WORLD SUSTAINABLE DEVELOPMENT SUMMIT 2021

REDEFINING OUR COMMON FUTURE: SAFE AND SECURE ENVIRONMENT FOR ALL

February 10-12, 2021

WSDS 2021 Pre-event

COP 26 Webinar Series

Role of Carbon in Nature-based Solutions (NbS)
An Opportunity to Be Explored

Date:
3 December 2020

Time
3.30 - 5.30 P.M. (IST) | 10.00 - 12.00 A.M. (GMT)

IN PARTNERSHIP WITH

UN CLIMATE CHANGE CONFERENCE UK 2021
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UK Government

AGENDA

3.30 – 4.00 p.m	**Opening Session**
3.30 – 3:40 p.m.	**Opening Remarks** **Dr. Ajay Mathur,** Director General, TERI
3.40 – 3.50 p.m.	**Special Remarks** **Ms Andrea Ledward,** Director of International Biodiversity and Climate, Department for the Environment, Food and Rural Affairs, United Kingdom
3.50– 4.00 p.m.	**Keynote Address** • **Dr. V B Mathur,** Chairman, National Biodiversity Authority
4.00 – 4.45 p.m.	**Panel Discussion 1- Theme: Forestry and Biodiversity** Session Description: India is committed to achieving the Nationally Determined Targets (NDC) targets and has taken on a target of creating additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030. Realising the role that the forestry and biodiversity sector related NbS could play in climate change mitigation, the panel discussion will focus on providing solutions to reduce the emissions gap and implementation of a Carbon Neutrality Policy at national and state level.
	Panel Discussion **Theme Setting: Mr Siddharth Edake,** Fellow, Land Resources Division, TERI **Moderator: Mr S S Negi,** Vice Chairman, Uttarakhand Rural Development & Migration Commission **Panellists** • **Dr. J V Sharma,** Director, Land Resources Division, TERI • **Mr Ajay Kumar Lal,** Joint Secretary, Ministry of Law and Justice ((Retd.), Government of India • **Mr Sandeep Roy Chaudhary,** Director, VNV Advisory Services
4.45 – 5.30 p.m.	**Panel Discussion 2- Theme: Agriculture** Session Description: In the past few decades, agricultural production in India is slowly shifting from traditional to modern agriculture. This has featured high input, high consumption and high productivity agriculture in the country. Although modern agriculture has greatly improved food production, it has also exerted huge pressures on the environment. In addition, farmers are having to contend with a climate that is becoming more unpredictable by the day, along with the consequences it brings such as water scarcity and soil degradation, just to name a few. Through this deliberation we try to make the case for the role that NbS can play in moving towards low carbon agriculture path while focusing on water resources management and enhanced agricultural production
	Panel Discussion **Theme Setting: Dr. Yogesh Gokhale,** Senior Fellow, Land Resources Division, TERI **Moderator: Dr. Alka Bhargava,** Additional Secretary, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India **Panellists** • **Mr Umakant,** Joint Secretary, Department of Land Resources, Ministry of Rural Development, Government of India • **Dr. Reena Singh,** Associate Director, Sustainable Agriculture Division, TERI • **Mr Anirban Ganguly,** Research Specialist, South Asia Research Hub, Foreign, Commonwealth and Development Office

As part of the COP26 webinar series, a virtual dialogue on the 'Role of Carbon in Nature-based Solutions (NbS): An Opportunity to Be Explored' was organized on December 3, 2020 at the World Sustainable Development Summit (WSDS) 2021, in partnership with the British High Commission in India.

The WSDS is the annual flagship event of The Energy and Resources Institute (TERI) and its 2021 edition addressing the theme of 'Redefining Our Common Future: Safe and Secure Environment for All' will be hosted virtually from 10th to 12th February 2021. The edition will focus on the current crisis and the roadmap that nations need to adopt for a greener recovery.

As worldwide communities are struggling with the realities of increased climate variability and climate change together with rapid loss of biodiversity, declining farm productivity, and rising cost of cultivation, associated with depleting and degrading natural resources, it has become crucial to bring in effective solutions. However, the technological solutions currently available for mitigating and adapting climate change are expensive and difficult to implement, especially by the developing countries. Hence, the nature-based solutions that are defined as actions to protect, manage, and restore eco-system which in turn ensure human well-being and address societal challenges are once again being explored for the potential to reduce greenhouse gases while enhancing livelihood benefits and eco-system services. The webinar sought to understand the diverse set of nature-based solutions along with their cost-effectiveness, policy implications, and the overall approach that may be deployed in order to move towards a low carbon path, resulting in reduced emission gap.

Delivering the opening remarks, Dr Ajay Mathur, Director General, TERI and the member of the Prime Minister's Council on Climate Change shared that partnering with the British High Commission in India for a series of four webinars is a matter of great pleasure for TERI. The series covers the four key areas including electric mobility, green finance, nature-based solutions, and adaptation and resilience which are important for climate change mitigation and are also among the themes of the next Conference of the Parties to be held in England in November 2021. Dr Mathur emphasized that it is important to focus on these issues keeping in mind the current scenario. Talking about electric mobility, which was the focus area of the first webinar, he said, "we all agree that we have moved ahead on decarbonization of electricity. Our next great challenge is how do we decarbonize the transport sector." For green finance, he said, "the first cost of greener solutions are higher than the first cost of other existing solutions. Though of course, their lifetime costs are less as their operating costs are less. And, there is a possibility that with the increase in volume the first cost too will become less. But there is a hump to cross." For the webinar on nature-based solutions (NbS), he emphasized that there will be interventions for biodiversity, agriculture, and ways to deal with nature to make sure that the emissions from nature are reduced, in fact sequestration increases. Talking about the fourth key area, that is, adaptation and resilience, to be addressed in the last webinar, he said "no matter what there is a large amount of __ is here. We need to manage it. As we want to make sure that we do not put more CO2 in to the environment, we also need to ensure that we manage what we have done." Coming back to the theme of NbS, Dr Mathur talked about the importance of the area for a country like India, where a large portion of the population still lives in rural areas and have land-based occupations. He said, "the livelihoods of the rural population mainly depend on what they get out of forests, agriculture, and a range of NbS. It is, therefore, important to find ways to reduce carbon emission from these activities. The activities would keep going but ensure that the emissions are reduced and sequestration is maximized." Another thing he pointed out was the need to see how in agricultural practices economies can move towards no-carbon and no-water agriculture, with the output being

at least the same or more than what exists today. There are states in India where there is a goal of creating waterbodies and the waterbodies would have very much here and now. Waterbodies across the state in each village. But, when waterbodies are connected, then great corridors for biodiversity are created. Further, Dr Mathur said, "in urban areas, we have been looking at urban forests as corridors and preservers of biodiversity. We need to see how we can move them. We want the few cities, whether it is Mumbai, Delhi, or Chandigarh into the heartland of urban planning. In other words, there are lots of opportunities, but we need to see how we can take them further."

Nature-based Solutions for Climate Change and the UK's Ambition

Highlighting the role of NbS for climate change mitigation, Ms Andrea Ledward, Director of International Biodiversity and Climate, Department for the Environment, Food and Rural Affairs, UK, talked about the country's climate ambition. She discussed that

it is important to recognize that climate change has a profound impact on nature. It is leading to loss of biodiversity which is not only linked with human activities and land-use practices but also more frequent and changing weather patterns the world is experiencing. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services (IPBES) states that biodiversity is declining faster than any time in human history with human actions threatening more species with global extinctions now than ever before. The WWF Living Plant Report 2018 estimated that there has been an overall decline of 60% in the population of vertebrate species in just 40 years. "So, degradation of land resources is negatively impacting the world consisting of at least 3.2 billion people and everything is costing about 10% of annual GDP in most of biodiversity and ecosystem services. So, sure it is not separate to growth, development and well-being, in fact it is an essential part of it," she said. In this scenario, she asserted that protecting nature using NbS can pose solutions to tackle climate change and save lives of the people whose livelihood is dependent on, for example, farming and fisheries, as well as deliver wider environmental benefits. She also mentioned that through nature resilience can be built against future pandemics, people's exposure to future disasters such as catastrophic floods, droughts, etc., can be reduced, and key systems such as national and international food supply chains can be strengthened. Ms Ledward said, "the global transition to low emission and sustainable land-use and food systems could unlock business opportunities of over 500 billion dollars by 2030 and over a trillion of dollars of hidden cost could be avoided. So, restoring natural habitats has merit and potential benefits for helping communities to adapt to climate change, from natural flood management to urban cooling, as well as helping to support the resilience of weaker systems to climate change." In other words, restoring and expanding habitats will benefit nature, which in turn help in climate change mitigation and adaptation. But, nature by no means is of silver bullet. Ms Ledward emphasized that emission reductions from other sectors are also required in keeping with the Paris Agreement. She talked about some of the recent initiatives by the UK government in this area. For example, the UK government is committed to increase tree planting across the country to 30,000 hectares per year by 2025 through the 640 million pound Nature for Climate Fund. The Green Recovery Challenge Fund was set up to support environmental NGOs of up to 80 million pounds to kick start nature-based projects or creating or retaining jobs in environment conservation. Ms Ledward mentioned that in 2018, the UK published a 25-year environmental plan. The plan seeks to improve the environment within a generation and is a living blueprint covering the next quarter of a century. She said, "on a global scale, we are funding NbS for our international climate finance." The UK prime minister announced a 220 million

pounds international biodiversity fund at the UN Climate Action Summit in New York in September 2019. It is evident that nature-based solutions are the UK's top international priority for 2021. Ms Ledward said, "Ahead of COP26, we are building a new government-to-government dialogue between producer and consumer countries to collectively agree on principles for collaboration in a road map for action. Over 80% of deforestation is driven by the production and consumption of internationally traded agricultural commodities. Thus, it is essential that both producer and consumer countries work together to protect forests or promoting trade and development." Furthermore, she talked about building resilience for sustainable agriculture, need of land-use transition, and marine protection. The UK-led initiative 'Global Ocean Alliance 30by30 aims to protect at least 30% of the global ocean marine protected areas by 2030. She praised India for a very strong track record of preserving forests, biodiversity, and wildlife conservation. She summarized calling NbS as a real opportunity to build greener and more resilient world post-COVID-19.

Inter-relationship of Biodiversity, Climate Change, and Nature-based Solutions

Nature-based solutions are actions that protect and help to sustainably manage and restore or modify ecosystem in response to societal challenges. Deliberating on this, Dr V B Mathur, Chairman, National Biodiversity Authority highlighted that the challenges the world is witnessing are no longer the issues only dealing with biodiversity and climate, they pose a challenge to the society as well. The NbS are important as they can provide a range of environmental, social, and economic benefits and they are indispensable for both climate change mitigation and adaptation. Dr Mathur talked about the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 2019 report, wherein it is said that if the business-as-usual scenario continues then the world might lose up to 1 million species of plants and animals in near future. On one hand, there is biodiversity loss, and on the other, climate change is impacting the world's order. Mr Mathur said, "In very complex dynamics, we face challenges that are common to biodiversity and climate change, thus their solutions need to be common as well." Talking about sustainable lifestyles for an NbS, he said "India's heritage embraces nature and environment consciousness, which are deep rooted in its tradition… India is ensuring that following its rich cultural traditions it continues to foster sustainable lifestyles, an integral part of its solutions to climate change, taking into account the massive pressures of development." Further, he talked about NbS as ways dealing with the use of nature in the context of climate change, food security, water resources, and disaster risk reduction to conserve and use biodiversity in a sustainable manner. There are a range of co-benefits which NbS can provide. And therefore, cost-sectoral multifunctionality is the main factor that makes nature-based solutions interesting for stakeholders. Further, he discussed about the four key actors important for setting-up NbS. First are micro-level actors, which include citizens, land owners, business owners, citizen groups, and non-governmental organizations. Second are meso-level actors who work at the city level, which includes municipal departments, water boards, and similar local actors. The third are macro-level actors who work at the regional, national, and international levels. The macro-level actors include regional and national authorities and international organizations. Adding to this, he said that there are transboundary actors also who transcend geographical and organizational boundaries, and foster relationships between networks, among producers, and among users of nature-based solutions. He also discussed about the barriers to NbS. He said, "the first barrier is finance, both public and private. Finance is required to innovate and implement NbS. Second is strong

political will and citizens participation. And, third is the availability of technical skills and knowledge holders for the implementation of nature-based solutions projects. So, if we overcome these barriers, we will definitely achieve our goals."

In the end, he stressed on the philosophy of co-creation, co-implementation, and co-governance in context to NbS for low-carbon pathways.

Forestry and Biodiversity-related Nature-based Solutions

Setting the theme for the first panel discussion on 'Forestry and Biodiversity', said, "Forests are probably the most well-known nature-based solution for climate change as they involve low cost. Other than forests, there are mangroves, wetlands, grasslands, coral reef, etc., that sequester carbon. Nature-based solutions have the potential to support broader climate strategy; they reduce disaster risk, enhance livelihood benefits, protect biodiversity, and provide ecosystem services. The overall global forest cover is around 4.06 billion hectares, 31% of the global land area, and it is estimated that approximately 2.6 billion tonnes of CO2 is absorbed by forests each year. In India, there is a forest cover of about 80.72 million hectares, which is about 24.56% of the India's geographical area, and as per a study conducted by TERI, in 2020, the total carbon sequestered by these forests was around 925.38 million tonnes of CO2." India is committed to achieving its nationally determined targets by creating an additional carbon sink of 2.5–3 billion tonnes of CO2 equivalent through additional forest and tree covers by 2030. Thus, to realize the role that the forestry and biodiversity sector-related nature-based solutions could play in climate change mitigation and achieving India's NDC target, a panel discussion was organized. It was moderated by Dr S S Negi, Vice Chairman, Uttarakhand Rural Development & Migration Commission. The panellists for the session were Dr J V Sharma, Director, Land Resources Division, TERI, Mr Ajay Kumar Lal, Joint Secretary, Ministry of Law and Justice (Retd.), and Mr Sandeep Roy Chaudhary, Director of VNV Advisory Services.

Talking about NbS that underpin the Sustainable Development Goals, Dr J V Sharma, Director, Land Resources Division, TERI said, "Adequate investment in NbS will help reduce financial consequences of climate change, and contribute to the creation of new jobs, to livelihood resilience, and to reduce people's poverty." Discussing about the targets in line with the Paris Agreement which are dependent on NbS, for example, 30by30 conservation target, Dr Sharma examined for the required ways and kinds of policies and regulatory and institutional interventions. To do so, he expounded with an example of India, who is committed to achieve additional 2.5–3 billion tonnes of the CO2 equivalent through additional forests and tree covers. It is one of the examples of NbS for climate change mitigation. He said, "first at the country level, the government has to decide and quantify how much target we have to achieve by 2030." The forestry sector in India is a concurrent subject under the Constitution of India. The responsibility of planning and policymaking remains with the central government, while the implementation aspect lies with state governments. Thus, "state governments should be involved in planning and implementing NbS to achieve such targets for mitigating climate change", he said. He mentioned that the substantial potential of carbon finance in the forestry sector in India has not really been tapped yet. "The policy and regulatory framework provides ground for community-based forest governance in which financial benefits should be transferred to the communities to take care of their additional income and be motivated for mitigating climate change through protection, conservation, and management of forest and biodiversity," he said. It is a major challenge at both state and national levels to tap and ensure that excess benefit is shared and passed on to the grass-root level biodiversity management committees. Mr Sharma informed that recently, TERI initiated a carbon project under agroforestry for providing financial benefits to farmers in five districts of Punjab, and is going to start the same in four districts of Gujarat. Under this project, additional finance will

enhance the income of farmers in the agroforestry areas and reduce human–wildlife conflict. Through such projects, "TERI is establishing mechanisms and methodologies in the area. But, major responsibilities lie with the Government of India and state governments", he said. He suggested that the government needs to come up with a carbon neutrality policy under Article 21 of the Constitution of India; it must empower communities for forest governance and build capacity of frontline staff of the state forest department as well as communities in context of carbon finance and climate change issues; and provide finance for forests and ecology. Highlighting the international aspect in carbon finance, Dr Sharma requested international communities to contribute towards setting their emission-reduction targets through forestry and agroforestry plantations, carbon credits, and also to fund implementation projects. He said, "it has been observed that substantial portion of the funds provided to the developing countries under the bilateral agreements or multilateral agreements goes back to their respective countries through their consulting organizations… Thus, if the international community is really interested to use nature-based solutions in forestry and biodiversity for mitigating climate change, they must focus on implementation and funding for offsetting their emissions through this process."

India has been active in dealing with and finding NbS for environmental issues. It is evident from the fact that in the 42nd Constitutional Amendments, citizens were given responsibilities as fundamental duties to adhere to and preserve and conserve the environment. Reflecting on this, Mr Ajay Kumar Lal, Joint Secretary, Ministry of Law and Justice (Retd.), Government of India said "India takes environment as one of its top most priorities. As per its commitments in the Paris Agreement, India has been implementing its climate change targets across the country. For achieving the target of creating additional carbon sink of 2.5–3 billion tonnes of CO2 equivalent through afforestation by 2030, the Forest Survey of India has come out with an in-depth study with projections and proposals." He discussed about the three barriers in achieving the target through NbS. The first barrier he mentioned is to get around 22–24 million hectares of land for the additional tree and forest cover. Addressing the issue, he said, "the present scenario suggests that of course we have additional area of 65.8 million hectares as highlighted and divided into different categories by the Forest Survey of India, and in other way, why not to concentrate on open forests together with other forests. Forest lands are more or less well-defined, and there will be no dispute in terms of ownership, title, etc. Those areas could be identified and taken up to meet the requirement before considering other areas." The second barrier he mentioned is finance. He said, "as per the projections, we require 2.5 lakh crores in 10 years in order to meet the target of 3182.5 billion tonnes of CO2 equivalent." For this, he suggested for an integrated wholesome approach involving inter-ministerial pooling of funds, public–private partnerships, inviting corporates for partnering in afforestation programmes, and giving a responsibility to corporates especially with a turnover of more than 500 crores to spend 2% of their net profits of last three years in this area. The third challenge he mentioned is establishing the tonnes of CO2 equivalent which is already sequestered. Mr Lal said, "validation and verification processes in international standards, when there are certain inflexibilities, rigid requirements for validation and verification, they are tough and also crucial to establish." In order to do that, he suggested to start with capacity building of primary stakeholders to induce them to participate more actively, then devise simple formats which could be approved prior to initiation of a project and further distribute those formats and standardized forms to all stakeholders at all levels. Besides, the projects and processes should be flexible so that if any deviations are required, they are taken into consideration, he discussed.

Talking about the Indian private sector contributing in carbon finance, said that Indian companies love forests, love trees, love farmers, and love biodiversity; thus, finance from the private

sector is not a problem. He mentioned that most commonly private companies in India plant trees under their CSR initiatives, but in an unorganized way. So, there is a scope of streamlining finance from the private sector which also leads to carbon markets, carbon trading, and finally to finance which can be ploughed back into the communities, he discussed. He reiterated that forests are more about people than trees, and alternative livelihoods and forest communities are the essential part of working with forestry. Mr Chaudhary discussed that there is a need of knowledge sharing and capacity building to an extent that there is available finance; ways to tie up the finance with possible regulatory frameworks should be explored. He suggested that after fulfilling the aforementioned requirement communities should be involved in climate change mitigation programmes and instead of following top-down approach, value must be created by working at the forest community level before moving upward. Further, he talked about blended instruments within financial services, for example, carbon finance and debt finance. Also, he suggested for innovating business plans out of NbS, for example, establishing processing centres for non-timber forest produce which will increase value for the communities involved. "We need to create a factual/financial value that comes in a form of carbon markets. That is a definite value which can be created for the private sector to be involved in", he said. Further, he emphasized that if there is an effective regulatory framework from policymakers, then money will easily come in.

Summarizing the panel discussion, Dr Negi thanked all the panellists for taking the discussion through a wide landscape of issues on carbon sequestration in forestry and biodiversity using NbS. He reiterated to achieve the climate goals through NbS, policies, implementation strategy at the national and state levels, and involvement of communities in the solutions are required. He said, "Communities are the major stakeholders. You cannot work in isolation, you cannot have carbon sequestration, you cannot have carbon neutrality without involving them… Capacity building of not only the communities but also of forestry staff and forest bureaucracy is needed along with the change of mind set."

Agriculture-related Nature-based Solutions

The second panel discussion on 'Agriculture-related Nature-based Solutions and Their Role in Carbon Sequestration' was moderated by Dr Alka Bhargava, Additional Secretary, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India. The panellists for the session were Mr Umakant, Joint Secretary, Department of Land Resources, Ministry of Rural Development, Government of India, Dr Reena Singh, Associate Director, Sustainable Agriculture Division, TERI, and Mr Anirban Ganguly, Research Specialist, South Asia Research Hub, FCDO.

Setting the theme of the discussion, Dr Yogesh Gokhale, Senior Fellow, Land Resources Division, TERI, said, "as part of agriculture, there could be a number of strategies and activities which could be talked about as NbS. Of course, all NbS are not necessarily a new knowledge but there could be a reinvention of existing solutions and traditional ecological knowledge, which could be seen in the climate perspective." He discussed that the solutions need to be holistic, where agriculture cannot be seen independent of soil management, traditional practices, ecosystem services, and so on. He said, "the NbS in agriculture would necessarily look forward to value chains for sustainable production, enhance soil productivity, and soil carbon. There are a number of aspects of integrated farming such as organic farming, indigenous crop production, safeguarding traditional knowledge of farming, livestock management, local food security, and nutrition that could become important for developing local-specific solutions leading to reduction in carbon emission due to agriculture and enhancing soil carbon." He mentioned a number of movements such as One Planet Business for Biodiversity, which is committed to scale up regenerative agricultural practices with an emphasis on soil health, and RECSOIL (recarbonization of global soil), which is supported

by FAO, for constituting and implementing facility to scale up soil organic carbon-centred measures. He said, "there is a manual compiled by the United Nations which talks about over 200 substances of NbS practices; but, what is more important is that there is a need to recognize these practices as solutions, contextualize those, and promote through conducive policy environment."

While discussing about the various government programmes related to agriculture for dealing with climate change issues, Dr Alka Bhargava, Additional Secretary, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India asserted that India is quite well-equipped to deal with the climate change issues right now. She said, "the National Mission for Sustainable Agriculture is the major flagship programme within the National Action Plan for Climate Change, which is arming India to deal with climate change issues. There are a number of things which are cutting across with NbS such as area under organic farming which right now we have about 28 lakh hectares in the country and in coming 5 years we are aiming to bring in 25 lakh more. And together with that we also have a programme for certification of traditionally organic areas. Such programmes lead to better remuneration for farmers also." She mentioned about the various programmes of the Government of India under which India is working towards achieving its climate change mitigation targets through agriculture. The programmes included Per Drop More Crop under the major umbrella scheme of Pradhan Mantri Krishi Sinchai Yojana, wherein focus on bringing more area under micro-irrigation technologies is given; Bharatiya Prakritik Krishi Paddhati, which promotes organic farming; and National Initiative on Climate Resilient Agriculture, in which best practices are being collated and implemented in 121 districts covering about a lakh farmers. She also mentioned that the production of biofertilizers is promoted and quantified quarterly, and additional area under plantation in arable land is quantified regularly. She informed that work is going on for the identification of genotypes of crops with enhanced CO2 fixation potential, which require less water, and climate resilience genotypes with greater adaption of drought, flood, salinity, and high temperature. With all these activities and more, she said, "we are also converging strongly with the rural development." She also touched upon carbon finance by mentioning about a declaration signed by private sector companies including Tata, Reliance, Mahindra, ITC, Dalmia Cements, and others, in which they voluntary pledged to move towards carbon neutrality. Further, she invited Mr Umakant to share his views especially on watershed development component of Pradhan Mantri Krishi Sinchai Yojana in context to the climate change mitigation.

Nature produces enough to meet the needs of all the people, but not enough to satisfy the greed of any man. Reflecting on this thought by Gandhiji, Mr Uma Kant, Joint Secretary, Department of Land Resources, Ministry of Rural Development, Government of India said, "we should try to capitalize with our full strength on the available resources. In India,

two-third of the population lives on degraded lands. Thus, India is in a position to harness the available land in the degraded category." Highlighting the importance of developing degraded areas for climate change mitigation, he talked about the overall impact of watershed projects under drought prone areas programmes in India, which has been positive and significant. He said, "such programmes not only result in land development, but also cater to the needs of the people who are marginal, landless, and settled in those areas." Also, he discussed about water harvesting structures brought under plantation and protective irrigation programmes which benefitted farmers through employment generation, rise in plantation, etc. The hon'ble prime minister on the occasion of 14th session of the COP to the UNCCD announced that India to raise its target for restoring degraded land from 21 million hectare to 26 million hectare area by 2030. In this regard, Mr Uma Kant said, "this is a huge commitment, which will not only address the degraded land category,

but will also provide necessary help to the farmers specially the smaller ones, develop those areas, and put the best efforts to get maximum benefit for production and productivity." Another point he raised is the importance of CSR activities. He said, "the role of corporates is very promising and they can contribute to help farmers in upscaling their efforts, for example, in amla plantation." Furthermore, he emphasized that though there are policies, strategies, etc., community's responsibility is equally important. "Good leadership can bring about positive change and benefit forestry activities. Scientists, bureaucrats, private sector, and common man should come together and join their hands in this mission" he said. He also mentioned about zero budget natural farming in which NITI Aayog has done a good amount of work. He referred to nature-based solutions as an answer to the climate change issues which can prove to be a golden opportunity to take communities on board.

Addressing the question asked by Dr Bhargava for comparing the Indian policies for climate change and other South-Asian countries and developed countries like the UK with reference to national resource management and sustainable agriculture,

Mr Anirban Ganguly, Research Specialist, South Asia Research Hub, Foreign, Commonwealth and Development Office said, "

India and other south-Asian countries share a common geography, thus many of the issues which are relevant to India are equally relevant to others in the region. The major issue that crosscuts across this region is the competing pressure of land use especially between forestry and agriculture and a large part of the problem rests with the uncontrolled expansion of certain kinds of commercial agriculture and its integration with the international trading system, for example, in case of palm oil. Thus, in this regard, it is important that effective collaboration is worked out between all the stakeholders. Talking about the UK, there has been a transition from forest, agriculture, competing landscape to just agricultural landscape. And the UK's climate action pledge, which was made last year and reiterated this year, refers to several of these issues." Moving on, he talked about the importance of integrated climate risk assessments at the planning level in terms of watershed structures or even for large-scale geo-spatial planning. He also discussed about the capturing of tremendous carbon mitigation co-benefits of land-use practices. He said, "land-use best practices, agriculture, forestry, nature-based solutions can contribute up to 1/3rd of cost-effective mitigation benefits, of total cost of benefits." Further, he deliberated on how the nature-based solutions can provide a large range of environmental and ecosystem services. With an example of cyclonic storms like Amphan, he said, "there are a number of studies that co-relate mangrove covers to reduction in storm damage, particularly impacting on agricultural fields." Thus, he called mangrove forests, which provide protection of high tangible value, as a clear example of a co-benefit of nature-based solution approach. He said, "nature-based solutions whether applied to the forestry sector or the agricultural sector, or land use can bring tangible gains at the ground level. Nature-based solutions in the forestry and agricultural sectors provide cost-effective mitigation options beyond producing adaption and resilient benefits. In fact, it is not just cost-effective, it is equity-effective – in the sense that the large part of the benefit from the NbS goes to people who have lesser incomes and lesser coping capacity against hazardous climate events. That is a clear co-benefit one needs to identify when designing programmes. It is not just large volume of benefits that we get, it is also the different distribution of the benefits when it is compared with more tech-focus solutions."

Dr Reena Singh, Associate Director, Sustainable Agriculture Division, TERI discussed about the

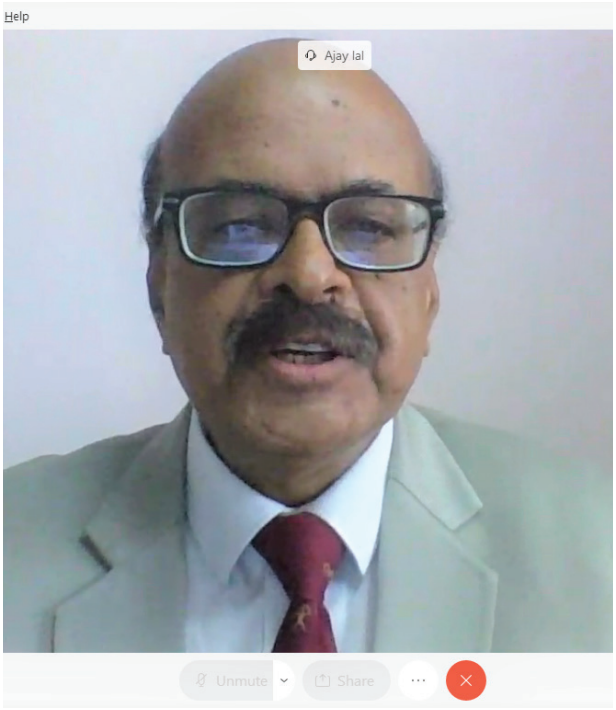
technological interventions by the Sustainable Agriculture Programme of TERI in the field of climate change mitigation and adaptation. She said, "in agriculture, maximum emissions are contributed by fertilizers and crop residue management." TERI has been working in the field of fertilizer management and crop residue management. For fertilizer management, TERI works with mycorrhiza and other biofertilizers. In

this context, Dr Singh mentioned about a project that TERI has undertaken with… She said, "under this project, the team collected isolates of strains from the fields where farmers were applying very low input of fertilizers and getting very high yields. This was followed by isolation of the strains and their mass production. The technology was transferred to the industry and now industries are distributing those strains across the country. Using these strains, farmers are able to save 50–100% of chemical fertilizers, depending on the soil quality. The technology was validated by various agricultural universities." With such experiences, she emphasized that if there is a good and cost-competitive technology, then finance is not a concern, as farmers are always ready to take up the technologies they see with good results. For crop residue management, she mentioned about a TERI's project in which 23 European institutes were involved to find ways to manage crop residues. She said, "farmers burn rice-crop residues and not wheat, as wheat crop residues have competing uses. Under the project, we did a feasibility analysis and a lot of technologies were worked out." Other than the aforementioned technologies and solutions, TERI has been working on nano fertilizers and has also worked on its guidelines, she informed.

Closing the session,

Dr Gokhale thanked Dr Bhargava, Dr Negi, and all the panellists. He said, "there are very important take-home messages – the nature-based solutions should be looked in terms of monitoring and developing the projects, which can be applicable for carbon credits, and there is a need of research in this area as there is a lack of accepted methodologies. There is a need of accounting, so that we can actually claim the benefits from the solutions. There is an emergent field in terms of accounting for carbon from NbS and for a country like India, where we have been investing on such sets of work, sets of programmes through government schemes. It is a great opportunity for government also to see these efforts actually reaching up to reducing carbon emissions from various development sectors."

Gallery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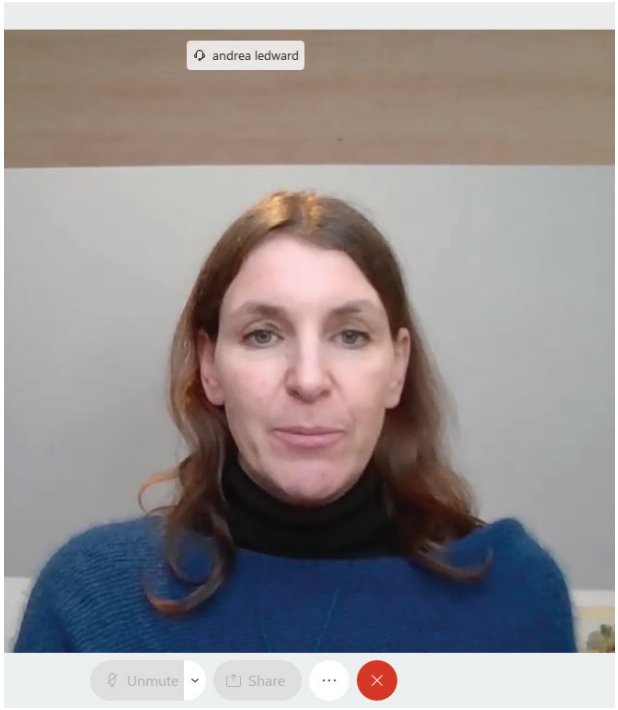
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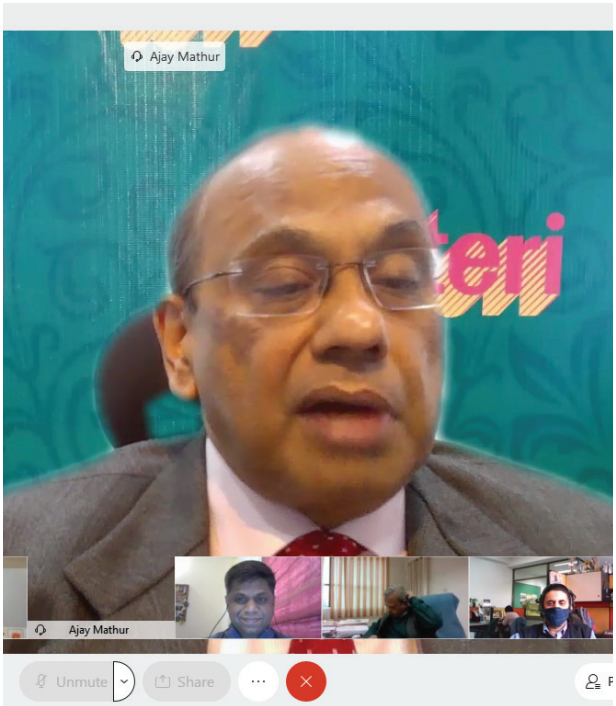
Ajay Mathur
Ajay Mathur
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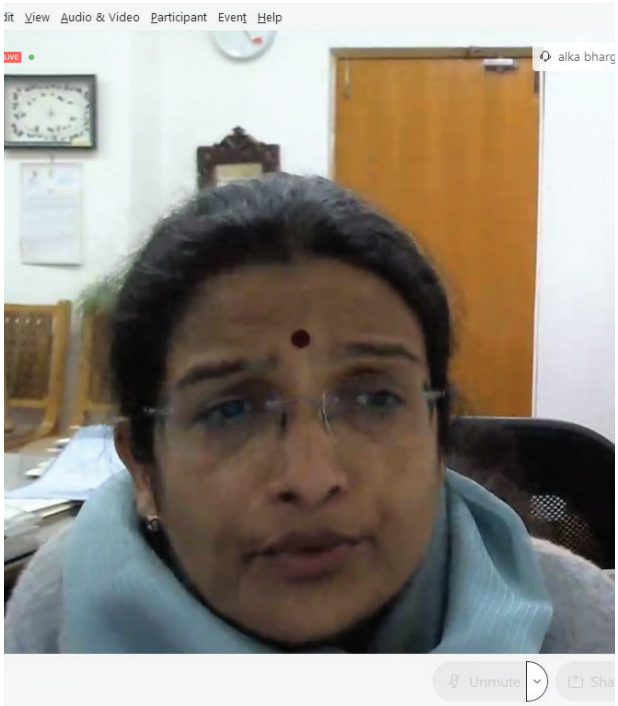
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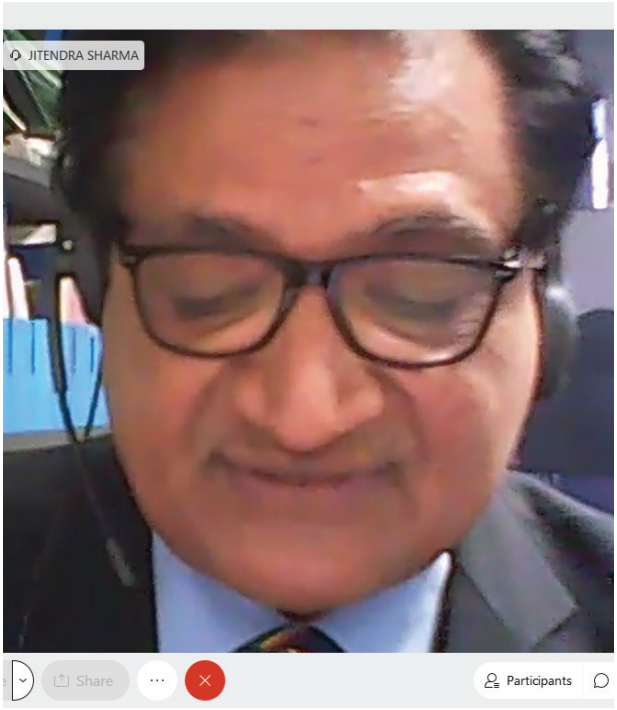
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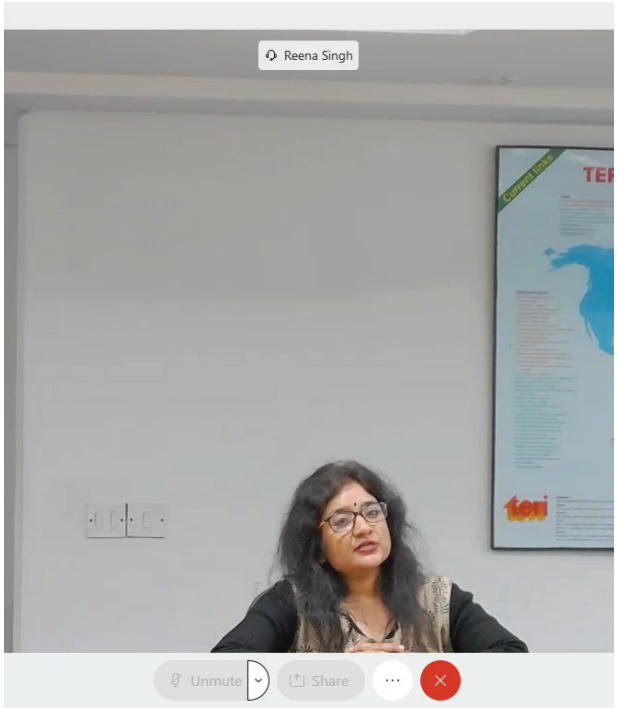
Reena Singh
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sharad negi
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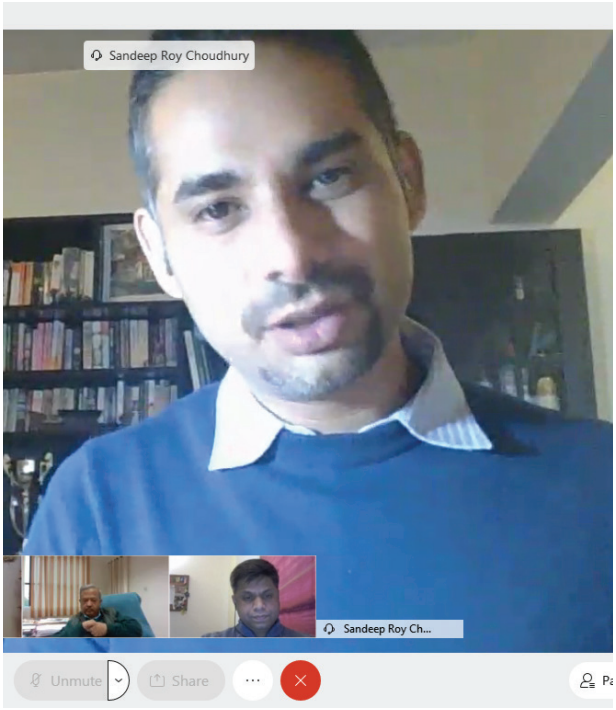
Sandeep Roy Choudhury
Sandeep Roy Ch...
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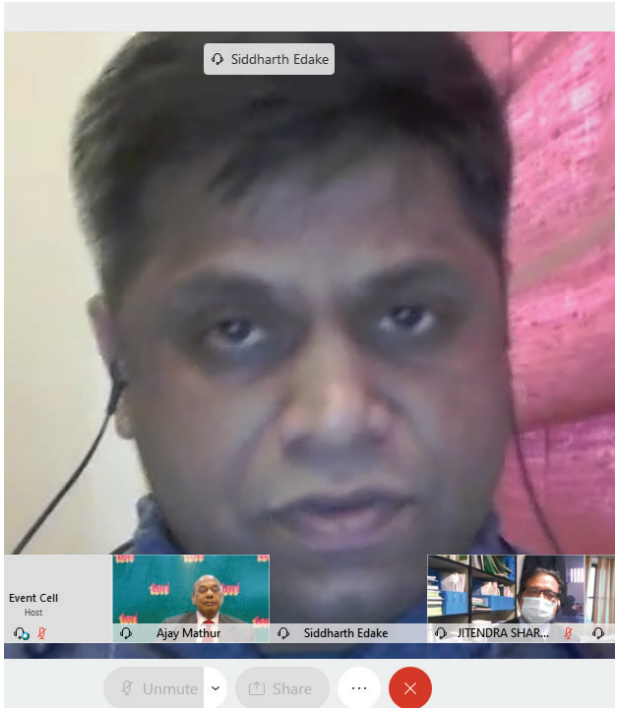
Siddharth Edake
Event Cell
Host
Ajay Mathur
Siddharth Edake
JITENDRA SHAR...
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Uma Kant
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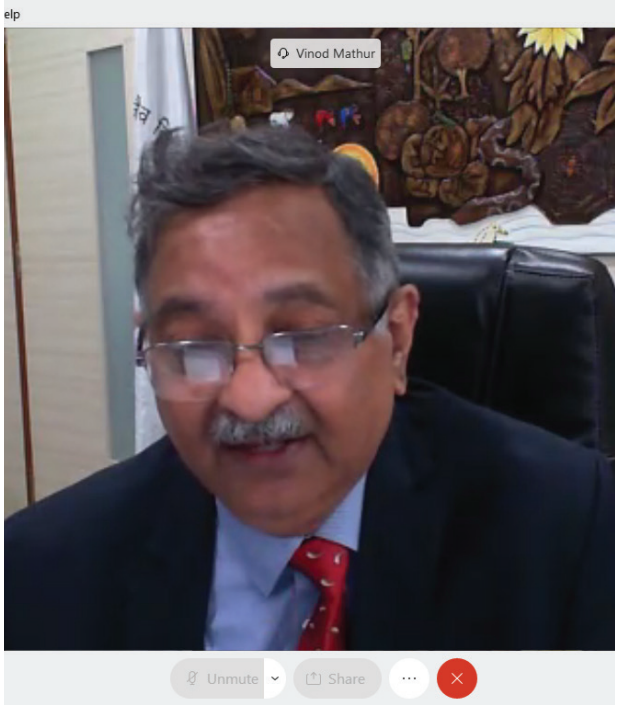
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Vinod Mathur
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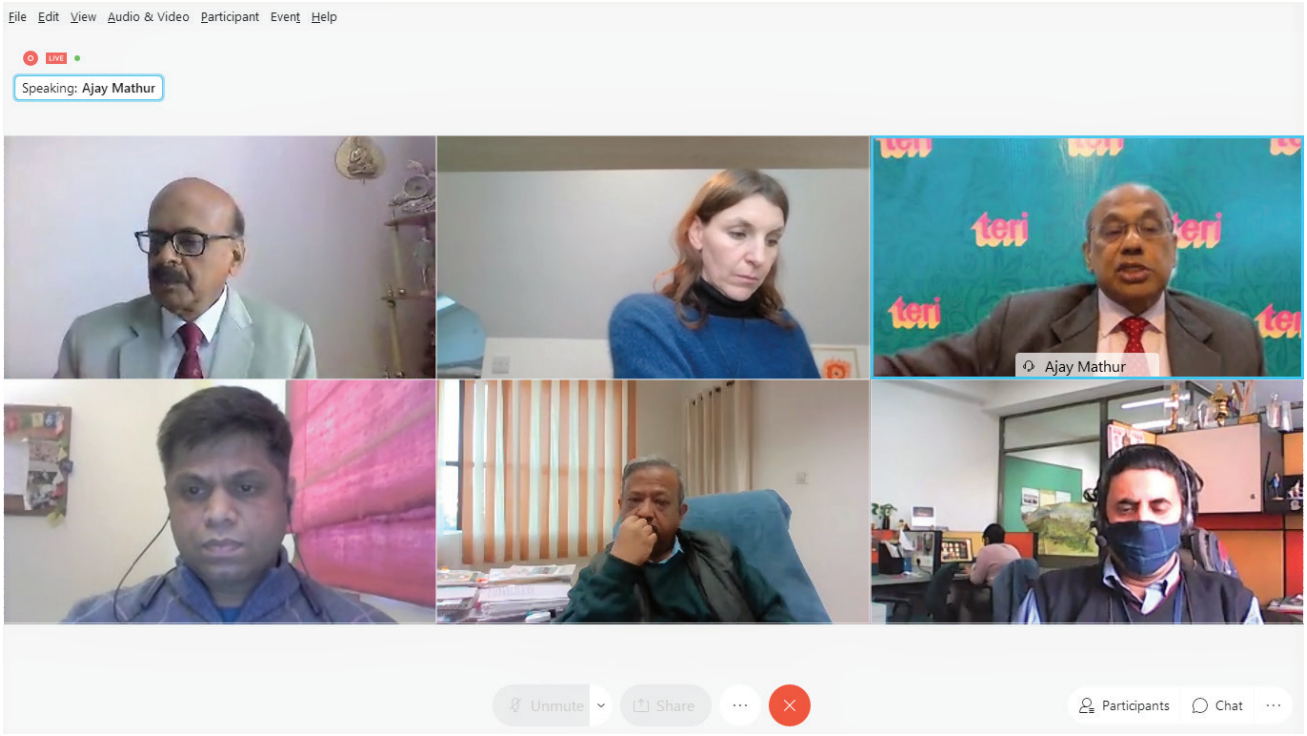
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Speaking: Ajay Mathur
Ajay Mathur
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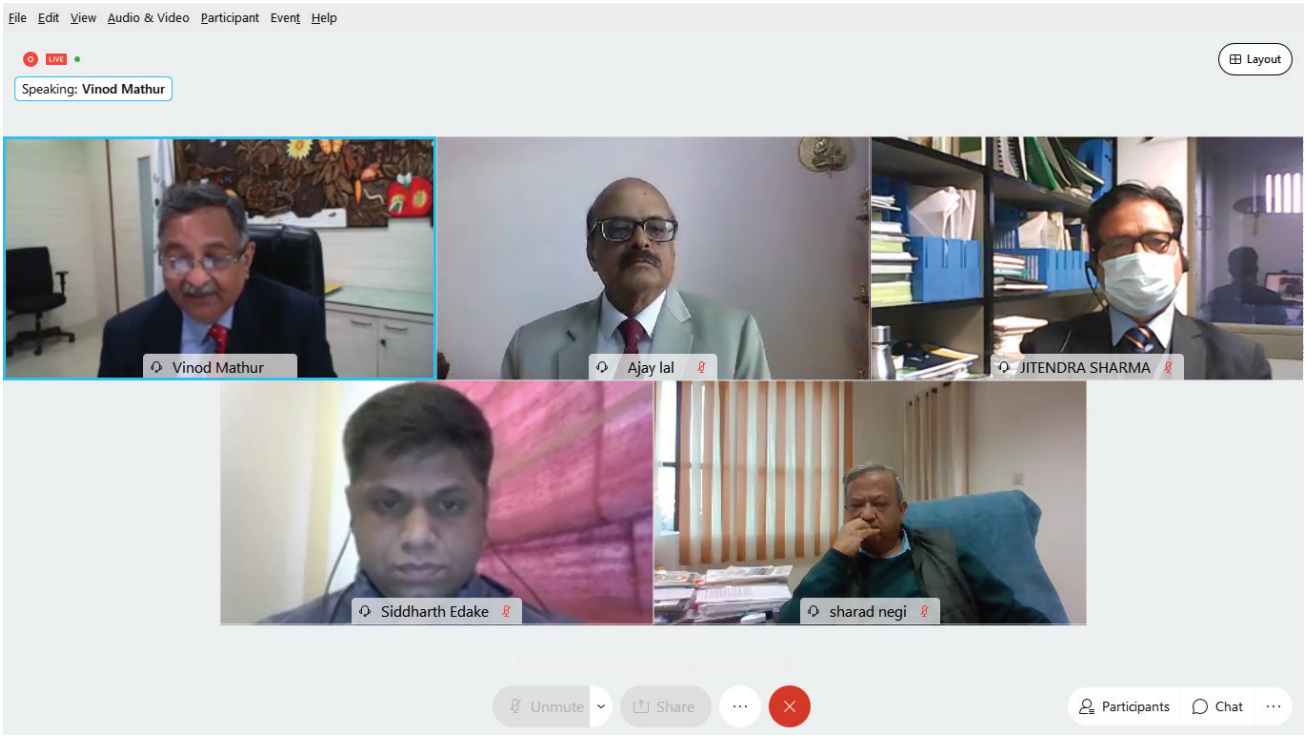
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