

# Bamboo for Africa: A strategic resource to drive the continent's Green Economy

Synthesis of policy dialogue between African ministers, decision makers, development partners and the private sector

Strategies, practices and experiences

- Policy Dialogue on bamboo for Africa
- National policy approaches
- Value chain and private sector development
- Land restoration



*Bamboo is a fast-growing plant that brings to many African countries a significant untapped potential for generating rural income, restoring degraded landscapes and combating climate change. To harness bamboo to drive a green economy in Africa, robust national policies and international frameworks that support bamboo development are needed.*

## INBAR Policy Synthesis Reports

INBAR Policy Synthesis reports aim to inform decision makers in government and international development partners of the benefits that bamboo and rattan can bring to their efforts to build sustainable development and green economies that improve peoples' livelihoods.

INBAR, The International Network for Bamboo and Rattan, is an Intergovernmental organization bringing together some 40 countries for the promotion of the ecosystem benefits and values of bamboo and rattan.

## Acknowledgments

This report is a digest of debates and exchanges at the **INBAR Summit on Bamboo and Rattan in the Green Economy**, held in Addis Ababa, Ethiopia in November 2014. The perspectives presented here were made possible by the contributions and insight offered by all Summit participants, especially keynote speakers and discussants in the high-level panels, and the members of INBAR's Council of 40 Member countries and their representatives.

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## Key Words

climate change, bamboo, resilience, mitigation, landscape restoration, INBAR, climate smart agriculture, forestry, agro-forestry, green economy, sustainable development

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ISBN 978-92-95098-60-2 Bamboo for Africa Policy report (printed)

ISBN 978-92-95098-61-9 Bamboo for Africa Policy report (pdf)

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## Key messages

- **Developing a green economy for Africa will be critical to sustainable growth for the continent as its population doubles by 2050.** Bamboo can make an important contribution, yet its benefits as a strategic resource – to safeguard landscapes and biodiversity and drive sustainable rural development – today remain largely unrecognised and undervalued.
- **Africa has huge reserves of largely untapped indigenous bamboo, and excellent conditions for growing cultivated species.** With careful management, both natural and cultivated bamboo can prove valuable resources for sustainable rural development.
- **Bamboo provides a practical and rapid solution for a number of the natural resource and poverty challenges faced by many African countries.** A number of well-documented case studies, especially from Asia, serve as a model for bamboo development in Africa. South-south technology transfer has started and expected to grow. This plant has proven its effectiveness for restoring damaged land and ecosystems, for combating climate change through carbon sequestration and avoiding deforestation, and boosting rural livelihoods – through job creation and income generation.
- **Practical policies are needed at local, national and global level for African countries** to fully tap bamboo's benefits. This will help scale-up bamboo activities for economic and environmental development and encourage private sector action an investment for business growth and job creation. At the global level, a greater recognition of bamboo's strong potential for climate change prevention is needed, as well as more clarity on bamboo's status in international conventions and instruments to confirm its place as a strategic resource that brings advantages to countries that have it as indigenous plant.
- **Bamboo is not proposed as a 'silver bullet' solution** to solve the problems of environmental degradation and climate change. But it is an excellent complement to the mix of environmental and ecosystems services bring promoted for green economy development.
- **Bamboo is an indigenous African species that can benefit from Asian know-how.** This plant is often perceived as an Asian species. But with millions of hectares of bamboo across the African continent it is a decidedly indigenous African plant – with vast forests stretching across the tropical and sub-tropical regions. But much of the technology and know-how for bamboo development lies in Asia, where strong bamboo economies have been developed over decades or hundreds of years. The Asia-Africa exchange of expertise has started and needs to intensify, so that African countries can fully benefit from their bamboo resources. Some eight percent of the world's bamboo resources are found in Africa.

## About this synthesis report

The information and experiences presented in this report are a synthesis of the INBAR **Summit on Bamboo and Rattan in the Green Economy**, an international dialogue between policy makers and experts on bamboo, natural resource management and development experts. The meeting was organized by INBAR and the Government of the Federal Democratic Republic of Ethiopia in 2014 in Addis Ababa.

This report investigates how African countries can obtain the greatest possible impact from bamboo to support their sustainable development goals, and contribute to poverty alleviation, landscape restoration, climate change mitigation and economic development. It aims to inform government policy-makers, agricultural planners and development partners of the potential offered by bamboo, of the obstacles and constraints to its wider adoption, and to explore the many options for using bamboo to the advantage of rural communities and the environment.

The Summit was the first of its kind to link bamboo with the potential for Green Economy development in Africa. It brought together some 200 policy makers, development partners and natural resource management experts from across Africa, with participation of professionals from Asia, Europe and North America. This policy dialogue on Green Economy approaches for low and middle-income countries was unique for the number of ministers and high political representatives attending, and for what is probably the first formal exchange between policy makers, decision makers, and the private sector – the engine needed for green development with bamboo to become a reality.

This report was linked to the INBAR two-yearly Council session of its 40 member countries, who offered their expertise in bamboo technical and policy development, exchanging approaches and opportunities for how bamboo economies can be developed in the African context.

## Bamboo benefits

Neither a timber species, nor a crop, bamboo is often overlooked in African ecosystem management and rural poverty plans. But with some 1,250 different species that grow naturally in the tropical and sub-tropical belt across vast areas of the continent, this plant can add real value to income generating, biodiversity and climate change mitigation strategies.

Bamboos are giant grasses belonging to the *Poaceae* family. They are arguably the fastest growing plants on earth, with recorded growth rates of more than one metre per day for some species. The plant reaches its full height in just one growing season. Bamboo poles, or culms, mature in four to eight years, depending on the species.

Africa has three native bamboo species: *Yushania/Arundinaria alpina*, *Oxytenanthera abyssinica* and *Oreobambos buchwaldii*. *Yushania alpina* is a highland bamboo species growing at altitudes of 2,200 to 3,500 metres above sea level. Lowland *Oxytenanthera abyssinica* grows at altitudes of 700 to 1,800 metres and *Oreobambos buchwaldii* grows between 300 and 2000 metres. A fourth bamboo species, *Bambousa vulgaris*, has been introduced and grows widely across sub-Saharan Africa. Madagascar has over 40 indigenous bamboo species, some of which are only found on this island.

As a renewable resource, the plant has few peers. Extremely flexible and resilient, bamboo thrives on poor soils, requires little or no inputs and is prone to few diseases. Unlike trees, bamboo can be harvested as a perennial crop 3-5 years after initial planting, without causing deforestation or resource loss. Once established, bamboo rhizomes remain rooted in the soil, producing new shoots each year. The underground rhizome and root system, which grows in the topsoil, helps to secure the soil and can maintain slope stability. No irrigation is needed, although bamboo typically requires upwards of 600 mm of annual rainfall.

Bamboo can be planted around farms, over fishponds and around wells or springs, and can help to protect the banks of natural watercourses. Highly resilient, bamboo can withstand flooding and grow back after being burnt to the ground following forest fires or slash-and-burn agriculture.

The world bamboo market, led by China – whose bamboo sector has increased by 54 percent since the 1970s – is experiencing strong growth. The global market for bamboo and rattan was estimated at \$34 billion in 2012 (comprised of \$1.9 billion of trade between countries with the balance being domestic markets within countries).

New technologies are enabling bamboo products to compete effectively as a substitute material for a range of products such as timber, fibre-glass and construction materials. On a larger scale, bamboo can be used for pulp and paper and has emerging potential for off-grid small-scale electricity generation. Roughly 1.2 kg of bamboo biomass can be used to produce 1 kWh of electricity through gasification.

Research by INBAR shows that charcoal made from bamboo is high in calorific value, and has lower smoke emission than equivalent amounts of charcoal from trees such as Acacia. Making bamboo charcoal is simple, and field studies have demonstrated that it is an economically viable option for local communities. Bamboo charcoal can be made by women-led households, and by small-scale farmers.

To make effective policies that guide bamboo development and investment, decision makers need accurate information on this plant's different types, characteristics, behaviour and how it interacts with different types of ecosystems. Bamboo is not proposed as silver bullet to the continent's development and livelihoods issues - but it can bring many benefits. Well planned and managed bamboo resources will make a big contribution to building Green Economies in many African countries.

## Executive Summary

What is needed to include bamboo benefits in growing Africa's Green Economy?

*Much of sub-Saharan Africa has abundant supplies of indigenous bamboo and ideal conditions for planting cultivated varieties and its benefits are well documented. Yet despite the scope that this fast-growing and versatile plant offers for economic development, why is bamboo's potential overlooked as a strategy by government planners and development agencies in many countries?*

With so many advantages to offer, why is bamboo not on the countries' development and Green Economy agendas as a tool to improve livelihoods and the environment? This was the key question addressed by the 200 policy makers, national planners, researchers and development professionals at the INBAR Summit meeting on Bamboo and Rattan in the Green Economy, held in Addis Ababa in late 2014. The answer, participants concluded, lies in three areas:

- **Evidence and information.** There is a lack of clear information and evidence documenting the economic and environmental benefits of bamboo, to inform decision makers and potential investors in bamboo-driven green economy plans.
- **Perception.** Bamboo has an image problem – both with national policy makers and development partners. Its potential as a new economic force for income and local job creation is not well recognized, nor is its potential as an important component of land restoration and reforestation policies that countries need to apply to meet internationally-agreed sustainable development targets.
- **National policies and action plans.** The foundations for increasing bamboo's investment in tomorrow's green economies that can be based on bamboo, require that countries put in place enabling policies – for example that encourage investment by the private sector or designate bamboo as a grass, not as a tree product – or specify the professional use and management of bamboo forests as a key national economic sector. At the same time, development partners need to appreciate that bamboo can add value to their programs; for example for climate change, small business development and forestry.

Much of the evidence and practice exists that shows what African leaders need to do to use bamboo to support their green economy plans. Asian countries have gained a wealth of experience over the past decades, demonstrating how this plant can be developed for environmental or commercial benefits. And this expertise is now being shared with a number of African countries. And some African countries are also taking action. Ethiopia, Ghana, Rwanda and Nigeria have enacted legislation or even presidential decrees calling for use of bamboo in specific cases and economic sectors. Kenya has a strategic document on the use of bamboo for green development and is working toward a national policy.

As awareness grows of how bamboo can play a role in national development, it is expected that more African countries will place this resource in their national policies and investment plans.

## The Ethiopian experience – positioning bamboo as a strategic crop

Ethiopia's State Minister of Agriculture, H.E. Ato Sileshi Getahun, Ethiopia's State Minister of Agriculture, comments that "...bamboo should be considered the most important, fast-growing, strategic intervention for afforestation and reforestation in the mountainous and degraded areas in the country."

With some two-thirds of all African bamboo found in Ethiopia, this East African country is a leader on the continent in developing the plant a source of revenue and land regeneration. Ethiopia has 1 million hectares of indigenous bamboo, representing 67 per cent of the African total. But it is only relatively recently that the country has started to tap this valuable potential.

The country has two indigenous species of bamboo – highland *Yushania alpina* and lowland *Oxythentera abyssinica*. Some of the highland bamboo is planted and managed by farmers, while the lowland is all natural and largely unused.

Ethiopia has been eager to embrace bamboo technologies. Knowledge has been transferred to the country's specialists in a partnership between Ethiopia and INBAR, involving a range of Chinese experts. Ethiopian technical experts have visited China to exchange on the latest techniques in watershed and bamboo resource management.

"Bamboo is a plant that grows vigorously, so planting it gives you an opportunity to generate very high economic returns," said Ato Sileshi Getahun, Ethiopia's State Minister of Agriculture. "It is seen by many as an Asian crop. But it is also African, growing naturally in many countries on our continent. Today it should be seen as a global that can be used build a green economy."

The country is starting to use bamboo for environmental conservation, to protect watersheds and prevent soil erosion. Some farmers are using it for intercropping, planting it as shade for other crops, protection against sun and wind and as a natural 'mulcher' providing drought protection and a steady income stream due to its rapid growth.

The use of bamboo is dramatically increasing," explains Tesfaye Hunde, of INBAR's East Africa Regional Office. "People in the cities love bamboo and there is a growing demand for furniture, so prices are increasing." But even so, it is used far below its potential. People living in bamboo growing areas use it for fuelwood, fencing agricultural tools and, to some extent, furniture and home decoration. They also collect bamboo shoots for food and animal fodder. But higher levels of value addition are small, limiting growth and export earnings .

Bamboo is one of the strategic resources targeted in the second phase of Ethiopia's Sustainable Land Management Programme (SLMP). A considerable part of the programme's watershed area is comprised of steep slopes, valley bottoms, gently sloping hills and ridges. The rate of deforestation and soil erosion is very high and as a result, the land is highly degraded. Deforestation and clearing of vegetation for crops, grazing and overuse have also impacted negatively on the land.

To help improve the livelihoods in these areas, bamboo has been prioritized as a strategic crop for integration into agriculture and forestry in the SLMP watersheds. The plant is now considered the by senior government officials and policy makers as the most important fast-growing strategic intervention for afforestation and reforestation in the mountainous and degraded areas of the country.

# 1 Bamboo – a strong pillar for Africa's future Green Economy

*Bamboo ticks many of the 'green development' boxes, offering a renewable resource that can help to restore degraded landscapes, provide sustainable bio-fuel, combat climate change, or provide new income streams for rural and peri-urban economies. Despite these benefits, which have been tried and tested in many Asian countries, bamboo is massively under-used in Africa, though the continent has plentiful indigenous supplies and excellent conditions for planting cultivated species. Some eight percent of the world's bamboo resources are found in Africa.*

Building an efficiently functioning green economy is a central component of establishing sustainable growth in Africa. The continent's population is expected to double to 2.4 billion by 2050, when one-quarter of the world's people will live here, calling on an urgent need for new kinds of goods, services and energy.

As a development tool, bamboo is a unique resource, especially for low and middle-income countries that have indigenous bamboo forests. It will help them address the imperatives they face, of meeting national and international sustainable development targets, driving rural development, and bringing increased income to these populations. Bamboo is referred to by some as a 'remarkable plant'. Looking at its properties, its flexibility and the variety of environmental of social, economic and environmental applications it offers, this description carries some justification.

## **Restoring landscapes, green energy sources, micro-business opportunities**

For rapid and large-scale landscape restoration, this plant's rapid growth rate and shallow root system make it a highly effective resource for slowing degradation and repairing damaged ecosystems. It has been proven to be especially effective for returning life to severely degraded landscapes, scared by mining, deforestation or long-term erosion. Its prodigious capacity to bind soil means it is a valuable tool for combating soil erosion and it is especially suited to protecting or restoring land on slopes, in gullies and on watersheds.

Bamboo is a useful ally in the fight against climate change, both for mitigation and adaptation. Its rapid growth rate enables it to absorb large quantities of carbon dioxide. As an adaptation tool, growing bamboo helps to build resilience for small-scale farmers living on marginal lands, whose other sources of livelihoods may be at risk from drought or extreme weather events.

Political leaders, technical and development experts at the Summit discussed that bamboo offers significant potential for almost every continent of the world for land restoration. Looking at climate change mitigation and adaptation it was explained that bamboo can sequester up to four times more carbon dioxide than some hardwood species.

## **Bio-energy for income and forest protection**

As a source of renewable energy, bamboo offers significant potential, especially for countries where households use firewood for cooking. With most sub-Saharan African families largely reliant on wood cut from trees or charcoal made from timber to meet their basic cooking needs, the International Energy Agency estimates that biomass energy will account for three-quarters of residential energy consumption by 2030. A significant contributor to Africa's deforestation, land degradation and indoor pollution, this level of wood harvesting is clearly unsustainable.

Bamboo provides a clean and renewable alternative as charcoal made from bamboo culms and off-cuts, which also offers local communities a source of revenue from charcoal production. Given that a significant portion of the yearly deforestation in Africa is caused by the harvesting of wood for daily household use (cooking and heating) a large-scale switch to bamboo - in both local practice and government policies - will have a significant positive impact on preserving the continent's forest ecosystems. Bamboo charcoal production is a simple process that can be put in place as a household, community or peri-urban economic activity with a low capital investment.

"My Government believes that bamboo and rattan greatly contribute to environment-friendly accelerated development ...and play a big role in poverty alleviation biodiversity and job creation."

*Mulatu Teshome, President of Ethiopia.*

## The more you cut, the more it grows

Bamboo brings a wealth of untapped benefits to African leaders

*Dr. Hans Friederich, Director General of INBAR, is confident that bamboo can make an important contribution to poverty reduction and environmental stewardship in many parts of the developing world. Here, he shares his enthusiasm for this renewable resource and outlines some of his hopes for its development in Africa.*

### What are bamboo's key benefits?

The interesting thing about bamboo is that it's a group of plants with about 1,250 different species, and each species has its own characteristics. But what they all have in common is that biologically, they are a grass species, and that means they have a root system, so when you cut bamboo, the roots stay in place. Therefore you do not have to replant. The roots simply grow new shoots. So it's a totally sustainable system of using a plant that can provide all kinds of goods and services.

### Why would a small-scale farmer be interested in growing bamboo?

A farmer might want to invest in bamboo because it grows incredibly fast. He or she will be able to sell it either as a raw product, or make things out of it. And you don't really have to do anything with it. It doesn't require fertilizer. It doesn't require chemicals. There are very few real diseases. Bamboo is not normally attacked by insects. So once it's planted, you can leave it. And it's not as heavy as timber, so women-headed households love bamboo. Bamboo can be cut by children. It's a plant that can help build resilience in vulnerable communities. It's quite an amazing plant.

### We have heard a lot about bamboo and climate change, Can you elaborate?

Bamboo is a plant and like any plant it has photosynthesis, but because it grows very fast, it sequesters carbon efficiently, and faster than many plants. Our research in China shows that if you compare bamboo plantations with Chinese fir plantations, the absorption rate of fir is higher. But in the case of fir you would have to leave it 10-15 years before you cut it. With bamboo you are trimming, not cutting so carbon stays in the plant while it is being tapped for productive use, and it is productive after 5-6 years. So over a 15-year period, you would have a yearly harvest of bamboo – and unlike a tree, it is not fully cut down.

### What do countries need to do policy-wise, to get bamboo integrated into frameworks?

To take the first step, countries should think how to develop national strategies for bamboo and rattan that look at the whole picture. There's an entire value chain that includes the environmental value of bamboo, product development, increased value and trading, domestically or internationally. Then, moving to action, countries need to have a plan, and this may involve several ministries working together to draw up a national strategy of how to make the best use of their bamboo resources.

### Bamboo offers good landscape restoration properties?

Yes, this plant has a number of unsung qualities. One of them is that it holds soil like no other plant – this is thanks to its fast growth and extensive root system. Some estimates show that one culm of bamboo holds 6 cubic metres of soil. So countries are beginning to realise that planting bamboo on soil that is prone to erosion will control that erosion. Taking this thinking one step further, bamboo can be planted in areas that have been affected by erosion to bring the land back to productive use.

### What is the scope for bamboo in Africa?

It's massive. There are places where existing bamboo resources can be used to develop small enterprises that generate income directly for local communities – such as charcoal, small household items, or furniture. We are working with our African member countries to use bamboo to restore unused land. So we are talking about replanting. We are talking about plantations. In many cases, it's a question of restoring a native bamboo plant population. The great thing about bamboo is that it's a grass, so the more you cut it, the more it grows. Unlike forestry, where everyone is saying 'please don't cut that tree', bamboo grows back. And the more bamboo you cut, the fewer trees you cut. So using bamboo brings us a continually harvestable crop, while also helping combat deforestation in a big way.

### **New local economy and income opportunities**

The plant's strong potential to be transformed into a number of high-value products is one of the many reasons that bamboo deserves more attention from decision-makers striving to bring new economic growth potential to their countries, through green growth strategies. Bamboo offers a range of business opportunities to private sector entrepreneurs and local economies.

Income generating and micro-business uses range from crafts to furniture, from flooring to textiles, bicycles and even beehives. And, with increasing urbanisation in much of Africa, bamboo is a valuable resource for construction. As strong as steel, but renewable and with a far lower carbon footprint, bamboo can be an excellent and affordable building material, particularly – but by no means exclusively – suited to areas prone to earthquakes. In China, emerging industrial applications for heavy industry are showing how bamboo has ideal strength properties to replace concrete and PVC for grills needed for cooling high temperature steam in many industries.

### **Green construction**

Bamboo has great potential to be unlocked in the building sector, especially in Africa, where massive urbanisation under way and huge demand for building materials. Key benefits are that it is strong, renewable, carbon neutral and affordable. In earthquake areas in particular, bamboo-based construction is much safer than buildings constructed with other materials. It also has great potential to be used alongside or replacing some middle quality wood for construction.

**Bamboo combats climate change** – providing rapid reforestation and potential for large-scale carbon sequestration.

**Bamboo restores degraded landscapes** – it grows quickly, slowing erosion and repairing damaged ecosystems.

**Bamboo brings new income streams to rural communities** – with its potential to be easily transformed in a number of high-value products

### **How Africa is developing bamboo**

In recent years, the International Network for Bamboo and Rattan has developed a network of 17 member countries in sub-Saharan Africa. Yet in spite of growing interest from some governments, many African farmers are unaware of the advantages of using, cultivating and managing bamboo. National development efforts need a combination of support from their governments. It can combine, awareness-raising, is crucial, as is providing incentives, attractive policies and involving local communities in planning. Without suitable government policies to drive the sector, bamboo's vast potential is likely to remain just that.

Challenges for government agricultural services include: equipping farmers with the skills to plant and manage bamboo as a crop, propagation and supply of seedlings, and teaming up with the private sector for processing and adding value to the raw material.

Developing a bamboo value chain, from farmer to markets, requires national policies, technology transfer and investment. Despite promising market potential, the commercialization of bamboo products still faces a number of hurdles, including research, product innovation, and increased skills in information or marketing approaches. Many countries face the barrier of accurate designation of bamboo in some categories of international trade and forestry standards.

"Bamboo should be considered the most important, fast-growing, strategic intervention for afforestation and reforestation in the mountainous and degraded areas in our country."

*Ato Sileshi Getahun,  
Ethiopia's State Minister of  
Agriculture*

Ethiopia probably leads the African continent in developing bamboo as a strategic resource, followed some way behind by Ghana, though neither country exploits this plant to its true potential. Ethiopia alone, with 1 million hectares, has two-thirds of Africa's total bamboo reserves, while Ghana has more than 400,000 ha. Both have recently evaluated and introduced new species from China and other countries and worked bamboo into policy frameworks for income generation and land restoration. Five new high-performing species from China are set to be introduced in Ethiopia for increased commercial production, following rigorous evaluation by the country's national agricultural services.

This represents an important start, which can be replicated in other African countries that currently make little use of their bamboo resources. The INBAR network is encouraging countries to put in place frameworks in place that encourage bamboo resource and market development.

### **Opportunities and challenges for bamboo and rattan development: Comments from summit political and policy leaders**

Raising awareness, stimulating the exchange of practical knowledge and sparking interest increased investments in bamboo economies. It is with these goals in mind that the Summit on Bamboo and Rattan in the Green Economy Summit was held in Addis Ababa.

In his keynote address to the Summit Ethiopian President HE Mulatu Teshome explained how the country's bamboo resources fit into Ethiopian government's Climate Resilient Green Economy strategy, that has the objective of creating a zero carbon net emission level by 2025. "My Government believes that bamboo and rattan greatly contribute to environment friendly accelerated development and that non-timber forest products such as these play a considerable role in poverty alleviation biodiversity and enhancing employment opportunities. They will help us with sustainable land management and with climate change and adaptation and mitigation. By using these plants we are protecting forest products. Due to their properties, they should be accorded an international priority in contrast to other previous categorizations."

Highlighting the advantages of bamboo and rattan for people and the global environment, Achim Steiner, UN Under-Secretary General and Executive Director of UNEP posed a question and challenge to Summit participants: how can the full range of opportunities offered by bamboo and rattan be better understood and more widely communicated? "We need to better understand what is holding back the potential for scaling-up, use and planting of bamboo and rattan, and how can we raise public awareness, expand markets and consumer demand for these products that will provide jobs, allow remote and marginal communities to take advantage to of global and national markets. In short to use bamboo and rattan to accelerate development. We also need to show how to use bamboo and rattan to combat climate change and contribute to the resilience of our economies."

HE Nii Osha Mills Minister for Lands and Natural Resources, Ghana advised that, while bamboo is a big plus for building a green economy, the opportunity for earnings at the household level is probably what will attract the most interest right across the population. "Because we have a lot of forest products African and these are of high value...we must impress on our people that bamboo is an alternative, and not only for the green economy. You can actually fetch a lot of income, for example using bamboo for charcoal production. We have piloted this in Ghana and it is an area that must be pushed very hard to encourage development of the sector. This and other uses of bamboo fit well into Ghana's wildlife and forest policy, that targets identifying and pursuing viable alternatives to wood."

Exploring the versatility and benefits of bamboo, HE Ambassador Gary Quince, Ambassador of the European Union to the African Union, commented that the plant has big potential but suffers from an image problem. "It seems that many farmers see it as a pest, because it grows fast. And I have learned that bamboo can be four times more efficient than some trees in carbon absorption. Then there is a scientific issue – they say that, quite rightly, biologically, it's a grass. But if I look at the products it looks like wood. So you need to get out the positive news about value added and positive environmental impact of bamboo," he says.

HE Koulagna Koutou Denis, Cameroon's Secretary General for Forests and Wildlife, shared the learning experience he had in visiting China, to appreciate how this country's market development approach can be applied to Cameroon. Cameroon is beginning its journey of building bamboo development into a national plan. The priorities are developing it for afforestation, building a transformation industry. "Cameroon has a wealth of forest resources, and bamboo. We visited China to see what was being done with bamboo. And after visiting a number sites, I asked my Chinese colleague: 'how can I use what I have seen here to develop bamboo in Central Africa?' He responded that that the approach used there for bamboo, was borrowed from wood forest development...so we already have the basic skills in place."

The benefits of building with bamboo are well known in some areas such as Latin America, but Eduardo Rojas-Briales Assistant Director General, Head of Forestry Department at FAO, sees bigger opportunities, for developing this sector globally for flexible low income housing – but innovative 'out-of-the-box' thinking is needed, he says. "In the temperate areas of the world, you have middle quality wood that is well suited for construction, with middle prices. The tropics have high-value wood that grows slowly, and not available today in large quantities, and it needs to be used sustainably. And there is a gap: some construction is done with tropical hardwood but it is a pity to use it for that." He suggests that bamboo can become a new gap-filling product that is lacking, for use as a locally sourced building material, avoiding imports from other regions. "It has been shown that 2-3 bedroom small family houses can be made with bamboo. So we can imagine a breakthrough, which is part technology transfer and part social change. What we may need for this is an 'Ikea' of bamboo building, with kits that allow a family to build their own home with very little support."

"There is tremendous scope for developing bamboo in Africa, and what is so exciting is that many decision makers and potential investors have not yet realised the extent of its possibilities." said Dr. Hans Friederich, Director General of INBAR. "If you look at a map you will see that most of sub-Saharan Africa to north of the Kalahari Desert has natural bamboo. The question is how to organize to develop it – by putting in place policies and market mechanisms that encourage investment. And to spark the interest of communities, so they can see the benefits that bamboo can bring them."

"We need to better understand what is holding back the scaling-up of bamboo and rattan to expand consumer demand for products that will provide jobs and link remote communities to global and national markets."

*Achim Steiner, UN  
Under-Secretary General  
and Executive Director of  
UNEP*

## 2 Policy approaches for developing bamboo value chains

*Practical and enabling policies are needed for bamboo to be used to its full effect by African countries, and for its benefits to be scaled-up. Developing a bamboo policy in a national context can be complex and requires dialogue between sectors including agriculture, forestry, natural resource management, energy, investment promotion, commodities, trade, small business and local market development. For maximum effectiveness, a national policy framework will need to involve all relevant ministries and national agencies.*

In Africa's bamboo producing countries, the initial responsibility for bamboo development lies with agriculture and forestry authorities. But real scaling-up requires expertise in micro-enterprise development and the promotion of local market mechanisms, in areas such as micro-credit or technical assistance for small-scale, peri-urban or more industrial level production of bamboo charcoal – or creation and promotion of household cooking kits that offer reduced health risks for families.

For this to work, value chain linking managed bamboo forests (forestry and natural resource management) with transformation of bamboo into charcoal (small business and local enterprise promotion), the design, local production of equipment (enterprise promotion), popularising of the technology and creation of local markets (enterprise promotion). Health and energy authorities may also be involved. Looking at this example, it is clear that a developing national markets and scaling-up of demonstration projects for bamboo-based bio-fuels needs to tap the expertise of a range of ministries and line agencies.

A number of national policies on bamboo/bamboo and rattan exist. But generally, bamboo resource countries do not have policies in place. What are the core elements of a national policy and where is the starting point for policy creation in a country? Review of some existing policies shows different starting points and political sponsors, as is the type of document (see box examples).

Some have started with high-level political support, such as Viet-Nam, which was driven by the Prime Minister. China's bamboo policy is very comprehensive and published as a book; others are shorter – like a memorandum or paper. The process in Kenya is taking a multi-stakeholder approach in a consultation between all relevant ministries, research partners, associations, NGOs and others with a stake in bamboo development, facilitated by KEFRI, the national forestry research institute.

In cases where a minister has taken the lead for policy development, a high-level working group of technical experts was formed, and a consultant hired to prepare a discussion document that evolved into framework for further discussion, through a consultative process.

### **How can countries address global policy needs**

Worldwide, specific policies and guidelines are needed that address the international, national and local context of bamboo economies. Macro topics include confirming bamboo as a non-forest timber forest product for trade, or meeting product and materials quality standards for import of bamboo transformed products into Europe and North American markets. National policies for bamboo development will address management and development of bamboo forest resources, and issues such as land rights and leasing, and defining how bamboo forest maintenance is different from current forestry and agro-forestry practices and legislation.

At global level, INBAR provides evidence and input for the creation of standards on bamboo use and development, for example in global forestry and agroforestry conventions and forums. And it is pushing for greater recognition of bamboo's contribution to climate change prevention.

In the light of bamboo's potential as a renewable alternative to products produced by forestry, there is a strong case for bamboo becoming the focus of a policy process that gives it equal status to silviculture in future international forest regimes, says Dr. Kathleen Buckingham, Research Associate for Forest and Landscape Restoration at the World Resources Institute (WRI). "The challenges of creating a frame for sustainable bamboo management are significant. The potential of commercial bamboo forestry to promote sustainable development, provide alternatives to timber products, sequester carbon and restore degraded land, bamboo development can generate farther-reaching benefits for humanity and the environment," she says.

### International policy issues

While timber resources are covered by many institutions and regulations, bamboo is not yet comprehensively included in international policy instruments. Its position in carbon mechanisms, such as the Clean Development Mechanism (CDM) or REDD+ is ambiguous, as it is not always clear whether the plant is treated as the equivalent of a tree or as a non-timber forest product (biologically, bamboo is a grass).

This situation has resulted in a lack of recognition of bamboo's potential as a strategic resource by development agencies, national and international policy-makers. There is an urgent need for a process of international policy exchange and reform, leading to the development of bamboo-specific policy approaches and tools. In a sector that is currently largely unregulated, standards need to be addressed. The challenge will be to find a compromise between costly schemes such as certification, while ensuring consumer confidence through quality and sustainability control.

### National concerns – better dialogue required

In Ethiopia, the Agriculture Ministry evaluated a range of Chinese and Asian varieties over the past several years, with the goal of increasing production outputs and bamboo wood density in its harvests. The evaluation and selection process yielded a shortlist of high-potential varieties that are used for large-scale production in China. Five new varieties have been selected for planting in Ethiopia. Kenya has one primary indigenous of highland bamboo that grows above 2000 metres. Following its plan to expand production in lowlands, 12 Asian varieties were identified as high-potential to boost new economic and livelihoods activities in its agro-ecosystems.

"Bamboo is a big plus for building green economies. It is the promise of earnings at the household level that will attract the most interest, right across the population."

*Nii Osha Mills, Minister for Lands and Natural Resources, Ghana*

## Bamboo in national bamboo policies, national guidelines and regulations – some examples

- **Ethiopia** is developing a new bamboo strategy and policy for sustainable development.
- **Ghana**, has a bamboo and rattan policy national bamboo and rattan programme that has created 15,000 jobs to date.
- **Rwanda**, has a decree calling on local authorities to plant bamboo along rivers and lakes to control erosion of riverbanks.
- **Nigeria's** new national bamboo and rattan programme started in 2014.
- **Cameroon** is supporting a policy to promote bamboo and rattan technology for income generation, sustainable development and climate change adaptation.
- **Kenya** has a strategic document calling for bamboo resource planning and development. It is working toward developing a national policy, through a stakeholder consultation.
- **China** has a comprehensive policy framework covering all aspects of the resource and its role in the economy, including cultural aspects. The government has also accepted bamboo as a climate change mitigation tool and pays for carbon credits through bamboo. No others have yet replicated this practice.

Developing local markets for bio-energy, bamboo charcoal and technologies to produce cleaner burning are a promising area for bamboo economies. Scaling-up and investment for a bio-energy sector up will happen more easily and quickly under cross-sector national guidelines.

### **Lessons from China**

China has among the world's most comprehensive bamboo development policies. More than three decades ago, the country identified an opportunity in bamboo and set an infrastructure in place, that includes a system of universities and research centres to investigate innovations and value addition. As a result, China now has a well-established industry, valued at some \$30 Billion, making bamboo products that are sold worldwide. The Chinese experience serves as a powerful model for African countries with abundant supplies of indigenous bamboo, and knowledge transfer on bamboo development with African countries has been in progress for more than a decade.

As one of the continent's leading bamboo resource countries, Ethiopia is moving quickly, placing this plant at the centre of its green development plan to become carbon neutral by 2025. With 1 million hectares of indigenous bamboo forest, the country has consulted Chinese bamboo experts to gain expertise and knowledge. It is evaluating and transferring new, higher performing, plant varieties into productive use. INBAR supports Ethiopia in refining its bamboo strategy.

### **Ethiopia's approach**

"Bamboo promotion cannot work without institutions to train, promote and test the technology. You need training centres to provide skills to people in business, across the value chain. Knowledge development is essential," says H.E. Ato Sileshi Getahun, Ethiopia's State Minister of Agriculture.

### **Building bamboo markets in Kenya**

Kenya is progressing toward the development of a national bamboo policy, with consultations planned between stakeholders in forestry, agriculture, research and involving development partners and civil society.

The foundation for a policy environment is in place today, in the form of a strategic document on bamboo resource planning. The goal is to raise the profile of bamboo and its benefits on the national agenda. The document describes the potential and the will to invest in expanding bamboo as a productive sector for the economy.

A range of development activities is also in progress, focusing on the use of bamboo as an alternative to wood in several sectors. The development challenge that the country faces is that its indigenous bamboo forest is one species of highland bamboo.

In an effort to expand its use to other locations, the Kenya Forestry Research Institute is leading evaluations of lowland bamboo from Thailand, Indonesia and China. Some 18 species were evaluated in a trial with 12 identified as high-potential for the country. The strategy centers around expanding bamboo planting on farms – for the sustainable production of fodder, charcoal, bamboo following and construction, weaving, and in gasification for local electricity production, which is being pursued with a local technology company.

In Ghana, where deforestation is now so acute that the country is having to contemplate importing timber, bamboo is being considered as an option for manufacturing products that can mimic timber, such as flooring, and for restoring degraded land, especially in areas where illegal mining has caused devastating environmental damage. Like Ethiopia, Ghana has now included bamboo into policy frameworks for income generation and land restoration.

## **A well-kept secret?**

*Raising awareness among decision makers, entrepreneurs and communities is the key to expanding bamboo economies in Africa*

*Sarah Simons, Global Sector Coordinator for Agriculture at the Netherlands Development Organisation, SNV, believes that raising awareness of the potential of bamboo is crucial, especially for African policy-makers, development organisations and small-scale producers.*

### **What would the attraction of bamboo be for a small-scale farmer in Africa?**

I think it's probably still a well-kept secret in Africa. There are many farmers who are unaware of the potential uses of bamboo, its multi-purpose nature, or where they can obtain the planting material. It is not a well promoted crop, and I think there is huge scope for expanding the growth of bamboo and production throughout much of Africa.

### **So what needs to be done to ensure that bamboo becomes better known and the value chain developed?**

There needs to be a real pull factor from the private sector in Africa. This can be driven by promoting the increased awareness of bamboo's potential benefits and of investing in bamboo plantations, in processing and renewable energy. And at the policy end, we need to do a lot more work with international organizations, governments and extension officers. The obstacle is a lack of information. So we really need to get out there and communicate bamboo's positive aspects. People need to be better informed of bamboo's benefit and the potential returns on investment it brings.

### **Why is SNV interested in bamboo?**

SNV is already working with bamboo in a number of countries around the world. Our partnership with INBAR will help us better understand and address the different ways in which bamboo can contribute to countries' and communities' development. Our combined expertise and geographic reach will help more users and decision makers appreciate and apply bamboo for green development.

"Bamboo shows big potential but suffers from an image problem....many farmers see it as a pest, because it grows fast...when in fact this is its real benefit."

*Gary Quince, Ambassador of the European Union to the African Union.*

### 3 The role of the private sector in developing a green bamboo economy

*In their strategies, policy makers should consider a mix of high-value and lower value bamboo value chains – that will inject income directly to communities and families.*

*Bamboo can bring new income streams to rural communities in a number of ways, stimulating growth in African countries through the private sector and the creation of local bamboo value chains. Case studies presented at the Bamboo and Rattan in Summit, show how this resource can be used to boost rural economies and job creation.*

The private sector will be central to green economy development with bamboo, driving demand and providing investment. In some countries, value addition is now highly sophisticated, with wide profit margins for processors who provide good design and quality. At the lower end of the spectrum, bamboo processing can produce good revenues from local and national markets, making it a valuable product for income generation, especially in rural communities. Bamboo's light weight makes processing particularly suited to women.

With a tensile strength that rivals that of steel and a higher compressive strength than wood, brick or concrete, coupled with its extremely light weight, bamboo is well suited to a vast range of purposes.

New technologies have developed bamboo as a strong construction material for entire buildings. Its use is also growing worldwide as a sustainable and attractive alternative to timber for flooring, furniture and household items – and other consumer items, including matchsticks, face creams, animal fodder and even wine and beer.

More recently, bamboo has gained popularity as a product for making textiles. Bamboo fibre makes clothes with excellent wicking qualities, UV protection and odour absorption, making it ideal for the booming fitness sector. Documented tests by Chinese, Japanese and other international scientists show that the fibre kills more than 98 per cent of bacteria, making these fibres especially suitable for socks.

The plant's fast growth rate means that producers receive a rapid return on their investment. For some species, a bamboo culm will reach its full height within its first year of growth. The subsequent use will determine how long a farmer needs to wait before harvesting. Bamboo destined for use in construction needs to be strong, so a culm will take several years before it has hardened sufficiently. But fibre intended for pulp and paper can be harvested in shorter production lifecycles.

The dream of many national planners is to mobilize their business sectors to tap high value export markets in Europe, Asia and North America. This is one strategy for using bamboo for green economy development. But if this is the country's single focus it will miss the potential of using bamboo to provide direct local income and growth in rural areas by focusing on smaller-scale value chains that will sustain families, villages and peri-urban areas.

So a smart business development strategy will combine high and lower value activities. High value-added will drive innovation and investment in the private sector. Local value chains will generate direct income from small, lower-value activities, so that a new bamboo economy does not count only on larger production facilities, that bank on earnings to trickle down to communities.

Small-scale activities with bamboo that are growing in many rural areas in India and South Asia include women's cooperatives or social enterprises supported by microfinance, who produce charcoal, incense sticks, matches, and small household items. Local bamboo resources are harvested for transformation in village enterprises. These lessons are readily available and ripe for transfer to Africa's entrepreneurs. Similar small-scale enterprises have been piloted in Ethiopia and Ghana.

Using South-South knowledge transfer, INBAR has worked with the International Fund for Agricultural Development (IFAD) to mainstream bamboo livelihood options in four African countries – Ethiopia, Madagascar, Mozambique and Tanzania – setting up model plantations, introducing new species where needed and treatment plants to improve the quality of products such as beehives and furniture. In Mozambique, more than 230 briquetting units have been set up, benefiting 690 households, most of them headed by women with no other source of income. In other recent livelihood initiatives, INBAR has worked with two microfinance institutions in Ghana to source funds for bamboo businesses.

### **Linking villages to the internet economy**

The digital economy also levels the playing field for small-scale and family producers of bamboo products and gives opportunities to link them to global market, circumventing middlemen and heavy investment requirements that are barriers in more traditional business models.

### **Green gold in Ethiopia: How one bamboo entrepreneur is creating 1000 new jobs in a remote province**

Some 1,000 small-scale artisans, many of them women, work with bamboo in Ethiopia and the country has three factories. One of them is owned by Michael Gebru, an Ethiopian entrepreneur who set up the Bamboo Star Agro-Forestry Company in western Ethiopia, 700 km from Addis Ababa. He now provides jobs for 200 people in the factory and 500 in the forest, a figure which will soon increase to a total of 1,000. Gebru, who leases 400,000 ha of land from the government, has forged close ties with China and Saudi Arabia and is planning to set up the largest pulp and paper mill in Ethiopia.

Gebru has hit on a successful formula for stimulating interest among local farmers by distributing free planting material from a nursery owned by the company and buying back the bamboo culms two or three years later for processing in his factory.

He says that bringing farmers together is crucial to the development of the local bamboo sector. "It is important that producers can work together through an organisation, to help them with production, processing and market linkages," he said. "Ethiopia has about two-thirds of all Africa's natural bamboo, but it has never really been used. It is green gold and should be given special attention."

Large-scale production for export requires certification and export standards that are costly and complex to manage. A small-scale producer working through an e-commerce channel does not face this challenge, but market forces enforce a defacto quality standard. E-commerce rules stipulate that if a customer is not satisfied, the cost of the product must be reimbursed in full.

The prize for the most original use of bamboo must surely go to designers of the bamboo bicycle. US cycle-maker Erba, worked with a group of scientists to design a frame that is light yet strong, and ideal for carrying goods. A number of companies in Ghana, such as Bamboo Bikes Ltd. use bamboo resources forests in the surrounding Ashanti region as their primary raw material for bike production. In Zambia, two Californians and two Zambians run a company called Zambikes aimed at creating jobs for communities where they work. The venture has produced a sturdy cargo bamboo bike, perfect for transporting agricultural goods, a bike trailer and a bike-drawn 'zambulance', now in use at clinics around Lusaka. It seems that this is just the beginning for bamboo market innovations. As entrepreneurs and industrial designers discover the material, a crop of new and surprising bamboo designs are expected to pop up every year.

"Bamboo's benefits can be best be demonstrated if we can show how it can put a coin the farmer's Pocket."

*Million Alemayehu Gizaw,  
World Bank*

## Process bamboo and save the forest

At a small industrial site 10 km from Addis Ababa, machines made in Asia are flattening, slicing, shaving and polishing lengths of hollow bamboo piled up on the factory floor. The end use will range from flooring planks to woven matting and from roofing to toothpicks, these latter for export to Sudan and the Middle East.

In a separate room, 25 women use nimble fingers to feed slivers of bamboo into machines that coat the fine pieces with a mix of charcoal and bamboo sawdust combined with bonding gum. These are incense sticks, whose ends will be dyed deep pink before they are dipped in perfume and sold at local markets.

Adal Industrial plc, one of three bamboo processing companies in Ethiopia, buys raw materials from farmers before collecting and storing them in warehouses ready for processing. The factory employs 180 staff, 80 per cent of them women.

In the yard outside the factory, bamboo offcuts and sawdust are fired for 12 hours in large kilns. The resulting matter is then crushed before being poured into Indian-made machines to make charcoal briquettes, which are sold locally and in the Middle East.

"Nothing is wasted here. We use 100 per cent of every piece of bamboo," says General Manager Adane Berhe. "Our motto is: save the forest, save the environment and save the Earth."

### Quality and innovation

Dutch processing firm MOSO International is the European market leader, producing quality bamboo flooring, ceiling panels and cabinets. It was founded by two businessmen interested in using renewable bamboo as a sustainable alternative to many products currently made from timber – doing business and helping curb deforestation. Currently, the company buys most of its raw bamboo from Asia. Arjen Veltman, Commercial Director and co-founder, says there is substantial scope for African bamboo-based enterprises to make higher quality products. "Why not think about different products and be innovative?" he suggests. "Often, people think bamboo is a cheap product. That means you need to work on awareness. And finally – go for quality."

Sourcing its raw materials from China, the company has developed machines and technology to produce high quality bamboo flooring for mainly corporate clients in the North. Since its launch in 1997, the firm has diversified into producing ceiling panels and cabinets. In all cases, the design and quality mean that items bear little resemblance to traditional bamboo products, whose image is tarnished among many consumers. Such is the style, finish and resilience of the product that clients include major airports and well known international chains of stores and coffee bars.

"We have a great deal of experience on the market side," says co-founder and Commercial Director Arjen Veltman. "And at the end of the day, it's important that a product finds a market."

Sustainability and bamboo's 'green' qualities are key benefits becoming a powerful new marketing tool, especially for consumers in Europe and the US. "It's important to back claims of CO2 neutrality with evidence from third party experts," says Veltman. "It's also critical to focus on quality. People often think bamboo is a cheap product. They don't usually link bamboo to a high grade product."

His advice for budding African bamboo entrepreneurs: "First focus on your local market and make the public aware of your products and unique aspects of bamboo. Public awareness is very important to build Africa's new markets."

"Then look at innovation, at how to make your product different, and how it will target the market," he says. "Today, products offered by African producers are not innovative."

### **Proof of concept – using bamboo for sustainable fuel**

An EU-funded project developed by INBAR for biomass production in Ethiopia and Ghana showed that fast-growing bamboo can be a sustainable substitute for wood in charcoal production and lead to a significant reduction in deforestation.

The project also helped set up 216 micro and small enterprises in both countries for the production of bamboo charcoal and energy-saving stoves, as well as three bamboo charcoal technology centres. The initiative revealed that some 70,000 tonnes of charcoal are consumed in the Ethiopian capital of Addis Ababa each year, the equivalent of almost 900,000 trees. To date, more than 440,000 energy-saving stoves have been distributed in Ethiopia and Ghana, each of which is estimated to save about 3 kg of wood per day, leading to a saving of well over 483,000 tonnes of wood per year.

### **E-commerce links villages to the global market**

Hao Dang is a Vietnamese entrepreneur and owner of Grass, an enterprise that works to tap bamboo's potential for high value addition in an environmentally friendly way (see box below). He has developed an e-commerce platform to help train local communities and artisans in bamboo design, and link them to global markets to sell their bamboo products. The system, which is running successfully in a number of Asian countries, also provides warehousing, distribution and access to e-commerce to people and rural communities. The aim is to link communities directly to markets, using this under-used renewable natural resource that is within reach of thousands of communities. In its business model, Grass works with rural producers to help them develop added-value products that will attract the consumers in high-income countries – a win-win partnership for the platform and communities.

“Bamboo has great potential to be unlocked in Africa's building sector, where massive urbanisation is progressing, with huge demand for building materials.”

*Eduardo Rojas-Briales,  
Assistant Director General*

### **For this entrepreneur....'design is everything'**

Vietnamese entrepreneur Hao Dang is CEO of Grass, a company that links communities and villagers producing bamboo goods to the world market. The company's e-commerce platform is poised to train African artisans in design and value addition, connecting them to new buyers in Europe, Asia and North America.

#### **What is the focus of your company?**

I used to work for Apple computers and my mission in life is to 'iphonise' bamboo, meaning that, in the words of Steve Jobs, we are making 'insanely beautiful' bamboo products for inside and outside the home.

#### **So how does it work and where do you get your bamboo?**

We take the raw material sourcing it from villages, then we design it and take the finished product to markets. We also train artisans to produce higher quality products, instead of selling bamboo as raw material for very low value. The whole idea is value added.

#### **Given your experience, what potential do you see in Africa?**

Taking the case of Ethiopia, the country has unbelievable resources. In the lowlands there is the solid bamboo which is extremely valuable. All people need is to have training in design, to make products that are suitable for the western market. We can help them take those products to the global market, especially Europe and the USA. What kind of interaction do you have with local communities when you offer them training? It's really hands on. We show them how to work with bamboo and how to make beautiful products from it. It's really not that difficult.

#### **What is the key ingredient for success?**

For every single piece we make – and we sell more than 1,000 products – design is everything. If you add design, ideas and grey matter, you have added value. There are very high profit margins for producers. One large outdoor lighting fixture that we sell in the USA uses four bamboo poles with a combined value of US\$5. The product sells for \$5,000 and people love it.

#### **What is your message on bamboo to Africa?**

I would encourage entrepreneurs in Africa to start thinking about what they can do with material that is not being used right now. They have 1 million hectares of bamboo in Ethiopia. Think what they could do with it! Also, I would invite people not to think about bamboo as a cheap product, but as a high quality product. Quality control is key. But the most important message is that it is possible. So please do it.”

## 4 Bamboo for land restoration – a valuable environmental asset

*When it comes to restoring degraded land, bamboo is a powerful ally. Wherever it grows, bamboo protects and rehabilitates the surrounding environment by conserving soil and water and improving the quality of the land. The plant grows rapidly slowing degradation and repairing damaged ecosystems. It is particularly suited to reforestation, afforestation, agroforestry and watershed protection.*

Its robustness and ability to thrive on the poorest of soils means that bamboo will thrive where other plants cannot survive. This makes it perfect for rehabilitating land damaged by erosion or industrial activity. A number of examples document of places where bamboo is being used to help repair severely degraded land and ecosystems, at the same time producing new revenues for local communities.

Bamboo also combats climate change – providing rapid reforestation and potential for large-scale carbon sequestration. As a versatile material that can replace timber for the manufacture of a wide range of products, it can also play an important role in relieving pressure on forests.

An ideal biomass fuel, due to its fast-growing properties and woody nature, bamboo is a sustainable alternative to timber-based firewood or charcoal that is currently used by 80 per cent of households in the developing world to prepare food and heat their homes. With its long, fibrous, shallow roots, which grow from its rhizomes, bamboo is highly effective in stabilising soil and preventing erosion. Its rapid growth and network of roots also makes it excellent for protecting riverbanks, dam sites, lakes, ponds and slopes.

Its robustness and ability to thrive on the poorest of soils means that bamboo will thrive where other plants cannot survive. This makes it perfect for rehabilitating land damaged by erosion or industrial activity. A number of examples document places where bamboo is being used to help repair severely degraded land and ecosystems, while producing new revenues for local communities.

Bamboo also provides rapid reforestation. And in in doing this, contributes significantly to combating climate change, offering large-scale carbon sequestration. As a versatile material that can replace timber for the manufacture of a wide range of products, it will play an ever-increasing role of relieving pressure on forests.

### **Regenerating degraded lands, reducing deforestation**

The plant's efficiency as a soil binder has been reported in China, Costa Rica, India, Nepal, the Philippines and Puerto Rico. A bamboo plant typically binds 6 cm<sup>3</sup> of soil, making this resource highly effective for rehabilitating land scarred by mining, industry or de forestation. According to the World Resources Institute (WRI) and the International Union for Conservation of Nature (IUCN), over the last centuries, 30 per cent of global forest cover has been completely cleared and a further 20 per cent has been degraded.

Studies show that bamboo boosts nutrients and organic matter, adding humus to soil through leaf fall and increasing soil carbon content. It also helps to raise the water table, with bamboo plants holding 1,000 tonnes of water per hectare.

INBAR's evidence from its years of work with partner countries demonstrates how bamboo helps restore degraded lands. Bamboo plantations are being used to restore vast areas of landscapes in Asia and South Asia, and the plant is also now being adopted as a resource for rehabilitating marginal or damaged land in parts of Latin America and Africa.

As a substitute for timber products, bamboo can make an important contribution to protecting the environment through avoided deforestation. Its resilient, fast-growing, and versatile properties make it well suited to the unique challenges posed by climate change, offering valuable ecosystem services that can help counter increasing temperatures, rainfall variability and desertification.

Bamboo stands can help shield other crops from harsh weather conditions and bamboo forests help increase water percolation and improve groundwater reserves. At the same time, the plant can serve as a sustainable source of alternative income for producers facing difficulties with traditional crops and livestock, due to drought or other climate factors.

Bamboo is being used in some communities for charcoal production in Ethiopia and Ghana. Similar initiatives are helping women to produce charcoal from bamboo in Madagascar, Mozambique and Tanzania and in various parts of India.

"The calorific value of bamboo charcoal is as good as Acacia or Eucalyptus. But it's cleaner, has less smoke and less smell. And having charcoal from a grass species means you can cut and make charcoal to your heart's delight without worrying about deforestation," explained INBAR Director General, Dr. Hans Friederich. "But charcoal is just one aspect. We are working with the development organization, SNV, and discussing with entrepreneurs in Indonesia, Kenya and Spain to better understand the and demonstrate how bamboo can be used for local electricity production. When perfected, this will have big potential for villages and communities how are currently living off the electricity grid.

#### **In India – a new lease of life**

Land used for brick making, which devastated a large area in Allahabad, India, has been restored with the help of bamboo. In just a decade, the badly degraded land, which was left totally unusable when the brick making venture closed down, has been turned back into a green, productive area.

Working with local partner the Utthan Centre for Sustainable Development and Poverty Alleviation, INBAR planted an initial 300 ha of bamboo. Ten years later, the area is unrecognisable. Bamboo is now part of a large-scale land rehabilitation scheme benefiting 786,000 people in 96 villages. The plant is used in an agroforestry system, grown around the edges of fields. The leaves fall over ponds and provide fodder for fish, meaning producers have to buy less fish food. Today, bamboo provides about 10 per cent of the total annual incomes of local farmers.

One unexpected but welcome side effect has been a fall in child mortality rates. According to a local doctor, the unexpected decline is due to the new energy supply provided by bamboo. As a result, life-saving vaccines can be stocked safely in fridges and administered to children. Previously this was impossible because of the unreliable performance of the local grid.

#### **Big benefits for land restoration in China**

In China, government policies are promoting the conversion of marginal agricultural sloping land into forest land. In provinces where bamboo is the major native species, the restoration has been carried out with bamboo species. During the past 15 years, bamboo-based restoration of degraded lands has been conducted in 2,300 counties in 25 provinces, involving 32 million rural households and 124 million farmers. The total conversion area is 29 million ha, with a financial input from central government totalling an estimated US\$60 billion.

"Cameroon has a wealth of bamboo resources. We are looking at China's experience in planning our bamboo sector development.

*Koulagna Koutou Denis,  
Secretary General for Forests  
and Wildlife, Cameroon.*

### Ethiopia's strategy for sustainable land management

Ethiopia's Sustainable Land Management Programme (SLMP) uses bamboo as a key resource to rehabilitate degraded lands and protect its landscapes and watersheds. Now in its second phase, the programme has joined forces with INBAR to use bamboo to plant degraded land, introducing new species and technologies.

In this initiative, Ethiopia's Ministry of agriculture and INBAR work together to develop the bamboo resource base of a series of pilot watersheds, and build the capacity of communities and government line agencies on sustainable bamboo development and management – transferring knowledge, planting and forest management skills and technologies. Carbon finance will become an integral part of the country's sustainable land management approach in the target watersheds.

Speaking at the Summit, Ato Million Alemayehu Gizaw of the World Bank said that helping farmers to see the benefits is essential to the success of this second phase of SLMP, and to all initiatives involving bamboo and small-scale producers in Africa. "How can we put a coin in a farmer's pocket? This is what we need to clearly demonstrate," he said.

## Bamboos and 'invasiveness'

When the topic of bamboos is discussed, the issue of invasiveness often arises. The short answer to this question is that there are some 1250 different bamboo species with a variety of characteristics. Bamboos are described in two main types, based on the way they grow and expand.

*Running bamboos*, typically growing in temperate climates, produce poles from underground stems that grow and expand horizontally under the soil, forming groves of usually widely spaced poles (known as 'monopodial' bamboos). These running bamboos may extend more than 10 meters in a year (Shananker et al., 2004<sup>1</sup>). *Clumping bamboos*, usually tropical, have short underground stems and produce poles that stay close together, forming clumps that do not expand as they grow (known as 'sympodial' bamboos). There are a number of intermediate types that have both running and clumping properties.

The species of bamboo chosen for any rural development activity will depend upon a variety of characteristics and application required – ranging from the nature and straightness of the poles it produces, to the minimum temperature and rainfall in which it can grow, to growing behavior.

Invasiveness is often context specific and there is no general agreement on the subject. Some pieces of legislation and guidelines refer to bamboos' growth habits in relation to their likelihood of invasiveness. The European Union has a Regulation on Invasive Alien Species<sup>2</sup> – this lists harmful invasive species, focusing on those alien to the EU and identified in a detailed risk assessment, and does not differentiate between different bamboo species, considering them all as a threat. The United States Department of Agriculture (USDA) profiles two bamboo types in its list of invasive species<sup>3</sup>. It cautions that this is not a list of all invasive plants, nor does it have regulatory implications, and that profiles are provided for information. The list includes *Phyllostachys aurea* (golden bamboo). The US National Park Service lists<sup>4</sup> three species as invasive: Common bamboo – *Bambusa vulgaris*; Golden bamboo – *Phyllostachys aurea*; and Arrow bamboo – *Pseudosasa japonica*. But Australia, one of the most vigilant countries against invasive species, has no bamboo species listed in its list of Weeds of National Significance<sup>5</sup>.

A statement by the American Bamboo Society (2012<sup>6</sup>) says bamboos have low potential for invasiveness, but recognizes that some running bamboos can be aggressive spreaders and form large stands if they are not well managed. It concludes that most situations where bamboos are problematic, especially in urban and suburban settings, are because they have not been properly planted and maintained or not been properly disposed of.

These different views show the need for more clarity. In rural development, a number of examples show how fast-growing bamboos have been the foundation of rapid rehabilitation of severely degraded lands, both in India and Africa. In these cases, fast-growing bamboos were the plant of choice for development experts looking to rapidly (in 3-5 years) bringing debilitated soils back to life, and livelihoods back to people living there. In all cases, a choice of a type of bamboo for development projects should require a technical assessment of the characteristics of the plants, following national legislation and international phytosanitary practices, before the import and use of any exotic species. INBAR is working with partners to bring more clarity and evidence-based technical information to this issue.

<sup>(1)</sup>Shananker, R.U., K.N. Ganeshaiyah, K. Srinivasan, V.R. Rao, and L.T.Hong. 2004. Bamboos and rattans of the Western Ghats. Population Biology, Socio-economics and Conservation Strategies. Ashoka Trust for Research in Ecology and the Environment (ATREE).

<sup>(2)</sup>[http://ec.europa.eu/environment/nature/invasivealien/index\\_en.htm](http://ec.europa.eu/environment/nature/invasivealien/index_en.htm). EU Regulation 1143/2014.

<sup>(3)</sup><http://www.invasivespeciesinfo.gov/plants/main.shtml>

<sup>(4)</sup><http://www.nps.gov/plants/alien/pubs/midatlantic/bamboos.htm>

<sup>(5)</sup><http://www.weeds.org.au/WoNS/>

<sup>(6)</sup><http://www.bamboo.org/index.php>

## Resources and further reading

**Comparative Analysis and Policy Recommendations on Developing Bamboo Resource Tenure Systems in Asia and Africa.** Wang, X.L. (2006) INBAR  
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**Indicators and Determinants of Small-Scale Bamboo Commercialization in Ethiopia,** Tefera B. Endalamaw \*, André Lindner and Jürgen Pretzsch  
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By A.A. Ogunjinmi, H.M. Ijeomah and A.A. Aiyeloja Journal of Sustainable Development in Africa (Volume 10, No.4, 2009)  
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**Socio-economic Importance of Bamboo among the Nagas of Nagaland** Longshibeni N. Kithan Department of Anthropology, NEHU, Shillong, Meghalaya, India  
[http://www.krepublishers.com/02-Journals/JHE/JHE-48-0-000-14-Web/JHE-48-3-000-14-Abst-PDF/JHE-48-3-393-14-2634-Kithan-L-N/JHE-48-3-393-14-2634-Kithan-L-N-Tx\[6\].pdf](http://www.krepublishers.com/02-Journals/JHE/JHE-48-0-000-14-Web/JHE-48-3-000-14-Abst-PDF/JHE-48-3-393-14-2634-Kithan-L-N/JHE-48-3-393-14-2634-Kithan-L-N-Tx[6].pdf)

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**The Potential of Bamboo is Constrained by Outmoded Policy Frames** Kathleen Buckingham, Paul Jepson, Liangru Wu, I. V. Ramanuja Rao, Sannai Jiang, Walter Liese, Yiping Lou, Maoyi Fu Royal Swedish Academy of Sciences, 2011

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## SUMMIT AGENDA

November 5, 2014

### **INBAR Summit: BAMBOO AND RATTAN IN THE GREEN ECONOMY Summit agenda**

#### **Opening ceremony (09.00 – 10.00)**

Welcome speech – H.E. Sileshi Getahun, State Minister, MoA

Video message – Achim Steiner; UN Under-Secretary-General and Executive Secretary of UNEP

Keynote address – Dr Eduardo Rojas-Briales; Assistant Director-General and Head of Forestry Department, FAO, Rome

Opening Speech – H.E. President Mulatu Teshome, Ethiopia

#### **First round table discussion – international and national policies for green bamboo and rattan development (10.30 – 12.15)**

##### **Panelists**

H.E. Nii Osah Mills; Minister for Lands & Natural Resources, Ghana

H.E. Sileshi Getahun; State Minister for Agriculture, Ethiopia

H.E. Koulagna Koutou Denis, Secretary-General for Forestry and Wildlife, Cameroon

H.E. Gary Quince; Ambassador of the European Union to the African Union

Dr Eduardo Rojas-Briales; Assistant Director-General and Head of Forestry Department, FAO, Rome

Facilitated by Dr Hans Friederich, INBAR

#### **Second round table discussion – the role of the private sector in a green bamboo economy (13.45 - 15.15)**

##### **Panelists**

Arjen Veltman; Commercial Director, MOSO International, The Netherlands

Ms. Sun Jialin, Vice President, Long Hua Group, China

Michael Gebru, CEO Bamboo Star Agro-Forestry Company, Ethiopia

Hao Dang; owner, Grass Co, Vietnam

Dr. Fu Jinhe, Senior Advisor, INBAR

Facilitated by Mr Tamane Hailegeorgis, GIZ

#### **Third round table discussion – Bamboo for Landscape Restoration (15.45 – 17.30)**

##### **Panelists**

Million Alemayehu Gizaw; The World Bank

Melaku Tadese; Advisor, Ethiopia Sustainable Land Management Programme

Mr. Wang Chunfeng; Deputy Director-General International Cooperation, State Forestry Administration, China

Joseph Osiakwan; Ministry of Lands & Natural Resources, Ghana

Dr Desta Mebratu; Deputy Director, Regional Office for Africa, UNEP

Facilitated by Dr Kathleen Buckingham, WRI

#### **Closing and presentation of INBAR contribution to the Bonn Challenge (17.30 – 17.45)**

Dr Hans Friederich, INBAR

## INBAR SUMMIT: BAMBOO AND RATTAN IN THE GREEN ECONOMY

### PARTICIPANTS

#### High Level representatives

H.E. Mulatu Teshome; President of the Federal Democratic Republic of Ethiopia, Federal Democratic Republic of Ethiopia

H.E. Ato Sileshi Getahun; State Minister of Agriculture, Federal Democratic Republic of Ethiopia

H.E. Kebede Yemam; State Minister of Environment and Forests, Federal Democratic Republic of Ethiopia

H.E. Denis Koulagna Koutou; Secretary General for Forests and Wildlife, Republic of Cameroon

H.E. Nii Osha Mills; Minister for Lands and Natural Resources, Republic of Ghana

H.E. Gary Quince; Ambassador of the European Union to the African Union

Eduardo Rojas-Briales; Assistant Director General, Head of Forestry Department, Food and Agriculture Organization of the United Nations (FAO)

Achim Steiner; UN Under-Secretary General and Executive Director, United Nations Environment Programme (UNEP)

Hans Friederich; Director General, International Network for Bamboo and Rattan

#### INBAR Council members or their representatives

Lucrecia Santinoni; Directora Nacional de Produccion Agricola Y Forestal Subsecretaria de Agricultura, Ministerio de Agricultura, Ganaderia Y Pesca, Argentina

Revocat Mukama; Adviser, Department of Forestry, Ministry of Water, Environment, Land Planning and Urbanism Burundi

Mahamat Habibou; Director, Promotion and Processing of Forest Products, Ministry of Forestry and Wildlife Cameroon

Juteau Deadjufo Tousse; Legal And Political Officer, Division Of Legal Affairs And Treaties, Ministry Of External Relations, Cameroon

Jennifer Bloom; Second Secretary- Development, Ethiopia Program, Canadian Embassy, Ethiopia

Wang Chunfeng; Deputy Director General, Department of International Cooperation, State Forestry Administration, China

Jing Liao; Program Officer, Department of International Cooperation, State Forestry Administration, China

Miguel Arturo Alvarez Gonzalez; Senior Researcher on Bamboo and Rattan, Silviculture section, Agroforestry Research Institute, Cuba

Tania Villegas Segovia; Advisor, Undersecretary of Forestry, Ministry of Agriculture, livestock Aquaculture and Fisheries, Ecuador

Joseph Osiakwan; Principal Planning Officer/Coordinator for Baradep/INBAR Focal Point, Forestry Directorate, Ministry of Lands and Natural Resources, Ghana

Gordon Sigu Onduru; Principal Scientist/INBAR Focal Point Contact Person, Kenya Forestry Research Institute, Ministry of Environment, Water and Natural Resources, Kenya

Eric Olivier Rabenasolo Solofoniaina; Directeur de la Valorisation des Ressources Forestieres, Direction Générale des Forêts, Ministère de l'Environnement et des Forêts Madagascar

Nkhamoza Nyirenda; Principal Forestry Officer, Department of Forestry, Ministry of Natural Resources, Energy and Mining, Malawi

Teresa Guila Nube; Forest Engineer, Community Management of Natural Resources, Ministry of Agriculture, Mozambique

Ramesh Shakya; Officiating Director General, Department of Forest Research and Survey, Ministry of Forests and Soil Conservation, Nepal

Adebayo Ibrahim; Assistant Director, Forestry Department, Federal Ministry of Environment, Nigeria

Adama Kone; Agroforestry Engineer, Agence Nationale des EcoVillages (ANEV), Ministère de l'Environnement et du Développement Durable, Senegal

Koffi Gnronfoun Kodjovi; Director of Forest Resources, Management of Forest Resources, Ministry of Environment and Forest Resources, Togo

Siamelie Latu; Ambassador, Embassy of the Kingdom of Tonga to the People's Republic of China, Ministry of Foreign Affairs, Government of the Kingdom of Tonga, Tonga

Denis Mutaryebwa; Plantation Development Specialist, Directorate of Plantations, National Forestry Authority, Uganda

Son Nguyen Nam; Forestry Senior Official Department of Forest Development, Vietnam Administration of Forestry, Vietnam

## **Panelists and discussants**

Wang Chunfeng; Deputy Director-General, International Cooperation, State Forestry Administration, China  
Sun Jialin; Vice President, Long Hua Group, China  
Michael Gebru; CEO, Bamboo Star Agro-Forestry Company, Ethiopia  
Melaku Tadesse; Advisor, Sustainable Land Management Programme, Ethiopia  
Joseph Osiakwan; Ministry of Lands and Natural Resources, Ghana  
Desta Mebratu; Deputy Director, Regional Office for Africa, UNEP  
Kathleen Buckingham; World Resources Institute, USA  
Hao Dang; Owner, Grass Co., Vietnam  
Million Alemayehu Gizaw; The World Bank, Ethiopia

## **Representatives of Intergovernmental Agencies**

Ababu Anage; Climate Change specialist, UNDP, Ethiopia  
Francisco Carreras; Head, EU Delegation, Ethiopia  
Stephen Danyo; Senior Natural Resources Specialist, TTL, SLMP programmes, World Bank, Ethiopia  
Monique Fofor Ekoko; Deputy Country Representative, UNHCR/UNECA, Ethiopia  
H.E. Chen Guanzhe; Country Director, World Bank, Ethiopia  
Habtemariam Kassa; Researcher CIFOR, Ethiopia  
Younhee Kim, UNEP  
Robson Mutandi; Country Director and Representative, IFAD, Ethiopia  
Elvis Paul Tangem; Coordinator, Great Green Wall for the Sahara and SAHEL Initiative, African Union Commission

## **Representatives of Bilateral Agencies**

Rully Arimaya; Embassy of the Republic of Indonesia to Ethiopia  
Daniel Bahiru; Embassy of the Republic of Indonesia to Ethiopia  
Chandra Hasan; Embassy of the Republic of Indonesia to Ethiopia  
Christian Jahn; Deutsche Gesellschaft für Internationale Zusammenarbeit, Ethiopia  
Mr. Fritz Jung; Representative of bilateral development cooperation, German Embassy, Addis Ababa, Ethiopia  
Ramli Saud; Embassy of the Republic of Indonesia to Ethiopia, Addis Ababa, Ethiopia  
Johannes Schoenberger; Deutsche Gesellschaft für Internationale Zusammenarbeit, Ethiopia  
Danayit Tadesse; Deutsche Gesellschaft für Internationale Zusammenarbeit, Ethiopia  
Melaku Tadesse; Deutsche Gesellschaft für Internationale Zusammenarbeit, Ethiopia  
Amare Worku; Deutsche Gesellschaft für Internationale Zusammenarbeit, Ethiopia  
Lin Zhang; Embassy of the People's Republic of China to Ethiopia, Addis Ababa, Ethiopia  
Gabriel Kruk; Deutsche Gesellschaft für Internationale Zusammenarbeit, Addis Ababa, Ethiopia  
Sarah Simons; SNV Netherlands Development Organisation, Ethiopia

## **Representatives of the Sustainable Land Management Programme (SLMP), Ministry of Agriculture, Government of Ethiopia**

Muleta Wember  
Yiftusira Yitayew  
Aberash Uregesa  
Tibebu Reta  
Alemtshay Mezegebu  
Meskerem Legesse  
Girma Kiibret  
Martin Stewart  
Mengistu Adamu  
Lidia G. Egiabher  
Hana Habetamu

### **Other Ethiopia national bodies represented**

Ministry of Agriculture; 18 representatives  
Ministry of Environment and Forests; 3 representatives  
Ministry of Culture; 3 representatives  
Ministry of Foreign Affairs; 2 representatives  
Ministry of Water; 1 representative  
Ministry of Education; 1 representative  
Agricultural Investment Agency; 1 representative  
Bureau of Industry and Urban Development; 1 representative  
Ethiopia parliament; 1 representative

### **Ethiopia regions represented**

Oromia; 2 representatives  
SNNPR; 4 representatives  
Amhara; 5 representatives  
Tigray; 2 representatives

### **Others**

45 national media representatives  
6 representatives of national research centres  
17 representatives from national and overseas private sector companies  
6 representatives from national NGOs/CSOs  
32 others

### **International Network for Bamboo and Rattan (INBAR)**

Tesfaye Hunde; Regional Coordinator, East Africa  
Michael Kwaku; Regional Coordinator, West Africa  
T.P. Subramony; Regional Coordinator, South Asia  
Hao Ying; Director, Membership Affairs  
Michael Devlin; Director, Communications and Outreach  
Fu Jinhe; Senior Advisor  
Pi Meiling; Membership Officer  
Biruk Kebede; Project Officer, Ethiopia  
Tamru Demsis Temam; Consultant, Ethiopia





