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Bamboo & Rattan Update

INBAR

Sharing the latest news and activities from the bamboo and rattan sectors

FIGHTING PLASTIC POLLUTION WITH BAMBOO

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Cover Image
Keynote speakers launched the Global Action Plan of the BASP Initiative at the First International Symposium on Bamboo as a Substitute for Plastic.

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About INBAR
INBAR is an intergovernmental organization which promotes the use of bamboo and rattan for sustainable development.
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INBAR Headquarters: Beijing, China
Regional Offices: Central Africa, East Africa, West Africa, Latin America and the Caribbean, South Asia.

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EDITORIAL

Welcome to the fourth issue of the* Bamboo and Rattan Update *for 2023, which focuses on INBAR's flagship plastic substitution project, the Bamboo as a Substitute for Plastic Initiative.

The problem of plastic pollution has dramatically worsened in the last several decades. Now, INBAR and the Government of China are taking meaningful steps to fight back. The Bamboo as a Substitute for Plastic (BASP) Initiative is an important part of the Global Development Initiative (GDI), which is an international framework for accelerating the achievement of the 2030 Agenda for Sustainable Development. The BASP Initiative seeks to make real strides in mitigating plastic pollution and tackling climate change.

On 24 June 2022, the BASP Initiative was initially mentioned by Chinese President Xi Jinping as part of the deliverables from the High-level Dialogue on Global Development. From here, it first began to gain momentum. Later, on 20 September 2022, China announced at the Ministerial Meeting of the Group of Friends of the GDI it would not only soon work to implement the Initiative, but also help formulate the Global Action Plan of the Initiative in tandem with INBAR. The Initiative was officially launched on 7 November 2022 during the Opening Ceremony of the 25th Anniversary of INBAR and the Second Global Bamboo and Rattan Congress.

Since the launch of the Initiative, much work has taken place. Scoping studies have been undertaken in INBAR Member States that are representative across the major regions of project work (Latin America and the Caribbean, Africa, and Asia) across 2023 and carrying into 2024. The First International Symposium on Bamboo as a Substitute for Plastic convened in Beijing, hosting hundreds of key stakeholders involved in the fight against the scourge of plastic waste. And at the same time, other strategic agreements and frameworks like the Intergovernmental Negotiating Committee (INC) on Plastic Pollution gathered steam, holding sessions and inching closer to ratifying an international treaty on plastic pollution, including in the marine environment.

But how much work has truly been done on the ground? The first article of this issue summarizes the progress of the pilot project of the BASP Initiative. The project is designed to encompass genetics, cultivation, performance, products and assessment. The ultimate objective of the project is to foster the creation of new global paradigms and modes related to the entire chain of bamboo products that can be substituted for plastics. The report highlights some of the main work done across the six pilot Member States, namely Viet Nam and Malaysia in Asia, Ethiopia and Cameroon in Africa, and Ecuador and Brazil in Latin America, mentions the

primary achievements across its eight work themes, and outlines the future work to be done in 2024 and beyond.

Recently, a prominent international event fully illuminated the topic. The second article gives a detailed account of the First International Symposium on Bamboo as a Substitute for Plastic. Launched on the one-year anniversary since the launch of the BASP Initiative, the Symposium offered a robust platform for hundreds of stakeholders around the world to meet and exchange knowledge and best practices, explore innovation opportunities, improve market mechanisms, and encourage policy formulation, ultimately seeking to facilitate the achievement of the 2030 Agenda for Sustainable Development. Importantly, China and INBAR released the official Global Action Plan for the BASP Initiative, set to function as a roadmap and guide project work until 2030. The Symposium also featured opening speeches from VIPs, keynote presentations, and parallel sessions on policy, resource management, private sector development, and R&D.

Other allies in the fight to safeguard the earth are also recognizing the real potential of bamboo to contribute to solving the plastic pollution crisis. Penned by the UN Environment Programme's China Officer Dr. Han Meng, the third and final article gives a detailed description of the scope of the plastic crisis facing the planet, before going on to examine the feasibility of scaling up bamboo materials to replace plastic ones. After reviewing the advantages and trade-offs inherent to utilizing the forest resource, the article identifies roadblocks in need of being overcome, and goes a step further to offer recommendations to realize the real potential of bamboo.

To overcome the transboundary challenges of our era, we need to integrate a wide range of multivariate solutions simultaneously. This requires a high level of coordination from different actors with potentially different incentives which need harmonization. Substituting bioplastics, namely bamboo, for harmful plastics is one of the important instruments in the toolbox of policymakers, entrepreneurs, researchers, growers and more that can help tackle the plastic pollution problem. We hope you enjoy this issue, as it presents the full range of the BASP Initiative and its future aims.

THE EDITORS

IMPLEMENTING THE BASP PILOT PROJECT

Sampling, collection, lab testing and more have been conducted on bamboo species in six countries.

Summary report from six countries signals the great potential for using bamboo as a substitute for plastics.

INBAR has a long history of advocacy for plastic substitution, from raising awareness of bamboo as an alternative green material at COP meetings, industry fairs, academic symposiums and other prominent international fora to participating in the Intergovernmental Negotiating Committee (INC) on Plastic Pollution. Working in tandem with other global stakeholders, INBAR has recently released the summary report of the pilot project of its flagship plastic substitution initiative, the Bamboo as a Substitute for Plastic (BASP) Initiative.

Project outline

The full name of the pilot project, the Bamboo as a Substitute for Plastic Key Technology Research and Demonstration Project in Pilot Member States of INBAR, first began in July 2023. INBAR has mobilized a number of research institutes to coordinate the project under the flagship BASP Initiative, encouraging countries to reduce plastic pollution, address climate change and accelerate the implementation of the UN 2030 Agenda for Sustainable Development

Six pilot Member States (Viet Nam and Malaysia in Asia, Ethiopia and Cameroon in Africa, and Ecuador and Brazil in Latin America) were selected from INBAR's 50 Member States to participate in the project research. The project is organized around eight thematic topics, with an overall design that encompasses genetics, cultivation, performance, products and assessment. The main objective of the project is to foster the creation of new global paradigms and modes related to the entire chain of bamboo products that can be substituted for plastics.

Experts from different disciplines have joined the project, adding their expertise and helping to refine project planning while also identifying hot spots for follow-up research. Representative bamboo species in the six pilot Member States have been collected and organized, and the schedule for 2024 including further sample collection and study tours in other pilot Member States has been drawn up. As of the beginning of 2024, work in the following eight topics has been carried out.

Starting from bamboo genes, research into changes in cell growth during the rapid growth stage of bamboo has been conducted. The research revealed encouraging results. Scientists have successfully annotated about 98% of the genome. Genome annotation is important because it helps researchers understand the genetic makeup of an organism by learning more about the roles different genes play in biological processes. Additionally, they have created detailed maps of gene activity at the single-cell level, focusing on three key stages in the rapid growth of moso bamboo shoots.

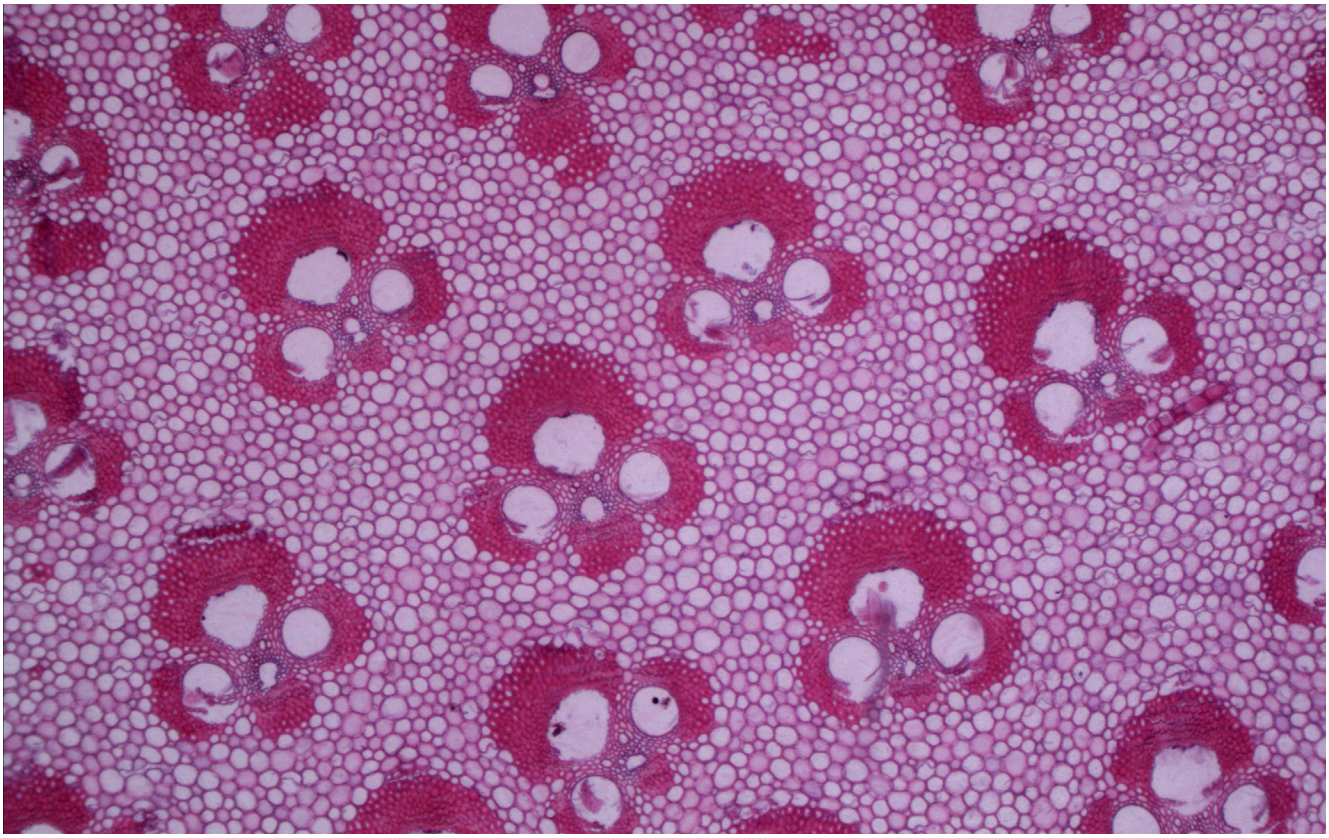
Bamboo resource surveys have been carried out in pilot Member States in Asia, Africa and Latin America to learn about and collect bamboo species suitable for BASP. For each of the three species, i.e., *Oxytenanthera abyssinica, Guadua angustifolia* and *Thyrsostachys oliveri*, more than 50 bamboos were introduced from the pilot Member States. A growth survey of the above bamboos has been completed. Sample bamboos were collected according to different sampling age standards. At the same time, the "Technical regulations on cultivation of *Oxytenanthera abyssinica*" (LY/T 2835-2017), a standard publication used in China's forestry industry, has been translated into English to facilitate training courses and disseminate knowledge on seeding technology for *O. abyssinica* for application in Africa in 2024.

Project research has focused on improving yields of important sympodial bamboo species. Chinese researchers have used demonstrations to draft proposals on density structure control, bamboo shoot management, water and fertilizer-based high-yield management, and also developed plans for sampling and training abroad. They have contacted relevant research institutes in Viet Nam and Malaysia to implement plans. An experimental forest for the high-yield cultivation of three tropical giant bamboo species, namely *Dendrocalamus sinicus, Dendrocalamus asper,* and *Dendrocalamus brandisii* was built in Guangdong Province, China. Preliminary tasks such as plowing and preparing necessary materials for water and fertilizer have been completed for the experimental forest.

A survey of the production and market conditions of major substitutes for plastic was conducted, helping to inform research into the structure/ function of bamboo and plastics. Several objects targeted for this survey included daily necessities, industrially produced goods, and construction products and building materials. Representative products were selected for this first stage. In the future, chemical components as well as the performance of main bamboo species in pilot Member States will be analyzed to probe the feasibility of replacing plastics with bamboo as well as optimizing other key mechanisms.

Efforts were made to achieve a breakthrough in the manufacturing technology used in bamboo products. *Dendrocalamus brandisii* and *Dendrocalamus giganteus* were collected. The relationship between bamboo wall thickness and bamboo height has been elucidated through scientific analysis. Sample bamboo materials have been prepared for further testing. Going forward, samples will continue to be collected from pilot Member States, and they will be used for comparative analysis and study.

The distribution of three types of Chinese small-diameter bamboos was surveyed to better understand value-added processing and utilization of small-diameter bamboo that can be substituted for plastics. Some of their structural characteristics were also tested and studied. In the future, the structural characteristics, physical mechanics and chemical properties of *Bambusa multiplex* from Taiping, Anhui Province will continue to be studied. *Yushania niitakayamensis* from Emei, Sichuan Province and *Schizostachyum dumetorum* from Guangdong will also be collected.



Bamboo's vascular bundles tell a story of strength under a microscope.

Attention was focused on high-precision and fast-speed milling technology for bamboo and wood composite parts. All structural designs of high-precision and fast-speed milling devices were completed, and a prototype was trial-manufactured. In addition, the challenge of making test pieces and cutter shafts that move in an independent, synchronized manner was overcome. Processing verification for wood and bamboo composite test pieces of different radians was also carried out using the prototype device.

Regarding the development of new materials related to the BASP Initiative, an investigative report entitled "EU plastic strategy and inspiration" has been outlined. Moreover, the production and processing of flattened bamboo for acoustic materials was completed. Density was tested, acoustic vibration characteristics were evaluated and modes were analyzed. A method to improve the acoustic stability of flattened bamboo was developed. The scientific mechanism to regulate bamboo rigidity and acoustic quality was preliminarily identified. In the future, efforts will be made to design and develop smart conference table signs made of bamboo and carry out the conceptual design of solar-powered bamboo fans.

Going forward

These unremitting efforts will ultimately help lead to a brighter future. Owing to the efforts of all parties, the summary report is a clear message that the project is progressing smoothly and will continue apace into 2024. Team members have voiced their commitment to achieving breakthroughs in order to spur greater scientific and technological advancements. It is believed that the project's outcomes will greatly promote the industrial development of products related to the BASP Initiative and drive green and sustainable economic and social development. And finally, the project will synergize with other international agreements and treaties such as INC while building upon INBAR's previous work at global fora promoting bamboo as a green alternative to plastics.

FEATURED ARTICLE

FIRST INTERNATIONAL SYMPOSIUM ON BASP

High-level delegates gave speeches during the opening ceremony of the Symposium.

The event featured luminaries who spoke on the promise of bamboo to address plastic pollution.

Plastic pollution has become a major problem facing the world. New solutions are needed to tackle the complex issue, as it resides at the core of several planetary challenges, like climate change and biodiversity loss. Now the world is rising to meet this challenge.

Marking the one-year anniversary since the launch of the BASP Initiative, on 7 November 2023, the First International Symposium on Bamboo as a Substitute for Plastic kicked off in Beijing. Held under the theme "Collaborative Innovation to Globally Promote Bamboo as a Substitute for Plastic," the Symposium offered a robust platform for hundreds of stakeholders from around the world to meet and exchange knowledge and best practices, explore innovation opportunities, improve market mechanisms and encourage policy formulation, ultimately seeking to facilitate the achievement of the 2030 Agenda for Sustainable Development.

The Government of China and INBAR also officially released the Global Action Plan for Bamboo as a Substitute for Plastic (2023–2030) during the opening ceremony, which will function as the main framework for coordinating and implementing the BASP Initiative.

Highlights from speeches

A number of high-level luminaries spoke at the Symposium. H.E. Wang Zhizhen, Vice Chairperson of the 11th National Committee of the Chinese People's Political Consultative Conference, pointed out in her speech that bamboo and rattan are

versatile resources with great potential for scaling up across the Global South. The BASP Initiative has enormous promise for promoting green growth, addressing climate change, delivering jobs and spurring sustainable economic development. China is looking forward to working with all partners to implement the Initiative within the framework of the newly unveiled Global Action Plan to help build a world that is cleaner and greener as well as in harmonization with other international frameworks, policies and strategic planning.

H.E. Guan Zhi'ou, Administrator of the National Forestry and Grassland Administration (NFGA) China, noted that the BASP Initiative has received enthusiastic media attention since its release, and outlined three important tasks to carry it forward: 1) Promote new innovation to overcome the technical bottleneck; 2) reinforce industrial clusters to jumpstart green development; and 3) bolster international cooperation to build a greener world.

H.E. Bishnu Pukar Shrestha, Ambassador of Nepal to China and Representative of the INBAR Council Chair, highlighted that the INBAR Council has already approved the Global Action Plan of the BASP Initiative. [The pilot project originating from it is already bearing fruit in the countries targeted for initial survey work, which is highlighted in on page 4 of this issue of the *Bamboo and Rattan Update*.] In the coming years, INBAR will work with Member States to ensure all parties are mobilized and actively working to support the achievement of the BASP Initiative in a coordinated and efficient manner.

Siddharth Chatterjee, UN Resident Coordinator in China, emphasized that bamboo can be a powerful tool to combat many problems global in scope like plastic pollution and climate change. It can be a relevant nature-based solution to promote the UN Sustainable Development Goals, particularly across the Global South where bamboo is widely distributed, and also has numerous applications for manufacturing low-carbon durable products.

Prof. Elies Molins, Co-President of the World Federation of Scientific Workers, remarked on the urgency of the many interrelated tasks ahead of us, and the key role bamboo can play in delivering a more sustainable future, particularly with the BASP Initiative accelerating progress toward the 2030 Agenda for Sustainable Development.

Later, in one of the keynote presentations, Prof. Jiang Zehui, Co-Chair of the INBAR Board of Trustees, stressed that a "global perspective" was needed to fully implement the Global Action Plan, alongside the following: Targeted cultivation; equipment research and development; technology and product innovation; and strengthening research projects. She urged participants attending the Symposium to harness advanced technology to lead the transformation of the bamboo industry and leverage science and technological innovation to build a new economy that can also help us meet our climate change goals.

Parallel sessions

The next day of the Symposium featured four parallel sessions held on topics related to bamboo and plastic pollution. High-level representatives attended the sessions, from ambassadors and policymakers, leaders in the private and public sectors, to researchers in academia and stakeholders in civil society. The parallel sessions were organized in accordance with the following categories.

Enabling Policy to Support the BASP Initiative
This session hosted 11 presentations that took a closer look at what policies and conditions are necessary to actualize the BASP Initiative. From the perspective of pioneers in the bamboo industry, practical paths were laid forward to facilitate development, from addressing difficulties in policy proposal, formulation, and implementation to advocating for the healthy overall growth of the sector. The session generated helpful guidance for key decision-makers in the bamboo industry.

Resources Cultivation and Supply
This session featured 9 lectures that put many hot research topics under its crosshairs, from new research into the creation of new high-quality bamboo germplasm resources to the efficient cultivation of bamboo resources. Given the

The conference hall during the opening ceremony of the BASP Symposium.

technical nature of the session, presenters also addressed the necessity of utilizing monitoring technologies and digital platforms for bamboo stands, which also have the powerful capacity to perform carbon sequestration. There was also a robust Q&A session between audience participants and presenters regarding resource management and supply systems, touching on cutting-edge theories in the field and prospective areas for future development.

Industry and Enterprise Development for Green Economic Development

This session was largely attended by entrepreneurs in the bamboo industry, sharing their practical experiences and knowledge. There was great enthusiasm for the opportunities in the sector, especially for meeting the twin goals of profit generation and environmental benefits. Presenters agreed upon the need for identifying and overcoming financial and technical challenges in the sector before new growth pathways forward could be explored. The following industry trends were outlined by participants as crucial for future development: Technological innovation; industrial upgrading; large-scale and standardized management; enhanced consumer awareness; fostering a new generation of entrepreneurs; creating and promoting BASP brands; and unleashing market forces to lead green progress.

Research and Innovation in Bamboo Products as a Plastic Substitute

In the final session, experts presented on some key technologies for unlocking new applications with bamboo, including composite materials made with bamboo fibers, specialized manufacturing and research equipment, and the continued R&D into BASP products. In particular, food packaging and automotive interior design were identified as areas with good foundations that could stand to greatly benefit from the introduction of more bamboo-related materials.

Closing Ceremony

With the parallel sessions wrapped up, it was time to place a ribbon on the proceedings. During the closing ceremony, a recap video of highlights was played for the audience. Lu Wenming, INBAR Deputy Director General, gave the final speech of the Symposium before officially closing the event.

This Symposium was jointly hosted by the National Forestry and Grassland Administration of China and INBAR. Representatives from many different governments, research institutes, higher education institutions, enterprises, as well as relevant international organizations and non-governmental organizations attended the meeting to discuss the development of and partnership within the bamboo-based plastic industry.

UNLOCKING THE 'REAL' POTENTIAL OF BAMBOO

Bamboo offers nature-based solutions to several planetary problems, including plastic pollution.

In the past decade, the production of plastic has grown exponentially, with around 430 million tonnes now produced per year. However, only an estimated 19% of the plastics produced are incinerated and a mere 9% are estimated to have been recycled. The remaining global plastic waste is either disposed in landfills or released into the environment, leaching harmful chemicals into soils, and also into the oceans, where it accounts for 85% of maritime waste. Plastic pollution has hence become one of the main contributors to the triple planetary crises of climate change, biodiversity loss and pollution.

Environmental impacts

Mainly produced from fossil fuels, greenhouse gases are emitted throughout the life cycle of plastics, contributing to the climate crisis. At the current rate of production, the expansion of plastic production is estimated to emit more than 56 billion tonnes of carbon dioxide equivalent greenhouse gases between 2015 and 2050, amounting to 15% of the global carbon budget by 2050. Further, incinerated plastic waste is known to release carbon dioxide and methane into the atmosphere, and disposal methods increase emissions and exacerbate global warming.

Plastic pollution is also a major contributor to ecosystem degradation and biodiversity loss. Over the last 50 years, billions of tonnes of plastics have been wreaking havoc on terrestrial and marine ecosystems. According to the United Nations Environmental Programme, every year 19–23 million tonnes of plastic waste leaks into aquatic ecosystems, polluting lakes, rivers and seas. As plastics degrade, they form micro and nanoplastics, which harm organisms across the spectrum of animal, plant, and microbial kingdoms through a combination of chemical and physical effects. Plastic pollution also reduces ecosystems' ability to adapt to climate change by altering habitats and natural processes. This can directly affect people's livelihoods, food security and social well-being.

Global response

The international community is taking critical steps to address the problem. The Intergovernmental Negotiating Committee (INC) on Plastic Pollution was convened at the resumed fifth session of the UN Environment Assembly (UNEA 5.2) and initiated its work in the second half of 2022, with the ambition of completing its work by the end of 2024. The task of the INC is to develop an international legally binding instrument on plastic pollution, including in the marine environment, based on a comprehensive approach that addresses the full life cycle of plastic. Following INC-1 in Punta del Este, Uruguay, in November 2022 and INC-2 in Paris, France, in May/June 2023, the third session of the Committee (INC-3) wrapped up in November 2023 in Nairobi, Kenya. At the meeting, nearly 2000 international delegates worked to update and revise the text of the Chair's Zero Draft. Delegates agreed that the revised Zero Draft will serve as a starting point and basis for textual negotiations at the fourth session (INC-4), to take place in Ottawa, Canada, in April 2024.

Commercial solutions are also coming into focus. Markets are now seeking practical and scalable solutions to plastic pollution, but available alternatives are far from sufficient and involve trade-offs. Many plastic alternatives have even higher carbon footprint than plastics themselves. For example, research has revealed that paper bags can have a much higher carbon footprint than conventional plastic bags. But viable sustainable resources are under development and could help point the way forward.

Carrying salable goods with a bamboo basket. Credit: Muhammad Amdad Hossain.

The real potential of bamboo and rattan

Bamboo and rattan have the potential to serve as excellent alternatives to harmful and single-use plastics. They can also be nature-based solutions to many pressing global challenges such as climate change mitigation and adaptation, poverty alleviation, environmental conservation and resilient construction. Bamboo is a powerful carbon sink, and its natural characteristics such as being lightweight and having robust tensile strength produce strong and flexible building materials that are resilient to disasters emerging from slow-onset climate change impacts. We are seeing new bamboo buildings emerge in Pakistan and Ecuador in response to flooding and earthquakes, respectively.

Further, they also help restore degraded lands and protect forests, making them an effective way to combat desertification. This is because bamboo is annually harvestable, maturing in just three to four years. Its extensive root and rhizome systems bind soil and allow for annual regrowth after harvesting with no need to re-plant. Bamboo fibers are also completely biodegradable, whereas some plastics take hundreds of years to break down.

Bamboo's linear-splitting nature also makes it comparatively easier to process than timber, providing farmers, many of whom are women, opportunities to engage in the initial processing and further increase their share in value addition. Bamboo has already been developed into over 10,000 product types, many of which can replace single-use plastics. Rattan is also a very important plant for many poor communities, especially in some rural communities across Cambodia, Indonesia, Laos, and Viet Nam, where 50% of cash income is derived from the sale of rattan products. It shows great potential in the biomorphic sector as a biomimetic bone substitute, given the plant's unique qualities.

From an energy perspective, bamboo can be used in electricity generation plants, where approximately 1.2 kg of bamboo can be used to generate 1 kWh of electricity through gasification technology. Another major advantage of bamboo is its efficiency in carbon sequestration, with its ability to sequester up to four times CO_2 compared

to other hardwood species. It even sequesters more carbon than some tree species like the Chinese fir, and products made from bamboo lock in carbon for the duration of the product's entire lifespan.

Challenges

Despite numerous benefits, challenges still remain that must be addressed to fully realize their potential.

Most bamboo manufacturers are small to medium sized enterprises (SMEs), lacking access to investment capital to increase the scale of production. This keeps production costs high, which is also reflected in a higher sticker price, and puts more advanced processing technologies out of reach for these manufacturers. Such obstacles severely hinder the ability of bamboo to be competitive with plastics from a market perspective. Harvesting and pre-processing also comprise a considerable share of total costs, which caps the ability of these enterprises to make a profit and invest in new technologies.

Given the recent explosion in diversity of bamboo products that can be substituted for plastic, there is enormous room for growth in the sector. However, there is still a low level of public awareness, largely owing to the ubiquity of plastics in our modern lives, uneven access and high prices. Despite the plethora of diverse products, only a few are generally stocked in retail outlets, such as straws, cups and plates. Key actors on both supply and demand sides remain fragmented, with inadequate cooperation and investment.

Over 10,000 diverse products can be sourced with bamboo.

At a comprehensive policy level there is a substantial dearth of support. Many restrictions exist at national and subnational levels restricting or banning plastics, but more enabling policies and conditions are needed to complement these. High tariffs are one barrier for many bamboo products. Furthermore, in the EU, bamboo is classified as a timber, requiring bamboo trade to meet a number of forestry regulations, which are onerous because bamboo growth patterns and management regimes significantly differ from trees and timber. These policy issues and more are an undue burden to bamboo SMEs attempting to grow their business.

And as mentioned earlier, bamboo fibers are biodegradable. However, some bamboo products use chemicals and resins in the manufacturing process that are not biodegradable or even harmful, which can extend the decomposition time and complicate recycling/waste management efforts. In addition to posing environmental problems under the banner of "green sustainable materials," these products oftentimes have higher carbon footprints than advertised, and can negatively impact consumer confidence in the overall real sustainability of bamboo products.

Recommendations

However, there is currently ample space for decision makers, markets and consumers to take action to address the outlined challenges.

At global, regional and national levels, international organizations such as INBAR and the UN system, governments, NGOs and sector associations can play an important role in this regard. Practical support includes offering guidance to policymakers, helping

Bamboo can be found growing across the world, especially concentrated in the Global South. Credit: Aditi Singh Roy

develop standards to facilitate trade and ensure high-quality products, providing training and expertise to partners, fostering multistakeholder collaboration be it South-South, Triangular or other forms of cooperation, synergizing with other international frameworks like the INC, launching public awareness campaigns, supporting research into new products and techniques, building linkages across the value chain, and acting as a global knowledge broker. The Bamboo as a Substitute for Plastic Initiative is a recent pioneering initiative seeking to leverage INBAR's global resources to use bamboo to combat the plastic pollution crisis. Another such resource is Bamboo's Solution to Plastic Pollution, a new work recently published under the Trade, Development, and Environment Hub project that consolidates and showcases the current status of bamboo for reducing plastic waste and tackling climate change.

Furthermore, there are a number of important sectoral actions that can be implemented. For example, the private sector can direct more investment and supportive efforts into product innovation and technology refinement. Growers and farmers need to establish sustainable forest management operations that meet standards and requirements, and joining groups, associations and cooperatives can help reduce costs for certification that can help facilitate trade. Civil society and media can help disseminate updated knowledge through different communication channels to raise awareness. Within academia, research into renewable, clean and low-carbon additives for usage in the manufacturing process can help alleviate environmental concerns, and also drive innovation for developing new technologies.

To effect meaningful change and help guide the holistic development of the bamboo sector as a nature-based solution contributing to sustainable development and tackling environmental challenges including plastics pollution, efforts at different scales and across sectors need to be implemented simultaneously and in concert with one another.

MENG HAN & LI YANXIA

Dr. Meng Han currently serves as the UNEP-WCMC China Officer, providing oversight to UNEP-WCMC's work in and with China on topics including the implementation of Kunming-Montreal Global Biodiversity Framework and the mainstreaming of biodiversity across key economic sectors (cities, trade, infrastructure). Li Yanxia is Senior Programme Officer at INBAR.

Collating the latest international news and activities around bamboo and rattan sectors development.

Oyster-tasting pavilion in Thailand. Credit: W-Workspace

Bamboo could replace high-emitting plastics, but tech bottlenecks are stunting growth

Bamboo can be a versatile solution to many of the world's problems. While most people know it for its importance in the diet of pandas, it is also usable in scaffolding and roofing, with an ever-growing list of structural applications, as well as its pulp can be used in a number of different fabrics. The plant's impressive ability to sequester carbon can also help efforts to meet carbon peaking and neutrality goals.

Despite the sustainable nature of the resource, there are still many challenges to overcome. According to experts and industry insiders, technological bottlenecks and poor public awareness are some of the primary obstacles. An action plan released by the Chinese government and INBAR writes that the bamboo industry's size is "relatively small, productivity is low, costs are high, and technology and equipment lag behind."

In addition to contributing to lowering emissions, bamboo can deliver other benefits, such as green jobs and economic opportunities for rural inhabitants. Given the abundance of bamboo forestland in China, spanning 7.56 million hectares in 2021 according to the National Forestry and Grassland Administration, there is little chance of encountering a material shortage and a high ceiling for developmental potential.

Throughout the production processes of fossil fuels like crude oil and natural gas, greenhouse gases are continually emitted, from extraction, transport, refining and manufacturing, whereas bamboo is a sustainable plant that can be harvested annually without the need for re-planting. Their fibers are also biodegradable, while plastics take hundreds of years to break down.

In China, Anji is the country's most popular bamboo tourism site. The bamboo industry is flourishing in the area, with new technologies under development for making single-use items like bags and tableware.

Source: South China Morning Post, 3 December

Second year of Bamboost, a Base Bamboo Forum

On 15 September, a large forum was held in Makati City, the Philippines on Upscaling Green Construction, hosted by Base Bahay Foundation. The meeting was held in celebration of the Philippines' National Bamboo Month under the theme "Building with Bamboo: The Future of Sustainable Construction," and featured an assembly of bamboo construction pioneers from around the world, including experts from academia, think tanks, and civil sector.

The event was accredited by the Professional Regulations Commission, which means that professional architects and civil engineers earned 4.0 and 2.5 Continuing Professional Development units, respectively, toward their continued professional learning and development. The forum also showcased the latest research and innovation regarding bamboo connection performance, life cycle assessment, and design.

Source: Orange Magazine, 5 October

Rethinking rattan

Recently, Ikea has attempted to develop a new kind of rattan armchair that is capable of being packed in a flat manner to facilitate transportation. Engineers and other members of the production team across the globe came together to confront the challenge, overcoming obstacles like pandemic travel restrictions, virtual meetings and national laws and regulations.

The process first began taking a five-pronged approach that took into consideration function, form, quality, sustainability and low price. Key to this endeavor was a chair design that featured a special new type of joint and fitting which needed to be developed from scratch, as well as machines to be used in the manufacturing process.

Since rattan grows in the wild and comes with long and sharp thorns, it must be cleaned and peeled beforehand, with only the core usable for products and furniture. Rattan is much softer than typical wood products you might find in a furniture store, which means the special joint needed to be able to get a better grip on a softer surface than was ever before necessary. Rattan furniture is traditionally labor-intensive, done by hand, and assembled by professionals on site.

At the end of the process, over 80% of the pieces could fit in one container, which helps streamline the efficiency of the transport chain, lowers cost and reduces carbon footprint, ultimately making the eco-friendly chair more accessible to the greater public.

Source: Ikea

Chat architects' oyster-tasting pavilion draws on traditional bamboo scaffolding in Thailand

In Thailand, a new form of eco-tourism is injecting new life into a struggling fishing community.

Built by local fishermen in Angsila Village, a new pavilion made with bamboo scaffolding can be seen off the coast. The shallow-ocean bamboo construction techniques do not require power tools. The red tarps dangling overhead have been recycled from the surrounding agricultural fields and provide shade while allowing a nice sea breeze.

Visitors can catch their own oysters from this pavilion which are then prepared fresh to eat. Local fishermen share their history and heritage through the cooperative interaction, while also ensuring that the food they are eating is fresh. It also raises awareness for the sensitive coastal ecology. And, when tourists are not using the pavilion, the piers can be used for regular fishing activities by members of the community.

Source: DesignBoom

INBAR commissions research, conducts project work and raises awareness about bamboo and rattan across its 50 Member States.

INBAR booth at COP 28 received delegates from around the world eager to learn more about the role of bamboo in the fight against climate change.

New bamboo project kicks off in Peru

The project "Productive and technological innovation with bamboo in the border economic corridor of northeastern Peru – BAMBÚ NORORIENTE" is now being implemented with the aim of promoting sustainable bamboo production across the intervention areas of Peru. This initiative emerged from a strategic alliance between the Peru Chapter of the Binational Development Plan for the Peru-Ecuador Border Region, the National Forestry and Wildlife Service (SERFOR) and INBAR.

The project will generate a model of productive and technological innovation to strengthen the technical, organizational and industrial transformation capacities of bamboo, which will directly benefit 300 producers and managers and indirectly more than 300,000 residents of the districts along the border of Ecuador.

The inauguration ceremony was held on 15 September in the city of Piura. In attendance were Oscar Schiappa-Pietra, Executive Director of the Peru-Ecuador Binational Plan; officials from SERFOR; Pablo Jácome Estrella, INBAR Regional Director for Latin America and the Caribbean; and local authorities. During the event, new project partners were also announced, such as the Toribio Rodríguez National University of Mendoza and the Regional Government of Amazonas.

INBAR at UN expert meeting on commodities and development

From 9 to 11 October 2023, the United Nations Conference on Trade and Development (UNCTAD) hosted the 14th session of its Multi-year Expert

Meeting on Commodities and Development in Geneva. An INBAR delegation led by Ms. Li Lan, INBAR Director of External Relations and Partnerships, participated in the forum, presenting on best practices with bamboo from the case study in Anji, Zhejiang, China.

UNCTAD figures have highlighted that natural fibers, such as those from plants and trees, can be important green alternatives to plastic materials. This is where a bio-based plastic substitute like bamboo can help address the global crisis while delivering a suite of other environmental, economic and social benefits.

Nowadays, bamboo industries and adjacent value chains have achieved nearly total biomass utilization. However, there are still issues to solve, such as fragmented policies, inconsistent rules and regulations, insufficient consumer awareness. Despite these issues, there is immense potential for developing bamboo into a viable plastic substitute, especially as the world is on the eve of a global plastics treaty.

GLF Nairobi 2023 sparks new enthusiasm for bamboo

The Global Landscapes Forum (GLF) 2023 convened from 11 to 12 October at the World Agroforestry Headquarters in Nairobi, Kenya. Held under the theme "A New Vision for the Earth," the conference adopted a hybrid format, combining in-person and virtual participation, bringing together a diverse group of over 200 prominent individuals, including scientists, activists, Indigenous leaders, financiers, women, youth and policymakers.

The first day of the conference focused on concerns and obstacles associated with the developing local solutions aimed at realizing the Great Green Wall initiative in Africa. On the second day, the conference shifted its focus to the global viewpoint of land restoration.

INBAR arranged a side event entitled "Can Bamboo Save African Livelihoods?" as part of the proceedings. Distinguished speakers were invited to speak at the event, presenting on a range of subjects related to bamboo land restoration in Africa, as well as exploring strategies to enhance the livelihoods of women and youth through the improvement of value chains.

Bamboo's solutions to plastic pollution and climate change highlighted at COP 28

From December 8 to 10, INBAR participated in the 28th Conference of the Parties (COP 28) to the UN Framework Convention on Climate Change (UNFCCC) held in Dubai, United Arab Emirates. INBAR organized three side events and an exhibition booth, aiming to showcase the potential of bamboo in the fight against climate change.

INBAR's side events at COP 28 showcased successful stories from the Global South, emphasizing bamboo's versatility in restoring degraded land, promoting green economies, fighting plastic pollution and advancing the Sustainable Development Agenda.

The first side event held on 9 December was organized at the UNFCCC Global Innovation Hub and titled "Bamboo Based Innovation for Upscaling Landscape Restoration and Green Growth in Developing Countries." The session highlighted bamboo's potential for landscape restoration, green growth and sustainable development. Key points included innovative approaches to bamboo planting material production and sustainable harvesting and management. The session also emphasized the importance of building robust supply chains, adopting circular economic models, promoting diverse products and industries, and facilitating South-South technology and knowledge transfer to accelerate the development of the bamboo sector in developing and least developed countries.

The second side event titled "Bio-Economy Value Chain Development for Climate Change Mitigation and Resilience: Bamboo & Amazon Products" was organized by INBAR and the Center for Management and Strategic Studies (CGEE) of Brazil on 10 December. The side event highlighted how bio-economy value chains are important to achieve carbon neutrality and build resilient economies. The session featured lessons

learned and knowledge advances on bamboo value chains globally, as well as, on the Amazon forest products, to aid countries in the Global South in achieving the 2030 Agenda.

The third side event titled "Mitigating Plastic Pollution and Climate Change with Bamboo" convened at the China Pavilion on 10 December. The session focused on demonstrating the feasibility and strategies for promoting bamboo as a substitute for plastic. Recently, INBAR released the Global Action Plan for Bamboo as a Substitute for Plastic (BASP) (2023-2030), outlining a series of actions that seek to mobilize global resources and key stakeholders in the fight to combat plastic waste. The BASP Initiative focuses on providing bamboo-based solutions to address plastic pollution and contribute to climate change mitigation.

The 13th Council Session convenes its first Working Group Meeting in Beijing

INBAR hosted its First Council Working Group Meeting of the 13th Council Session at the INBAR Headquarters in Beijing. The meeting welcomed distinguished representatives from INBAR's Member States Embassies in Beijing. The meeting was co-chaired by INBAR Director General Mr. Ali Mchumo and H.E. Mr. Bishnu Pukar Shrestha, Ambassador of Nepal to China and Chair Representative of the 13th INBAR Council Session.

The meeting covered several key items including the Board of Trustees Report to Council, the Report on INBAR's work progress for 2023, the call for recruitment of a new INBAR Director General, and the Presentation of INBAR's work plan for 2024. At the end of the meeting, the Council Chair Representative, on behalf of the Working Group, expressed sincere appreciation to Mr. Mchumo for his excellent leadership and contribution to INBAR during his five-year tenure, scheduled to conclude on 31 March 2024.

The Council, made up of representatives from INBAR Member States, convenes biennially, guiding the Board of Trustees on the organization's general policy orientation and strategic purposes, as outlined in INBAR's Establishment Agreement. The next major session of the Council will take place in November 2024.

Manabí: Bamboo field schools taking root

The province of Manabí, located in the coastal zone of Ecuador, is home to more than 145,000 hectares of bamboo. This natural resource considered to be "vegetable steel" covers the province with an imposing green color, which transmits not only the vibrancy of nature but also the opportunity for growth in the region.

Since 2021, the project "Support for the economic-productive reactivation of the province of Manabí through sustainable development based on bamboo, including the construction of public-private alliances for development (APPD)" has been implemented in Ecuador, owing to generous financing from the Spanish Agency for International Development Cooperation (AECID). The project aims to take advantage of the abundance of bamboo in the area as a source for generating income and establishing productive chains through strategic public-public alliances, stimulating green development, increasing job opportunities and expanding the bamboo market.

As part of the activities in the project, Field Schools serve as the training centers for the sustainable management of bamboo and act as training spaces for uniting producers and those interested in the resource. Their purpose is to recover and make productive the natural Guadua patches present in the territory which are used in daily productive activities by locals.

To date, 20 Field Schools have been implemented, reaching 375 people in cantons such as Portoviejo, Pedernales, Santa Ana, Chone, Portoviejo, Santa Ana, Jama, Junín, El Carmen, Esmeraldas and San Lorenzo, growing new spaces in these communities for the exchange of technical and Indigenous knowledge as a mutual teaching process between facilitators and participants.

Many important topics are covered in such learning environments, including the repopulation of bamboo forests and how to conduct bamboo inventories, which are delivered by experts who

have graduated from the Trainer of Trainers in Sustainable Bamboo Management program to help further spread relevant ecological knowledge.

The APPD project arises from the need to generate public-private strategic alliances that allow the industry to develop, increase job opportunities and expand the bamboo market in Manabí. It is scheduled to culminate at the end of 2023, setting the crucial precedent in Manabí, Esmeraldas and Guayas that bamboo is a sustainable source of raw materials and income, and also driving home the point that it is necessary to increase the availability of alternative technologies and materials to boost sustainable construction efforts in the region and around the world.

Reaching the unreachable in Southern Ethiopia

In Southern Ethiopia, the potential of bamboo has been overlooked for too long, as local communities lack critical technical skills to manage their diverse local resources. However, that is starting to change.

Seeking to bridge this gap, the INBAR-AECID Bamboo Supply Chain Development Project conducted training from 11 to 13 October 2023 across four districts of the Ari Zone. The purpose of the training was to build the capacity of bamboo growers and development actors on sustainable management and utilization of bamboo so as to boost the economic, environmental and social returns of the resource for the benefit of the community. In total, 244 men and 54 women participated in the training. The training delivered expert knowledge and skills on technical and theoretical aspects of bamboo management such as bamboo propagation methods, plantation establishment and maintenance, and sustainable harvesting.

In the opening program, Project Coordinator Dagnew Yebeyen, said that about 67% of Africa and 7% of the world's total area of bamboo coverage is found in Ethiopia, highlighting the abundance of the natural resource. Moreover, bamboo in the Ari Zone is untouched and not fully utilized. He further mentioned that if we integrate indigenous knowledge with science, we can generate multifunctional benefits because bamboo is a plant that is highly beneficial for climate change and environmental protection and also for being sourced for industrial raw material as well as creating job opportunities of socio-economic importance. Dagnew went on to state that after the training is completed, INBAR also plans to organize further bamboo skill development training on bamboo handicrafts for local youths in the future.

Mr. Wondemagegne Bekele, Senior Technical Officer at INBAR-EARO reported that bamboo has now become an object of increased interest in international sustainability conversations. It has more than 10,000 uses, from food and clothing to replacing wood and reducing deforestation. In his speech, Mr. Zerihun Seyum, Director of the Forestry Directorate and Delegate of the Head for the Regional Forest, Environment Protection and Development Bureau, thanked INBAR for organizing such an important training program for the area, which is the first of its kind. He stressed that attention should be given to the sustainable management and utilization of bamboo in order to reduce pressure on forest resources. Mr. Kasahun Tekay, Head of the Ari Zone Forest, Environment Protection and Development Office, also expressed his gratitude to INBAR for technical and financial support of the training, and mentioned that his office is ready to strengthen cooperation in the future.

After the statements during the opening were conveyed, the training program was officially launched. Theoretical and practical trainings were arranged for the districts in the following two days. After the training, the participants expressed their appreciation for the organizing bodies. They also indicated that they gained a lot of new knowledge about bamboo management and sustainable utilization which will be very useful for building their livelihoods.

In total, the project has organized five sustainable bamboo management and skill development trainings across its implementing areas in Ethiopia.

INBAR ANNUAL INTERNATIONAL PHOTO COMPETITION

First place in the category Alternatives to Plastic, "Playing in The Bamboo Forest" by Wahyu Budiyanto from Indonesia.

With each passing year, the task of selecting the winners becomes more challenging as the number of exceptional entries showcasing the magnificence of bamboo and rattan continues to rise. The submissions this year surpassed expectations, with over 300 entries from many countries around the world.

INBAR's commitment to advocating for the utilization of these remarkable plants for sustainable development remains steadfast, and your contributions play an important role in this endeavor. Your photographs provide a window into the sometimes surprising ways in which bamboo and rattan are entwined with our daily lives. A distinguished panel of photographers meticulously selected the images that best exemplified the uses of bamboo and rattan for sustainable development, focusing on this year's three categories: Alternatives to Plastic; Hand-in-hand with Nature; and Everyday Livelihoods.

Discover the stories behind these photos and also the second and thirds places in each category at www.inbar.int/2023-photo-competition-winners

First place in the category Hand-in-hand with Nature, "Communication" by Kishore Das from India.

First place in the category Everyday Livelihoods, "Bamboo Water Wheel" by Myat Zaw Hein from Myanmar

Bamboo's Solution to Plastic Pollution

A recent publication is helping comprehensively document the capability of bamboo to fight plastic pollution.

Bamboo's Solution to Plastic Pollution was written under INBAR's Bamboo as a Substitute for Plastic Initiative and the Trade, Development and Environment Hub project with financial support from the UK Research and Innovation's Global Challenges Research Fund (project number ES/S008160/1). Experts at UNEP-WCMC also contributed to reviewing the document before finalization.

The document is written to be a concise knowledge product that is also holistic in scope. It begins by outlining the enormity of the plastic crisis, mentioning that worldwide plastic production reached 367 million tons in 2020, a twentyfold increase since the 1960s. Given the ubiquity of the material in our modern supply chains, a staggering four-fifths of plastics become waste, discarded in natural environments or in landfills, causing pollution that impacts global landscapes and oceans. If we do not change our course, we are heading for a serious correction, with upwards of 30 billion tons of plastic waste filling the planet by 2050.

Bamboo is highlighted as an opportunity for tackling this challenge. International recognition of the plastic crisis is increasing, and bamboo is becoming better known for its uses as a nature-based solution. Indeed, in addition to being substitutable for difficult-to-degrade and emissions-heavy plastics, bamboo can also help sequester carbon, making a real impact in the fight against climate change, and also boosting efforts for land restoration and soil enrichment.

Thousands of bamboo products and technologies have already been developed and deployed in markets worldwide. Specific bamboo commodities are highlighted in the publication as being particularly relevant to the plastic crisis such as ones that can be alternatives to single-use plastics. Single-use plastics are particularly damaging to the world because they have a short lifespan and high rate of disposal, accounting for half of global plastic waste. Single-use products that plastic can be substituted for include cotton bud sticks, balloons and balloon sticks, cutlery plates, straws and stirrers, food containers, cups for beverages, beverage containers, packets and wrappers, plastic bags, wet wipes and sanitary items, and cigarette filters.

Many of these are the main targets of plastic bans or restrictions. Many of these, also, already have market-available bamboo substitutes. Focusing on unleashing private enterprise with good policymaking and robust standards can help spur the growth of the bamboo industry, creating new green jobs while also lowering the number of single-use plastics plaguing our planet.

Tailored recommendations are enumerated to achieve this, focusing on suggested actions for the public sector, private sector, resource growers and farmers, civil society, media and academia, and international organizations. These actions must be done in a coordinated fashion and in concert with one another in order to optimize effectiveness.

Li Yanxia, Durai Jayaraman, Austin Smith. 2023. Bamboo's Solution to Plastic Pollution: Bamboo as a Plastic Substitute to Address Plastic Pollution and Climate Change. INBAR: Beijing, China.

EVENTS

2–6 October
30th Session of the Asia-Pacific Forestry Commission (APFC)
Sydney, Australia

11–12 October
Global Landscapes Forum Nairobi 2023: Can bamboo save African livelihoods?
Nairobi, Kenya

11–13 October
Training on Bamboo Propagation, Plantation Establishment, Management and Harvesting and Testing Methods
Ari Zone, Ethiopia

12–16 October
The Forests & Livelihoods: Assessment, Research, and Engagement (FLARE) meeting
Nairobi, Kenya

24 October
United Nations Day

26–27 October
International Seminar on Bamboo
La Vega, Dominican Republic

30 October – 3 November
Training on Bamboo Sustainable Management
San Rafael de Carvajal, Venezuela

6–8 November
19th International Conference on Non-Conventional Materials and Technologies
João Pessoa, Brazil

7–8 November
First International Symposium on Bamboo as a Substitute for Plastic
Beijing, China

13–19 November
Third session of the Intergovernmental Negotiating Committee on Plastic Pollution (INC-3)
Nairobi, Kenya

21 November – 12 December
2023 International Online Seminar on Bamboo: A Very Sustainable Construction Material — Lessons from Latin America
Online

21 November
6th World Congress on Disaster Management (WCDM): Bamboo for Climate Resilience and Disaster Management
Dehradun, India

30 November – 12 December
UN 2023 Climate Change Conference
Dubai, United Arab Emirates

5–6 December
International Conference on Bamboo Development in Southern Countries
São Paulo, Brazil

5–15 December
East Africa Community-Micro Small Medium Enterprises Annual Trade Fair
Bujumbura, Burundi

15 December
First Council Working Group Meeting of the 13th INBAR Council Session
Beijing, China

15 December
Webinar | South-South Technology Learning for Bamboo Development: Approaches, Lessons, Actors and Enablers
Online

19–20 December
International Young Scientist Forum for Climate Change — Bamboo-based Solutions
Online

21–22 December
Workshop on Bamboo Regional Multi-stakeholder Platform
Hawassa City Ethiopia

For more information, please see INBAR's event page: https://www.inbar.int/events/.

"In a tranquil bamboo forest, a skilled woman meticulously weaves Myanmar traditional bamboo leaf hats. This scene embodies sustainable development, where the forest provides renewable materials, and tradition meets eco-conscious craftsmanship. It's a beautiful testament to the coexistence of culture and nature, ensuring the bamboo forest's future vitality." Credit: Pyae Phyo Thet Paing

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