up in the BCDI campus,

Agartala, is the ideal place where students and entrepreneurs can go and understand how bamboo-based zero wastage system works, and can also avail higher studies facilities.

Mr. Kalita spoke about RFRI, Jorhat and gave a brief account of the work done by the Institute on bamboo. He said that RFRI, Jorhat is the pioneering institute in the entire Northeast India that started scientific and systematic study on bamboo. The Institute completed three rounds of selection of priority species of bamboo and started the work on germplasm collection of six species initially and their subsequent improvement. Over time, the Institute has developed improved clones of a few species which were released to the public for plantation. He stressed on developing bamboo nurseries for the production of improved and quality planting materials of bamboo. RFRI has already developed nursery protocols for important bamboo species suitable for NER. He said that only quality planting materials will give better performance in field plantations.

MISSION BAMBOO : REVIVING CONSTRUCTION SKILLS IN NE



People have been building bamboo houses since centuries as bamboo is the only locally available material in areas where bamboo grows in abundance and naturally. Across continents, bamboo has been a constant building material with a certain degree of design alteration here and there.

While bamboo is extensively used in puja pandals, bamboo can have very modern applications and can be used to make more beautiful buildings and not necessarily something that looks very traditional. There are different types of buildings made of bamboo in Bali, Singapore and many North Eastern states like Meghalaya, Mizoram and also in Majuli, Assam. There is a school in Bangladesh made of bamboo which won the Aga Khan Award for Architecture and of the bamboo builders in Bali, popularly known as IBUKU, and how they have taken bamboo buildings to a much high-end level of construction.



Shri Priyam B. Goswami
Bamboo Architect &
Director, Magnidus Design Pvt. Ltd


The Institute has also developed agronomic practises of economically important species of bamboo. Many forest departments and farmers have adopted it and raised plantations. He also spoke about the certification of planting materials. Certification is a very important step that will ensure the health of the plantation in the future.

Mr. Saikia started with the bamboo wood manufacturing process and later discussed various products manufactured by their company. He talked about the zero-waste policy of bamboo, in which every part of the bamboo wood is utilised in furniture making, be it tiles for flooring, doors, windows, wall cladding, door- window frame and panel, etc. He elaborated on multiple usages of bamboo wood in various fields. He also talked about the technical specifications of bamboo wood for making such furniture and some laboratory tests like termite and borer tests, which are tested in Kolkata and Bangalore. He mentioned certifications for bamboo wood and

the future demand for bamboo wood products.

At the end of the session, **Dr. Shailendra Choudhury** - who chaired the session- concluded by talking about the huge potential of the bamboo sector and talked about various usages of bamboo. He described the usage of bamboo as food, energy source, building material etc. He stressed on calling bamboo an “energy crop” and emphasised on a bamboo policy, especially for the Northeastern region of India. In the end, he also discussed some innovative ideas to promote the use of bamboo like bamboo as biochar for air purification, bamboo vinegar manufacturing, bamboo vinegar as a pesticide, herbicide and fungicide, medicinal purposes, skincare, bamboo shoot as a source of high protein, bamboo cookies, bamboo bottles, bamboo mat making, basketry making and incense stick making. He concluded that by moving in the right direction and in an appropriate manner with proper skill development, we can strengthen the bamboo sector by tapping its true potential.





BOOSTING FOOD PROCESSING INDUSTRIES IN NE INDIA: FRUIT AND VEGETABLES PROCESSING TO BOOST RURAL LIVELIHOODS AFTER CORONA CRISIS

DR. MANISH DAS (Principal Scientist, Indian Council of Agricultural Research (ICAR))

MRS. MALAMONI HAZARIKA (Entrepreneur)

PROF. RAMAGOPAL UPPALURI (Professor, Department of Chemical Engineering, Indian Institute of Technology, Guwahati.)

MS. SUNITA RAI BHARALI (Assistant General Manager, Agricultural and Processed Food Products Export Development Authority (APEDA))

Dr. Manish Das, an expert from the Indian Council of Agricultural Research (ICAR), focused on the primary processing of food items. Primary processing is a significant step in any processing application. For example, if medicinal plants are not processed soon after harvesting, they will get spoilt and lose all medicinal properties. Processing, storage and value addition are the critical factors for any food item. Also, it cannot process all varieties of desired products. For example, ICAR-Central Potato Research Institute, Shimla identified more than 40 potatoes that can be processed. Citrus available in our country are having seeds, and that's why not suitable for processing. For processing potatoes, the dry matter content must be more than 20%. There are 4 to 5 types of potatoes that can be processed for chips and French fries, out of which only two types are available in our country. Also, for example, in case of mango pickle, all types of mangoes cannot be processed to make pickles. Therefore, lot of research is required for the processing of foods and vegetables. In India, hardly 2% of food and vegetables are processed, unlike many developed countries where almost every product is processed, even flowers. So, colossal research is required in the area of primary processing,

seedless varieties and breeding for boosting fruits and vegetable processing in the country, including the NE region.

In his introductory remark, **Prof. Ramagopal Uppaluri** from IIT Guwahati, Assam, explained the need for consuming vegetables and fruits. Vegetables and fruits contain dietary fibre, antioxidants and other nutrients that make them an essential food item for our body. There are abundant types of fruits and vegetables available in Northeast India. More than 20 types of leafy vegetables and varieties of vegetables are consumed in the region. More importantly, jackfruit, banana stem and many more vegetable types grow organically without much fertilizer and other agrichemicals. All these have a tremendous impact on human physiology. It is best to consume these fresh but to preserve these, a stable cold chain is required. Unlike developed countries, in India, there are limitations regarding cold storage. So, there is a need to go for processing. Packaged products like canned juice, soup, sauce etc are all processed food items and have more shelf life for commercial utilization of various fruits and vegetables.

Therefore, the proper processing of these fruits and vegetables are the most important aspects to be looked into. There should be a discussion on balancing between processing and nutrition. The emphasis should be put on locally available produce and value additions.

Ms. Sunita Rai Bharali, AGM, Agricultural and Processed Food Products Export Development Authority (APEDA), was a Special Guest in the session and shared her expert views on fruits and vegetables processing from the export perspective. APEDA is an apex body under the Ministry of Commerce and Industry, Government of India, responsible for exporting agricultural products. Export is one of the key factors which needs to be adequately understood for the growth of the food processing business. APEDA has an office in Guwahati that looks into the entire North East sector. She stated that processing is something which Northeast India is doing traditionally, but there is a requirement for innovative and cost-competitive processing techniques. For example, instead of traditional pineapple jam, pineapple wine can be a more lucrative product for today's market. Since most parts of the border of Northeast Region are shared by countries like Myanmar, Bhutan, China, Nepal and Bangladesh, the region has an additional advantage in terms of export.

However, the right crop and correct value addition is required. Items like jackfruit and pineapple are abundantly available in Northeast India, and there is a massive demand for these items for export to other countries during the Covid-19 crisis. Countries like Singapore look for canned jackfruit. Frozen jackfruit using IQF (Individual Quick Freezing) is another excellent concept to look into items like frozen peas. Also, in Northeast India, around 20 GI (Geographical Indication) products are available, which by itself is a USP (Unique Selling Point). As per APEDA, the export items having the highest importance from North East region are pineapple, Assam lemon, jackfruit, banana, ginger, turmeric, rice (Red Rice, Black Rice), chilli (King chilly, Mizo chilly), cut flowers (Anthurium, Orchids), organic honey, bamboo shoots, and buckwheat. In export, food safety is an important aspect. The main concern is chemical contaminants which may be natural substances like aflatoxin in processed food products or externally added ones like pesticides residue or any other antibiotic residue. In Northeast Region, most agricultural or horticultural produces are organic by default. Though organic certification is an issue in the region, especially for small farmers, the traditional process of growing food items is completely organic.



FROM SCHOOL SAVINGS TO SMALL SCALE INDUSTRY: MY 'PICKLE' STORY

I started my journey 1993 and during my 9th Standard in school, I used to save from my school expenses to try my hand at mushroom cultivation. Realizing that mushroom was not my cup of tea as it was a seasonal cultivation, I thought of an alternative project to augment my income. After graduating from Dispur College in 1997, I purchased 5 kg of mangoes from my personal savings and started manufacturing pickles on an experimental basis. It clicked. It was admired and accepted by local consumers. Realizing that I should set up a food processing industry, I decided to obtain required education, training and mastery over food preservation. In 2002, I got the license from Ministry of Food Processing Industries to start production of pickles, squashes and vinegars. In 2003, my firm was registered with District Industries & Commerce Centre, Kamrup as a Small Scale Industry for starting commercial production. Currently, I am manufacturing 40 varieties of pickles and seven types of squash, jams, jelly etc. Even during this time of COVID-19 crisis, they were successfully operating. My company is also organizing video training programmes continuously for the small farmers/raw material suppliers for primary processing of items and thereby, maintaining a steady flow of supply to the market. Products like pickles and energy drinks are in huge demand now and I am even supplying to COVID Care Centres (CCC) in Assam. I am working hard to create job opportunities for local women and empowering them through skilling and associating them with my company.



Malamoni Hazarika
Proprietor & Founder,
Kamdhenu Industries



CLIMATE CHANGE, FLOOD & WATER RESOURCES MANAGEMENT: NE INDIA PERSPECTIVES AFTER CORONA

PROF. ARUP KUMAR SARMA (Professor, Department of Civil Engineering, IIT Guwahati)

PROF. HARI PRASAD SARMA (Professor & Head, Department of Environmental Science, Gauhati University)

PROF. N.C. TALUKDAR (Vice-Chancellor, Assam Downtown University, Guwahati)

Prof. Sarma revealed that climate change impact on precipitation is not only in temperate countries but also in countries in Africa. Perhaps, the total annual precipitation may not change significantly but major changes include short duration but high-intensity precipitation and longer dry days. This short-duration precipitation will lead to more flooding. He also stated that late monsoons are also observed, leading to floods in October and November. Also, the temperature is changing and even though it does not seem to have a direct link with precipitation, it is indeed directly linked with precipitation. He said that not only with the depth but with a delayed flood, the cultivation time gets affected. To cite an example, he said that for delayed flood, the crop cultivation gets delayed but simultaneously, if there is a decrease of temperature at that time, then the germination might get affected and the production might go down.

Therefore, the pattern of precipitation leads to flood and drought conditions. In the Northeastern part of India, he stated that there is precipitation on the Brahmaputra river and nearly 540 BCM flows through precipitation but this comes only in 4-5 months. This hugely available water for short duration precipitation is much less in terms of utilizable water.

Prof. Sarma stated that a basin stores lot of water. It has natural storage capacity as precipitation infiltrates into the basin and recharges the groundwater table but nowadays, due to deforestation and urbanization, several areas are being paved and grasses are removed, because of which infiltration gets reduced. Ultimately, rainwater goes away to the river, causes flood and thereafter goes off to the sea and becomes unusable. He explained that crisis is there in freshwater - only 2.6 percent of water available on the planet is fresh-water.

Therefore, we need to conserve the precipitation water because with time, deforestation and urbanization will be leading to more temporal variation. Water footprint which includes the total requirement of water for varied uses like industrial manufacturing, agriculture, drinking and all other uses comes to around 1240 cubic meter/ capita/year. According to Prof Sharma, fresh-water is sufficient at the moment but needs to be managed and conserved. He stressed that we should try to get closer to nature through Ecological Management Practice (EMP).

Ecological Management Practice (EMP) concept, he stated, has been implemented in an urban watershed in Guwahati and also in Germany and Costa Rica. This EMP is a combination of catchment management practice and watershed management practice which tries to take the ecology to its virgin state and that is the way to go closer to nature. He also proposed a small cascade of reservoirs to store water on the tributaries of the Northeastern rivers and canal network for navigation, where tourism is also possible. He also proposed proper data monitoring system with online sensors-based

data systems to prevent flooding or provide early warning of flooding.

Prof. Sarma stated that there is no direct impact on climate change due to Corona virus since people of every climatic region have been affected by the COVID 19 pandemic. He illustrated the positive and negative sides of the COVID 19 pandemic-for example, on a positive note, greenhouse gas emission has been considerably reduced during the last 6-7 months due to low transportation. Also, the pollution level of water resources has been reduced in terms of heavy metals and Dissolved Oxygen (DO) levels.

However, the negative part is that several companies have already delayed their investments in renewable energy sectors and climate research policies. At the same time, there has been disruption in scientific research due to the lockdown in terms of data acquisition and fieldwork. Another alarming factor is that there has been extensive use of plastics in terms of gloves, masks, disposable shopping bags, packaging materials in food delivery and online delivery practises and improper disposal system at quarantine centres.



He regretted that plastic packaging materials increase the carbon footprints, which is a negative aspect of e-commerce. Prof Sharma felt that there are lots of opportunities for developing livelihoods, particularly for those people who have come to their native places in the Northeast due to the corona pandemic, by exploring and managing water resources like rivers, lakes and wetlands in an optimal manner. He also proposed that agriculturists and water scientists should work together for optimal management of available water to get the required crop. This would also help the workers who have come back to their native places in the Northeast to cultivate their land and get benefits and not suffer because of mismanagement of water. He also stressed that children should be made aware of the need for the conservation of water right from childhood.

In his remarks, **Prof. Dr. Talukdar** stressed on soil system sustainability and green climate. He spoke about losses to the tune of about 45% destruction of biodiversity in the last 45 years as well as more than double the increase in the global population. He dwelt on the necessary evil of the elimination of biodiversity for the development of humans. Dwelling at length on climate change, he said that in case of Guwahati city earlier, the uniformly distributed rainfall of about 30% water gets percolated to recharge groundwater and the remaining part moves down as runoff. Therefore, for low to moderate intensity rainfall for a long duration, the rainfall-runoff process becomes synchronised. But in the case of high intensity and short duration rainfalls, the percolation loss will be reduced and that results in immediate flood problems in Guwahati city. Climate change, he stated, has enhanced the severity of the flood problem in Guwahati city.

Further, he briefly stated about the high yielding variety seeds, chemical fertilizers and pesticide advancement and their advantages on crop yield as well as the toxic effect on soil due to reduction in natural fertility of soils, run down of microbial population of soil and reduction in soil capacity. He suggested the regular raw data monitoring of small hills of Guwahati city during high rainfall events to figure out how much water is coming down; how much is being percolated and flood inundation time.

He also suggested changes to the existing drainage system to reduce floods. He also stressed on the practice of ecological agriculture and preparing individual level vermicompost by utilisation of vegetable waste and applying it in home gardens. He also recommended the implementation of knowledge of sustainable agriculture and ecological farming at the small scale level.





COMBATING WILDLIFE & FOREST CRIME IN NORTHEAST INDIA DURING & POST COVID-19

MR. AGNI MITRA (Regional Deputy Director, Wildlife Crime Control Bureau)

MR. C.P. MARAK (IFS, Retd.) and former Chairman of Meghalaya State Pollution Control Board)

PADMASHREE JADAV PAYENG (Environmental activist popular as “FOREST MAN OF INDIA”)

MR. JIGMET TAKPA (Joint Secretary, Ministry of Environment, Forest and Climate Change, Government of India)

MR. KALICHARAN BASUMATARY (President of NGO Manas Maozigendri Ecotourism Society (MMES))

MR. MEVAR KUMAR JAMATIA (Minister of Tribal Welfare and Forest Department, Tripura)

MR. VIVEK SAXENA (Country Representative, International Union of Conservation for nature (IUCN))

Dwelling on inherent wildlife challenges in Northeastern region and the Covid effect on these challenges, **Mr. Agni Mitra** stated that India is more prone to such difficulties due to its geographical location and being surrounded by countries with the traditional use of wildlife in medicines. Northeast India is a critical region as it has open borders with surrounding countries, making smuggling easy. He talked about the high-value species: rhinoceros, tiger, leopard, elephant and the cultural acceptance in the NE region. He also discussed the effect on wildlife due to the Covid-19 situation as due to lockdown, there is a problem with intelligence collection since informers are restricted from travelling. Even the return of migratory workers has increased, resulting in incidences of local hunting. The Forest Departments has taken action to combat such wildlife incidences. Apart from these effects, he also discussed some positive aspects of the Covid situation as it may lead to the reduction in wild meat consumption. Pre-Covid smuggling that used to happen using public transport declined with limited transport during the lockdown. There is less pollution due to less travel, mobility, and less industrial activity. The activities of wildlife have increased in the areas that used to be more polluted earlier but are cleaner now. He also discussed the participatory models, as in Northeast India, where most forests are managed by communities and cited the example of the Community Reserve Projects of Nagaland. He also stressed on exhaustive awareness drives, eco-tourism revenue incentives, synergy between state/central enforcement agencies and addressing issues of illegal demand of wildlife products internationally.

Mr. C.P. Marak talked about wildlife crimes, measures needed to protect biodiversity, prevailing laws, rules and regulations enacted to conserve and preserve the wildlife and forests of Northeast India. He highlighted six major points starting with the particular laws for forest and wildlife; the constitutional provisions; the policy issues regarding wildlife protection; the jurisdiction provisions of forest, wildlife, biodiversity and environment; landmark judgments by High Courts and Supreme Courts in regard to wildlife crimes and the enforcement bodies that play a significant role in regulation and implementation of wildlife acts and forest policies. He discussed essential laws and procedures such as Assam Forest Regulation 1891, Indian Forest Act 1927, Wildlife Protection Act 1972, Environment Protection Act 1986, Biodiversity Protection Act 2002, Article 46 and 51 highlighting the fundamental duties for the protection of wildlife and forest, National Forest Policy 1986 and National Environment Policy 2006 among other vital acts and laws in India for biodiversity protection. He talked about the need to relook at the National Forest Policy to strengthen the forest departments to protect the country's green gold.

Mr Payeng stressed on the importance of planting indigenous trees on the land even if it may not be economical at times, or else there will be impact on nature in the long run. He talked about the effect of the Covid situation on humans and the need to respect nature and Mother Earth. He addressed some critical environmental issues like impending water shortage in Northeast India and the melting of glaciers, causing the water bodies to rise and resulting in disasters like tsunami. He suggested some critical reforms in our day-to-day life such as making it mandatory for lower primary schools to have environmental science.



Mr. Jigmet Takpa talked about the importance and vulnerability of wildlife, referring to all flora and fauna in the international market. He described wildlife crimes as crimes against nature and highlighted the role of laws and organizations such as UNODC in preventing wildlife crime. He talked about the immense opportunities that Northeast India has due to its rich biodiversity and described eco-tourism in Northeast as the best way for revenue consideration through a cooperative approach. He also stated that Northeast India could demonstrate how sustainable livelihoods can be achieved. The region can become a model for not just India but also the world, he felt. He stressed on the need for a cultural shift in Northeast India to respect nature with a cooperative approach.

Mr. Kalicharan Basumatary, the president of Manas Maozigendri Ecotourism Society in Assam, described how the NGO was initiated by All Bodo Students Union to free Manas National Park from the World Heritage Site Endangered List while addressing people's livelihood issues surrounding the protected area. Many insurgents surrendered and got together to form the eco-tourism society with support from the Manas Tiger Reserve administration. He

discussed the idea of inclusion of such people as the ex poachers understood the area much better than anybody else, due to which the society engaged them in patrolling and development work. These ex-poachers now patrol 250 sq km out of 510 sq km of the park. Basumatary spoke about the role of MMES, which is currently working with Indian and Bhutanese administrations and local people, to conserve the park. This project is empowering people with skills to come out of years of political instability. The model is developed with a people-centric view with an emphasis on tourism. New changes are coming to the area, and roads, electricity, and livelihood are just a few of them.

Mr. Mevar Kumar Jamatia, who chaired the session, started the discussion with climate change and global warming as the significant issues around the world which led to the melting of icebergs and glaciers, besides increased water level due to which the islands are sinking. It is a significant concern in terms of the decreasing population of aquatic species, especially fishes, which causes the marine population's imbalance and affects the livelihood of lakhs of fisherman besides other allied activities. He talked about the effect of illicit activities such as poaching, hunting and killing animals for trade in forest and national parks like Kaziranga National Park in Assam where animals are killed for human profit. Due to Covid-19, people take advantage of this situation, and there is an increase in such activities by around 200%, while it was 85% before lockdown. Also, the Forest Departments' funds - which they got earlier for the protection of such wildlife - is now diverted for Covid-19 management. He also discussed the significance of discussing such topics with the younger generation through such meets and Summits, which, he felt, helped in awareness and contributing to controlling and combating such illicit activities against contributing to controlling and combating such illicit activities against animals. He addressed the need to reach out at the grass-root level to discuss issues such as protecting wildlife with the tribal people and employees who work in forests and national parks. Climate change and global warming are significant issues for imbalance in aquatic species and the environment as a whole. Trading, hunting, poaching and other such illicit activities for human profit causes the inequality of animal species in nature and such activities increased due to the Covid-19 lockdown situation. Hence, such awareness programs like the Northeast Green Summit act as a window to interact with the younger generation, but still, there is a need to reach out to the tribal people and employees who work in the forest and national parks.

Dwelling on the role of IUCN in biodiversity conversation, **Mr. Vivek Saxena** talked about wildlife crimes, which lead to disruption of ecosystem services, imbalance in nature and degradation of species' natural habitats. IUCN, as one of the oldest organizations, plays a vital role in combating wildlife crimes by ensuring safety and protection to the species which are vulnerable, endangered or are on the verge of becoming extinct.

It works on a global conservation plan that includes world conservation strategies, Rio conventions that dealt with significant climate change issues, biodiversity and desertification. He talked about the key lesson that has been learnt due to the Covid-19 pandemic - the role of species in balancing nature and this cannot be ignored. Humans, being the superior species, are severely affected by the tiny virus while the other species play their role in nature. Hence, there is a need to respect and care for fellow species in nature, their habitats, survival and food systems. Although combating wildlife trade in the NE region is a challenge, but collectively as a society, Mr Saxena felt that we need to work on the solutions based on capacity building, livelihood generation through the institutional mechanism, enforcement mechanism and regulatory mechanism to protect the wildlife species.





BIO-ECONOMY RESEARCH & INNOVATION FOR POST COVID WORLD

DR. ALBERT CHIANG (Scientist C, Institute of Bioresources and Sustainable Development (IBSD)

DR. G. NARAHARI SASTRY (Director, CSIR-North East Institute of Science and Technology (NEIST), Jorhat, Assam)

DR. LATHA RANGAN (Professor, Department of Biosciences and Bioengineering, IIT Guwahati and Fellow, National Academy of Sciences, India)

DR. RAJKUMAR RANJAN SINGH (Member of Parliament, Lok Sabha, Manipur & Parliamentary Standing Committee Member, Department of Science & Technology)

Talking about bio-economy, **Dr. Chiang** harped on the need to look for economic aspects of bio natural resources, plants, organisms, natural capital, forests as well as industrial activities related to it. Dr Chiang shared an experience of his own about an orchidarium in Shillong that was set up by the Institute of Bioresources and Sustainable Development (IBSD) to highlight orchids as a means of bio-entrepreneurship and projecting its economic benefits. Chiang said that in a span of nine months, they generated revenue of around Rs 47,600. Among different species of orchids in India, 72% are present in Northeast India only. He also mentioned that there is much need to conserve orchids, approximately 900 species of which are in Northeast India and a lot of which are now extinct because of illegal trade and other natural causes. Talking about floriculture, he said that floriculture has a lot of scope in boosting the bio-economy. He added that most of the flowers are consumed locally and less exported. He informed that the Indian flower export market is estimated to be around Rs. 571 crores and the orchid trade is about Rs 50 crores. He said that the floriculture market is unfortified because of the informal market and production. He stressed the need for tissue culture techniques and bio entrepreneurship.

Dr. Sastry provided the introductory note about the session “Bio-economy Research & Innovation for Post COVID World” and expressed that he would expect a two-way dialogue so that at the end of the session, definitive measures and recommendations can be finalized. Dr. Sastry mainly focused on the importance of bio-resources in the economy. He addressed issues related to agricultural residues and also the value addition of such materials in the economy. He also mentioned about opium cultivation in Manipur and how the Aroma Mission plays an important role to reduce such cultivation. He appealed to the scientific community to find solutions to various problems afflicting the Northeast. In this context, he talked about land erosion problems of Majuli, problems of the tea industry in Assam and water scarcity problem in Guwahati last year.

He felt that most of the tea garden problems would be solved if bio-waste is converted into something more useful. Catechins that is found in tea has anti-cancer properties. On bamboos, he stated that Northeast India has 70-80% of the 150 types of bamboo and these possess properties that are good for skin, besides having medicinal and nutritional value. The charcoal which comes from bamboo has different uses. He also observed that the pandemic has brought about several opportunities for researchers in every field. He stressed that one needs to be an entrepreneur and innovator to make the best out of the bio-resources. Dr Sastry observed that there are problems and challenges but if bio-resources production is good, there is a lot of value that they can add.

Dr. Rangan started with her presentation on the topic, “Bio-economy Research & Innovation for Post COVID World.”. She dwelt on the impact of the Covid-19 pandemic and how the GDP shrank by 10.3% which is expected to rise to 8.8% by 2021. Thereafter, she spoke about bio-economy and how the bio-economy comprises those parts of the economy that use renewable biological resources from land and sea such as fish, forests and crops to produce food, materials and energy. India shares 3% of the global biotechnology industry. Biotechnology Industry Research Assistance Council (BIRAC) has predicted that the Indian bio-economy will reach the \$100 billion mark by the end of

2025. Several factors influence bio-economy research and innovation like science and innovation, public sector R&D, the demand of innovations like the value of economy and input shortage, pandemics of zoonotic disease, plant disease and natural calamities, policies to support innovation etc. She spoke about the importance of the bio-economy that also helps in decarbonization shifting from non-renewable to renewable sources.

It helps in reducing Greenhouse Gas(GHG) footprint with better varieties and modern technologies. She focused on the various solutions to enhance bio-economy such as investing in biological research, changing public research priorities to zoonotic diseases, encouraging Public-Private Partnerships etc. She spoke about Prime Minister Narendra Modi’s ‘Atma Nirbhar Bharat: Self-reliant India’ initiative with the help of which India will reduce over-dependence on other countries for trade and focus on ‘Make in India.’ She stressed boosting innovative entrepreneurial spirit in health care, agriculture/ food processing, education and infrastructure sectors in India due to Atma Nirbhar Bharat. She depicted the challenges faced by the medical device industry in India due to the Covid-19 pandemic such as limiting imports, non-availability of firm orders, supply chain issues etc and how this, in turn, has opened up opportunities for Indian medical device manufacturers during Covid-19 times. India has also announced funding cells and invited proposals with a focus on diagnostics, vaccines and other interventions for control of Covid-19.



She highlighted opportunities for India's biotech start-ups. There are more than 2,600 biotech start-ups in the country including 50 BIRAC supported incubators. Prof. Latha Rangan also spoke about the various developments spearheaded by IIT Guwahati like low-cost incubation box, antiviral spray-based coating PPE, 3D printed face shield, drones which spray disinfectants, alcohol-free environmental protector, low-cost UVC LED etc. She added that this technology will not only serve the state but also the whole country. She stressed strategies for a better bio-economy post-COVID-19 through

sustainable development goals, switching to renewable sources, improving biodiversity, recovery policies, grants and loans, etc.

Dr. Singh said that he was neither a scientist nor a specialist in this domain but a simple activist involved in the protection of nature in the Northeast and particularly in Manipur. By virtue of being a member of the Parliamentary Standing Committee for Science & Technology, he stated that he had the opportunity to interact with some of the best scientists and researchers in India. He shared a personal experience during the beginning of the pandemic when

hand sanitisers were in short supply. The CSIR- North East Institute of Science and Technology (NEIST), Jorhat, formulated a herbal-based sanitiser with local herbs and this technology was transferred to local entrepreneurs in Manipur who are into manufacturing of sanitizers and even deodorants with local herbs.

Dr. Singh stated he was involved in the establishment of the Institute of Bioresources and Sustainable Development (IBSD), Imphal. He shared how very rich bioresources are available across the Northeast. One of the main objectives of IBSD is the scientific documentation of medicinal plants and traditional ethnic foods. After documentation, it has been revealed that the vegetables used in Northeast India are highly antioxidant and very healthful. This has to be further analysed and there can be bio-economy potential on this front also, he felt. He said that he was informed by university professors that there are 80 varieties of ginger available in Northeast India and based on that, some products can be developed - either herbal drink or immunity booster.

Dr Rajkumar also spoke about a local entrepreneur in Manipur who had scientifically made herbal tea mixing three local varieties of ginger and said that local media had claimed that it has helped in curing corona. This is one of the areas where local bio-resources can be used to boost the bio-economy, he observed. He described in detail the run-up to the inauguration of the North East Centre for Ethno Medicinal Research at Hengbung, Manipur. Through this centre, three to four bio-resources collected from the forests of Manipur have been used to make medicines-the bio-resources have otherwise been traditionally used for treating lung ailments, cancer and diabetes. This is an area where the Northeast has a lot of bio-resources. Earlier, PPE kits were imported from China to our country but now, following the pandemic, India is able to meet our domestic needs and we are even able to export them. These are inspirations that emerged during COVID. He urged young scientists to ensure that more innovations emerged so that our bio-resources are strengthened. He stated that most Northeastern states do not have industries, except Assam, hence we have to depend on bio-resources based industries like bamboo, a bio-resource which we have in abundance across the Northeast. In Imphal, CSIR is trying to introduce an organic lipstick that can be used across the Northeast - this, he felt, would help improve the bio-economy. He reiterated that to improve our economy, we should improve our bio-economy by sustainable utilisation of our local bioresources.



BIO-ENTREPRENEURSHIP EMERGING THROUGH COVID-19: OPPORTUNITIES AND CHALLENGES

DR. ARUN K. SARMA (Director General, North East Centre for Training and Research (NECTAR))

DR. BULA CHOUDHURY (Senior Scientist & Coordinator, Entrepreneurs at Guwahati Biotech Park, Govt. of Assam)

DR. DEBAPRIYA DUTTA (Head of SEED, Department of Science & Technology)

DR. JLN SASTRY (Chief Executive Officer of National Medicinal Plants Board (NMPB))

DR. NAZRANA AHMED (Chairperson, Assam Tea Planters Association (ATPA))

MR. SAMRAT DEKA (Director, SRD Group)

Dr. Arun K. Sarma spoke about the activities of NECTAR and the link between research and commercially viable products. Citing a technology example, Dr. Sarma spoke about plasma technology and its use in agro-food processing. He explained how NECTAR was trying to intervene through technology related to the real application in the Northeastern region so that young entrepreneurs of the region can come up and use it properly. He regretted that although the technology was available, still these are not being properly utilized in the region. There is a huge gap between Research & Development and the real application, he felt. Dr. Sarma described how NECTAR has picked up some 55 indigenous technologies and was in the process of establishing a Mega Demo Techno Centre at Guwahati. He also stressed the fact that NECTAR's focus was not only on making the region technologically sound but also making it more swachh through the use of technology. Northeast India produces a huge amount of pineapples and bananas, besides bamboo trees. Dr. Sarma stated how fiber can be extracted out of banana trees and pineapples to make clothes and how this technology was very much available in the country. He also explained how one can yield the most filtered water from a banana tree. He informed that NECTAR, for the first time, has also developed a machine to add value to the terracotta industry in Assam's Dhubri district.



Dr. Bula Chaudhury spoke about inculcating entrepreneurial mindsets in Northeast India. Particularly, she gave an example of tissue culture that is taught in many B.Sc/ M.Sc. programs but in the Northeastern Region, there is very little business use of tissue culture. Also, she highlighted different government initiatives including the activities of Guwahati Biotech Park to promote bio-entrepreneurship.

Dr. Debapriya Dutta highlighted the areas of rural livelihood in the Northeastern region like oil extraction, community farming etc. In his lecture, he emphasized on four aspects digital transformation, supply chain resilience,

localization of processing and agility so that bio-entrepreneurship can become a reality.

Dr. JLN Sastry spoke about biodiversity that supports entrepreneurship. Also, he highlighted the government initiatives that sustain the balance between sustainability and commercial exploitation.

Dr. Nazrana Ahmed highlighted many innovations like the cultivation of very high-value crops like vanilla pods, orchids and reuse of personal protective gear like masks, gloves, tracking technology etc.





DEHING PATKAI MINING & BAGHJAN GAS LEAK: FACTS, FEARS & WAY FORWARD

PROF. DEVESH WALIA (CEO, Incubation Centre & Professor, Environmental Studies Department, North Eastern Hill University, Shillong (NEHU))

DR. HRISHIKESH SHARMA (Assistant Professor, Dept. of Civil Engineering, IIT Guwahati)

DR. SOUMYADEEP DUTTA (Founder, Nature's Beckon)

DR. SUNEEL PANDEY (Director, Environment & Waste Management Division, The Energy and Resource Institute (TERI))

Prof. Walia's talk centred around finding a balance between conservation of natural biodiversity and economic growth, majorly in the biodiversity hotspots situated in the NorthEast region and also being more responsible as citizens and as individuals. He explained the significance of biodiversity hotspots and their fragility and gave us a brief idea of the geological makeup of India. Coal deposits in India can be traced back to the movement of this tectonic plate from the southern hemisphere crossing the equator to the north, giving rise to climates promoting abundance in vegetation forming coal aeons later. He further explained the threats mining and oil drilling activities pose to wildlife, referring to the tragedy of Baghjan Oilfield and exploitation at Dehing Patkai Elephant Reserve for coal mining. His suggestion was to take immediate actions in declaring a species endangered to protect its natural life cycle and habitat. He also suggested risk assessment of such activities and deciding settlements accordingly. Even if the economy is prioritised over ecology, his opinion was that it is finally a loss for us humans, as a natural forest can never be re-grown by human efforts since a natural forest is the result of timeless evolution. The forests in Dehing Patkai Elephant Reserve are evergreen rainforests like those found in the Amazon and attract a large number of tourists globally, especially after the declaration of a wildlife sanctuary.

An area is declared protected not just to protect the ecology but also the cultural heritage which, in this case, is inspired by nature. This area, he stated, has a thick deposition of coal which is economical for mining in open cast fashion but there have also been reports of rat hole mining which might indicate ongoing illegal activities. This forest was declared a wildlife sanctuary by the Indian Government on 13th June 2004. Mining in this area was legal on a lease basis until this date. In a tragic turn of events, another 41 acres of land was granted for coal. Prof Walia also shared other tragic incidents from Bhopal and Mexico, the former being his first-hand experience. He tried to emphasise on the importance of industries as these constitute 30% of the GDP. Talking about the requirements of industries, he said that we depend on nature but various kinds of risks are linked with it, such as fire, flooding, malfunctioning, spillage, transportation accidents etcetera, of which the most damaging of all accidents would be a loss of life. Problems such as fire, contaminated water supply, damaged electric lines do impact industries and environments and air, water and food supplies are direct needs of nature. But nothing can be compared to a loss of life and it cannot be reversed. He emphasised how lack of awareness can cost lives. In the case of the Bhopal gas tragedy, Methyl Isocyanide, the culprit gas, is soluble in water. Lives could have been saved if people had known that they could just cover their faces with wet cloth. Instead, what was visible were dead bodies all around. It is necessary to put control mechanisms in place every time an industry is being planned. Prof Walia's message was that "our livelihood and wellbeing is in our own hands."

Dr. Sharma informed that being a structural engineer, he was involved in the Baghjan incident for measuring the noise and fire levels that were occurring and impacting structures, and he did a case study there. That area is flood-prone, and the whole area was flooded. One aspect that was not thought of was the human aspect. He enlightened the audience on the geography of that area, people's living quality in that area, and the area's geology. He emphasised the aspects of improving living quality over there. He talked about modern construction to improve life and said it should protect them from flooding, heavy rainfall effect, earthquake effect, and other loading conditions like wind

loading. He gave the example of the Grand Canyon for protecting flora and fauna with a good quality of livelihood.

Dr. Dutta stated that Dehing Patkai is a wildlife sanctuary and a great source of biodiversity in Dibrugarh and Tinsukia districts. It is a rainforest consisting of three reserve forests, namely Jaipur, Upper Dihing and Dirak, constituting a total area of 500 square kilometres. Dehing Patkai was a part of this rainforest area with a 111.19 square metre area, which was later declared a wildlife sanctuary. In 1992, a survey was done for the first time in the entire Upper Assam. Dehing Patkai was identified as the largest and unique rainforest among few other rainforests, he stated. The survey revealed 400 species of bird species, over 40 mammals and numbers of other reptiles, out of which 22 species were endogenous. Before this survey, no rainforests were declared in Assam. After this survey, the whole Dehing Patkai area was declared as a Reserved Forest. According to Dr Duta, the meaning of Reserved Forest does not mean its conservation. It means these forests will be reserved for revenue generation or resource collection. Reserved forests, he stated, can be considered as feudatory land of the forest department, and they can use it for commercial purposes such as sand mining, coal mining, oil drilling etc. For conservation of a forest area, the area must be announced either as Wildlife Sanctuary or as National Park. Many organisations and people of Assam started to raise their voice for conservation, due to which it was declared as Elephant Reserve in 1993. But still, it did not get any legal protection, and exploitation of nature continued. At last, in 2004, 111.19 square km area was declared as Wildlife Sanctuary, and it received legal protection. But the movement is still going on to increase its size and also to get National Park status. Source of exploitation of forest area, he elaborated, includes coal mining, oil drilling, encroachment of forest land by village people, forest land use for agriculture and deforestation for industrial use as industries do not tend to plant their woodland. He said that the steps for future protection lies in educating the ordinary people, putting pressure on Government, and mining coal sustainably and scientifically with minimal effect on the environment and plantation. The government should increase the area under the wildlife sanctuary and declare it as a National Park.

initiative. Man, he observed, cannot create a forest. Man can only compensate for the raw materials for industries by afforestation. Forests should not be considered a source of economic development; instead, they should be treated as a source of ecological security. The incident of Baghjan is regrettable, he opined, but he felt nature will heal itself with time. It can be said on a positive note that no civilians were harmed or injured, he stated. While Oil India Limited is taking good care regarding rehabilitation and compensation, he was of the opinion that India should adopt technologies to deal with such unfortunate situations. Two specific events were discussed in this session - coal mining activities in the past in Dehing Patkai and the recent fire activity because of the gas leak at Baghjan.

While addressing the audience, **Dr. Pandey** talked about how it can be managed or mitigated efficiently. Dr. Pandey said that economic activities are essential for prosperity, and in the Northeast, it is crucial. He highlighted some crucial and important issues, like how economic development should happen and what should be the elements of economic development. He said for economic development, some cost has to be paid in terms of the environment and how well these costs are managed to mitigate environmental impact decides permissible economic activities. These are the areas where many forms of biodiversity and a lot of wildlife conservation aspects exist. There are environmental damages out of which some can be reversed, and some cannot be reversed. While talking about Dehing Patkai mining, he informed that Dehing Patkai Wildlife Sanctuary was in the news because of coal mining, and this coal mining is a subject of debate for a long time. He also informed that this is not just a wildlife sanctuary, but also an elephant sanctuary and it is a proven fact that this sanctuary is rich in reptile and butterfly species population. There exists a case of potential conflict, he felt, if any development is happening in such areas; mining in this area is open cast mining, which impacts the environment more violently and causes more observable damage to the environment compared to subsurface mining. Giving the highlights on Baghjan, he said Well No. 5 caught fire suddenly on May 27 this year. This area is a mix of oil and gas wells. The thing that worsened the event was that the gas wells in operation had gas and some condensate, which is in liquid form.

Initially, he said it looked like the oil well had caught fire but then, gas started coming out and along with gas, condensates also came out and spread in the area. Two things, he said, have been done: ambient air quality and possible impact on that area measured along with preparation of bio remediation plant. Dr. Pandey summarised the issues of contingencies namely, location of mines, impact on wildlife and biodiversity, ecological fragility of that area, the impact of mining, need to displace impacted area population and need to assess the impact of the closure. At last, he concluded that climate change issues are becoming important globally, and there is an agreement also according to which most of the countries will reduce consumption of fossil fuel. He also stated that there is an allegation of illegal mining, open cast mining, and rat hole mining when other mining was stopped.





MANAGEMENT OF EPIDEMICS IN INDIA & NORTHEAST REGION

DR. ANUJ KR. BARUAH (Chief Medical Officer, IIT Guwahati)

DR. BHAGAT LAL DUTTA (Health Epidemiologist & Data Scientist)

DR. RAJDEEP ROY (Parliamentary Standing Committee Member. Ministry of Health, Govt of India & MP, Lok Sabha, Silchar, Assam)

DR. SACHIN KUMAR (Associate Professor, Department of Biosciences and Bioengineering, IIT Guwahati)

Dr. Baruah, an internal medicine specialist and diabetologist, spoke about the definition of an epidemic. According to him, an epidemic is the occurrence of any health-related issues or any habits above the expectation of natural occurrence. He also commented on endemic diseases like malaria and dengue. Diseases that affect huge geographical areas are called endemic while pandemic is that which crosses inter- vessel boundaries through easiest communication. Without proper precautions and care, it doesn't take time to convert an epidemic to a pandemic. He spoke about dengue when he was a medical student - at that time, dengue was not there in Guwahati, but dengue cases were reported in Delhi, but nowadays, we see dengue everywhere. This is due to the movement of people from Delhi to Guwahati, which acts as one reason for the communication of the disease. Anticipation is required to deal with such a situation. He also spoke about yellow fever. He said yellow fever was not there in India but the bacteria which causes yellow fever is there in India. But if some people from India visit countries like Brazil, they should get vaccinated so that the disease doesn't come to India. Notification from a clinician is very much important so that proper records and data are created about the epidemic. That will help to prepare for precautions as well.

Dr. Dutta started his session with a brief insight into epidemics and pandemics and gave us a picture of such occurrences during the last 50 years. These included yellow fever, cholera, SARS, MERS, Swine flu, Bird flu, H1N1 and finally, COVID-19.

He pointed out that most of the diseases have a zoonotic origin, that is, animal origin. According to the World Health Organisation (WHO), five new human diseases emerge every year of which three are of animal origin. The curious case is that bioterrorism also finds its roots in zoonotic origins. He stated that after all, COVID-19 is also a variety of influenza. According to Dr Dutta, the main criteria of diseases that cause serious public health concerns are zoonoses, antimicrobial drug resistance and those which are transmitted by food. NIPAH, a disease widespread in Bangladesh and transmitted from bat saliva onto palm jaggery, has been reported in Siliguri of West Bengal, India.

It has become a common practice in East Asia and North East India to have animal integrated farms for livelihood development. The governments of the Northeastern states have also been promoting this for generating rural livelihood. Dr. Dutta also pointed out that the lifestyle of these regions is remarkably similar. Hence, it is possible that such diseases could be finding their epicentre in Northeast India in a few years. Lifestyle in the NorthEast region needs to be carefully managed to avoid such a potential outbreak.

Dr. Roy, as the chairman of the session, concluded the discussion by stressing on the importance of such forums that give a platform to talk about the epidemics in the past, the current epidemics and getting out of such situations. As research bodies still know less about some of the microorganisms and their behavioural pattern, there is a need to emphasise on such research areas more. He gave the example of bubonic plague, 1918 that severely affected the Indian population and resulted in the death of more than a million people as they were unaware of such epidemics in that era. But such epidemics lead to the generation of antibiotics. With the advent of streptomycin in 1940, researchers could understand their pitfalls, side effects, positive effects etc. In the 1980s and 1990s, the use of antibiotics was prevalent around the world. He talked about the role of government in such epidemics and the New Epidemic Act which was recently passed in the Indian Parliament, getting reformed after a long period of 123 years as the first epidemic act was made in 1897 during the British era. He emphasised the importance of research to handle such epidemics and how even the negative results can help understanding various

concerns of the research. He also motivated the students to work in such research areas for the betterment of our society.

Acknowledging the vulnerability of the NE region towards viral diseases particularly zoonotic ones, **Dr. Kumar** said that the Northeastern region is surrounded by a long international boundary with other Asian countries and also, there is much similarity of lifestyle and ethnicity. No matter, we can control the migration of humans but animal or bird migration, we can't control, he stated. Giving an example of bird flies, he mentioned that bat is called the reservoir of pathogens and bat is also supposed to be the cause of this current Covid-19 pandemic. Dr. Kumar stressed the need for close linking between veterinary pathogens and human pathogens. He also stated every cat is an outstanding host of coronavirus. Talking about the diseases which originate from animals, he said that we need to be careful with human-animal interaction and also, there is much need for surveillance when we eat poultry foods. He also regretted that in Northeast India, there was less reporting of such cases which made the region even more vulnerable and stressed the importance of effective communication and coordination between veterinary and medical doctors. Responding to a question, Dr. Kumar said that as the people want everything in less time referring to chicken poultry, there is much susceptibility of antimicrobial resistance in humans. He stated that the Indian breed is of course low in productivity, but they are highly resistant to pathogens, so we need to hunt ways of improving their productivity.





RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT OF NE REGION

MR. BHARGAV DEORI (Co-founder, Renergy Solutions Private Limited)

MR. BHASKAR KAKOTY (Director & Co-founder, Free Power Technology Pvt. Ltd., Guwahati)

DR. HARSH CHATURVEDI (Assistant Professor, Centre for Energy, IIT Guwahati)

MR. JYOTISKA BARUA (Assistant General Manager, Assam Power Distribution Company Limited (APDCL))

MR. MRINAL KRISHNA CHAUDHURY (Additional Director, Assam Energy Development Agency)

MR. VIKAS ARYA (General Manager, Sales & Marketing, Jakson Group)

Mr. Kakoty underlined the use of rooftop solar programs at a local level, skill development and workforce generation towards the application of renewable energy. He suggested the application of biomass energy. Also, he spoke on the challenges in the Northeast in terms of wind and geothermal energy. He feels that without energy, growth is not possible in Northeast India. Also, he dwelt on the challenges in Northeast India regarding the use of hydropower generation. He spoke on the low generation of solar energy in the Northeast compared to states like Gujarat and Rajasthan. So, investment in solar energy in Northeast India also has to be double that of other states, he stated. Hence, support from the government system in the form of subsidies is required. Existing grants need to be worked upon by policymakers based on ground situations in Northeast India. There is a need to concentrate more on the hydro potential in Northeast India than solar, as the scope is immense for us in the hydro sector. Only strong political will is needed for the same. He suggested the change of government policies from grid-based solar energy system to the small-scale battery-based solar energy system as the grid-based system is mainly urban-based and fails if the power cuts off. In contrast, no subsidy scheme is associated with the storage based solar system. Also, he recommended changes in existing policies by policymakers.

Dr. Chaturvedi stated that technology needs to be economically viable and socially acceptable and talked about the prediction of weather conditions, energy consumption rate, people acceptance rate via data analysis, and application of Artificial Intelligence. He majorly focused on the need for technology transfer to the market. Dr Chaturvedi also talked about bamboo charcoal as a source of renewable energy as it is locally acceptable in the Northeast. He shared how Nagaland is trying to export bamboo charcoal to China. He suggested the reuse of lithium from the battery as India does not have lithium mines. Also, he proposed the import of only lithium for battery preparation instead of buying the whole battery to store renewable energy.

Mr. Barua stressed on ensuring access to renewable and sustainable energy systems by 2030 and electrification of 100 per cent of Northeast India households through solar energy. In Northeast India, the Central Electricity Authority report and the Central Electricity Policy had fixed a target of 60,000 MW, out of which 1564 MW has to be from renewable sources. Till now, only 368 MW has been harnessed in the Northeast up to October 2020. The solar energy target was 1200 MW, but only about 60.38 MW could be harnessed, and most of the solar energy potential is lying untapped. Also, he spoke on the challenges of the micro grid system and suggested the rooftop-based solar panel system and community-based small scale solar micro-grid system. He also spoke on applying floating solar plants on water bodies, which have much potential in NE states like Assam. He also spoke on the need for Solar Plant development without disturbing the agriculture on that land. He dwelt on research findings of the crops cultivated in plots where solar plants are functioning. He underlined the combination of renewable energy systems together-for example, the use of solar energy in hydropower generation. Further, he suggested a variety of these energy systems as a substitute to others like, for example, when there is cloud cover, then solar energy will not generate and hence, instead, during that time, other alternative sources of non-renewable energy should be used.

Mr. Choudhury briefly illustrated the need for renewable energy scenario in the country. He discussed the rapidly increasing cost of conventional sources of energy. He stressed on the use of solar energy, starting from small solar pumps to large scale solar panels. He stated that India has considerable potential for wind energy, and the country has significant shorelines where several windmills are being set up. Bio-energy is also one of the resources which contribute to the whole global scenario, and India has fixed up a target of 175 gigawatts (GW) to utilise renewable energy by 2022. Records state that around 50 per cent has been achieved, and we have another two years to go. It is hoped that if not the complete target, a considerable amount will be achieved by that time. He stated that his organisation has set up the first floating solar plant in Northeast India in Assam's Morigaon district. The 10 KW plant, which is in a pond, generates electricity and rises as per the water level, especially at times like the floods in Assam. He also stated that taking the cue from Assam's solar plant, the Jharkhand Government has initiated a scheme of floating solar plants in that state, with the tagline - "Upar Bijli, Niche Machhli" (Power on top, Fish below).

Mr. Vikas Arya described JAKSON as a 70 years old company focusing mainly on diesel generator manufacturing and now moving towards solar power. Started in 2012 in Rajasthan, JAKSON group implemented solar power plants all over the country, including Assam and Northeast India, he stated.

He explained how the manufacturing of solar modules is another dimension of the company and how module modelling structure manufacturing, both for rooftops and land, has been done by the company over the years. The company's next goal, Mr Arya said, is towards hybrid energy, which will include the integration of various resources like solar and wind energy. A solar off-grid system is available with a battery system for remote areas where power cuts are very frequent.

Mr Arya explained how his group also installed solar modules on railways, thermal power plants, agricultural fields, cold storages, highways and even the Rashtrapati Bhawan in New Delhi. He stressed on maintenance, pointing out how very crucial it was and should be taken seriously in solar generation technologies.

Mr Arya said that Jakson's largest solar project is currently underway at Amguri in the Sivasagar district of Assam in collaboration with Assam Power Distribution Corporation Limited, Assam. He asserted that with proper awareness of large solar plants in Assam, the state can utilise the best potential of solar energy. He stated that stable grid power has to be ensured in the Northeastern states while the hilly terrain of the Northeast acts as both an advantage and a disadvantage at times.



RUNNING A HOME-GROWN RENEWABLE ENERGY COMPANY: MY JOURNEY SO FAR

As a budding entrepreneur, I have conducted many solar energy projects across Assam and in other parts of the country. Starting in 2015, with the help of IIT Guwahati, our organization was motivated to work on the renewable sector, mainly for the Northeast region. As we are still dependent on coal power plant, we need to upgrade to renewable sector in a stage wise manner. Northeast India has lots of potential for hydro power but the distribution is very difficult and costly. The environmental affect is also a point to be seriously taken in case of hydropower. In terms of bio energy, waste segregation is the main challenge. Proper management has to be implemented like the developed countries. In India, there are two ongoing models in solar business implementation in grid systems. In the CAPEX model form of the solar power plant, the customer generally hires a solar EPC (Engineering, Procurement, and Construction) company that provides the installation of the entire solar power system and hands over access to the consumer. The RESCO model is a zero investment model in which the consumer pays only for the electricity generated, while the solar plant is owned by the RESCO developer. The off grid system is the solar street light where the lithium ion batteries are inbuilt with the solar structure and controller. Other applications include solar pump, captive solar plant and solar power park (At Balipara near Tezpur, Assam). My practical analysis showed that though solar irradiation intensity is not very perfect in the Northeast region but the technology is economically feasible, both in residential and industrial sectors. The implementation also needs social acceptability and viability as well.



Bhargav Deori,
Co-founder, Renergy Solutions Private Limited





ACT EAST POLICY: ACHIEVING SDGs THROUGH INTEGRATED GREEN ENTREPRENEURSHIP : NE & ITS NEIGHBOURS

MR. AMIT DEORAH (Founder, AASRAY Concept Foods & Managing Partner, Excel Foods)
DR. CHINGLEN MAISNAM (Associate Prof., Dept. of Economics, Manipur University)
DR. ISHANI NASKAR (Professor, Department of Political Science, Rabindra Bharati University)
MS. JAHNABI PHOOKAN (National President of FLO. FICCI)
DR. JAIKHLONG BASUMATARY (Associate Dean of Students' Welfare, JNU)
DR. K. K. DWIVEDI, IAS (Principal Secretary to the Government of Assam)
MR. MAHESH DAHAL (Research Scholar, Dept of Commerce, Tripura University)
MR. RAVINDRA JAIN (Executive Committee Member at India-Myanmar Chamber of Commerce)
MR. S.M. FARID (Founder-Director of Northeast India-ASEAN Chamber of Commerce & Advisor to the Garo Hills Border Trade and Chamber of Commerce, Meghalaya)
PROF. SWABERA ISLAM (Professor, RSBAS, Assam Royal Global University)
MR. U OAKKAR KYAW (Secretary General, Mandalay Region Chambers of Commerce and Industry (MRCCI), Myanmar)

Mr Deorah, a food entrepreneur, presented a case study of integrated green entrepreneurship. His organization, AASRAY Concept Foods, is into infar nutrition products, especially with local resources, like Assam Mix, Assam Bhim, Fit Bhim, Kolakhar etc. Apart from the domestic market, they export their product Yummy noodles to countries like Qatar, Bahrain, Seychelles, Maldives, Dubai and Bhutan since 2017. Now, they are planning to expand further.

While dwelling on green entrepreneurship, he mentioned that it is essential to consider economic sustainability as well. About Act East Policy, Mr Deorah said trade with neighbouring countries like Bangladesh and Myanmar is not feasible currently due to heavy taxation. India exports raw materials to neighbouring countries and imports products from them. As an entrepreneur, his organisation was mainly focusing on 10 SDGs. He also shared his experience at the G20 Young Entrepreneurship Alliance 2020 in Saudi Arabia and how people talk green globally. In particular, Europe is the market for green products as people there are more conscious.

Dr Maisnam commented on the Shukla Commission Report on Transforming the North East” (1997) to provide direction for development. He spoke on problems and challenges the Northeast faces- a primary need deficit, an infrastructure deficit, a resource deficit, a two-way deficit of understanding with the rest of the country and a governance deficit. He stressed on the need for the continuation of Micro, Small and Medium Enterprises (MSME), which is the highest contributing sector in NE India, and observed that speedy recovery of MSME is fundamental need.



The recovery requires enormous investment, including public funding and comprehensive strategy. Fiscal packages and infra development are priority. He also mentioned lessons learnt during Covid-19 and how the focus should be on green economy entrepreneurship.

Dr Naskar drew attention to the background of the Act East Policy and the challenges in implementing the policy from both sides. Also, she talked about the interest of the countries in the Northeastern Region of India, especially ASEAN countries, and the evolution of the Act East and Look East policies. Depending on each country's response, India can plan with whom what kind of links or relation is to be established to achieve SDGs. She forwarded important suggestions:

Para-diplomacy in Indian and specifically Northeast India, allowing NE states to work little more independently and with flexibility under Act East Policy, need for more involvement of people and administration at all levels, needs for

multilateral engagements and requirement of understanding the needs of the ASEAN countries.

Ms Phookan spoke about the potential for Micro, Small and Medium Enterprises (MSME) and explained how the private sector could positively impact multiple SDGs. She added that green entrepreneurship and green product processes promote economic growth in various sectors, including creating new jobs. Northeast India is culturally diverse but little disconnected from the rest of the country. Northeast India acts as physical bridge between India and Southeast Asia and enjoys strategic partnership with Indonesia and other countries. She gave examples of partnerships like India's strategic vision for the Indian Ocean, i.e. Security and Growth for All in the Region (SAGAR). The 300 billion dollars Indo-ASEAN trade is expected to be double in the coming years. India-Japan Act East Forum facilitates multi-sectoral cooperation in areas like connectivity, disaster management, irrigation and people to people cooperation.

She also spoke about Prime Minister Narendra Modi's vision of Vocal for Local that offers tremendous scope for services and manufacturing sectors in the region. Notably, women entrepreneurship needs to be encouraged in both India and its neighbouring countries.

Ms Phookan concluded by stressing on the importance of tapping the commercial potential of traditional arts, tea, handloom, bamboo, tourism etc. and promoting the same in South-East Asian countries.

Dr Basumatary moderated the session and discussed sustainability issues globally and especially explained how India could benefit from Act East Policy politically, especially considering three regional events viz., South China sea conflict, chokepoints in Western Pacific regions and fundamentalism spreading out of some East and Southeast Asian countries.

Dr Dwivedi addressed the session by mentioning the metamorphosis of the Look East Policy into the present form, Act East Policy, since November 2014. He summarised the policy in 3 Cs, i.e, Commerce, Culture and Connectivity. Notably, Northeast India is landlocked, and just two per cent of its area is connected to India's mainland. On the other hand, it has proximity to East Asia and Southeast Asia. Till the sixties, Northeast India or primarily Assam was well connected to these Asian regions through various land and water trade routes which could be seen in the higher per capita income of the area. The trade spread was even up to Java and Sumatra, which eventually got lost post-seventies. The restoration of old, historical and successful trade routes, besides promoting cultural exchange and trade with neighbouring countries of the Northeast region, is essential to bring prosperity and economic development. The speaker explained the current bleak trade scenario with the adjacent and ASEAN countries from Northeast India, which is less than 2% of the national export. Trade with Southeast Asia from Northeast India is more economical than the western part of India due to the region's geographical and cultural proximity. The focus should be people's connectivity, development of railway, waterway and other modes of cheap and effective methods of transport to

achieve SDGs in the Northeast. Northeast India can trade with the existing country blocks like ASEAN, SAARC, SASEC, BBIN, BIMSTEC and Mekong Ganga coop countries. The Central Government has realised the need of building infrastructure to facilitate such business promotion from Northeast India.

Remarkably, he mentioned the recent actions taken to restore the old glory of Indo-South Asian trade and relations. The Assam Government has opened the Act East Policy (AEP) Department to ensure the effective implementation of Act East Policy. Land customs stations were upgraded, and the government has provided land at Sutarkandi, Mankachar and Golakganj for more stations. At Darranga Mela, an integrated check post is being developed. A Multimodal Logistic Park is being constructed. Various forums like ASEAN Ambassadors Meet, Indo ASEAN Youth Summit, Indo-Bangladesh Stakeholders Meet and Indo-Malaysian Business Forum has been created to plan and implement Act East Policy. On the air connectivity side, he cited an example of "Viability Gap Funding" through an international UDAN scheme by which the entire region can be connected. Connectivity with Bangladesh is getting better through rail, river (especially the Brahmaputra), and road transport. Direct flights to ASEAN and BBN countries under the UDAN scheme are starting soon. Asian Trilateral Highway, i.e., road connection of India-Myanmar-Thailand, is creating excellent opportunities. The Kaladan Multi-Modal Transit Transport Project is a US\$484 million project connecting the eastern Indian seaport of Kolkata with the Sittwe seaport in Rakhine State, Myanmar, by sea. In Myanmar, it will then link Sittwe seaport to Paletwa in Chin State via the Kaladan riverboat route, and then from Paletwa by road to Mizoram in Northeast India. Once finished, it will reduce the distance between Aizawl and Kolkata from 1458 km to 826 km. Dr Dwivedi also stressed on improving people-to-people relations. ASEAN countries consulates are required, just like Bangladesh and Bhutan have opened consulates offices in Guwahati. Also, easy visa processing and relaxation of Restricted Area Permit for citizens of ASEAN and BBN block of countries will further accelerate communication and trade. There is a considerable possibility of tourism and collaboration in education in the region. In conclusion, he stated the problems of international business

and industry due to the current poor connectivity. Many of the commodities like tea are exported to Europe and facing decline but none to ASEAN countries. Nevertheless, there is a potential trade opportunity of \$840 billion in BBN and ASEAN countries.

Mr Ravindra Jain brought few exciting insights about the Indo-Myanmar relationship. Myanmar is primarily Buddhist, so for people, a visit to Bodh Gaya is of great importance. Hence, there is huge potential if the Myanmar-Bodh Gaya tourism route can be developed and train routes can be connected. Language and people-to-people connect is essential to facilitate medical tourism to India from Myanmar. Due to its strategic location, every country wants to have a good relationship with Myanmar. He suggested higher education can be an up-and-coming sector where institutions from Northeast India can be the destination for students from Myanmar. In conclusion, he talked about the India-Myanmar Chamber of Commerce. It is an organisation with 140 members and eight verticals that act as a connection point for any person/organisation from India willing to start a business in Myanmar.

Shri Farid discussed how the unavailability of data about the region is also a bottleneck for trade with ASEAN countries. We need to send more data to ASEAN countries about the services and products from Northeast India. He also stressed using local products and setting up state institutions for border people. The development of border haats can be suitable for employment in both countries.

Prof. Swabera Islam started her speech by commenting on the relation between SDGs and green entrepreneurship. She spoke on how entrepreneurs can build up businesses that not only are sustainable economically but also environmentally. In Northeastern India, the economic growth is low due to a lack of connectivity. The opening of trade routes is essential to increase entrepreneurial activity as well as economic growth. She mentioned that the critical aspects of sustainability are the development of Micro, Small & Medium Enterprises, specifically Small & Medium Enterprises, promoting green entrepreneurship

and appropriately skilling people.

She mentioned that as per the UN General Assembly, December 2015, entrepreneurship is a potent tool to achieve SDGs by creating jobs and employment opportunities, facilitating inclusive economic growth and innovation, ensuring equitable and balanced regional development, improving socio-economic conditions and enabling youth to harness their creativity. The local resources need to be better utilised, like tea, spices, oil, other agricultural produces, silk etc. A tiny percentage of the export of such products happens to South-East Asian countries - only about 2% of the entire export happens to these countries.

On the other hand, part of this millennium has seen mostly jobless growth with concurrent growth of unemployment. Entrepreneurship is one significant way to break this vicious cycle. To bring economic sustainability to the region, there is a need for skill development programmes followed by a provision of finance.

Mr Oakkar started his speech by introducing Mandalay, the second important city of Myanmar. He identified agriculture as the most critical sector in Myanmar. India and Myanmar have been strategic partners for trade and business. India is the fourth largest trading partner to Myanmar. The Indian government has extended air, land and sea routes to strengthen trade links with Myanmar. While the involvement of India's private sector has been low but growing at a slow pace, both governments are proceeding to enhance cooperation in agriculture, telecommunications, information technology, steel, oil, natural gas, hydrocarbons and food processing. Manipur is the nearest state of India and the centre for all the trade between the two countries. Train and bus services between Manipur and Mandalay needs to be improved to amplify cross border trading between the two countries and according to Mr Oakkar, Myanmar is ready to cooperate with India. The strong relation between India and Myanmar is also established through cooperation in the sector of education. Mr Oakkar also talked about the role of the Mandalay Region Chamber of Commerce & Industry (MRCCI) in enhancing industrial collaboration in the region. 150 businesses are associated with the organization.

MRCCI is working with Small & Medium Enterprises (SMEs) because SMEs are the growth drivers for the economy of the area. There is a need for capacity building of SMEs for better resource utilization and green manufacturing to achieve sustainable development. He shared how India's four states - Mizoram, Manipur, Nagaland and Arunachal Pradesh, share an international border with Myanmar. So, Northeast India and the Mandalay region are in a perfect position for more cross border trading and developmental cooperation. Both governments have already taken the initiative for multi-sector collaboration. A high-level meeting happened between the two countries in 2019 to bring the two countries closer.

The last speaker of the session, **Dr Dahal**, probed whether green India is healthy for the stock market. The environmental regulations and protection create some negative and some positive impact. In India, it is becoming challenging to balance the environment and economy. His analysis showed exciting results of how different green laws have affected the stock market in India. He cited the example of Swachh Bharat Abhiyan, which conducted a positive and significant long-term impact on the Indian stock market.

Similarly, the Paris Agreement and the green skill development programme showed a positive and significant impact. The International Solar Alliance indicated a negative impact initially but showed a positive long-term impact on the stock market. In conclusion, the announcement of green policies have a positive impact on the stock market, and green policy is healthy for the Indian stock market.



HARD REALITY: HOW TAXATION HITS GREEN ENTREPRENEURSHIP

We at AASRAY Concept Foods are into infant nutrition products, especially with local resources, like Assam Mix, Assam Bhim, Fit Bhim, Kolakhar etc. Apart from the domestic market, we are exporting our products Yummy noodles to countries like Qatar, Bahrain, Seychelles, Maldives, Dubai and Bhutan since 2017. Now, we are planning to expand further.

As far as green entrepreneurship is concerned, it is very important to consider economic sustainability as well. Pertaining to the Act East Policy of Assam, trade with neighbouring countries like Bangladesh and Myanmar is not feasible currently due to heavy taxation. India exports raw materials to neighbouring countries and imports products from them.

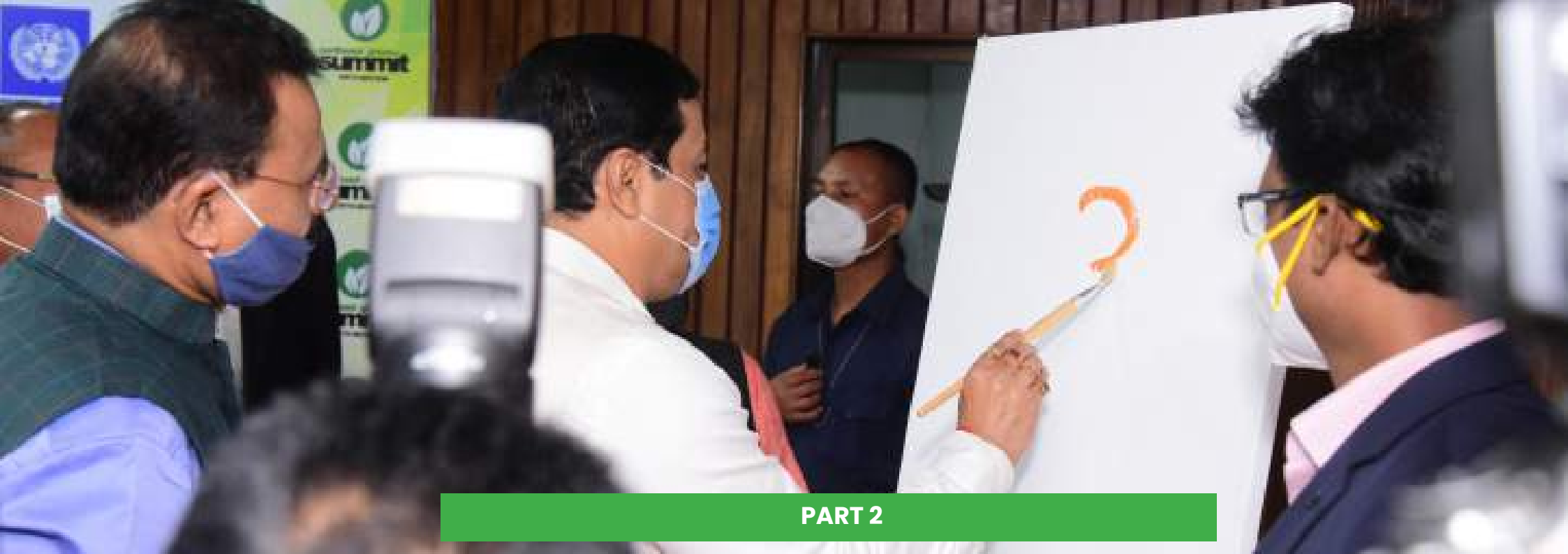
As an entrepreneur, my organisation is mainly focusing on 10 SDGs. I would also like to share my experience at G20 Young Entrepreneurship Alliance 2020 at Saudi Arabia and how people are talking green globally. In particular, Europe is the market for green products and people there are more aware.



Amit Deorah

Founder.

AASRAY Concept Foods & Managing Partner, Excel Foods



PART 2

ART WALK

The art component of Northeast Green Summit tries to focus on preservation of biodiversity and environment, highlighted through various art forms and showcasing how the indigenous people are deeply connected to nature, which is visibly reflected through our region's traditional art and culture.

The Art Walk component was inaugurated by the Chief Guest of the inaugural ceremony, Hon'ble Chief Minister of Assam, Shri Sarbananda Sonowal, who inaugurated the component by painting an 'OM' on a canvas. Shri Sonowal was also gifted a portrait of himself by an artist who made the painting live,

while Sonowal was attending the inauguration ceremony.

During this component in the lap of nature at IIT-GUWAHATI, renowned artistes from across Northeast showcased various nature-inspired sustainable art forms. In fact, the highlight of this segment was the art items made out of plastic waste.

Later, at the valedictory function of the Summit, all the artistes were felicitated and given away certificates of participation.





PART 3

RHYTHM OF THE HILLS





Through the cultural component, the Northeast Green Summit tries to portray the indigenous music, dance and all forms of culture of Northeastern India celebrating the region's eternal bond with nature.

Though full-fledged cultural evenings on all three days of the Summit could not be held due to the pandemic, the performance by Sifung Harimu Afad, an indigenous Bodo girls' group, during the Summit's inaugural ceremony, had a lot of significance. Why? Well, these 11 young Bodo tribal girls from a remote village of Assam have broken gender stereotypes by choosing to dance and

play certain traditional musical instruments, which were hitherto off-limits for women. Overcoming the initial resistance from certain sections of the community, these young ladies now thoroughly enjoy each hard-earned moment playing the sifung (Bodo flute), kham (Bodo drum), serja (Bodo violin), jota (made of iron/tama) and what not!

Not surprisingly, they mesmerised all during the inaugural function with their phenomenal performance. Indeed, could there have been a better way than this to kick start the 5th Northeast Green Summit 2020?





RECOMMENDATIONS

OF THE 5TH NORTHEAST GREEN SUMMIT 2020

5TH NORTHEAST GREEN SUMMIT DECLARATION

18 NOVEMBER 2020

WE

Representatives of Central and State Governments, research and academic institutions, Non-Governmental Organisations (NGOs), international national and development cooperation organisations, professors, researchers, government officials and private sector professionals assembled at IIT Guwahati campus, Assam, between 16-18 November 2020, on the occasion of the 5th Northeast Green Summit 2020 co-organized by Vibgyor NE Foundation and Indian Institute of Technology, Guwahati (IITG) and supported by North Eastern Council (NEC)

WISH TO SEND TO

Central and State Governments, international organisations, funding agencies, universities and research institutions, NGOs, civil society, private sector and local communities who have the opportunity to shape the future of North Eastern region a message expressing our concerns, calling for action, proposing solutions and reaffirming our belief that the time is appropriate for converting the COVID-19 crisis into an opportunity to advance climate action and get the region's economy on a more sustainable track whenever the focus shifts from immediate response to recovery plans, besides closing the gap across sectors

GIVEN THAT:

Out of 7.8 billion population of the world's population, 4.64 billion is residing in Asia and Asian continent is projected to be one of the largest urban growth regions in the next two decades; while governments and businesses across SE Asia, India and NE India have been focused on addressing the corona virus crisis, another challenge the existential climate and wider sustainability crisis-is around the corner; the major environmental issues that policy makers across the Asia-Pacific region will need to address towards 2030 are water management, deforestation and land degradation, air pollution, and climate change; to prevent another pandemic, stopping the illegal wildlife trade through NE India is key since it is not just a conservation issue anymore, it's a public health issue, a bio-safety issue and a national safety issue;

NE India continues to be very vulnerable to floods, earthquakes and landslides and in case of a disaster, it would be a nightmare for the government to handle pandemics like COVID-19 while executing rescue and relief operations; the pandemic is playing havoc with NE India's food and farming systems and hence, we need to start moving towards local, sustainable and resilient food systems;

CONSIDERING THAT:

India, its Northeast and contiguous biodiversity zones of Bangladesh, Myanmar and Bhutan, should not lose track of sustainability commitments and goals while addressing the economic crisis that COVID-19 brought with it;

a just climate transition ensuring the protection of the poor and vulnerable and integrated into our pandemic response is needed; climate-neutrality is not achievable if retrenched, unemployed as well as the so called unemployable population is not included in the development process;

the development and diffusion of adequate technology would play the key role to create far-reaching social, environmental and economic impacts and it has the potential for considerable positive effects on employment in Northeast;

AND HAVING AGREED THAT:

Shutting down markets and routes where wildlife trade is rampant is essential, both inside and adjoining NE India; boosting alternative sustainable livelihood options post COVID-19 pandemic through skilling and other employment avenues is required, with emphasis on medicinal plants, agriculture, horticulture, food processing and allied sectors where NE India has an edge; tourism sector revival in Northeast through eco-friendly alternatives is vital;

economic revival with judicious intervention of biotechnology needs to be stressed upon;

improved disaster mitigation preparedness for vulnerable NE India needs urgent attention;

We submit the following recommendations for consideration, awareness raising, and expressing our willingness to work together with policy and decision makers, practitioners, and other stakeholders:



- R1.Create a uniform SOP among all Northeastern states for tourism to create “Destination Northeast”
- R2.Properly market the existing tourist destinations and various products attached to the local community
- R3.Use social media to attract millennial who will remain the primary target customers in the “new normal” in tourism sector
- R4.Create more centres for training and skill development
- R5.Youth need to be made aware of traditional products, practises and amply supported to develop such products and deliver them to a global market
- R6.Make use of existing infrastructure like tea gardens’ “Chang Bungalows” and the cultural heritage of the tea industry to create packaged tours for tourism enthusiasts
- R7.Set up more industries, particularly the ones related to food processing, and provide institutional support and mentoring to reach global standards.
- R8.More public-private cooperation to give a push to rural and ecotourism by taking lessons from success stories like Manas Maozigendri Ecotourism Society (MMES), Manas. Involve all sections and categories of the societies
- R9 Give more push to community-based tourism projects
(ACTION: NITI Aayog, Ministries and State Departments of Tourism, Skill and Commerce, Ministry of Food Processing Industries, Tea Companies)

- R10. Cluster development for vegetables & other horticultural crops in NE Region
- R11. Introduction of indigenous fruits and vegetable gardens in each of the schools of the region for education and conservation purpose
- R12. Total value chain development in commercial horticulture with focused attention on post-harvest management
- R13. Establishment of incubation centres in selected locations to promote entrepreneurship in the field of horticulture
- R14. Creation of database management system in medicinal and aromatic plants for NE region
- R15. Protocols to be developed or followed to conserve and improve the status of medicinal plants & aromatics in the eight states of NE
- R16. Awareness campaign on medicinal plants, its cultivation and marketing should be done among the farmers, tribal communities and villages of NE Region
- R17. Cultivation of medicinal plants to be promoted under the new scheme of Ministry of Ayush
- R18. New project proposals have to be prepared in different fields; research & development, drug discovery & formulation plus regulation friendly manufacturing process development activities should be promoted
- R19. Collection centers/processing centers for medicinal raw materials should be established in various parts of Northeast

- R20. There should be specific Agri policy for horticulture promotion in NER
- R21.State Medicinal Plants Board should be proactive in cultivating medicinal plants of all NE states
- R22.Extensive promotion and publicity of various unique fruits & vegetable products from North East India
- R23. Translational research and emphasis on local products of North East region, including GI (Karbi Anglong Ginger, Black rice of Manipur, etc.) products with an export and product development outlook
- R24.Breeding process-able varieties like seedless oranges and transferring them to farmers through extension activities
- R25.Establishing prototypes and pilot plants that demonstrate fruit and vegetables production transformation into final products
- R26.Extensive market analysis to help the small processors
- R27.Emphasis on holistic processing to balance nutrition, taste, cost and minimal additives
- R28. Research, training and skilling on primary processing of local produces
- R29.More focus on sustaining organic production from NE region, besides other horticulture produces like pineapple wine, canned pineapple, jackfruit, frozen IQF and all such stuff

- R30. To attract investments in the food processing industry, tie-up with Farmer Producer Organizations (FPOS), Farmer-Producer Companies (FPCs), processors, and exporters could be a good model. A database of FPOS, FPCs, entrepreneurs and exporters may also be created for overall successful presentation in the public domain
- R31. All departments, agencies, stakeholders to converge various government schemes and handholding of the entrepreneurs / exporters
- R32. Optimal crop planning
- R33. Practices of ecological agriculture and organic farming on an individual scale
- R34. Horticulture is one more field to be taken care of at a large scale in the NE region based on state-specific focus areas. For example, honey in Nagaland & Assam

(ACTION: NITI Aayog, Ministries of Agriculture, Ayush & Food Processing Industries; National Medicinal Plants Board, National Horticulture Board, Indian Council of Agricultural Research (ICAR), State Departments of Agriculture, Horticulture and Industry, State Medicinal Plants Boards)





- R35. Planting materials must be of improved/ higher quality and from known sources
- R36. Certification of quality planting materials for bamboo cultivation/plantation
- R37. Incentive for scientific commercial cultivation of bamboo by farmers/others and market linkage with industries consuming bamboo as raw material
- R38. Inter-State Transit Pass free movement of bamboos
- R39. Mobilization of uncultivable/waste land of farmers/homestead for cultivation of bamboo
- R40. Formulation of a “Bamboo Policy for NER”

(ACTION: NITI Aayog, Ministry of Agriculture, National Bamboo Mission, Indian Council of Agricultural Research (ICAR), State Departments of Agriculture, State Bamboo Development Agency)

- R41. To create the necessary business environment for promoting bio-entrepreneurship whether it is through streamlining of rules, regulations or even availability of financial capital
- R42. To promote bio-based industries for livelihood enhancement based on focused industries that are centered on a selected few bioresources of every State or District
- R43. Floriculture, Phytopharmaceuticals, nutraceuticals and herbal cosmetics are the sectors that can be focused on
- R44. Making full use of the medicinal value of natural products and herbs
- R45. Technological intervention in the Agriculture & Food Processing sectors should be taken up for overall development and to generate livelihoods
- R46. Zero budget natural farming should be implemented. Emphasis should be to produce ethanol from waste plastic in NE India soon
- R47. Origin of the products (vegetables) should be displayed in a proper manner. It can be done by some QR coding or composition analysis

(ACTION: NITI Aayog, Ministry of Science & Technology, Department of Bio-Technology and Ministry of Commerce)

- R48. To give fillip to renewable, its inter dependency and sustainable energy
- R49. Data analysis, prediction towards advance computing techniques for smart grid and emerging EV technologies requirements
- R50. Reuse, recycling of e-waste for self-reliance on conserving energy materials and less dependent on imports

(ACTION: NITI Aayog, Ministry of New & Renewable Energy (MNRE), Ministry of Electronics and Information Technology)

- R51. Many states still lack physical connectivity, so significant investments need to be made to improve connectivity to far-flung areas of the region by providing more rail, road and air connectivity
- R52. Promotion of peace in the region by aptly handling insurgency and terrorism
- R53. Creating a new brand image of NE India by proper advertisement through all possible media, especially social media, and removing the idea of an insurgency ridden zone
- R54. Involving big companies in the tea industry to bring in more considerable investments
- R55. Emphasis on small scale cascade reservoirs with canal network
- R56. Optimal flood control measures like vegetative as well as structural measures besides reduction in sediment loss
- R57. To raise Special Task Force or Forest Protection Force to give teeth to protection as neither the State nor Central Police can provide dedicated force with Central sponsorship. Hon'ble Supreme Court in T N Godavarman case had underlined provision of force to State Forest Department.
- R58. To set up a body for coordinated action and synergy of State and Central agencies to combat forest and wildlife crimes for real time action and response.
- R59. To notify more community reserves for wildlife conservation
- R60. Intrinsic benefits of forest to be accounted for in monetary term and forest-rich states should be rewarded as Green bonus and plough back part of it to increase quantity and quality of forests

- R61. To address livelihood issues and market linkages for products/produces from forest villages/ forest fringe villages
- R62. To formulate NE Forest Policy to take into account its unique situation of land tenure/ courts' orders
- R63. To increase workforce at the frontline level to prevent illegal wildlife trade & Forest offences. Strict measures also needed by land forces.
- R64. More budget/fund allocation should be given to the Forest Department for the overall conservation of forests, wildlife and biodiversity.
- R65. Focus should be given on Aroma Mission and Floriculture Mission, besides specific items like ginger, turmeric, Giloy (*Tinospora cordifolia*), bamboo, orchids, endemic fruits, tea etc.
- R66. To move towards low carbon solutions like solar power and electric vehicles to reduce need for mining
- R67. Address forestry and mining conflicts in a transparent/ informed manner. Reserved forest areas should be strict NO-GO and preference should be given towards creating livelihoods (preferably through green jobs) by maintaining the ecology of the area
- R68. Industrial emergency preparations need to be strengthened to avoid accidents in the future and provide emergency services
- R69. The Epidemic Diseases Act, 1897 - which is 124 years old - need amendment to allow clinicians for case-specific treatment, health education improvement and coordination of various stakeholders like data scientists, clinicians, epidemiologists, psychologists etc.
- R70. To establish proper linkage between medical colleges and veterinary institutes to share the data related to epidemiology or disease epidemics

- R71. Health education, lifestyle management and behavioral changes, besides nutritional intervention, should find a place in health plan
- R72. Healthcare management system should be set up.
- R73. Multiple channels are to be integrated for effective implementation of Act East Policy (AEP). All stakeholders, including Centre & State Governments, concerned government departments, academia and private industries, are to be involved appropriately for specific projects under the umbrella of AEP
- R74. Augmented funding and innovative banking for creating MSMEs towards realising SDGs
- R75. Capacity building and skilling of entrepreneurs from NE Region and neighbouring countries for going green and harnessing the opportunities offered by Act East Policy
- R76. Understanding the operational dynamics of individual countries for the implementation of Act East Policy is essential. Each country's need is different, and the kind of opportunity they offer to India is also different, so country- wise planning is required under Act East Policy
- R81. Flexibility in visa procedure and ease of movement for traders/visitors in border areas through the creation of local offices and simplifying permit processes
- R82. Border Haats need to be established and improved to create employment opportunities
- R83. Higher Education sector to be opened and facilitated for students of East and Southeast Asian countries

- R84. Survey and data curation about resources of NE Region and other products plus services available in the region so that new business opportunities can be created across the border.

(ACTION: NITI Aayog, Ministries of Home, External Affairs, Finance, Road Transport & Highways, Railways, Civil Aviation, Tourism, Water Resources, Micro, Small & Medium Enterprises (MSME), Commerce, Education, Ministry of Environment, Forest and Climate Change (MoEFCC), Health, New & Renewable Energy (MNRE), National Disaster Management Authority, State Departments of PWD, Home, Disaster Management, Tourism, Transport, Industry and Commerce, Department of Act East Policy, Health, Veterinary, Power, Irrigation and Water Resources, Autonomous District Councils of NE States, Tea companies.

We firmly believe that the recommendations adopted in the 5th Northeast Green Summit 2020, will **BOOST** alternative sustainable livelihood options post COVID-19 pandemic through skilling and other employment avenues, **IMPROVE** disaster mitigation preparedness for vulnerable NE India and **PROMOTE** sustainable development aiming at a greener, sustainable and happier future of the region.



ROLL OF HONOUR

Manas Maozigendri Ecotourism Society
(A community based society for Conservation & Ecotourism)
at 5th Northeast Green Summit 2020, IIT Guwahati



TURNING AROUND MANAS NATIONAL PARK: OUR INSIDE STORY

Our Manas Maozigendri Ecotourism Society (MMES), a community-based society for conservation and ecotourism, has been an integral part of the Northeast Green Summit since the last 3 years. But why, you may ask? Let me explain. We emerged as a conservation messiah in Manas National Park, as witnessed by the local community here, at a time when Manas was being rampantly depleted. With the emergence of MMES began an era of transition of mindset from terrorism to tourism in our area.

During the turbulent period of the Bodo Mass Movement for demanding Bodoland, there was rampant poaching of wild animals and felling of trees in Manas National Park. Those days, there was no trumpeting of elephants, barking of deer, roars of tigers and chirping of birds. But still, the pristine beauty of Manas was still not totally tarnished and there were quite a few wild denizens left.

At that point, some local youths and a few activists of the All Bodo Students Union decided to launch efforts to restore the former glory of Manas. The local unit of Chapaguri Koklabari Anchalik Committee of All Bodo Students Union subsequently urged their central leadership to place the issue of conserving Manas National Park and making it an international tourist spot at the negotiating table while negotiating with the State and Central Governments to resolve the Bodo issue.

Consequently, when the Bodo Accord was signed on 10th February 2003, the issue of restoration of MNP and making it an international tourist spot was incorporated as one of the special packages. Enthusiastic after this success, local ABSU youths planning to do a lot more to conserve MNP formed Manas Maozigendri Ecotourism Society on 13th December 2003, pledging to look after conservation and ecotourism issues in and around Manas.

Since then, the Society has been working relentlessly for Sustainable Conservation and Responsible Ecotourism in Manas and adjacent areas. In fact, Sustainable Conservation and Ecotourism for poverty alleviation is the main motto of MMES. Besides, MMES has also been launching motivation as well as awareness campaign for conservation and ecotourism development with a series of workshops and trainings in the related fields since its inception.



ROLL OF HONOUR

Our aims and objectives, some of which are achieved, are stated below:

- i. To conserve Manas Tiger Reserve with Special Preference to its core zone & to restore the Past glory of Manas and make it free from Endanger Tag of UNESCO World Heritage Site. (Achieved)
- ii. To promote Manas National Park into an international ecotourism spot. (Achieved)
- iii. To establish Manas Maozigendri Conservation & Ecotourism Model. (Achieved)
- iv. To preserve the most ideal traditions and cultures of Boros.
- v. To motivate and create awareness towards conservation of nature and environment amongst the people.
- vi. To bring about socio-economic and educational development in the fringe villages of MNP through ecotourism and community tourism.
- vii. To promote Manas Maozigendri Ecotourism Concept across the globe
- viii. To develop network and co-operation among likeminded NGOs throughout the world.
- ix. To rehabilitate the ex-Poachers.

As we march ahead on our journey to fulfil the above objectives, a little appreciation of our efforts does bring in a lot of encouragement. We at MMES convey our heartfelt thanks to the Northeast Green Summit and its organiser, VIBGYOR Northeast Foundation, for their recognition of our effort towards conservation and opening up such a big platform like the Northeast Green Summit to us. Besides me, Rustom Basumatary, our General Secretary and former poachers Jaisron Basumatary, Khebai Boro, and Budheswar Boro represented our organisation at the prestigious Summit 2020. I must admit that it is a huge acknowledgement for MMES to have the opportunity to give a presentation regarding the success story of Manas restoration at the Technical Session on checking wildlife crimes during the Summit.

Besides, the MMES was honoured with a certificate of appreciation while the former poachers turned conservators were felicitated at the Summit's valedictory function in the presence of dignitaries from Northeast and Delhi. We not just had a pleasant stay at the Summit but also interacted with many naturalists and the whole Summit was more like an educational tour for us- a tour which we enjoyed every bit!



NORTHEAST GREEN SUMMIT 2020 VALEDICTORY



The Valedictory session of the 5th Northeast Green Summit 2020 started at 03:00 pm on November 18, 2020 at the Mini Auditorium of IIT Guwahati,

A galaxy of dignitaries led by Chief Guest of the session, Shri V. Muraleedharan, Union Minister of State for External Affairs, Govt. of India graced the occasion virtually. The other dignitaries who sent video messages included Dr. Jitendra Singh, Union Minister, Ministry of DONER, Govt. of India, Shri K Moses Chalai, Secretary, North Eastern Council, Shillong, Shri Vivek Saxena, Country Head, IUCN, Shri Atul Bagai, Head, India Country Office, UN Environment and Professor Sivaji Bandyopadhyay, Director, NIT Silchar.

Dignitaries on the dais included Dr. Rajkumar Ranjan Singh, Member of Parliament, Manipur, Shri Mama Natung, Minister, Environment & Forest, Arunachal Pradesh, Shri Thomas S Sangma, MLA, Chief Advisor to the Chief Minister of Meghalaya and Shri Mevar Kumar Jamatia, Forest Minister, Tripura.

Dr. Harsh Vardhan, Union Minister of Health and Family Welfare also wrote to communicate his best wishes for the Summit, which was read out during the programme.

The Welcome Address was delivered by Prof. Davesh Walia, Environmental Studies Department and CEO, Incubation Centre, NEHU, Shillong and Academic Advisor, Northeast Green Summit.

Shri Sengrak D Marak, Advisor, Garo Students' Union, spoke on Northeast Green Summit and the role of civil societies in conserving the environment.

The highlight of the programme-the Summit's recommendations-was declared by Prof. S.K.Kakoti, Deputy Director, IIT Guwahati.

During the valedictory session, the Summit felicitated all the Art Walk artistes and presented them certificates for their participation. The Summit also felicitated the poachers turned conservators of Manas Maozigendri Ecotourism Society for their extraordinary contribution towards protection of wildlife. The Valedictory session concluded with vote of thanks by Dr. Rajdeep Roy, MP Silchar & Advisory Board Member, Northeast Green Summit.



SNEAK PEEK : HOW WAS THE SUMMIT?

IMMENSELY ENGAGING SUMMIT!



David Lalrochunga

Research Scholar, North Eastern Regional Institute of Science and Technology (NERIST), Nirjuli, Arunachal Pradesh

The Northeast Green Summit was immensely encouraging and I came to know about numerous

factors that were harming our environment and how we need to attain sustainability in the endeavours that we take up in the ever advancing technological age. Issues regarding management and sustainability were one of the key areas of interest for me as a researcher. More and more of sustainability issues need to be addressed so that we may improve the current technologies, ideas, solutions and even work out substitutes so that there is maximum impact, especially in the context of Northeastern India. I have benefitted much from the Summit and would like to physically attend the next Summit, if the situation allows. I am indeed blessed for I have gained much from all the sessions

MY FIRST SUMMIT EXPERIENCE, A WHOLESOME EXPERIENCE!



Mamata Debbarma

Manager (Electrical), C & T Department, Tripura State Electricity Corporation Limited

This was my first time at the Northeast Green Summit and my experience, even though slightly limited due to my virtual presence, was wholesome. The Summit not just raises public awareness but also allows learning on various recent researches going on. In fact, in the course of the Technical Sessions, shortlisted research papers are allowed to be presented which is actually a great opportunity to determine how effectively the Project Objectives can be met and achieved, especially since relevant stakeholders are part of all sessions. The Summit indeed provides a platform to understand the real situation at the ground level and improving our knowledge and learning by discussing with stakeholders and arriving at solutions in a very efficient manner. Needless to say, our environment poses regular challenges and various departments and researchers have to come up with solutions to cope with the situation. The Summit not just provides a platform to explore how the present situation can be improved but also enlightens us about the consequences otherwise.

SNEAK PEEK : HOW WAS THE SUMMIT?

MESMERISING EXPERIENCE



MAHESH DAHAL

Research Scholar, Department Of
Commerce, Tripura University

Firstly, accept my kind gratitude for organising the Northeast Green Summit, 2020 and providing me an opportunity to contribute to this noble cause.

It has been a mesmerising experience for me to listen to all the highly qualified and experienced scholars. The broader range of ideas and business techniques presented in the Summit will undoubtedly impact the fate of Northeast in the long run by encouraging entrepreneurship skills amongst the youth of Northeast.

For this, I would again like to thank Vibgyor N.E. Foundation and IIT, Guwahati, for their immense initiative in organising the Summit.

FOR A GREEN WORLD



FR. ANDREW XAVIER, SDB

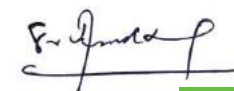
Don Bosco School Tuli, Nagaland

It was a very pleasant, happy and unexpected surprise for me to have received an invitation to attend the Northeast Green Summit 2020. Personally, I am deeply committed TO CARE FOR THE EARTH, OUR COMMON HOME. Therefore, it was a golden opportunity for me to listen to and interact with the scholars and experts on all things green.

The resource personnel, the coordinators, the speakers and the lecturers all did excellent presentations. The topics that interested me most were Renewable and non-conventional Energy, Sustainable Development, Bamboo Promotion, Climate change, Water resource Management and the conversion of the Covid crisis into opportunities to advance and speed up climate action.

My key takeaways from the Summit are that the world is prepared for a change as far as green energy is concerned, it is possible to have a make-over to a greener world, every institution (both government and private) should invest on green technology within a given time, every educational institution should compulsorily include environmental studies in its syllabus and lastly, help is available from innumerable quarters for the willing souls to do GREEN.

I was very impressed with VIBGYOR NE Foundation, which did a masterful work in the efficient organisation of the Summit and taking care of the minutest but vital requirements like the availability of the notes, photocopies, data in thumb drives, etc.

A handwritten signature in black ink, appearing to read 'Fr. Andrew Xavier'.

BIKING 2000 KMS TO ATTEND NE GREEN SUMMIT



Dr. Jaikhlong Basumatary

Assistant Professor at the Centre for Indo-Pacific Studies, School of International Studies, Jawaharlal Nehru University (JNU), New Delhi.

Growing up in areas surrounded by Reserve Forests in Bodoland area of Assam, my worldview towards environment is rather conservative. As a child, matters relating to environment were a non-issue. However, with more exposure to issues of the world, concerns relating to environment started creeping in. The realization that world environment is indeed a pressing issue was reassured from my experiences of seeing areas of the Reserve Forests that I grew around disappearing rather rapidly. Living in areas where I grew up is a luxury now. Alas! I have become a city-dweller.

But one day, I will be re-united with the sounds, the aroma, the land I played on tirelessly. Well, that is at least the hope and the plan for now. If the yardstick of an environmental warrior is being an activist like Greta Thunberg or a part of groups like Greenpeace, then I am a disappointment. Frankly speaking, I am not an environment warrior per se. Rather, I have been a part of many a project to plant trees, cleaning up areas, spreading awareness, and the like. Environmentalists like “Forest Man” Jadav Payeng are the people I idolize.

As far as Northeast Green Summit 2020 organised by Vibgyor NE Foundation at IIT Guwahati is concerned, it has been a vibrant platform to exchange ideas and share issues concerning the environment. This is happening for the fifth time in 2020. The fact that the schedule of the Summit was not hampered by the COVID-19 situation speaks in volumes the seriousness of the issues that the Summit deliberates annually. Kudos to the foundation.

My personal experience with the Summit began much ahead of the scheduled opening ceremony of the Summit itself. These were funny times with Corona virus wrecking havoc all over the world. Travels were restricted and I was not willing to share a space in a container with compressed air! This is the moment I decided to travel to the venue (some 2000 kms.) of the Summit by road, in my motorcycle. Solitude is bliss! Though I was given the option to be a part of the Summit online, the offline option seemed more interesting and much needed. Anyways, it had been a while I have been a part of any “offline” interaction.

As I hit the road from my residence at JNU on the Diwali day of 2020, there was no predetermined route. I just hit the highway and the kilometers were munched with smile from ear to ear. This continued for the next 28 hours till I reached my hometown in Kokrajhar (by then I had covered some 1700 kms.) with intermittent power naps on the motorcycle itself. Not while on the move of course! The road trip was made much more enjoyable with Diwali lightings at homes as I passed village after village and town after town. The best experience happened at Gorakhpur in Uttar Pradesh. As daylight faded by the time I crossed Lucknow and headed towards Gorakhpur, the sense of Diwali became more evident. Somewhere in Gorakhpur bypass, I saw laser beams beaming from afar. My assumption was that these were Diwali celebrations in Gorakhpur town.



However, as I rode at a steady pace, I came across a bridge, which was lined with cars and beautifully dressed people glancing towards darkness from the railing of a bridge. This elicited my curiosity.

My curiosity compelled me to halt and enquire about the fuss. As I took off the helmet and approached the railing of the bridge, I could see diyas floating on a water body. As the surrounding was enveloped in darkness, the swaying of the flames of the diyas floating on the water twinkled. The sight brought

about an uncontrollable glee. Its *je ne sais quoi* Diwali 2020 celebrated. Later on, I discovered that the place was actually a Ghat, which the Chief Minister of Uttar Pradesh, Yogi Adityanath, had developed. The twinkling of the floating diyas impaled the darkness. Thereafter, much of the riding was done at night. It was only when I entered Bihar the fog took away much of the riding pleasure. By dawn, I had reached Siliguri. It was here, the sense of home had already set in. It was just a matter of twisting the throttle and enjoying the ride.

After a couple of day's rest, my journey took me to the NE Green Summit 2020 at IIT Guwahati. Such events are platforms for "experts" on various fields in sustainable growth/development to come together and intellectually contribute to the issue-area. With this goal in mind, the organizers had scheduled a three-day Summit to address issue-areas concerning not only sustainable development in the Northeastern region but for overall sustainable development. The Summit was as vibrant in terms of deliberations as I had expected.

Practitioners, intellectuals, policy-makers from different countries and states deliberated on a given issue and area. Such exercise is essential to understand the varied approaches to the issue at hand, which helps in wholesome understanding of the issue, which in turn aids in designing appropriate solutions and framing appropriate policies. The international nature of the Summit points to the universal exchange of ideas, which is always a good indication of the seriousness of the Summit. In the end, it must be stated that at least I came back richer with knowledge on the subjects deliberated, and I am eagerly looking forward to the next edition of the NE Green Summit.











5TH EDITION:
16TH-18TH NOVEMBER, 2020

ORGANIZED BY:
VIBGYOR N.E. FOUNDATION

IN ASSOCIATION WITH:
NORTH EASTERN COUNCIL, SHILLONG

VIBGYOR N.E. FOUNDATION

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S U P P O R T E D B Y





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