National Consultation on Opportunities and Challenges for Bamboo in India

25-26th February 2021

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Inaugural Session

Welcoming the dignitaries of the inaugural session, Dr. Alka Bhargava, Additional Secretary DACFW thanked the Hon’ble Minister of Agriculture and Farmers Welfare, Hon’ble Minister for MSME, Hon’ble Vice Chairman NITI Aayog, Hon’ble Minister of State for Agriculture and Farmers Welfare, Secretary Agriculture and Special Secretary, DONER for gracing the inaugural session of the two-day conference ‘National Consultation on Opportunities and Challenges for Bamboo in India’ jointly organized by National Bamboo Mission, NITI Aayog and Invest India. She reiterated that the brainstorming session aimed to deliberate on the bamboo ecosystem for promoting the holistic growth of the entire value chain. The deliberations of experts and stakeholders from various fields would further accelerate the efforts of the National Bamboo Mission to pinpoint solutions to issues facing the sector.

Shri Sanjay Agarwal, Secretary, Agriculture Cooperation and Farmers’ Welfare in his opening address highlighted the fact that 2017 was a watershed moment for the bamboo sector when bamboo was removed from the definition of ‘tree’ by amendment of the Indian Forest Act, 1927. This is proving to be a boost to encourage farmers to take up bamboo plantations since bamboo grown outside forests would no longer require felling and transit permits. He suggested that there is a necessity to focus on value-added bamboo products. Bamboo is one crop where the wastages are minimal so each part of the should be utilized. He also informed that 50 bamboo based FPOs are being established across the country under the new scheme of DACFW of establishing 10,000 FPOs in the coming 5 years. Of all the regions, the North East region (NER) of India holds a huge opportunity for this sector especially.

Shri Kailash Choudhary, Hon’ble Minister of State for Agriculture and Farmers Welfare said that the National Bamboo Mission can contribute significantly to doubling farmers’ incomes but the key to this would be to identify a clear roadmap of how farmers can benefit through the NBM. As bamboo matures within 3 years and can be easily harvested, it is a good avenue to employ youth in rural areas. It is a versatile crop whose usage ranges from small products like agarbatti to large products in the construction industry.
Dr. Rajiv Kumar, Hon’ble Vice Chairman, NITI Aayog, highlighting the fact that bamboo can grow in any agro-climatic zone emphasized the benefits that can be reaped from bamboo for many years as it is fast-growing, being, in fact, the future. In India, bamboo covers over 15 million hectares spreading predominantly over 10 States which account for 90 percent of India’s production. He also stressed the importance of bamboo for increasing green cover and the potential for earning carbon credits. Despite having such large quantities of this natural resource, India is a net importer of bamboo products, a trend that needs to be reversed. The potential of bamboo can be harnessed extensively for construction, pulp production, and reduction of our dependence on fossil fuels. More focus needs to go into product development and innovation.

Shri Narendra Singh Tomar, Hon’ble Minister of Agriculture and Farmers Welfare delivering the special address said that the Union government is putting in due diligence in developing the bamboo sector since it is evident that it can be a key crop to double farmers’ income, increase employment opportunities and improve the livelihoods of the people, especially in the North East region. He also emphasized the formation of FPOs to encourage small and marginal farmers for taking up bamboo plantations as it would ensure handholding of the groups for providing correct procedures for raising nurseries and plantations and urged the States to send proposals for the formation of FPOs for the bamboo sector. As it is very difficult to identify the species and quality of bamboo at the seedling stage, Hon’ble Minister appreciated ‘National Bamboo Mission’ for preparing the guidelines for accreditation of nurseries and certification of planting material and that States were in the process of accrediting nurseries, details of which are available in the public domain on NBM website to guide farmers and industry as to where they can get good planting material. Talking about the achievements in the bamboo sector he said that commercially important bamboos have been planted in an area of 15000 hectares in the last 3 years. To ensure Quality Planting Materials supply to the farmers, 329 nurseries were set up under the Mission. The National Bamboo Mission has set up 79 bamboo markets. These activities can be seen as pilot projects to establish a model of the bamboo-based local economy. He said that the synergy of interventions of the Mission, public sector, and private entrepreneurs will accelerate the efforts of the government to improve the status of farmers and the local economy. Hon’ble Minister said a multi-disciplinary approach is required to develop the sector in which resources
and expertise from various Ministries, Departments, national institutes, entrepreneurs, and farmers have to be dovetailed in a harmonized manner. He directed more awareness and extension of the multifaceted uses of bamboo together with engaging with startups and designers for innovative products to be taken up. The two days of discussion will be a good opportunity to evaluate the achievements and potential of all the stakeholders for augmenting the scientific, technical, and most importantly the commercial approach to set up Indian bamboo products in their rightful place in global markets.

Shri Nitin Gadkari, Hon’ble Minister for Micro, Small and Medium Enterprises delivering the inaugural address said that to change the picture of the bamboo sector, it was very important to explore big investments and industry. He appreciated the works being done by the National Bamboo Mission and desired that DACFW and M/o MSME should work together for greater progress for bamboo in India. The 50 bamboo clusters being developed under the SFURTI scheme of MSME and those under NBM needed to be connected to local technical colleges for better technology and machine design to flow in. He stressed the concept of mass production and the mass employment potential of bamboo. Speaking on the expanse of products possible he mentioned the growth of the agarbatti sector after supportive policy decisions of the Govt, fibre for blending with other fibres for use in textiles, cheaper bamboo poly houses to replace the expensive metallic structures. Referring to the recent launch of the bio CNG run tractor, he said that bamboo should be used for the production of bio CNG and ethanol. Biochar produced by anaerobic combustion of bamboo has a tremendous beneficial effect on soil health by increasing organic carbon. He also stressed the importance of proper species identification for utilisation by different industries and the use of biotechnology and tissue culture for improving productivity. There was a tremendous scope of plantation of bamboo on the wastelands of the country. Bamboo has the potential to provide employment opportunities in agriculture-dependent areas and tribal districts. The focus must be on increasing farmers’ income and promoting sustainability. While we focus on niche products, we should look at mass production for the masses. Hon’ble Minister envisaged the creation of a Rs 20,000 Cr industry and 25,000,00 jobs in the bamboo sector. Speaking about the challenges, the Hon’ble Minister flagged high logistics costs for which subsidy can be provided for transport of bamboo the way it is provided for fruits
and vegetables via rail transport from the North East to other parts of the country. Farmers, youth, institutions, colleges, communities, private players can be incentivized to grow bamboo on wasteland. North East can be made a manufacturing hub for agarbatti and mass production promoted. Bamboo textiles need to be promoted where bamboo, jute, linen, and silk can be utilised to make blended fabrics. Organic soil carbon is in short supply and Biochar can help maintain the quality of soil for 25 years. So, every farmer should have a system for making biochar from bamboo. A significant amount of fossil fuel is imported. Referring to the refinery for making ethanol from bamboo coming up in Assam, Hon’ble Minister urged that farmers should be encouraged to take up dedicated plantations since 2G ethanol can become a major industry. Bamboo tiles can be another big opportunity. Biotech departments and biotech companies can be tapped to understand how we can grow different varieties of bamboo in India. Large-scale plantations can be taken up on wastelands. A round table should be planned after 100 days.
Session 1: Bamboo for Aatma Nirbhar Bharat

1. Shri Shailendra Singh, Additional Secretary, Department for Promotion of Industry & Internal Trade (DPIIT)

The global bamboo market is valued at USD 72.10 billion in 2019 and is expected to reach over USD 98.76 billion by 2026. India is the 2nd richest country in the world after China in the bamboo resource. Modern uses of bamboo include 3D printing; Interior of cars; Furniture; Consumer goods; Construction; Textile, etc., and India stands as the 4th largest furniture producing country where there is a significant demand for lifestyle products as well. Despite this huge demand, the productivity of bamboo-based industries is lower than that of China. The cost of transportation of bamboo is also high. There is a need for the Ministry to promote private investors to plant bamboo and make finance available for such plantations. NABARD needs to devise a policy for financing bamboo plantations. He stressed that while production of bamboo items should be increased, there is also a need to also look at increasing the custom duty on similar products that are being imported. For the knowledge of investors, all incentives need to be compiled in one place to enable ease of information access for stakeholders. Moreover, States like Uttarakhand are working on replacing plastic with bamboo. Such initiatives need to be taken up in a time-bound manner. The agarbatti industry employs 20 lakh people, and the construction industry is key sub-sectors that need a special focus. The Project Development Cell (PDC) set up under the Ministry will work towards inviting investment in the agriculture sector.

2. Mr. William Bissel, Chairman FabIndia

The bamboo fiber in the textile industry can have a huge multiplier effect on rural employment, especially for farmers who are dependent solely on traditional sources of agriculture. Bamboo can be grown on lands not suitable for agriculture. For bamboo products, there is a large labor component that exceeds 50% meaning direct rural employment. There is a lack of consumer demand for bamboo products, hence there is a need for the Govt. to initially provide incentives for encouraging businesses in this
The general awareness of bamboo fibers is limited in India, however, customers in more developed countries give more priority to these products. So, Fab India has started working with IKEA to create a national platform to connect communities and MSME units. Fab India is also aiming at increasing production in areas like Bihar, Chhattisgarh, etc. The company works to create micro-entrepreneurs in the sector.

3. **Shri Sanjeev Jain, Head R&D, Orient Paper Mills**

India is still not AatmaNirbhar in the business of paper and there is a huge scope for bamboo in the paper sector. Potentially, bamboo can help in replacing single-use plastic applications with paper pulp, but the challenge lies in high transportation costs and the limited availability of raw material. There is a requirement of 600 MT/day of raw material. Also, very few industries produce high-value products from pulp and there is a need to replace the imported pulp with bamboo pulp. Additionally, special focus should be given to replace paper in the packaging of online shopping products. With high tensile strength, bamboo is the perfect substitute for soft and hard boards. So, a lot of promotional activities are required to promote the use of bamboo. The transportation cost of bamboo, basically from North-Eastern India where superior quality of bamboo is present, is very high. It is hollow in structure and contains relatively higher silica content as compared to other raw materials used for pulp and paper manufacturing. It would be beneficial to establish a paper industry based on bamboo as a raw material in Eastern India from transportation and their maximum utilization point of view. Revival of old shut down pulp mills and dedicating these mills for bamboo pulping only should be explored. This approach is more economical and can be implemented immediately. With the rich morphological and chemical composition of bamboo, it can replace costlier imported softwood pulp very conveniently and effectively with immediate effect. Farm forestry should be promoted for the local nearby pulp and paper industries like it is presently being adopted in the case of eucalyptus and poplar by all the renowned pulp and paper industry. This is the best solution to promote the cultivation and utilization of bamboo.
4. **Shri Neeraj Mutha, Director, Mutha Industries Pvt. Ltd., Epitome**

Epitome is a Mumbai-based company and has executed more than 400 projects in India. Its main products are flooring, ceiling, paneling, furniture, doors. The bamboo industry currently is functioning in silos and does not follow an integrated approach. Bamboo wood products are one of the major contributors to the bamboo industry in China. Bamboo wood plays an important role as maximum value addition in bamboo is done in the bamboo wood industry. Bamboo waste of one unit can become the raw material for other units. There is a need to understand the difference between bamboo wood and hardwood. Unlike the ban on cutting trees, bamboo outside forests has been exempted after the recent amendment of the Indian Forest Act, which is more environmentally friendly and cheaper than hardwood. If 10% of the wood demand can be shifted to bamboo wood it would create 7 million direct jobs in India and be an important contributor to GDP. NABARD needs to have the policy to support farmers through the first years of bamboo plantation. Also, a policy needs to be put in place to create demand for bamboo wood by mandating government institutions to include it in their procurement, through promotion on the GeM portal, and protection from dumping of imported material.

5. **Shri Rajeev Kandpal, CFO, Govt e-marketplace (GeM)**

Incorporated in 2016, Govt e-marketplace (GeM) has a mandate to establish a digital and contact-less platform for government procurement. This socially inclusive platform has facilitated about INR 85,000 cr worth of business. There are more than 5 lakh MSMEs on the platform and 1,50,000 artisan weavers. Concerning bamboo, GeM has facilitated about 7,300 orders and is now open to creating more categories of bamboo products. Like what has been done for textiles, a dedicated page can be created for bamboo-based products on the GeM portal. Majorly bamboo poles have so far been sold on the GeM portal.
6. Shri Rahul Saxena, Sustainable Options, Bhopal

Bamboo can be processed for various applications where the wastage can almost be zero. For example, bamboo waste can go into bamboo gasification. Though the current focus is on small-scale production, there is a necessity to shift focus towards large-scale production along with the creation of a good market for bamboo products. Most of the bamboo is procured from the NER of India. So, there is an issue with the transportation cost of bamboo. However, he has started procuring from farmers in MP as well. Additionally, a problem is the availability of finance because banks are not very forthcoming in financing bamboo projects.
Session 2: Promoting Exports and Global Branding

1. Shri Deepak Bagla, CEO Invest India

India’s total trade in bamboo is about USD 67 million, out of which India imports to the tune of USD 65.5 million. India is importing from countries where bamboo cultivation is stagnant now. As of date, Invest India has handled 3 cases on bamboo investments which are as follows:

i. PRIMAX Corporation – a Taiwanese consulting firm with expertise in bamboo-related product research has proposed to support the Govt of Mizoram through technology transfer and knowledge sharing mechanisms in the focus areas of Bamboo Timber, Bamboo Fiber, and Bamboo Charcoal.

ii. Taiwan Technical Textiles Association (TTTA) is looking to enter into an MoU with the Government of Mizoram on skill development programs for engineering graduates and professionals from the state.

iii. Fiber Strength a Norwegian company is actively pursuing a mega-investment project of 420 million euros for setting up an export-oriented “Orient Strand Board (OSB)” manufacturing unit in Assam. This project will generate livelihoods for 100,000 farmers.

Start-up India team is working with startups like ‘Happy Turtle Change’ which has developed a calculator for estimating plastic consumption and thereby promote the use of bamboo instead of plastic. Similarly, there is another start-up related to the production of bamboo-based tiffin boxes. To promote investors and investments in various sectors, Project Development Cells (PDC) have been set up in most Departments of GoI. The sector teams, state teams, and country teams at Invest India are helping in fast-tracking the investment facilitation process. There is a dedicated desk for NER where bamboo is a core focus area. Bamboo is an idea that is impacting our lives: women empowerment, doubling farmers’ income, ODOP. He stated that Invest India can assist to bring state governments on board to promote bamboo cultivation in wastelands. AAYUSH is promoting bamboo
packaging for immunity boosters and through the AGNI Project – the Principal Scientific Advisor to the PM is promoting waste to wealth in the sector.

2. **Shri Sanjeev Karpe, Managing Director, Native KONBAC Bamboo Products Pvt. Ltd**

   Having started Native KONBAC in 2004 in Maharashtra, farmers were trained to grow one species and later do primary processing using machines. Quality control was made possible using pressure treatment plants and the treated bamboo was graded and kept in one place. This bamboo was used to make durable and aesthetic structures and cottages. Having done major infrastructure projects across India, KONBAC has also worked with Waldorf Astoria, Open Terra Restaurant in the Maldives and won awards for the best structures. According to Mr. Karpe, in India, more focus should go into the branding of bamboo. Bamboo has been included in PWD-SOR in Maharashtra. Availability of quality planting material is critical for this sector.

3. **Shri Rudra Chatterjee, Chairman, Obeetee, and Chairman Manor & Mews**

   At 2% of the furniture industry, the scale of the bamboo furniture industry in India is small. The furniture segment has been growing rapidly and bamboo can play a huge role in it. People are importing office furniture from South East Asia and there is a need to reverse that trend. Products need to be developed along with leading companies like IKEA. As more and more people are working from home, products made from bamboo could be used for indoor structures that are soundproof. He stressed the need for product development since bamboo is much more than just a substitute for wood and identifies key customers. Bamboo is stronger than steel and hence needs to be promoted for use in the real estate segment. He also spoke about developing a separate HS Code for construction material. Bamboo in NER can be promoted by integrated projects with backward and forward linkages. There is a need for FSC certification (Forest Stewardship Council) for bamboo.
4. *Shri Rakesh Kumar, DG Export Promotion Council of India*

India is the world’s second-largest cultivator of bamboo but its share in the global bamboo trade is only 4%. Nearly a quarter of the total bamboo production in India is used by pulp industries and the remainder is utilized for making a range of products. The share of bamboo handicrafts is very negligible. Hence, there is a need for backward integration, skill development, design, and training along with certification. Also, there is a need for the promotion of exports of value-added products with some transformational designs that can also be used for home utility items such as chopping boards, packaging, etc. As bamboo fibre has anti germicidal properties, it can also be used for making masks.

5. *Shri Vaibhav Anant, Founder, Bambrew, Bengaluru*

Most of the plastic used in packaging is single-use plastic that cannot be recycled. The global packaging industry is a $1 Trillion economy and India stands at $75 billion today. Sustainable bamboo-based solutions which are acting as an alternative would be an answer. However, a shift is happening and the era of single-use plastic could be coming to an end. With bamboo, a lot of the packaging solutions have been developed for various industries including food, E-Commerce, Food, FMCG, and Pharma, and are currently under R&D for developing a solution for the Dairy industry as well. However, the pressure must come from the government to stop the use of single-use plastics. Along with the ban, there should hefty financial fines that should be implied to boost or an incentive on relaxation on GST for buying sustainable solutions which would push for the usage of alternatives and investment in R&D for indigenous production of alternates from Bamboo and other sustainable materials. The detailed presentation is annexed.

6. *Ms. Manisha Pawar- New Business Development Manager, South Asia, IKEA*

For IKEA, bamboo is a potential opportunity where exports can be promoted. However, there is a need to create scale and build capacities to cater to world demand. In the immediate future, bamboo wood would be incorporated into various products. Also, as more and more customers are appreciating sustainable supply chains, traceability
is one of the key things that IKEA takes into account. Scale, knowledge, and scalability are the key focus areas for IKEA. Best species, clones, planting material, agronomy, and high-density certified plantations are required.
Session 3: Success Stories

1. Shri. Kailash Choudhary, Minister of State, Ministry of Agriculture and Farmers Welfare

   The National Bamboo Mission needs to focus on how farmers will benefit from bamboo. Being an early harvest, long life crop, its cultivation is cheaper and requires less maintenance. Areas must be identified for specific species wherever they grow in abundance. Efforts should be directed towards improving the quality of the seedling which will also help in reducing the import of bamboo from other countries. Youth needs to be attracted to work in this domain & vocational education incorporated within the National Education Policy 2020. Lack of awareness among people is a major setback for the bamboo sector & so efforts need to be strengthened for promoting bamboo on social media, news articles, and other means. Bamboo cultivation aligns with the “Har Med Par Ped” Yojana and can be fostered to develop agroforestry as well.

2. Shri Ram Kumar, APCCF, Mission Director, Gujarat

   The Mission Director shared the success story in the state of Gujarat wherein for increasing bamboo production, free seedlings were given to farmers. Two communities were involved in bamboo works in Gujarat (i) The Kotwalia tribe (located inside forests) and (ii) The Bansfodia (located outside forest areas). Bamboo was used as traditional packing material in South Gujarat for fruits like Alphonso & Chikoo. 355 artisans were trained in Gujarat in the field of bamboo furniture, bamboo craft (pen stand, lamps, pen, diary) & construction material which can be sold online through Flipkart & Amazon. There is a high demand but a lack of an efficient supply chain in bamboo raw materials becomes a constraint most of the time.

3. Shri Shakti Singh Chauhan, Director, Indian Plywood Industries Research and Training Institute, Bengaluru (IPIRTI - MoEFCC)

   IPIRTI is working on improving & building efficient and safer chemicals for bamboo processing. Novel technologies are being brought in for wood composites & have
successfully manufactured quality bamboo mat trays; bamboo mat board; ridge cap; bamboo floor tiles etc. Since the bamboo industry is in a nascent phase, more participation from private players is needed in the industry to make cost-effective products for mass consumption. There is a need to hedge on bringing synergies to ensure a continuous supply of feedstock bamboo to industries. There is a need to develop a market for high-value, large-volume bamboo for industrial and commercial purposes. He stressed R&D, training, testing, standardization & extension efforts for the growth of the sector.

4. **Shri Sandeep Sangaru, Sangaru Designs Studios, Bengaluru**

   Bamboo-based luxury décor products are playing a role in promoting the bamboo sector. Its utilization can be explored as luxury items and in the furniture segment in hotels & villas. Efforts on skill development, designing & training in collaboration with artisans should be undertaken. He emphasized the challenges faced in obtaining credit where the bamboo sector is concerned and also the rate of GST applicable is too high.
Session 4: Availability of Feedstock: Management of Nurseries and Plantations

1. Dr. Jayaraj, Director Rain Forest Research Institute (RFRI – ICFRE), Jorhat

   The National Bamboo Mission covers 23 States, but the critical issue is that of low yield, around 0.5 tons per acre. Therefore, the selection of the right species of good quality is very important. Productivity up to 40 tons/acre can be achieved through best agronomy practices, quality bamboo species, advanced propagation culture- tissue culture, and using deep irrigation & systematic fertigation. There is a need to increase the target for tissue culture so that 1 lakh plants are produced every day. The focus needs to be given to better technology which is required for higher quality bamboo. There will be regional variation in the species, their silviculture, and their use. The State Bamboo Missions should first identify the potential land for planting with bamboo, then work out the requirements of planting stock, and then the number of nurseries, TC labs, etc based on the requirement of existing and potential industries. Further, many labs in North East are lying defunct and need to be made operational immediately viz. Jalukabari and Jagi Road in Assam; Kohima, Agartala, etc. This can immensely increase the production of tissue culture planting material.

2. Dr. N Barathi, Bamboo Scientist, Founding Director, Growmore Biotech Ltd, Hosur, TN

   Nearly 2,400 million tons of bamboo can be grown from just 600 lakh acres of land which can be further used as an alternate for fossil fuels. Thus, it can be a game-changer for the Indian bamboo industry. Potential sites need to be identified all over the country to promote bamboo. Policy for an appropriation of land for bamboo cultivation is the key issue in the bamboo plantation. The North-Eastern region can act as a hub for bamboo species where it is available in a large quantity. These hubs can further specialize in different varieties of species as per the regional agroclimatic/ soil conditions and requirements of various industries. Research institutions and industry associations can further work in tandem to improve the quality of the produce.
3. **Dr. Arunachalam, Director, Central Agroforestry Research Institute (CAFRI- ICAR) Jhansi**

   Intercropping of bamboo is a better option with crops like pulses, ashwagandha, etc., and is being promoted by the extension of appropriate bamboo-based agroforestry models developed at CAFRI. It is helping provide the farmers with an additional source of income. The challenge here lies in bamboo production and the lack of quality seeds/planting material. A uniform availability of planting material in nurseries and other infrastructural ecosystems (like a basic supply of electricity for production) will augment the setting up of industrial units. Waste and degraded lands should be apportioned for bamboo cultivation.

4. **Shri Deepak Goyal, MD, Green Earth Group**

   He shared his experiences regarding bamboo farming in the Khargon district of Madhya Pradesh. He emphasized the role of intercropping models, variety selection, robust saplings, availability of credit, and stable electricity supply. There needs to be more transparency in the procurement of seedlings by various nurseries. Information asymmetry has been addressed by some states like Uttarakhand, Madhya Pradesh, and Odisha which have already started publishing nursery information on their website. This adds credibility to the nurseries and their produce. States are also taking part in bamboo trading through eNAM. A cluster approach is very important in the development of the bamboo industry.

5. **Shri Gurpreet, Guroofarms, Uddham Singh Nagar**

   Shri Gurpreet stressed the selection of species which is one of the major tasks in establishing a bamboo plantation is finding the RIGHT GENOTYPE (species). Some of the salient parameters to be considered are:

   a. **Endemic Species**: Depending upon the weather/climate, soil, location, certain bamboo species would be endemic or naturally suited.
b. **End Application:** Different species have different applications, thick-walled, being more suitable for structural works and thin-walled for basketry, mat making, etc, as splitting/slicing thin-walled bamboo into strips and slats is easier.

c. **Morphology of bamboo:** Internodal distance is a consideration, as specific end-use may warrant a unique morphology. For example, bamboo straw-making units would prefer hollow bamboo of longer internodes and 1 cm diameter, probably something like *Ochlandra setigera*. On the other hand construction work would need a shorter internode, for STRUCTURAL STRENGTH, like *Bambusa balcooa, Bambusa nutans, Bambusa vulgaris* (green), etc.

d. **Skillset and value addition resources:** for bamboo to be a remunerative crop, it has to compete with sugarcane and provide a higher per acre return. For farmers to switch over, they will need clusters of craftsmen within the vicinity. NBM has recently tried to breathe life into this native craft in Uttarakhand, by reactivating the dormant clusters in the Shakti Farm area. Depending on the targeted market, the focus will be given to develop and incubate skillsets & provide the requisite infrastructure. This will need to be done in tandem with the acreage of bamboo.

e. **BAMBOO Mandis:** Hapur, Najibabad are the major ones. A reorganization, data collection, and analysis may be required. Currently most bamboo comes in from the Northeast and there indeed is a big market for all kinds of bamboo.

f. **GREGARIOUS FLOWERING** is an issue, requiring judicious selection, by verification of passport data.

From the above standpoint, the clones good for the Terai region are *B. balcooa* (GBPUAT, FRI); *B. nutans* (GBPUAT, FRI), and Green Vulgaris (GBPUAT). Under trials, Shri Gurpreet is working on *Guadua*, which seems to be responding well to terai soil/climate. Work is underway on 10 to 12 more species.
Summary of the Session

1. Since the plantations of bamboos are increasing there is a need for using high-yielding genotypes available with various research organizations, instead of using routine planting stock. This can increase productivity by at least 20%.

2. There is a need for expansion of facilities for mass multiplication of the quality planting material. The existing functional tissue culture labs can be expanded and the non-functional labs can be revived.

3. The species that are planted should be examined for their suitability to the sites. Only 7 species have been found suitable for planting all over the country. Others have to be planted only at suitable locations.

4. Genetic diversity of the clonal planting material has to be maintained to avoid pest/disease on an epidemic scale.

5. Intensive silviculture of bamboos is required for improving productivity, especially irrigation in respect of bamboos native to Northeast India when planted in other regions.

6. Suitable bamboo-based agroforestry systems developed by ICAR and ICFRE need to be popularized.

7. Efficient linkages between the producer (farmer) and the consumer (industry) are required with the support of research institutions and bamboo missions.
Day 2

Session 5: Innovations, Research & Development

1. **Dr. Anil Gupta, Founder HoneyBee Network, SRISTI, GIAN, National Innovation Foundation, CSIR Bhatnagar Fellow**

   Stressing on the need for innovation, research, and development, Dr. Anil Gupta pointed out that there is a need to think about the processes or types of machinery that can be developed to increase bamboo plantations. He urged to focus on new and innovative segments such as dissolving grade pulp for Rayon, pharmaceuticals and high-end cellulosic products; collapsible furniture; bamboo shoots, and lifestyle products. He pointed out that no species-wise database of bamboo is available and measures should be taken to compile that database. The issue of bamboo waste also needs to be addressed, according to him.

2. **Shri Amitabha Bandopdhyay, KENT Chair for Entrepreneurship & Innovation, IIT Kanpur**

   Shri Amitabha Bandopdhyay spoke about the major advantages at IIT Kanpur such as manpower, infrastructure, and alumni network. He also spoke about the support that can be rendered by IIT Kanpur for bamboo innovation where funding within the range of Rs.5 lakhs-Rs.10 crore can be given to an innovator. IIT can play a role in support with R&D where technical assistance can be provided on campus, the collaboration between stakeholders can be encouraged and an ecosystem for start-ups and employment can be created. IIT Kanpur can also set up a centre for excellence for bamboo technologies that can support innovators and collaborators to develop next-generation technologies related to the application of bamboo. Such startups can then be further supported by connecting them with angel networks, VC funds, and impact funds as well as corporates that can use their products. IIT Kanpur incubator can support remotely located entrepreneurs from socially weaker sections of society as well.
3. **Shri Anubav Mittal, CEO, Biomize**

   There is immense scope for new and innovative uses of bamboo such as bamboo fiber-infused biopolymers that can replace traditional plastic and bamboo nano charcoal-infused textiles. The strength of Biomize lies in creating high-value-added products from agri-waste. The focus of the company is on replacing traditional plastic through products that can be used in different applications. As a startup, the major challenge faced by the company pertains to institutional credit (to avail NBM support that is a must) and a request has been made for support from NABARD and also under the Agri Infra Fund. It was also suggested that the state missions can help create the CFC model under the National Bamboo Mission. NBM can provide platforms like EPCH fairs and other major trade fairs in India and abroad on a shared basis to showcase our products and develop export markets. Also NBM through its interventions like GEM, Green business ideas and other state exhibitions can support sales as well as brand awareness of the bamboo products.

4. **Dr. Ajay Thakur, Head of Genetics & Tree Improvement Division, Forest Research Institute, Dehradun.**

   He made several recommendations for growth of the bamboo sector - Legislation on the lines of One Nation One Permit to ensure easy supply of raw material, collaboration for training with the Furniture Council of India and the Furniture and Fitting Council, use of efficient machines, inclusion of contemporary design and quality testing for furniture durability, developing designs with hybrid material to provide better alternatives, etc. There should be one nation, one permit for easy supply of raw material. Selection of 10000 beneficiaries and artisans was suggested with support with kit and training. Each beneficiary could get a set of handheld small tools, training, and linkages. This would support livelihood in villages, especially in this difficult time, and help in increasing the income of farmers by value addition. Linking them with social entrepreneurs was also suggested.
5. Shri Vijay Karadbhajne, Head Department of Oil Technology, Laximnarayan Institute of Technology, Nagpur

LIT, Nagpur is focusing on research in the following areas: Biofuels; Bioethanol; Bio greases; Bio lubricants; Biomass to Energy; Edible and Non-Edible Oils; Renewable Energy Sources; Industrial Paints; Natural Resins. Shri Vijay Karadbhajne also spoke about existing and future products: extraction of bamboo fibre and fabric, disposable cups and plates from bamboo dust; pencil body from bamboo and pencil lead from bamboo carbon; graphitization of bamboo carbon; biomass pyrolysis; extraction of silica from bamboo leaves, etc.
Session 6: Skill Development

1. Shri Praveen Kumar, Secretary M/o Skill Development and Entrepreneurship

The Secretary underlined the importance of linking skilling to the Bamboo supply chain and connecting the bamboo backward and forward linkages to improve the value chain from plantation to processing, commodity manufacturing, finished products, and marketing, as well as the skills needed for the field development. Several actions are already taken by Sector Skill Council, Ministry for Skill Development and Entrepreneurship (MSDE) under PM-Kaushal Vikas Yojana under which 32,000 candidates have been trained by Agriculture and Handicrafts Councils in 21 States and 68 centers in the last four years. There is a need for supply and demand analysis for the enhancement of the bamboo sector and the full continuum from beginning to end needs to be considered as well as the need to enable workers to match up with innovation and technology. There will be a lot of descriptions in the coming years so the workers need to manage themselves and upskill by using large metrics. However, two Councils are missing: Construction, which can build good warehouses that can be used for construction purposes as well, and Furniture Council, which is not as active in the skill phase of bamboo furniture production while furniture has a lot of opportunity and demand in India. As a result, this area could be given more weight in terms of growth. As NBM and States, skill agencies are there but that much is not enough in terms of quality and quantity there is a need to do continuous supply-demand analysis. Since NBM is entirely financed by the Government, now the bamboo industry needs to be involved in the development of the bamboo sector. There should be a public-private partnership between the States and the bamboo industry, and in terms of quality, we need to ensure quality not just for the domestic market, but also for the international market, where the quality of product and its price and skill quality is playing a vital role in determining both the economics of operations and quality of operations.
2. Shri Rajeev VK, Wind Craft, Kerala

Shri Rajeev discussed the creative use of raw materials and the flexibility of bamboo. Craftsmen's approaches can be modified to produce new products with minimal product designs that are both elegant and functional. They were attempting to create a desirable commodity from bamboo using its physical and natural properties, as well as the concept of invention and understanding of its characteristics. He discussed the possibility of combining bamboo with other materials such as coconut, jute, metal, and so on to produce something unique and revolutionary. Wind Craft makes everything from smartphone holders and sound enhancers to wall clocks, kitchen tools, and home decor out of bamboo. And, for mass production of innovative products, not only advanced technologies but basic machines can be used.


Shri Susanth spoke of the rediscovery of bamboo on value addition in connecting with modern lifestyles. The importance of connecting skills, design, and technology to make bamboo reach beyond being a craft material to an industrial scale was highlighted. He emphasized the need to create awareness among the new generation on the use of this sustainable material by introducing bamboo in curricula while training artisans in the craft to be designers. NID has a center for bamboo and does consultancy for the sector as well. The bamboo industry needs to work with an integrated approach instead of working in silos. There is a need to connect the designer with tools and technology, uses, and the market. Online courses are an important step to spread knowledge on the above. NID has an online course for bamboo including 21 modules for self-learning.

4. Dr. S K Negi, Central Building Research Institute-Roorkee

Dr. Negi pointed out that the majority of people in India are using bamboo without treating it which reduces its life and durability. There were a few suggestions
made such as developing a prefab and efficient jointing system, capacity building of artisans, and awareness among students is required to consider it as a viable option for construction. Bamboo should be part of the curriculum in technical institutes like IITs etc.

5. **Ms. Monica Bahl, CEO, Beauty & Wellness Sector Skill Council**

Ms. Bahl highlighted the use of bamboo in the beauty and wellness sector in the form of gels, scrubs, bamboo charcoal scrubs, cosmetic containers, blotting sheets, etc. She also spoke about the increasing trend of using charcoal in the beauty industry. Bamboo holds water and helps in achieving glowing skin and is used for facial and blemishes treatment. Bamboo has bioactive compounds which can hold oils which makes it suitable for gels and scrubs. Moreover, bamboo fiber converted into bamboo sheets and towels is used in spas. Bamboo fibers, an end product are being used to create biodegradable wipes. It is also used in bamboo therapy for treating low back pain, post-injury rehabilitation, circulatory problems, respiratory problems, and migraines. Owing to the versatile uses of bamboo, the share of bamboo can increase significantly in the beauty and wellness sector. Entrepreneurship in the sector needs to be promoted.

**The signing of MoU between NBM and Handicraft and Carpet Sector Skill Council**

An MOU was signed between NBM and Handicraft and Carpet Sector Skill Council and is annexed. This will enable skill development under the provisions of the National Skill Qualification Framework of the Skill India Mission enabling pan India recognition of competency achieved. Of major interest to NBM would be the provision of Recognition of Prior Learning (RPL), which would bring traditional craftsmen to the fore as Master Trainers. NBM looks forward to such MoUs with Furniture; Beauty Wellness; Retail, Construction Sector Councils soon.
Session 7: Access to Institutional Credit

1. Shri Vivek Sinha, CGM, NABARD

Shri Sinha described bamboo as a "green gold" due to its commercial potential and versatility and as a carbon-sector power plant. And it claims that one of the sector’s major challenges is the lack of institutional credit and access to it. He also specified that North East Region is the most promising for bamboo development and creative models can be used to facilitate credit in the region for which Mr. Sinha called for the views of the panelists for promoting Public-Private Partnership in the bamboo sector. Further, suggestions were invited on the possible innovative models that could be used to access credit not only at a farmer level but also recognize aggregators, craftsperson, distributors and some innovative models come across for financing for bankers in this sector. Also, with the necessary revision in the credit or comfort to banks in financing in the sector is with capacity building, proper assessment of the marketing linkages, and will look forward to credit guarantees and interest subventions to extend it for the bamboo sector.

2. Shri Ajit Pai, Senior Advisor, NITI Aayog

In the bamboo value chain, aggregators and craftspeople have been left behind in terms of credit availability. There is a need to look into easier ways to increase the credit to GDP ratio. Steps taken by the Government have helped in pushing credit up viz the Jan Dhan Program and the JAM Trinity. He highlighted issues such as lack of land ownership, rewards, lack of collateral, etc. for the bamboo sector. Ideas such as using inventory as collateral or better creditworthiness for FPOs can be explored.

3. Shri B. Paulmuktieh Chairman, North Eastern Development Finance Corporation Ltd

A study needs to be conducted and an Action Plan for Bamboo needs to be prepared. NEDFI operates through 15 branches in all the states of NER of India. So far it has not assisted the bamboo sector. However, a few sectors have been identified
that can be taken up under bamboo-like Construction, Engineered Bamboo Wood Furniture, etc. There is also a need to have a front-end subsidy given for the bamboo sector. There is a need for experts, mentors who can assist entrepreneurs in this sector. A cluster approach needs to be adopted for the sector. Identification of wastelands and a campaign with community conversion of wasteland to bamboo, forest with participation of State Forest Departments is required.

4. **Shri CSR Murthy, CGM Farm Sector Development, NABARD**

Since the 1990s NABARD supported the commercialization of tissue culture-raised planting material. Skill Development Programmes and Common Facilities were taken up as promotional interventions for bamboo as well. Across the value chain, interventions like the cultivation of bamboo by farmers, promotion of value chain activities, and promotion of value-added bamboo products were supported. NABARD supports areas by assisting state governments, refinancing eligible banks, and providing concessional refinancing to banks and promotional support under various schemes to encourage the growth of planting species. The Capital Subsidy Scheme under NBM was implemented by NABARD. Promotional Schemes like LEDP for SHG members, Skill Development Programs, Partnership with NSDC Skilling, Rural Haats/Rural Marts, Promotion of FPOs, Rural-Urban Business Incubation Centres (RBICs), Catalytic Capital Assistance for supporting Rural Agri-Business Start-ups in Agriculture and identified sectors were made. NABARD encourages start-ups with their recently founded 5 Agribusiness centers across India (Haryana, IIT Kanpur, TNA Coimbatore, Madurai, etc.) NABARD has set a provision of Rs 5 lakh for each start-up for goods setup and assistance, implying that 40 startups will be funded with this amount. Recognizing the need for early-stage support for agriculture and rural enterprises and the lack of adequate institutional support, NABARD has launched NABVENTURES Limited, a separate subsidiary to support start-ups. FPOs will be a key priority of the Ministry of Agriculture for the enhancement of agriculture, with a goal of 10,000 FPOs set and NABARD allocating
4000 FPOs among the 9 implementing agencies for the sector's holistic development.

5. **Shri K.R. Meena, Director (CPC), Agriculture Infrastructure Fund, DAC&FW**

Shri Meena said the Agriculture Infrastructure Fund (AIF) has signed MOU with several banks. This fund provides for convergence of state and central schemes including the National Bamboo Mission Scheme. He said that applications worth multiple crores have been received on the portal to date for activities including Primary Processing like splitting of the Culm, straightening, external and internal knot removal, and so on.

According to him, the machines considered by processors mainly include hydraulic splitting machine, cross-cutting machine, bamboo blind weaving machine, Vacuum/Pressure impregnation treatment plant, Laser Engraving Machine, Stick Polishing Machines, and Incense Stick Making Machines.

He further stressed that even infrastructural support like bamboo depots and godowns are covered under AIF with a total eligible loan of Rs. 2 Crore under the scheme. On Ease of Doing Business, he highlighted the usefulness of the portal on which an applicant may apply for the loan under the eligible components along with the DPR.

6. **Shri M Krishna Rao, DGM, Agribusiness Operations, State Bank of India**

Shri Rao stated that bamboo can be used to build sustainable projects from both a climatic and a market standpoint. He stated that there are plenty of opportunities right from the creation of nurseries to distribution points for consumers. As a result of this, the value chain encompasses both processors and stakeholders & SBI is taking various initiatives to encourage end-to-end value chain financing. Strategy for Commercialization of Bamboo Cultivation consists of identifying bamboo potential states like the North Eastern States, Maharashtra, Madhya Pradesh etc. In
collaboration with NABARD and the Maharashtra Bamboo Development Board, a scheme for tissue culture for bamboo plants and drip irrigation was formulated. According to him, partnerships for marketing and buyback agreements with the paper industry are likewise expected and E-trading (e-NAM) for fair price realization will boost exports as well.

Concessional pricing applies at MCLR + 200 bps for one year & 9% interest may be provided from the banks. Interventions like interest subvention, credit guarantee, and grants/subsidies as provided in the Agri Infrastructure Fund can be replicated for the bamboo sector as well.
Session 8: International Cooperation

1. **Shri P. Harish Additional Secretary, Ministry of External Affairs**

   The bamboo industry is a labor-intensive industry and there are significant import pressures as there is a high demand for bamboo products. Demonstration projects should be implemented for articles for which there is an existing demand in India and presently being met by imports - like agarbatti, paper industry, etc. In the paper industry, specialty paper is a niche product type that should be explored and not just be restricted to writing paper. It is vital to harness the domestic demand through the development of integrated clusters and bringing good practices from other countries. The aim should be at achieving zero waste and demonstrating greater returns to the farmers is the key. The focus needs to be put into areas such as bamboo fiber, bamboo tourism, etc.

2. **Mr. Nilaya Mitash, Principal Operations Coordination Specialist, India Resident Mission, Asian Development Bank**

   Mr. Mitash suggested that the focus needs to go into 10 commercially important species/products and the easiest way to meet the demand needs to be figured out. As there is a need for enhancing the productivity of the entire bamboo sector, policy interventions are required, viz duty structure needs to be corrected. A cluster approach needs to be followed for developing products like Bio-Ethanol. There should be an emphasis on aggregation through FPOs, SHGs, etc, resources should be mapped, commercial species promoted, competitive products encouraged and market linkages created. The duty structure for bamboo items should also be looked at. He drew attention to the Integrated Bamboo Park project being developed with NBM and 6 States of the NER as a follow-up of the study of NE Economic Corridor study commissioned by DEA to ADB.
3. **Collaboration in the bamboo sector under the India Japan Act East Forum**

   a. Mr. Shingo Miyamoto, Minister, Head of Economic Section, Embassy of Japan in India

   The North East has a historic, cultural, terrain, vegetation similarity to Japan. Japan will utilize the Act East Forum with India to develop the North East of the country.

   b. Mr. Ikko Watanabe, First Secretary (Food and Agriculture) Japan Embassy

   - **Lifestyle**
     - Even though Bamboo occupies only 1% of the area but still finds a place in Japanese folklore.
     - Bamboo is the symbol of the Prime Minister’s Office in Japan.

   - **Challenges in Japan**
     - Both production of bamboo materials in Japan and imported bamboo materials in Japan have declined manifold from 1990 to 2010. Due to demand reduction, production has also reduced.

   - **Collaboration between India and Japan is proposed as part of:**
     - India Japan Act East Forum
     - Proposed Project of India Japan Cooperation in the Bamboo Sector
       - JICA will be a partner from the Japan side.
       - Project to be implemented in the North East

   - **Opportunities for Innovation**
     - Bamboo Innovation Group
     - Bamboo Design Project
     - Ethical Bamboo Inc.

4. **Mr. Van Berkel Cornelius, Representative, UN Industrial Development Organisation**

   He emphasized the work done by UNIDO in Vietnam, China, and Japan for bamboo and rattan. The cluster approach should be promoted and a zero-waste policy for the bamboo sector should be adopted. Bamboo fiber should also be scaled up. Set up in 2000 under UNIDO, the Cane and Bamboo Technology Centre, Guwahati, Assam*
has supported 5 Clusters in the North East. The main issue lies with the sustainability of supply, treatment to prevent mold and insect attacks, and high material wastage. Priorities for the sector include sustainable sourcing, Good Manufacturing Practices, modern design, quality and craftsmanship, conformity assessment, market linkages, and geographical identification. A Value Chain approach is to be followed to enhance the full utilization of bamboo.

* this is now renamed as North East Bamboo and Cane Development Council
Valedictory

Summing up of Sessions

Dr. Alka Bhargava, Additional Secretary, DACFW

Dr. Bhargava laid stress on the much-required and game-changing amendment of the Indian Forest Act which has catalyzed the bamboo ecosystem of the country's positive activities. However greater awareness is required by the States for percolating this changed scenario at the field level by appropriate orders/ amendments in their respective rules so that there are no unnecessary hurdles during felling and transit of bamboo grown outside forests. It was reiterated that bamboo grown inside forests continues to be governed by the requirements of management plans/ working plans and hence urged State Forest Departments to draw bamboo harvesting plans urgently as has been requested by NBM since the launch of the restructured Mission in 2018-19. This is important since the plantations being done now would take 3-4 years for maturity depending on end use and hence supply from forests is imperative to meet the requirement of feedstock for the range of sunrise uses emerging, since the use in the paper industry has been waning in the country. However, the new age paper requirements (tetra packs, disposables, packing – rising e-commerce demand, etc) with the latest technology needs to be promoted in the country to reduce the dependency on (bamboo) pulp imports in addition to the softwood pulp for traditional paper manufacturing.

To give a boost to the nascent construction industry, it was suggested that Government should also take part indirect promotion of bamboo products through design, furniture, and construction work. BIS has included bamboo in the National Building Code and also included in the SORs of CPWD and hence should be mandated for a government building. D/o Consumer Affairs has been requested to direct BIS to develop further standards, as required. Some State PWDs like Maharashtra have also included these in the SORs.
Bamboo has huge potential for contributing to the National Biofuel Policy for blending targets set. The 2G ethanol plant coming up at Numaligarh Refinery Assam is being watched closely. Dedicated FPOs are being set up in Assam as well as MOUs done with the other NER States for the supply of required feedstock. In addition, there is scope for blending (forest) bamboo to fulfill the requirements of the cement plants of NER and elsewhere for mixing with fossil fuel. Another option is the setting up of Compressed biogas plants in line with what is being done with Cowdung and Agri waste spearheaded by D/o Drinking Water and Sanitation. This will also provide an avenue for the complete utilization of leftover bamboo from other uses.

The craftsmanship of traditional artisans should be gelled with the requirements of contemporary markets by linking with designers, skilling, branding, and finishing. The bulk consuming industry must be promoted to lift the bamboo economy but at the same time, efforts should continue to nurture our traditional handmade products for addressing requirements of a premium global market as well as preserving our rich cultural heritage. Hence the link with industry in planning and execution is of utmost importance together with synergy and coordination between all the 14 Ministries/ Departments identified under NBM for holistic development of the sector in India.

*Dr. Sanjay Kumar, Director General of Forests & Special Secretary, MoEFCC*

Dr. Kumar stated the main challenge in the bamboo sector is to supply bamboo material to the industry and artisans, and the fact that there was a decline & then a revival in the bamboo sector. After the landmark update on the Indian Forest Act three years ago, MOEFCC launched a pilot program on a national transit permit portal to alleviate problems with bamboo sale and transit across the country. Talking about the initiatives by the central government, tissue culture labs have been set up, different varieties have been released, and many improved planting materials are being supplied- grown at different institutes of the Indian Council of Forestry Research and Education. Forest Institutes in Dehradun and Bangalore, wood sciences and technology as well as IPRTI are developing new bamboo-based products to help the advancement
of the industry in terms of higher-tech products. Bamboo was formerly mostly used in low-end paper and pulp manufacturing, as well as in the construction industry. Due to the greater focus on concrete-based houses/pakka makaan, the demand for bamboo is falling drastically, and this needs to be addressed by employing higher-tech solutions. Steps are being taken by both public and private organisations for the technological advancement of bamboo based construction. Dr. Kumar also highlighted that the Department has also begun a large-scale bamboo plantation in the forest for the benefit of wildlife, as well as providing raw materials to many local artisans who rely on bamboo raw material. Further, 30 main rivers in the country were rejuvenated, by bamboo afforestation. This would also enhance the quality of the stream flowing through the bamboo fields.

Dr. Kumar stressed the importance of bamboo not just from an economic perspective but also ecological benefits like moisture retention, biomass production, reduced irrigation, soil quality improvement, etc. Bamboo is a zero-waste commodity & therefore it can be used for a variety of applications. According to him, the most common feedback received from organisations pertains to the need to concentrate on higher-value goods to compensate for the shortfall of demand across the conventional bamboo industry. For this, the agriculture-based laboratories must run a pan India coordinated program to increase R&D activities, reduction of data duplicity & bringing accurate data from the state level. This will help a large number of craftsmen and tribes in India whose livelihood is entirely dependent on bamboo.

*Shri Pasha Patel, Farmer leader, and former Chairman, Maharashtra Commission for Agricultural Costs and Prices*

Shri Pasha stated that bamboo is an essential component of the atmosphere's oxygen and carbon dioxide balance. A bamboo plant produces 35% more oxygen than a comparable stand of trees. As a result, growing bamboo is an excellent way to reduce the carbon footprint and contribute to the fight against global warming. Bamboo is a viable alternative to timber. He added that they have built tissue culture labs, where
20 to 25 lakh plants are nurtured every year. Further to promote and educate farmers and the general public, a radio station called Prithavi Rakshak has been set up. To better train, the farmers and their families, the Atal Bamboo Diploma Engineering College was also founded. Furniture-producing units were also established for the holistic growth of bamboo and providing end-to-end solutions & promoting capability creation through institutes. Shri Pasha mentioned that a goal of planting 7.5 lakh bamboo plants in 4000 hectares of NBM land has been earmarked after which another 4000 hectares of the plantation will be undertaken.

Shri Pasha believes that bamboo is one of the mediums for doubling farmers' income and is akin to kalpavriksha. More initiative is needed for the growth of the bamboo industry, including the establishment of a National Bamboo University where students can avail bamboo related courses through attractive scholarships & stipends. Bamboo must also be encouraged and deployed as a piece of furniture at the various government organizations & government-supported infrastructural projects. Further to support the bamboo sector, acquisition of carbon credits for bamboo, farmers incentive programs for their best harvest, & establishment of CNG units are few initiatives that can be taken immediately to entice people to plant bamboo.
Vote of Thanks

A vote of thanks was given by Ms. Chhavi Jha, Joint Secretary & Mission Director NBM to all the chairpersons, panelists, attendees, and the organizing cell for their coordinated efforts in this virtual gathering and sharing their visions about the sector and offered all possible assistance from the Department to enhance the Bamboo Industry not only at the national but also at the global level. A coordinated effort should be made by NBM, State Agencies, Institutes, and private players to continue all interventions in a mission mode and to achieve all targets.
# Challenges & Solutions

The challenges facing the sector and plausible solutions are summarized as follows:

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| **Supply of raw materials**                            | • Extension of agroforestry models developed by ICAR and ICFRE, especially to tide over the initial 3-4 years while the clump matures [intercropping with ginger, pulses, lemon grass, etc as being done by Mr Pandey and Mr Gurpreet]  
  • Easy access to certified, right species planting material  
  • Use good credible planting material, improved agronomic practices to increase yields/ha  
  • Formation of FPOs [Assam engaged 1 existing FPO; 40 bamboo FPOs approved under the new scheme of 10,000 FPOs] |
| Awareness and outreach to small and medium farmers to do profitable farming by connecting to markets |                                                                                                                                              |
| Suggestion of allowing plantations by privates sector in degraded forests | • Captive plantations / contract farming with industry partners [Assam MoU with Cycle brand agarbatti]  
  • Education of farmers / entrepreneurs on right technique of harvesting, sorting, grading  
  • Plantations on culturable wastelands [NBM has shared potential areas for NER with the States] |
| Hurdles in felling and transit especially inter State despite amendment of Indian Forest Act, in 2019 | • Educating frontline staff of FD on amendments of IFA  
  • Exemptions have given by some States but with riders  
  • Pan India transit portal of MoEFCC to be adopted across the Depts – not just by Forest Depts |
| **Price competitiveness**                               |                                                                                                                                              |
| Low awareness about bamboo products among consumers – chicken and egg situation on demand supply and prices | • Commodity specific buyer seller meets [furniture in the offing]  
  • Participation in major trade events |
| Increase production and incentivize nascent industry    | • Analyze why imported products are cheaper and more accessible  
  • Primary processing and CFCs to set up nearer to plantations |
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| • Set up integrated primary processing units for complete utilization of the bamboo poles – zero waste  
  • These to feed to bigger industries  
  • Bamboo parks (BEZs) to be set up – plug n play facilities for industry | • Do primary processing in NER itself - reduces cost of transport, complete utilization, generates more local employment  
  • Use of waterways [IWAI to proactively support as per discussions started by NBM - Assam Tripura to start using this mode even cutting across Bangladesh]  
  • Provide subsidy as being provided for fruits and vegetables by MoFPI                                                                                     |
| Logistics cost is very high for transportation of bamboo since a large proportion continues to be sourced from NE |                                                                                                                                                                                                 |
| Low market penetration of traditional products                              | • Upskilling as per contemporary requirements, branding and finishing [EPCH, NIDs, etc]  
  • Connect to big buyers [FabIndia, IKEA, William Sonoma, e-commerce platforms, etc]                                                                 |
| Mindset of products being ‘expensive’ – comparison with cheaper mass produced plastics, etc | • Concept of ‘green premium’  
  • As demand goes up prices would fall  
  • Incentives by Govt as given for other sectors [mandating in warehousing, cold storages, constructions, substitute for single use plastics, etc]  
  • Compile incentives available across sectors by GOI and States for use by potential investors                                                                 |
| Traceability requirements for global buyers                               | • FSC certification  
  • Vikrsh of EPCH                                                                                                                                 |
| Upscale use in Govt works [1000+ suppliers registered on GeM, Rs 10 cr worth transactions but largely for bamboo poles] | • Number of value added products registered on GeM but (i) difficulty in registering (ii) not visible since mixed with other products  
  • Hence dedicated window for bamboo on GeM to be created for value added both industrial and hand crafted |
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| Supporting startup ecosystem           | • Access to grants and subsidy without need for bank loan (suggested in the panel discussion)  
• Provide CFC to set up project on lease basis – faster transition from lab to commercial stage  
• Each start up can generate employment of at least 20-30 people directly and support large farmer groups  
• Use of Agriculture Infrastructure Fund |
| Skill development and entrepreneurship  | • Multi sectoral – agriculture, handicrafts, construction, furniture, beauty wellness, retail SSC, NIDs  
• Standards for Branding, packaging, online retails  
• Draft QPs made for Beauty Wellness |
| **The paucity of financial support in all links of the value chain** |                                                                                |
| Availability of institutional credit   | • Marking the sector for priority sector lending [letter written by NBM to DFS]  
• SBI has developed a product in consultation with Maharashtra, MP and NABARD [Rs 1.5 lakhs/acre over 3 years, working capital of Rs 3000/yr thereafter  
• Requirement of credit guarantee and interest subvention was flagged in the discussion  
• Complete value chain approach is required for each actor to be assisted |
| Synergy between Ministries/Departments since this is a sector requiring intense interdisciplinary conversation, planning and action | Single coordinating point / body may be created |
Immediate Opportunities to be Tapped

i. Textile Fibre
   - Invest India to investigate the convergence of industry and R&D institutions as well as bringing in technology by foreign companies since this is one sector with huge potential but completely dependent on imports.
   - Bamboo can be blended with other fabrics such as jute, linen, and silk to make blended fabrics.

ii. Construction
   - Bamboo tiles, Bamboo wood has huge potential and the maximum amount of value addition in bamboo is done for bamboo wood. Use in Govt works – mandate 15-20% to give a boost to production and thereby fulfill demand India has very recently started using bamboo for building airports, viz Bengaluru Airport. NBM has approached all major consuming Ministries and interacted also with NBCC, CPWD, architects, designers, etc.
   - Give opportunity to ‘smaller’ Indian architects and manufacturers for a fair play in tender documents.
   - Testing facilities to be set up at Central Building Research Institute, Roorkee

iii. Agarbatti
   - Agarbatti raw material imports have increased lately but domestic units have been catalyzed by the recent supporting policy decisions of Govt.
   - Make North East Region of India a manufacturing hub for Agarbatti [synergize efforts of NBM and MSME]

iv. Use in agriculture
   - Bamboo poly houses and greenhouses in hydroponic setups – cheaper than and as sturdy as steel.
Biochar for increasing soil organic carbon [number of small units in the country and a fully automated unit coming up in Meghalaya with the requirement of 7 tons bamboo per cycle]. Protocol for application prepared by ICAR after an international conference at the behest of NBM.

v. Charcoal and activated carbon [filters, beauty wellness, etc]
   - 1 tsp of bamboo carbon has surface equivalent to a football ground [better than any other biomass].
   - Huge global demand, but export has been banned since 2016
   - Activated carbon when iodine number is 500 mg/g almost 26 out of 35 species of bamboo >500 mg/g
   - DIY filters can be made in each household through bamboo.

vi. Furniture
   - A lot of furniture being imported ($3.5 billion) - export only $1.65 billion - global share 0.6% trend needs to be reversed.
   - Bamboo is currently 2% of furniture which is small.
   - Include bamboo furniture in the ‘Make in India’ priority sectors of DPIIT - space in the parks being set up.

vii. Paper and pulp
   - The packaging industry has grown due to an increase in take-away, e-shopping, pharmaceuticals.
   - Demand for virgin tissue paper.
   - Huge potential to replace the single-use plastic industry.
   - Assistance for new technology-based plants.
viii. Bioenergy

- Bamboo waste from producing other products can be added to biodigester which will help in creating fuel for vehicles, Bio CNG, and ethanol.
- Save foreign exchange
- 2G bioethanol plant coming up in Numaligarh Refinery Assam [dedicated FPOs being formed for supply of feedstock]

ix. Bamboo Food

- Shoots, vinegar, charcoal, wine, etc [integration with Pradhan Mantri Formalisation of Micro food processing Enterprises (PM – FME) of MoFPI]

x. Research and Development

- High yield planting material - use of biotechnology
- Connect clusters with technical colleges for infusion of technology
- Development of efficient machinery and tools suited for Indian Bamboo
- Quality testing for durability and fire retardants and international standards
- Bamboo dust into composites

xi. International Cooperation

- Demand and production in other countries has gone down - so the first harness low hanging domestic demand and then look for exports.
- Set up demo projects for species suited to textile fiber, paper
- Other countries to be collaborated with include Vietnam, Cambodia

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National Consultation on Opportunities & Challenges for Bamboo

Inauguration Session
Shri Narendra Singh Tomar, Hon’ble Minister of Agriculture & Farmers’ Welfare delivering the Special Address

Shri Nitin Gadkari, Hon’ble Minister for Micro, Small & Small Enterprises delivering the Inaugural Address
Glimpses of the signing of MoU between National Bamboo Mission and Handicraft & Carpet Sector Skill Council
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