Mid Term Evaluation Report

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Jatropha Oil for Local Development in Mozambique

Biofuel for development and Communal Energy Self Supply

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Introduction

This mid term evaluation report on the "Jatropha oil for local development in Mozambique" project is based on a visit to the project in October 2008. The project is located in the Quirimbas National Park, Cabo Delgado, Mozambique, and is designed to improve the self sufficiency of local communities in terms of energy supply.

In the visit report of October 2007 we commented that the park is relatively new and to date most emphasis on development has been on the marine side with the only real tourist developments on the islands and coast (Ibo, Quirimba, Matemo and on the coast at Guludo, with one bush lodge now under construction at Mipande).

What is interesting is that in fact many of the villages in the park are also relatively new, several in fact having grown up subsequent to the park being designated in 2002. The total population of the five districts that are partially included in the park is now over 316,000 in an area of 17,600km^2 , i.e. 18 people per km^2 . This is in fact nearly as much as the average of Mozambique as a whole and perhaps surprising for a national park.

The traditional form of agriculture in the Quirimbas area is shifting cultivation based on slash and burning. Given the population density above, the effects of slash and burn are dramatically visible throughout the park. In three visits between October 2007 and now, the evidence of increased rate of clearing is everywhere. Given the predominantly light surface soils there is a low build up of organic matter, and this will be exacerbated as more land is cleared and bush has little chance to regrow due to yearly fires. (This is a problem in evidence across very large areas of Mozambique, but seems particularly contrary to expectations within a national park).

There continue to be significant Human Animal Conflicts in the park area (specifically with Elephant) and while mitigation measures are being attempted it is clear that with the density of human population present, instances of conflict will continue increase. As more bush is cleared and wild food becomes scarcer, Elephant will be more drawn to enter machambas and vegetable gardens.

Another increasing environmental concern in the area is the lack of reliable water sources. The project is engaged in well digging and fitting of simple rope pumps. Contact farmers are taught maintenance of the pumps, which are constructed at the project base at Bilibiza. The project is now using a longer lasting metal design and a well trained welder is fabricating the frames. However in a number of the villages seen at the end of the dry season wells were dry and had been hand dug as far as the country rock which in most cases is gneiss, with some plutonic intrusions and other metamorphic rocks overlain by between 3-6 metres of sand with occasional clays and other soils. There are a range of sedimentary rocks towards the coast. Without accurate hydro geological data it is hard to predict whether there might be

water available at deeper levels, though gneiss and granite are impermeable making it unlikely that significant water sources exist. Anecdotal evidence is that water found in several of the boreholes drilled by the government is salty.

The project has a number of related activities which are aimed at increasing the sustainability of livelihoods within the park without increasing impact on the environment, and where possible reducing this impact through the fostering of conservation agriculture techniques. Considerable progress has been made compared to one year ago, for which the team should be congratulated. Delays caused partially by the difficulty of working in the very large area being covered mean that an extension of the project period for a full year is justified.

One of the key activities is the planting of *Jatropha Curcas*, an oil bearing, toxic plant for use in fencing machambas, and growing mini plantations. There are now significant numbers of hedges around machambas and the total area covered by such hedges and mini plantations has reached one hundred hectares.

All the activities take place through the channel of the farmers' club, which bring farmers together to learn conservation farming techniques and the cultivation of vegetable crops for home consumption and sale. This activity has gained considerably in popularity once the clubs realised that there is a ready cash market for the produce; those situated along the main road have benefited considerably from sales to buyers from as far as Pemba. Translated into earnings per hectare, these vegetable plots can appear to have a fantastic earning potential. Naturally it is the very fact that there are not hectares within easy access to the market that has made prices so attractive.

The mid term evaluation was very brief and took the form of a field visit in which farmers from a number of participating clubs were interviewed and project documentation was reviewed. It is recommended that provision for a longer final evaluation is planned.

Figure 1. Jatropha with a good number of fruits closely bunched

Field Visits

The ADPP – FACT progress report no 4 contains information on specific observations in the villages visited.

26th October Ngwe, Nanjua and Anlia

27th October 1 de Maio, Petolia Koko

28th October Koko and Novo Zambezia

Achievements

It was not possible to visit all of the 32 farmers clubs in the short time available however a selection was made which in conjunction with project reports gives an idea of the project progress.

Regular progress reports are produced by the project and are posted on the FACT foundation website as well as the Arrakis website.

There are now 32 farmers clubs. This means that there are around 1,600 farmers directly involved in the project and at least being exposed to conservation agriculture techniques, vegetable production, jatropha use and to rope pumps and lined wells which could all have major benefits for the communities.

Figure 2. One of the most lucrative vegetable plots; Ngwe

Staffing ratio has improved, although with the increased number of clubs, each staff member still has to spend an inordinate amount of time travelling. While each farmers' club does have a Field Extension Worker, essentially a contact farmer, direct contact with the project is through a limited number of staff. There is money in the various budgets to recruit more staff and it is highly recommended that this be done to increase contact with farmers and effectiveness of staff time (the ratio of travel time to field work is currently too high).

Vegetable plots have been established in most of the 32 clubs. It was interesting to note that of those that we visited last year, some had stopped producing (mostly due to water supply issues), whereas another which had no vegetable plot before now has a thriving one. In the case of Primeiro de Maio, the garden which had looked quite good last year has run out of water and been destroyed by elephant, whereas in Ngue, the repair to an Afridev pump with project support has meant that the group has earned money from sale of cabbage and from sale of water. In a number of other villages there have been considerable earnings from the sale of vegetables, and in a few of them the farmers have also increased their own consumption of vegetables. The popularity of vegetable production increased considerably when the market opportunities started to be realised (particularly by those closer to Pemba). Although very high returns have been made per square metre, the reason is the small production areas. If these were to be increased the returns per square metre would decrease, but clearly there is considerable earning potential from vegetables for those within marketable distance of Pemba.

Figure 3 A functioning rope pump in Novo Zambezia

Conservation agriculture techniques are being taught. It requires quite a shift in thinking to move from slash and burn agriculture to composting and use of intercropping and IPM to keep yields up. There is little doubt that yields of most crops could be improved if conservation techniques are well implemented. Compost heaps and pits were noticed in most of the villages though the volume appears to be rather small in relation to the size of the plots. Experience suggests that elephants (and children) destroy the Chinese heaps (covered with earth), possibly suggesting that pits might be a more practical approach, both in terms of maintenance and volume. Monitoring should

include productivity indicators (proxy indicators such as sales volume can also be used), as well as incidence of pest and diseases amongst farmers crops. The need for conservation agriculture is very clear in the area and efforts to increase the awareness of the damage done by slash and burn need to be increased. It would be worth investigating the use of biochar in the project area; with an emphasis that this is not a license to fell more forest, but where clearing is inevitable, biocharring the organic matter does at least lock carbon in the soil and improve soil fertility.

Jatropha nurseries of >1000 plants continue to operate in all of the villages that we visited, and in total there are now 100,000 live jatropha plants in plots and as fences, and tens of thousands in nurseries. Some pruning has been done recently, though in some other locations the Jatropha was already so tall as to be difficult to harvest. Pruning will encourage a tight round bush that should be kept to head height. This maximises the number of branches per bush and makes harvesting simpler.

Jatropha plants which have been established for over 18 months are producing fruit, and even some younger ones are where water supply is good. Batches of seed (1800kg) have been bought from farmers in Meluco and Macomia at 5Mtn per kg. However, emphasis should remain on pruning for the right shape before yield at this stage. Research plots exist in a number of villages, though some of these are relatively recently established. The price of 5Mtn per kilo is quite generous, but may just be sustainable due to the locally high fuel costs. 5 Mtn would be the equivalent, after pressing etc of less than $1 per litre of oil. That is not too high in comparison to what diesel costs locally (even with the lower price of oil now).

Figure 4 Ngwe, next to a tar road has good access to market

Out of a total of 22 wells that have been equipped with steel rope pumps, 14 are operative. Problems that were initially experienced in the construction of wooden pumps have for the

most part been overcome using the stronger steel frames constructed at Biibiza. The pumps are sensitive to the installation and this must be emphasised again, as fitting bearings squint makes them much less durable. Construction of manilhas (the concrete lining rings) has improved over one year ago, with size being more consistent – the reinforcement and thickness still needs to optimised, use of bamboo reinforcement may not be ideal as this can cause splitting. The most common problem is however that wells are running dry in several villages. There is no immediately obvious technical solution to this. Enquiries into what hydrogeological data is available might help decide what can be considered.

Progress against objectives

Activity	Planned result	Actual	Notes	Revised plan
1.1	25 farmers clubs	32 running, function better than 1 yr ago	Increased levels of interest in production of Jatropha and additional funding opportunities made expansion possible.	Continue with 32 clubs
1.2.1	25 teacher trainees; One more training for 2006 team, plus one for new team	As planned		Follow up trainings planned for the 2007 team
1.2.2	25 field workers; training in Environmental awareness	One meeting less than planned, 32 FEW have been selected	One meeting rescheduled for November	Continue with 32
1.3	250 HH surveys as baseline	Surveys undertaken and entered in Excel	Some of the data not up to standard thus net number a bit lower. Analysis not yet undertaken	Analysis of the available data to be completed
1.4	50 wells with pumps for nursery irrigation	22 have been done. Several are dry and some re-dug elsewhere. Some pumps not working	There will be at least one well with steel pump per farmers club. Currently only 14 out of 22 are fully operative with water in them	41 to be complete and operative by July 2009
1.5.1	Setup nursery at EPF	Nursery operating with 6 varieties of Jatropha and other species	A 25 ha plot of Jatropha will be planted near EPF. A number of new cultivars from different countries have been found	Enough seedling raised by July 2009 to complete 25ha.
1.5.2	Establish 25 nurseries; total of 250,000 plants, 200kg of seed distributed and sown	Around 100,000 plants are already planted and several thousand seedlings are in nurseries. 800kg seed distributed	Although behind target, the nurseries should be capable of catching up over the coming year. Survival in the nurseries and after planting is good. No major pests have been observed.	Up to 32 nurseries supplying seedlings by July 2009
1.6	Train 250 farmers in Jatropha production	2 field days have been held. Up to 1600 farmers have been exposed to Jatropha	Hedges, which are preferred to plantations, are single row only. An attempt has been made to encourage double row hedges. The numbers of Jatropha are noticeably higher than one year ago	Catch up with seedlings and cuttings.
1.8	Sell seed harvested by farmers	Project bought1800kg from farmers at 5Mt per kg	Not all farmers seed was bought. Some may have planted this or stored it	Over the course of the year a better syStem for purchase
1.9	Annual field days and reviews held	Field days and held in each district 3 reviews held	Two district review meetings still to be conducted	To be continued according to plan
Remaining activities were not scheduled for this period. Collection of best practise information and awareness with local authorities is ongoing to be able to meet the targets with regard to information dissemination. Many of the lessons learned depend upon the full chain having been developed and operational. Since no oil has yet been pressed this is not yet the case.				

Observations

There are 32 farmers clubs operating throughout the five districts which are covered by the Quirimbas National Park. The mode of implementation is to use extension workers who are based in the district and they cover a number of clubs each. The clubs were established within reach of an ADPP Escola Professors de Futuro primary school. The clubs are not necessarily legal entities, although they are encouraged to draw up a constitution. Farmers clubs receive training both from the extension workers as well as from the teachers in the schools. Once the clubs are producing sufficient volumes of any product for sale, or are in a position to want a bank account, it will be necessary to formalise them by registering them. With income from vegetable sales some of the clubs have started to build up funds, and a transparent and safe means of keeping this money should be found. One club did ask for a loan from the project to buy boots for working in the wet season. While there is no budget for credit in the project plan this could be attempted on a small scale as an arrangement between the club and the project, and then only when the club puts in a significant deposit. It is not the intention for the project to start a micro credit programme, and if there are further requests for this it might be useful to introduce groups to the Aga Khan foundation which is already active in the area and is much more specialised in micro credit.

Figure 5 Elephant damage to the fence at Primeiro de Maio

A year ago there was some concern that farmers clubs were not always necessarily the “owners” of the project in their own villages. That related to the fact that there is a relatively limited range of activities in the clubs, and essentially all of them ended up doing the same. This is still the case and it is interesting to see the variation between the

level of success of the same activities in different villages. Those that are closer to the main road and are in Pemba Metuge for example are much more likely to have a good market for vegetables and have been energetic in producing them. In other villages where there is a shortage of water it is clear that there is little chance that vegetables will become a major income source. Unfortunately there is no clear solution to the water supply problem as drilling is not always an option, and this emphasises the limitations of the project activities from the farmers point of view. This is inevitable in a project that is developed using a normal project cycle approach, though even a logical framework is open to review annually. A more flexible way of working (though not always popular with funders) is to work on a more participatory action research basis so that the activities in each village are really defined by the people themselves (within the agreed limitations of a project setup). On the water issue, there may be nothing anyone can do. Discussions with Provincial authorities may reveal what is possible, and they may have hydrogeological data. It may be that some of the relatively recently settled villages do eventually have to move due to lack of water.

Structure; roles and responsibilities are clearer than a year ago. There is room in the budget to hire more people and it would be wise to make use of this. There is an issue regarding transfer of funds from Maputo to the project. While we are in favour of adequate checks and balances, the current system for transferring funds creates unnecessary delays and thus ends up costing the project money. Regular expenditures such as salaries are going to be paid every month and thus transfers should adequately cover these, in addition to normal levels of project expenditure. For larger purchases, a purchase request should relate to quotations and to the relevant project budget line – assuming that these are in place there is no need to delay a transfer, and this should be *in addition* to normal expenditure.

Quality control appears to have improved over the course of the year. It would be surprising given the limitations of the environment and availability of staff if it were perfect, however there were not as many obvious cases of poorly executed activities on this visit. It would be useful to have a clear system for checking and reporting on quality control on a regular basis.

Terms of reference for the project staff have been developed over the past year, and this seems to have helped. These should be reviewed to make sure that they are kept up to date

as it is inevitable that roles change slightly over the course of time. As there is now a project administrator in place (Francis) it would be useful to make sure that routine administrative tasks are in his hands, both to save time for other staff and make the most of his abilities.

Transport for staff is in general problematic, though once again there is money available under some budget lines to purchase some more transport. At the moment it appears that a replacement for the light truck is a priority as well as one or two high quality motorcycles if possible. As an indication of the amount of travel – in the past 1 year the Nissan pick up has covered around 100,000 km, which is equivalent to driving continuously for 30 work weeks (i.e. 40 hours a week). In effect this means that the amount of time to actually carry out work in villages has been severely limited.

Figure 6 Nursery at Anjua

The construction of the new workshop as planned and supervised by Giuseppe is well underway, though it was not complete in October. Once it is complete it is important that an inventory system is introduced to make sure tools etc are accounted for. The fact that management of the workshop will be in the hands of one person will help in this regard.

No progress seems to have been made on the subject of human elephant conflict and it would be useful for the farmers if contact was made with the Elephant Pepper foundation. This is likely to increase in importance as the local forest is being felled and burned at a dramatic rate. In turn elephant are more and more likely to come to farmers fields and machambas and cause damage.

Recommendations

- Delays caused partially by the difficulty of working in the very large area being covered mean that an extension of the project period for a full year (up to end 2010) is justified.
- It is highly recommended to recruit more staff in order to increase contact with farmers and effectiveness of staff, particularly given the availability of funds for this purpose.
- Funds transfers from Maputo must be timely and in accordance with budget lines. Though adequate procedures must be in place to avoid fraudulent use of funds there is should be no delay in justifiable expenditure that is budgeted and planned for and approved by the project manager.
- Research participatory methodologies and provide training to extension workers and technicians. Empowerment of farmers and ownership of the process (and hence sustainability) will come from the people themselves being responsible for the way in which the project works in each of their communities. This will of course require some flexibility. I recognise that as this was not part of the original plan there may be some difficulties involved.
- Establish a quality control system whereby any activity can be assured to have been implemented according the training that staff have received.
- The water availability issue needs to be raised with provincial authorities to determine what the options are for villages now chronically short of water.
- Human Elephant conflict issues need to be raised with Loki Osborne who has a lot of experience in this field as the incidence is likely to continue increasing as felling continues.
- The use of biochar to retain soil carbon and contribute to soil fertility should be investigated. An increase in the amount of compost produced in villages for the machambas is desirable as the current amounts appear too small to be significant.
- Links to Aga Khan could be developed where farmers clubs show an interest in savings and credit as AKDF has a lot of experience in managing credit.
- Each member of staff does have a written job description. I suggest that these are periodically reviewed with staff members to ensure that responsibilities are being adhered to. Where gaps are identified, these should be assigned to the appropriate people. This should simplify for example, maintenance of the inventory etc.