

HANDS-OFF! IS IT AN OPTION IN BIODIVERSITY CONSERVATION?

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Introduction

BOCAF is an initiative of JPFIRST Limited to enhance the agriculture and forestry extension services at the foothills of the Eastern Usambara Mountains. BOCAF is an acronym for *Business-Oriented Conservation and Agro-Forestry Initiatives* in Muheza District. The mission of BOCAF is to introduce on-farm technologies to the rural communities that will ease the pressure from eco-destructive means of subsistence. The challenge we would like to contribute to is to introduce eco-farming technologies that have immediate, short-term and long-term economic benefits which will result into environmental conservation as a product. We have a revolutionary idea of turning conservation from an activity to a result.

Our approach aims at introducing improved indigenous practices that the local population can learn from. The main philosophy of our initiative is the seeing-is-believing approach whereby we introduce small-scale, low-capital eco-farming projects that can be perceived by the local population to be demonstrably profitable and yet within the economic means of many. We also assist the villagers to make prioritized inventory of their problems and writing project proposals for funding by the Local Government Authority. Between 1999 and 2001, for example, we assisted Kiumbo Village in this way to implement a self-help project for a water supply scheme, thereby reducing the burden on women. So far, we have achieved all this without taking prominence on the village management structure, thereby keeping ownership of ideas and success to the villagers themselves.

Our methodology involves actually setting up a farm in more or less the same conditions as the villagers and imparting the know-how through their involvement in a variety of ways. We have found that this is a more effective method than the introduction of a project. Projects tend to be regarded as externally-driven and having an end. Our approach leads people to want to imitate, having woken them up to the economic potential of well-chosen agro-forestry systems.

Recognising that our initiatives are in line with their goals, the Critical Ecosystems Partnership Fund (CEPF) agreed to support our efforts for a period of three years beginning 2005. The Critical Ecosystems Partnership Fund is a joint initiative of Conservation International, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. A fundamental goal is to ensure civil society is engaged in biodiversity conservation.

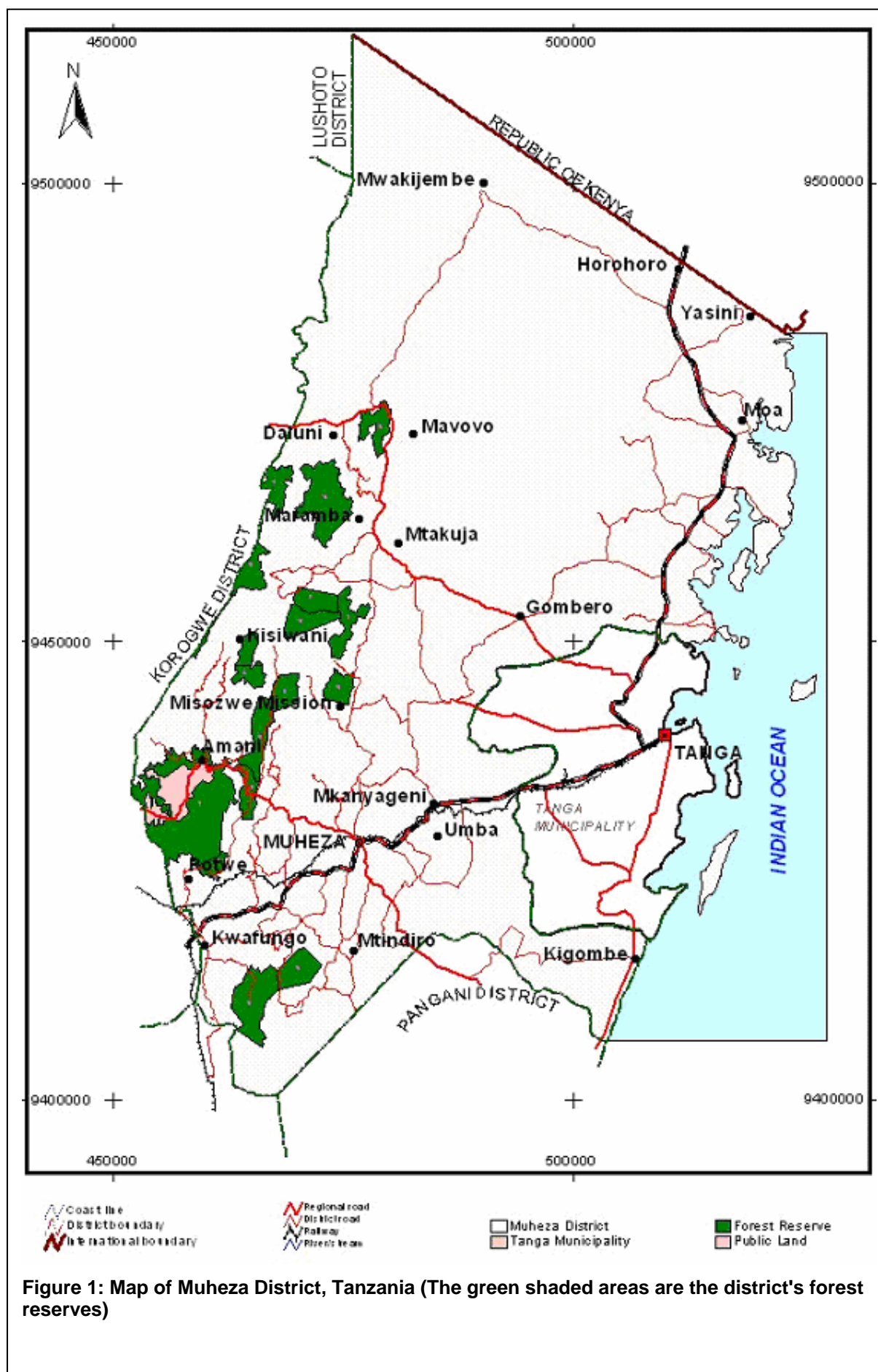
In this article we would like to share out the challenges in biodiversity conservation that we have encountered so far, in trying to transform traditional conservation approaches into viable socio-economic activities.

To understand the nature of the challenges we begin by a short description of the environment where we operate.

A profile of the environment

Location

The BOCAF plots are around the Mavovo-Kiumbo area in the north-eastern part of Maramba Division below the eastern slopes of the Usambara Mountains in the northern part of Muheza District, Tanga Region, Tanzania. The area is located at approximately 4°45' South and 39° East.



The plots are on an extensive old dissected plain at an average altitude of 100 m above sea level. This plain extends into Kenya to the north. To the east it is bounded by the northern tip of the Usambara Mountains, which rise to over 1,500 m above sea level. The Indian Ocean is farther to the east. See map on page 1.

Vegetation and land use

The indigenous natural woodland vegetation has mostly been depleted through wholesale clearing for cultivation and selective harvesting for timber, wood fuel, carvings and construction. In a major part of the area, the remaining vegetation is more or less bushland with shrubs and scattered trees. The area is characterised by abandoned charcoal-burning kilns and numerous old tree stumps, mainly of the reserved tree species locally known as *Mhuhu* or *Mkarambati* (*Brachylaena huliensis*). In this article we shall use these names for this tree interchangeably.

The main land use in the area is subsistence farming for food crops in plots averaging between 1 and 2 hectares. The major annual crops are cassava, maize, cow pea and pineapple. The perennial crops cashew and coconut are the main cash crops, frequently intercropped with banana and other annual crops.

The farm boundaries in the area are not visibly demarcated, a situation which sometimes results into border disputes.

There is a substantial number of free-grazing cattle in the area. These cattle are owned by the local population, but a large part belongs to nomadic pastoralists who originate from neighbouring regions. This has resulted in considerable soil erosion, especially in the northern parts of the plains towards Mwakijembe (see map on page 1).

Another major land use is the harvesting (legal and illegal) of trees for firewood, charcoal, construction of dwellings and sometimes for timber.

Uncontrolled fires are common, especially during the dry season. People start fires for a variety of reasons, including land preparation and stimulating fresh growth of grass for livestock in general land. In many cases these fires get out of control and stray into forest land, cropland and even in residential areas. One such fire devoured a large part of Kiumbo village in 2000.

General climatic conditions

The nearest climatic recording station is at Lugongo Sisal Estate, approximately 10 km away from Mavovo Village. Only rainfall data is recorded there. Temperature and other climatic data are expected to be comparable to other areas in Tanga at the same altitude. Temperature is fairly constant over the year. February is the hottest month (about 27° C). July and August (23° C) are the coolest months. Day and night temperatures differ by about 10° C. Temperature conditions are ideal for most crops. The monthly average climatic data is shown in Table 1.

Table 1: Approximate climatic data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	64	29	156	15	161	46	51	50	66	125	156	147	1,253
Temp(°C)	27.1	27.5	27.4	26.2	24.8	23.9	23.2	23.2	23.6	24.6	25.8	26.6	25.3
ETo ¹	168	174	162	138	114	117	111	120	138	147	150	156	1,695

Sources:

Rainfall: NSS, 1995. Soil Fertility Status of Lugongo Sisal Estate (average for 1949-1971)
Temperature and ETo: Estimates from Tanga Water Master Plan for ARI Mlingano (altitude: 183 m)

¹ ETo (potential evapotranspiration) is an *indicator* of the amount of water that a full grown crop requires to its evapotranspiration. When the available water in the soil from (rainfall and other sources) is less than ETo the crop suffers from moisture stress.

The social and economic environment

Accessibility

Maramba town and some of the villages in our work area are connected to Tanga town (the regional headquarters) by an earth road. This road passes through Maramba town, just outside of Mtakuja and Mavovo villages then through Daluni on to Korogwe through Mashewa. Before Daluni village, there is a turn-off to Mwakijembe and round to the east, where it joins the Tanga-Mombasa road (Refer to the map on the previous page). The Tanga – Maramba – Mashewa road is serviced by commuter buses and mini-buses at frequent intervals throughout the day.

Mavovo and other villages that are located in the centre of the ring marked by the Tanga – Daluni – Mwakijembe – Horohoro road have poor access to this main road network. These villages are accessible only by motorcycles and private vehicles. There are no public transport services covering these villages.

The District administrative headquarters are at Muheza town, about 50 km (equivalent to about 1 to 2 hours drive in a four-wheel drive vehicle depending on the season) from our work area to the south. The road between Muheza and Maramba is inadequately served by public transport. The most reliable access to the District headquarters by public transport is through Tanga town, a circuitous route covering about 100 km and a minimum of 3 hours.

Tanga city provides all the transport and transportation services by air, rail, road and marine to and from outside the region.

Water, power and telecommunication

The East Usambara mountains provide a potentially adequate supply of water for gravity-fed distribution to the villages. At the moment all villages at the foot of these mountains are provided with gravity-water supply. Some of the villages further to the east, however, do not have piped water supply. Mavovo and Kiumbo, which are at the heart of our work area, have unreliable water supply. The villages that do not have piped water supply depend on shallow wells and the main rivers passing through them, which dry up during the dry season in most years.

Maramba town and the villages on the main road between Maramba and Muheza town are connected to the national electricity grid. All the villages in our work area have no electricity supply of any kind.

The area is served by several cellular telephone service providers but the signals in the work area are intermittent, weak or missing altogether. No land-line telephone services exist. There are postal services at Maramba town.

Description of dwellings

For a major part the communities live in villages comprising between 200 and 400 households. In all villages most households are clustered together in crowded urban style; only a few families have begun to move their households to the family land holdings. The



Figure 2: Roadside business on the Maramba-Mashewa road. In the background is the Mavovo-Mwakijembe plain extending into Kenya. Photo by Juvent Magoggo

majority of households comprise one or two huts built on poles and mud with coconut leaf or grass thatched roofs. These houses have no flooring. A small percentage of households have houses with corrugated-iron roofs and may be built on bricks or blocks. Such houses may have cement flooring. Most but not all households have pit latrines with walls of coconut branches or worn-out plastic or canvas sheetings. Muheza District Council estimates that only about two thirds of homesteads in the district have latrines of acceptable standard.

Sources of income

The main sources of income in the area are cashew, coconut, maize, cassava and cowpea. Cashew and coconut are generally looked upon as the official cash crops. However, their planting and management techniques do not take due consideration of contemporary economics for a variety of reason, which are beyond the scope of this article. Another source of income, considered as supplement to the sale of agricultural products, is the harvesting of trees mainly for charcoal, fire wood and poles. For all these uses people prefer *Brachylaena huliensis* because of its high calorific content, tensile strength, durability and its resistance to pests and insect damage. All these products are sold to markets outside the area of production.

During land preparation for seasonal crops and weeding, opportunities for casual farmer-to-farmer employment among the community are generated. These employment opportunities are improved by the presence of non-resident farmers, who have generally more resources than the local farmers.

In general there are few opportunities for formal employment.

Food security

The main staple food in the area is maize, which is supplemented by cassava in times of maize shortage. These are sources of carbohydrates. In reality these staple foods must be complemented with proteinous foods. In our work area cowpea and pigeon pea are the main proteinous crops. Because the available sources of income do not satisfy household income requirements, many families usually sell these food crops immediately after harvest to supplement family income, without due consideration for family food reserves.

Another factor, which forces farmers to sell food crops is lack of household or communal grain storage facilities. These grains are easily attacked by grain borers and pests and farmers do not have access to pesticides and other means of protecting their harvest.

An overall factor that influences food security is the generally unpredictable rainfall distribution – the main climatic factor that determines crop production in the area.



Figure 3: A three-year old *Mkarambati* at Maramba. Photo by Juvent Magoggo



Figure 4: Poor performance of the main staple crops is common in the area. Photo by Juvent Magoggo

Real-life issues in conservation

Policy and legislation

Man selects places for habitation because of the resources available in that area. In our area of work, the utilisation of the forest resources has resulted into such a level of depletion as to raise the concern of conservationists.

To curb this depletion, the government has recently formulated a forestry policy under which the community participates in forestry management and shares in the benefits accruing from the forests. Also, under existing legislation:

- some tree species have been identified for conservation
- harvesting of forest resources is controlled or prohibited altogether

Under the latest forestry policy communities are expected to benefit by way of fines, confiscated products, sales of forest products, tourism and related income. Under this principle, these benefits and incomes become part of the village governments' revenue.

The policy also provides for support to communities to initiate income-generating activities for community-based organisations. Until now this facilitation to community-based organisations in Muheza District is limited to the rain forests in the high-altitude areas. In the lower-altitude areas, where most of our work is based, community involvement in forestry management and facilitation in income generation has not taken root.

Usually community groups are formed on initiatives external to the groups themselves. For this reason these groups tend to expect external support and direction for their growth. Furthermore, our experience with community activities is that the individuals within those groups do not perceive the income potential from those activities to have an impact on their household economy. As a result these communal activities are given little importance by the individuals.

Likewise, our experience in Maramba indicates that the expectations from the sources of income that are identified in the formulation of the area forest management plans are difficult to realise. In actual fact only a small amount of revenue is collected from these sources, which does not seem to have much potential for poverty reduction.

So far there are few signs that the local community is convinced with these conservation types of investments. It appears that these strategies have not only failed to reduce the rate of destruction of forests but have also failed to raise awareness of people to conserve reserved trees found on their holdings. In fact, to avoid later problems with the forestry legislation, farmers prefer to "nip in the bud" most conserved tree species on their farms.

The law and the importance of *Brachylaena huliensis* to the community

We have seen that the livelihood of the local population is dependent quite considerably on the forest resources. In some localities this dependence is of a desperate magnitude. Because of its virtues listed earlier in this article, the *Mkarambati* tree is the main target. In fact this tree has so much importance in the livelihood of both the local population and external markets that the way it is used deserves detailed description in this article. The information in this section is based on casual observation and experience of the authors. All quantitative information and subsequent analysis on this issue are not based on scientific investigation and should not be quoted.

Informal (illegal) harvesting

The main informal use of *Brachylaena huliensis* is the making of charcoal. Although this kind of use is illegal, in this document we shall refer to it as informal use. According to estimates by the forestry office at Maramba about two cubic meters of the tree are required to make one bag of charcoal. Two cubic meters of wood is equivalent to about 2 to 3 mature trees of the tree population now remaining in the Mavovo area. The biggest and most reliable charcoal market is at Tanga (about 100 km away on a poor earth road). The price of charcoal that the charcoal maker receives at the source is less than Tshs 1,000 (less than US\$ 1) while at the regional end market in Tanga it is about Tshs 6,000 (US\$ 5.5) from which the government may receive Tshs 600 (about half a Dollar).

Another important informal use is for fuel wood. The wood is split into small pieces according to the requirement of the market at Maramba, Muheza, Tanga and beyond.

The informal harvesting of *Mkarambati* is indiscriminate: young and mature trees are felled without any special consideration.

People in our work area do not keep data on the amount of charcoal or fuel wood sold. Therefore it is difficult to make an estimate of the proportion of the household income that originates from the sale of charcoal or/and firewood. Viable conservation strategies could easily depend on this knowledge.



Figure 5: The charcoal market at Makorora in Tanga City. Photo by Juvent Magoggo

A special use of *Brachylaena huliensis* in our area is for the making of wood carvings. Locally, this kind of use is not legalised, but the tree is exported illegally outside the country for production of wood carvings. Because of the lucrative nature of this business, this kind of use poses a considerable threat to the tree.

Industrial uses

There is one company at Mombo town in Korogwe District whose business is based on the use of *Mkarambati*. The company has a saw mill and plant for producing floor parquets and another plant that extracts oil from the saw dust.

Floor parquets

This is the main business of Coastal Consortium Ltd. The company officially buys the *Mkarambati* tree from the Forestry and Beekeeping Division. While basically any hard wood can be used to make parquets, the plant prefers *muhuhu*. It is estimated that 1 m³ of sawn wood can produce over 150 m² of floor parquets. Although there is a small local market, most of the parquets are exported. The export price is estimated at between US\$ 14 and 24 per m²; on the local market the price is the equivalent of about US\$ 7.



Figure 6: A section of parquet from *Mkarambati*. Photo by Juvent Magoggo

Medicinal oil

The sawdust that results from the parquet plant are used to extract oil. The company's extraction plant (seen in Figure 7), situated just one or two hundred meters from the parquet factory, uses steam to extract oil from the sawdust. The oil is used for medicinal purposes. According to information obtained

from the management of the plant, one kg of the oil extract fetches over US\$ 50. About 50 kg of sawdust will produce 1 kg of oil.

Apart from the wanton destruction by informal harvesting, the economics of using this precious reserved tree is also wrong.

Put in simple terms and in simplified arithmetic, this means that when the derived income is distributed all around, one cubic meter of *Brachylaena huliensis* is worth less than US\$ 10 into the economy when harvested by the informal sector and over US\$ 1,000 when harvested legally for commercial uses. This arithmetic is presented Table 2 with values in Tanzania Shillings. The table presents a very simplified story whose object is simply to indicate the orders of magnitude of the economies of scale.

Table 2: The simplified *Brachylaena huliensis* arithmetic (per cu. m.)

Formal harvesting		Informal harvesting	
Harvesting license fees	70,000	Harvesting license fees	-
Local Govt levy (5%)	3,500	Local Govt levy	320
Corporate tax	?	Income tax	-
Staff salaries	?	Wages and transportation	?
Water and electricity	?	Kiln fuel	-
Floor parquets (150 m ²)	1,050,000	Income from charcoal	3,000
Medicinal oil extracts	?	Debris for domestic energy	?
Minimum value per cu. m.	1,123,500	Minimum value per cu. m.	3,300

Sources: Coastal Consortium Limited, personal communication
 The Forestry and Beekeeping Dept, Maramba, personal communication
 Personal interviews with different stakeholders

Note: Question marks in this table means that we are not in a position to make an estimate of the value

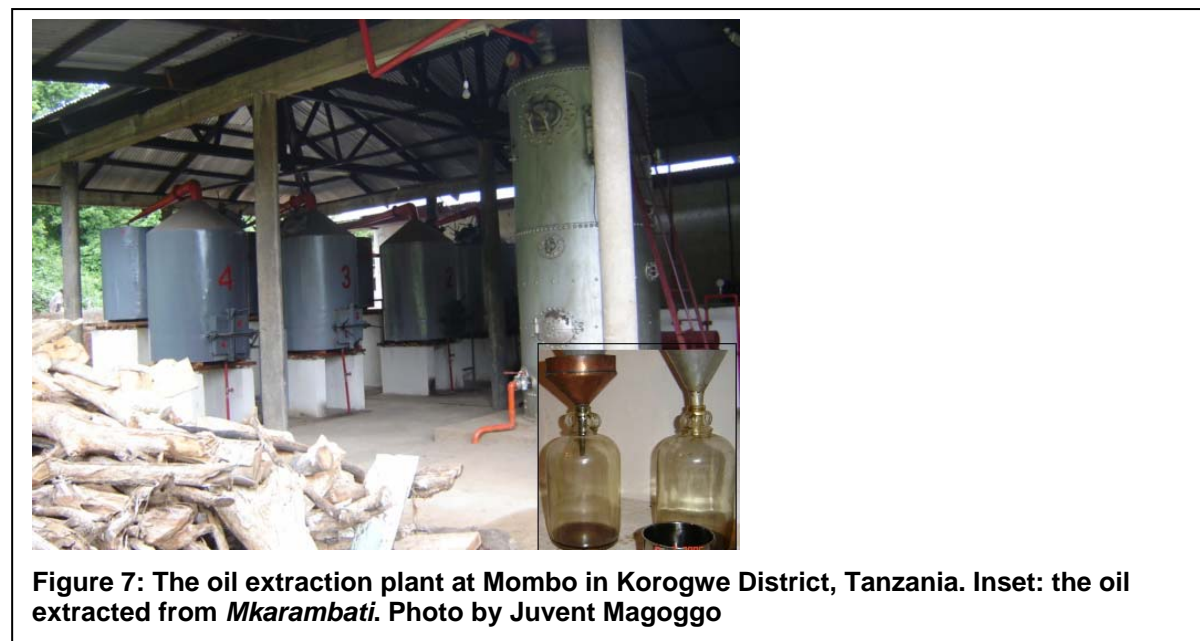


Figure 7: The oil extraction plant at Mombo in Korogwe District, Tanzania. Inset: the oil extracted from *Mkarambati*. Photo by Juvent Magoggo

Is extinction of *Brachylaena huliensis* inevitable?

The economics of using this tree in the ways we have termed *informal* is wrong all round. However for the communities we work with, their basic needs for survival depend on this tree more than on any other. In fact even urban populations in nearby cities and towns, though supposedly more affluent, also depend on forest resources for domestic fuel. This raises a social dimension that makes enforce-

ment of the legislation difficult. So it looks as though depletion of this tree will continue, unless more pro-active approaches are adopted.

Within the limited scope of our activities we have observed that almost all stumps have dried out. These trees do not rot easily and the area is now characterised by numerous tree stumps of *Brachylaena huliensis*. Once in a while, however, we have come across off-shoots of the tree, so the tree is capable of coppicing under certain conditions. When it coppices, it produces numerous off-shoots. On the BOCAF land at Mavovo village, there are coppices of different ages. However, we are not in a position to make an estimate of the age of these coppices.

The plant produces small seeds that are difficult to collect. We do not know the phenology of this tree, but local knowledge exists in our area to collect and grow the tree in a nursery. One of our contract farmers has made some attempts to transfer naturally germinated seedlings from the wilderness to pots in a nursery. At this point we have no idea about the germination rate from seeds or the survival rate of seedlings transferred from the forest. We intend to transfer these seedlings to the BOCAF plots at Mavovo village. The photograph in Figure 3 (page 1) indicates that, when planted under appropriate management, its growth rate is comparable to many timber trees.



Figure 8: *Brachylaena huliensis* coppices on the Mwakijembe plain. Photo by Juvent Magoggo

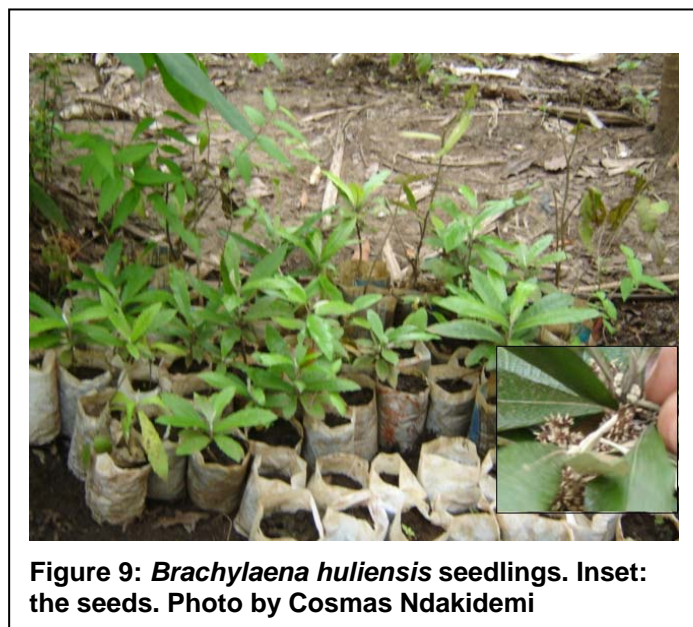


Figure 9: *Brachylaena huliensis* seedlings. Inset: the seeds. Photo by Cosmas Ndakidemi

trees can be left to mature. The present incentive scheme contained in the forestry policy would be regarded as too long-term by most households, whose very survival is constantly threatened by the lack of basic necessities. A more practical approach would be to devise an incentive scheme under which the conserver is paid regular instalments of the final amount due throughout the life of a tree. Apart from expected revenues from the conserved tree, the conservation legislation has expenses which could be diverted to such a scheme. Is it an option?

The coppicing character of this tree and the fact that it can be tamed perhaps offer a glimmer of hope. The question is: what must be done?

What are the options?

It appears that it is possible to grow *Brachylaena huliensis* like other timber trees. If the tree can be raised to maturity, it is then capable of providing both for the industrial uses described earlier in this article and for the informal sector, also described in this article. What are the possibilities for a *Mkarambati* plantation?

For the ordinary households, the idea of such a long-term investment may not be very attractive. We have seen, however, that the government stands to collect a substantial amount of revenue if these

As things stand now, the carving industry for *Mkarambati* harvested in the Mavovo area is based outside the country. One reason for this is the fact that this kind of business is illegal in the area. The sale of *Mkarambati* logs to the carving industry provides a lucrative source of income to the local population. For this reason the local population does not co-operate sufficiently in curbing this business. If the carving business were to be legalised in the area, this would raise the economy of the area, provide employment to youths and contribute to foreign exchange earnings. It is also conceivable that eventually it would raise awareness of the economic importance of conserving and propagating *Mkarambati* to the community. Is this an option?

As we have shown in this article, there is a wealth of indigenous knowledge on how to grow not only *Brachylaena huliensis*, but also other indigenous conserved trees. What mechanistic options are there for putting this knowledge to practical use in conservation?

There are a few farmers who can be early adapters and others who have already taken considerable initiatives. Our experience shows that in most cases these farmers need only little support in terms of farm material and inputs. On the other hand, community-based groups are, by their very nature, initiated by coercion from external sources. Yet, the current community development strategies, including the forest policy, do not give as much consideration to individuals as it does to groups. What would be the impact of supporting such individuals in comparison to supporting groups?

To address some of these questions, in the BOCAF project we are consolidating our activities in the following areas:

- Participatory extension work including giving thematic lectures on issues of environment in the village council and general meetings.
- In collaboration with willing village residents, we have established tree nurseries which include timber and fruit trees as well as indigenous high-value tree species (with special emphasis on *Brachylaena huliensis*). In this regard we have three approaches: (a) entering into agreement with individuals (b) encouraging people for form groups and (c) working with schools
- Nurturing the indigenous trees found in the farm area during the process of opening up a demonstration farm.

As a result of this combination of activities several households at Mavovo village have joined our programme of planting farm and household boundary trees and conserving valuable indigenous trees. This idea is completely untried in virtually the whole of Muheza District. Apart from its scenic and environmental value, boundary trees would eliminate border disputes – not an uncommon source of animosity in the district.

We expect that at the end of the three years of CEPF funding, popular awareness will have increased regarding eco-farming systems, protection of threatened indigenous forest tree species and in general that there will be an increase in the number of people practising conservation in the area.

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