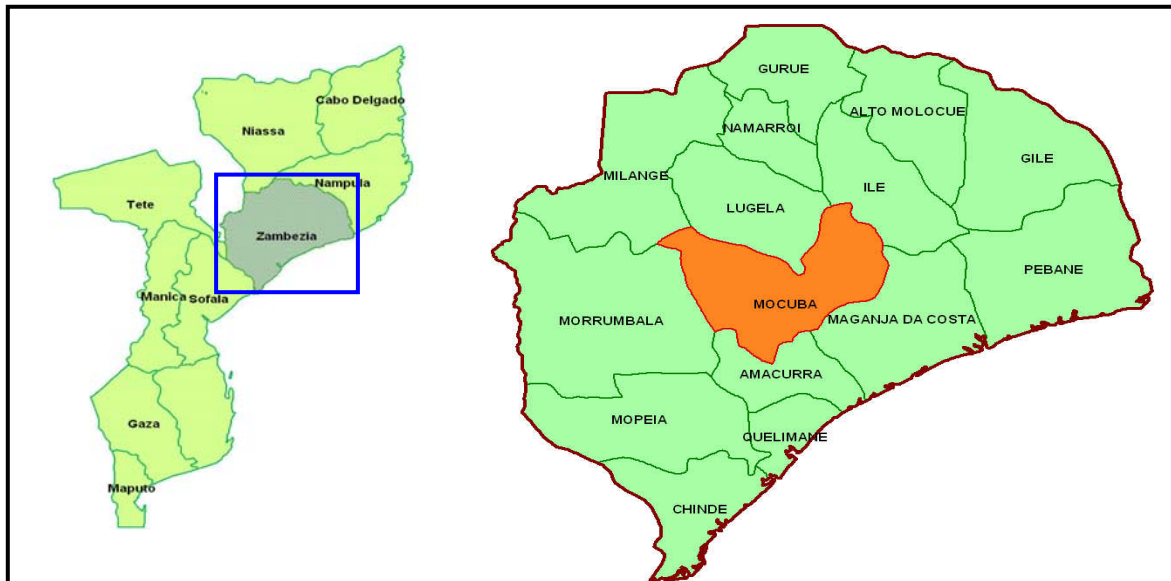


Project title:
Rural Enterprise Development
for Livelihood Enhancement: Awareness
Raising, Policy Development &
Demonstrations - Mozambique





in 2004/05, as part of IFAD grant 774, INBAR began to undertake action research in Mozambique to replicate technologies and knowledge, which were developed in other countries and regions under IFAD grant 518 (2001-2004). Initial action research was focused on evaluating bamboo resources in Mozambique, providing policy recommendations, building stakeholders bamboo propagation capacity, and validating bamboo charcoal briquetting technology.

Following this work, rural bamboo charcoal production was identified as a clear entry point for poverty alleviation. This led to IFAD awarding INBAR's partner programme, NTFP GPP, a small grant (911). Under the grant, further work was conducted on charcoal, with a review of charcoal production and supply chains undertaken, followed by a charcoal workshop in the capital Maputo.

In 2008, to consolidate this work, INBAR also helped to establish MOZBAMBU, a national NGO, dedicated to supporting development of bamboo and other NTFP sectors. INBAR is now looking for funding to establish a pilot ARS programme, with Mocuba District in Zambezia province selected as the future site.

The Context

In Mozambique, over 80% of national residents use wood-based fuels for space heating and cooking (Falcao & Magane, 2003). This contributes largely to national deforestation rates of 219,000 ha per year, with the annual exploitation of wood for biomass fuels estimated at around 17 million m³ (Pereira *et al*, 2002). As rural communities depend on forests for livelihoods and income, deforestation is a major cause of rural poverty alle.

However, despite this challenge, charcoal production is a large cottage industry with the potential to help alleviate rural poverty, especially among women. At present, annual urban domestic markets for charcoal are worth US\$ 200 million, with 15,000 rural producers working in the sector (FAO, 2004). However, due to current use of physically demanding, wood-based production methods, many women are unable to make charcoal on a commercial scale, and, thus fail to access the market.

Due to recent developments in charcoal processing (IFAD grant 518), it is now possible to make charcoal at the household level using bamboo and other agri-residue biomass. This charcoal is cost-competitive with wood

charcoal, and of higher quality. Therefore, promotion of the sector can help to protect Mozambique's natural forests, while also alleviating rural poverty. As IBAR's work in other countries has shown, in the future, bamboo livelihood development programmes can also be used as entry points for a diverse number of additional sectors, such as construction, furniture, handicrafts, and fishing.

MAIN RESEARCH PROGRAM COMPONENTS

Components:

- GIS and remote sensing based evaluation of national bamboo resources.
- Promoting bamboo propagation.
- Validating bamboo charcoal production technology
- Policy and advocacy work.

CONDITIONS FOR REPLICABILITY

Scaling-up: In Mocuba District, Zambézia Province, where a future ARS will be based, there is large potential to up-scale upon initial bamboo charcoal trainings, which have validated bamboo charcoal as high-quality, cost competitive alternative to wood charcoal. In Mocuba District, due to widespread rural poverty (per capita income is just US\$96 in a year), over 80% of local communities use firewood and wood charcoal to meet household cooking and heating energy needs. However, if women start working part-time from home producing bamboo charcoal using drum kilns, they can add US\$ 1,142 to their annual incomes (see Data Entry Box for more information). The introduction of new bamboo and agri-residues charcoal production methods in Mocuba District could benefit nearly 160,000 rural women, who are currently unable to earn remunerative incomes from agriculture alone.

In addition, development of an ARS programme in Mocuba District will also complement an ongoing Finnish Government province development project, which has a pilot area in Mocuba district - Programa de Desenvolvimento de Zambezia (PRODEZA). This programme aims to develop small to medium size rural enterprises, which utilize local bamboo and small biomass resources for livelihood and income generation.

Scaling out: As capital investments for ARS community charcoal enterprises are low, this model can be easily replicated across many village communities in Mozambique and other African countries. For example, oil drum kilns used for producing bamboo charcoal are locally available and cost around US\$ 100. The required production skills and technologies for bamboo charcoal are easily transferable (INBAR has already successfully validated bamboo charcoal production in Ghana, Tanzania, Ethiopia, India, and the Philippines), as long as suitable bamboo resources and markets are available.

In the future, there is also scope to diversify into different rural markets in Mozambique. For example, In Sofala Province, mangrove forest degradation caused by the fishing sector is a major issue that threatens the livelihoods of around 26,000 households. Bamboo could be used as a substitute for mangrove boats, fishing rods, and storage facilities. This work could link with the ongoing IFAD Sofala Bank Artisanal Fisheries Project

EXISTING LINKAGES WITH OTHER IFAD INITIATIVES

- Activities initiated in Mozambique are one of several INBAR ARS Programmes developed by INBAR LEDP, under IFAD grants TAG 518, TAG 774. The project also has linkages with IFAD small grant 911.

INBAR/FAO bamboo Charcoal Training 2004/05



Bamboo being cut and Split



Cut bamboo sun dried



Metal Kiln mounting



Initiating fire



Phased addition of bamboo



Flaming drum being closed



Reducing air intake for carbonisation



Fully closed for carbonisation



Carbonised bamboo charcoal



Bamboo charcoal



Bamboo vs wood charcoal test



Manual bamboo charcoal powdering



Charcoal powder for clay briquette



Drying Hand made bamboo briquettes



Mocuba 60% underutilized biomass.

THE PROGRAMME IMPLEMENTATION

TARGET GROUPS AND OUTPUTS

Project target group:

- The ARS primary target groups were government officials and policy-makers
- The ARS also targeted women, youth, and bamboo smallholders, through bamboo charcoal production and market demonstrations.



IFAD TAG 774 trainees

Institution involved during the ARS process:

Inter-Governmental:

The Food and Agriculture Organization (FAO) of the United Nations (UN) – INBAR worked with FAO between 2004/05 in Mozambique to conduct bamboo resource evaluations. FAO also supported initial field validation and community demonstrations/trainings on technology for bamboo briquette charcoal production.

Government Agencies:

Agrarian Research Institute of Mozambique (IIAM), Ministry of Agriculture– The institute works closely with INBAR and provides office space in Maputo for ARS programme activities.

National Directorate of Lands and Forests (DNTF), Ministry of Agriculture – Members from the agency have been involved in forming policy recommendations for the bamboo sector. Private individuals from the Agency are also members of MOZBAMBU (see below)

Universities:

Faculty of Agronomy and Forest Engineering, Eduardo Mondlane University – has worked with INBAR on technology components of ARS research. Private individuals from the faculty are also members of MOZBAMBU (see below)

NGOs:

The Association for Bamboo Promotion and Biodiversity Conservation in Mozambique (MOZBAMBU) – INBAR is now working with MOZBAMBU, a national NGO established in 2008, to develop project proposals for bamboo-based livelihood development projects.

Outputs:

- Bamboo propagation manual (Portuguese) developed and distributed to project target groups
- Metal kilns manufactured from used 200-liter oil drums field validated, with an efficiency of 28 -33% depending on operator skill and experience; traditional earth-mound kilns are just 10-15% efficient
- MOZBAMBU established with an informal network of supporting institutions

IMPACTS

Tangible impacts

Impacts on the human capital:

- Capacity of Government agencies built in bamboo propagation and charcoal kiln fabrication
- through market demonstrations and trainings, rural community have improved awareness of bamboo charcoal as a sustainable alternative to wood charcoal

Impacts on the social capital:

- MOZBAMBU is now formally registered and conducting advocacy and awareness raising work on behalf of bamboo and other NTFP sectors

Impacts on the natural capital:

- Bamboo-based charcoal production has the potential to reduce deforestation by providing a sustainable alternative to wood charcoal (bamboo resources are fast growing and can be harvested every 3-5 years)



Intangible Impacts

Due to successful demonstration of bamboo charcoal technology through the IFAD project, INBAR and MOZBAMBU were selected as finalists for the World Bank's prestigious Development Marketplace in September 2008 (pictured left). While the project did not receive grant funding, fellow finalists choose MOZBAMBU and INBAR for the Peer Choice Award. This helped to raise MOZBAMBU's profile, with a number of alternative donors now being approached to fund the project.

CONSTRAINTS FACED DURING THE IMPLEMENTATION

Main difficulties faced during the process were:

Internal constraints

- Limited time and budget to conduct ARS training events
- Local partners still have limited technical capacity in areas such as bamboo propagation, kiln fabrication, and bamboo charcoal production.

External constraints

- Informal nature of bamboo and charcoal sectors hinders statistics collection, decision-making, and policy development
- Lack of additional donor funds to consolidate initial work and start field-based initiatives
- Negative perception community perceptions about bamboo as a charcoal substitute material

Sustainability, Acceptability and Accessibility

Accessibility

Because of the programme's linkage with INBAR, technical and research outputs from the programme are available for replication at both the national and international level. In Mozambique, the programme will now work with MOZBAMBU to disseminate information to key national stakeholders.

Internationally, action research from Mozambique can be adaptively replicated across INBAR's network of 34 countries, particularly in Africa. In addition, research outputs are available at low, or no cost to individuals and community groups operating in INBAR member countries.

Institutional Sustainability and Degree of Farmers' Involvement in the Research Programme

The ARS programme has a strong institutional foundation with MOZBAMBU receiving ongoing support from INBAR, as well as private members in a number of key Government and technical agencies. For example, IIAM is currently providing MOZBAMBU's secretariat with office space in their Headquarters in Maputo. However, current institutional capacity still needs to be built, as at present MOZBAMBU has no source of financing. This is critical for developing field site programmes, which will bring livelihood development impacts to rural communities.

While, to date, the ARS programme has primarily focused on building capacity and awareness of key Government agencies, a number of efforts have been made to involve farmers in demonstration and training events. For example, once bamboo charcoal was validated in Mozambique, ARS programme staff made a number of visits to rural markets to give bamboo charcoal demonstration and training events. These events raised awareness of bamboo charcoal as a sustainable alternative to wood charcoal. In addition, there is now interest among farmers in Mocuba District to establish bamboo-based charcoal production.

Gender dimension

Bamboo charcoal production using modified oil drum kilns is very gender friendly. The portable kilns enable women to collect small woody biomass and produce charcoal at home. Each drum produces a 40 kg bag of charcoal in 6-8 hours (2 cycles), with recovery rates of over 25%. Bags sell for US\$ 3. As the kilns use uniform, small-sized biomass, they reduce physical demands on women during collection. Using this technology rural women can establish their own household enterprises.



■ **DISSEMINATION PATHWAYS**

- *Communication strategies at the village level:*
 - Face-to-face meetings
 - Rural market bamboo charcoal production and demonstration events
- *Communication strategies at the national and international level:*
 - Meetings with government departments and other enabling agencies
 - Meetings with technical experts in the field
 - Technical reports and publications

■ **FURTHER RESEARCH NEEDS**

- Local partners still require additional training, especially in bamboo propagation and resource management.
- To introduce bamboo initiatives at the field level, INBAR will try to develop links with ongoing IFAD loan projects, such as the Sofala Bank Artisanal Fisheries Project
- Action research needs to be conducted on bamboo charcoal production at the rural household level. The study will produce a pro-poor, production model, which can be replicated across the country.

ANNEX ONE: DATA ENTRY BOX

Based on results of field testing for bamboo briquette charcoal, which show that one drum kiln can produce one 40 kg bag of charcoal every 6-8 hours, and the assumption that bamboo briquette charcoal can be sold at US\$0.06 (wood equivalents currently sell for US\$0.08), INBAR estimates that a rural household could earn an income of over US\$1,000 per year from producing bamboo charcoal. In the future, INBAR aims to promote household cluster-based production, with an initial pilot of 250 families in Mocuba District.

Production & Sales Projection	Unit	Unit Rate (US\$)	
Family			1
# working days per year			240
# Briquettes per day			120
Total Briquettes Production per year			28800
Cost of Briquettes			\$0.06
Total Sales Revenue per Family in a year			\$1,728
Project Adresses (Families)			250
Total Sales Revenue per year			\$432,000
Capital Expenditure			
Drum Kiln Units	250	\$100	\$25,000
Tools and Equipments	250	\$50	\$12,500
Total Capital Expenditure			\$37,500
Provisioning			
Depreciation	Annual	30%	\$11,250
Interest	Annual	15%	\$5,625
Sales loss	Annual	10%	\$43,200
Insurance (on total sales figure)	Annual	10%	\$43,200
Sustainability Corpus	Annual	10%	\$43,200
Total Provisioning			\$146,475
Profit Projections			
Sales Revenues			\$432,000
Less Provisioning			\$146,475
Profits	240 Days	250 Families	\$285,525
Profits	240 Days	per Family	\$1,142.10
Profits	1 Day	per Family	\$4.76

USEFUL INFORMATION

Key words: Bamboo, Mozambique, Mocuba District, Bamboo charcoal briquettes, kiln

Useful links

www.inbar.int www.inbar.int/livelihood/ldmain.htm *INBAR's Livelihood Development Programme*
www.mozbambu.org

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Acronyms:

ARS	Action Research Site
DNTF	National Directorate of Lands and Forests
FAO	Food and Agriculture Organization
GIS	Geographic Information System
IFAD	International Fund for Agricultural Development
IIAM	Agrarian Research Institute of Mozambique
INBAR	International Network for Bamboo and Rattan
LEDP	Livelihoods and Economic Development Programme
MOZBAMBU	The Association for Bamboo Promotion and Biodiversity Conservation in Mozambique
NGO	Non-Governmental Organization
NTFP GPP	Non-Timber Forest Products Global Partnership Programme
PRODEZA	Programa de Desenvolvimento de Zambézia