

FINAL REPORT: REFORESTATION AND AGRO-FORESTRY SITES IN THE MONARCH BUTTERFLY MODEL FOREST

Summary of Activities

In April 2002, 3 members of the MBMF travelled to Zitacuaro , Mexico to work with the members of the BMMM to set-up the project. Travelling to Mexico were the MBMF General Manager - Mike Waldram , there to finalize an Agreement for the project between the BMMM and the MBMF, Mr John Dojack of Manitoba Conservation to provide advise on the forestry and reforestation component of the project and Mr Larry Fischer of Manitoba Agriculture to advise on the Agro-Forestry component. The Manitoba MF delegates were met and assisted in Mexico by Mr Silvio Casino a Canadian intern sponsored by HRDC and a Canadian NGO called EarthBound International based out of Winnipeg and a partner in the project. While in Mexico the MBMF team visited the proposed sites of the projects and provided advise, met with BMMM staff and local people to be involved in the project, met with the Executive Council of the BMMM , helped the BMMM staff to find and purchase needed materials for the projects, inspected the trees in the forest nurseries, trained the BMMM staff in the construction of the mobile grazing cages, and prepared and signed an Agreement between BMMM and MBMF (see Fig 1). Mr Silvio Casino returned to Canada with the MBMF members and was replaced by a new intern (Ms Mirna Dominguez) under the HRDC program in early June, 2002.

Contact was maintained with the BMMM staff from Canada by regular phone calls, reports sent back to the MBMF by BMMM staff and e-mail correspondence.

In October 2002, the General Manager - Mike Waldram , silviculture expert John Dojack and agriculture expert Mark Sloan travelled to BMMM to provide further advise on the project, evaluate the progress and results and to determine the requirements for the second year.

The project was organized in Mexico by introducing the specific project objectives to residents of the ejidos of La Mesa and El Rosario. Tree planters and work party leaders were recruited and hired . (See Fig 3 and 4). Two families, one in each community were chosen to manage the agro-forestry plots based on interest and earlier site visits. A project manager was designated and a female assistant project manager hired. Material for fencing was located and eventually purchased, tree nurseries were contacted and orders placed, appropriate forage seed was located and purchased and mobile cage material and a carpenter was located and purchased or retained.

A site plan map was produced showing the locations for reforestation and the agro-forestry plots. (see Fig 24).

Negotiations were conducted successfully between the BMMM and federal, state and municipal governments to acquire the trees free of charge for the project. Transportation services were acquired to move the trees from the nurseries to the planting sites

A total of 161,000 trees were planted in the two ejido communities La Mesa and El Rosario. In the Ejido of La Mesa, these trees were planted in a previously burnt portion of the Monarch butterfly reserve, an Agro-forestry site and 24 deforested agricultural sites which are being converted back to forest. The number of trees planted was 6,000 less than planned, however, the total area planted was 76 hectares, 4 more than planned. These discrepancies are normal for tree planting operations of this size and well within normal parameters. The average stocking was 2,012 tress per ha which is standard. In the Ejido of El Rosario the trees were planted in the understory at the Monarch butterfly reserve, and agro-forestry site and 38 deforested agricultural sites which are being converted back to forest. Details of the planted trees are outlined in the following tables:

Location and Hectares of Plantations

Species	La Mesa				El Rosario				Total
	Mariposa Monarca Area	Agricultural Area	Agro Foresty Plot	Sub Total	Mariposa Momarca Area	Agr. Area	Agro Foresty Plot	Sub Total	
Abies Religiosa	15			15	5			5	20
Pinus Pseud.		14.5	0.5	15		28	1	29	43
Pinus Ayac.		5.5	0.5	6					6
Pinus Jart.		1		1					1
Pinus Patula		5		5					5
Total	15	26	1	42	5	28	1	34	76

Number of trees planted by species and Ejido

Species	La Mesa	El Rosario	Total
Abies Religiosa	35,000	5,600	40,600
Pinus Pseud.	40,000	54,000	94,000
Pinus Ayac.	15,000		15,000
Pinus Jart.	2,000		2,000
Pinus Patula	10,000		10,000
Total	102,000	59,600	161,6000

While in Mexico for the evaluation mission, the team visited all proposed project sites and evaluated progress. They were accompanied by various Bosque Modelo staff depending on their level of involvement. All landowners and land managers were included in the site visits and project discussions. Further training was conducted through field discussions regarding techniques for successful reforestation management and pasture poultry management to ensure the continued success of the project (See Fig. 15). A blend containing seven forage grasses and legumes was used for the majority of the land and a small section of the plot was set aside to evaluate each of the forages on their own. In these small plots, each of the seven forages were seeded alone in order to evaluate their suitability to the area. The forages used include – Alfalfa, Red Clover, Orch pasture, perennial Rye Grass, annual rye grass, a perennial pasture mix, and Hercules grass. The forage grass establishment was very successful and the forages are beginning to grow quite aggressively. The technique used for seeding these forages was a hand broadcast approach and a simulated harrowing to ensure adequate seed-soil contact. The legumes appear relatively weak at this point, potentially due to a lack of rhizobia bacteria in the soil, however with good management practises, these legumes should continue to establish and develop into productive forage stands. In El Rosario, the entire plot was seeded to the same mixture of 7 forage grasses and legumes and establishment has been successful. The land is not as well suited to agricultural production at El Rosario however the forage stand is somewhat comparable to La Mesa. Given the growing conditions, growth and development of the forages have been delayed however at the time of the visit, they were at the ideal stage for grazing.

It is obvious from the successful establishment of the forage that more forage is available than what can be potentially used by 2 grazing cages at each site. Discussion has taken place regarding other methods of rotational grazing with other livestock on the farm to utilize the additional forage. This would include frequent movement and restricted access with cattle, horses, or sheep with careful attention paid to forage health as an indication of success. Both sites have been completely fenced (approx 886m) using a combination of page wire and barbed wire. Fencing is more than adequate to exclude other grazing animals and predators (See Fig 14,15, 18).

Two poultry cages have been constructed for each site according to plan and poultry has been placed in the cages (see Fig 20, 21, 22). Management of the two agro-forestry sites is being done by the entire family owning the land including wives and children. Movement of the grazing cages was frequent resulting in successful survival of the desirable forages. The frequency of the cage movement is twice a day. There are 70 chickens in La Mesa and 80 in El Rosario. The cages had to be reinforced to withstand the constant movement. The survival rate of the chickens was 86% at La Mesa and 96% at El Rosario. The mortality at La Mesa was greater because this was the first site where the chickens were introduced. Very cold temperatures occurred the first night killing a number of them. This lesson was imparted to the family at El Rosario and after that the chickens at both sites were moved in doors at night when forecasts indicated cold temperatures would occur.

Public events were held at both sites to introduce , formally, the agro-forestry plots to the local people, although many people had visited and met with the owners on their own throughout the project, presumably out of curiosity. The plots are very evident and stand out from quite a distance. (See Fig. 14)

(B) Analysis of Results

Agro-Forestry – Forages all successfully established

Fencing successfully constructed

Controlled exclusion of other grazing animals successful

Integration of forages and tree species successful at La Mesa. But tree survival at El Rosario expected to be poor requiring a replant with better stock.

Planned activities have been very successful however more forage is being produced than can be used by the poultry. This will result in a requirement for more cages or implementation of other grazing livestock species.

The tree establishment did not go well at El Rosario due to reasons explained above. The landowner is confident that this can be solved by obtaining healthier seedling stock and extremely careful attention paid to planting techniques.

Both of the sites received a great deal of skepticism from neighboring producers at the start however the impressive forage stands raised a great deal of interest within the Ejido communities.

Planting quality was excellent. All trees inspected were planted with planting hoes used to create a 30 cm X 30 cm scalp prior to planting. This removed competing vegetation immediately adjacent to the planting site and created an excellent planting microsite, complete with a slight depression to trap rainfall. This level of attention to creating proper planting sites is far superior to typical tree planting projects in Canada and speaks to the dedication of the tree planters and their supervisors.

The CPB partner was also impressed at the dedication of the project co-ordinators and tree planters in delivering the trees and planting extremely difficult to access planting sites. A number of the agricultural reforestation sites in El Rosario and the wild fire site in La Mesa required transporting trees by burrow and walking tree planters in well over one kilometer up very steep grades.

Based on experience with tree planting contractors in Canada, sites like these would cost well over \$1.00 Cdn per tree to plant. These trees were planted at less than \$0.05 Cdn per tree

(C) Challenges Encountered

Over the course of the project a number of challenges were encountered. The first challenge was an unusual weather pattern that resulted in a delay in the forage seeding of the agro-forestry sites. The "wet" season ran much later than usual and the ensuing drought meant that the seeding of the forage grasses had to be delayed.

Delays occurred in the planting of trees for the reforestation sites due to one nursery supplier selling their trees to another organization and having to find another supplier and have the trees replaced. Another supplier was found , however, and all sites were eventually planted

The price of fencing material increased substantially from the time of estimates to the time the material needed to be purchased. As a result the actual metres of fencing erected was less than planned, however, this was partially overcome by using natural impediments like brush piles or heavily forested areas to block grazing animals (see Fig. 13)

Only one HRDC intern was sent to Mexico to work on the project rather than two as a second suitable candidate (one fluent in Spanish with necessary skills) could not be found in time. The contribution of Earthbound Environmental to the project was, therefore, less than planned, however, the lack of a second intern had no measureable impact on the program.

Pregnancies among some of the women caused a 10% absenteeism among the tree planters causing some delays, however, as noted all the trees were planted. It just took a little longer.

Communication problems (internet glitches, time and effort to set up conference calls with a translator, having documents and correspondence from and to Mexico translated) caused delays in the production of both the interim and this final report

Integration of poultry into the agro-forestry site and cages was delayed due to problems sourcing poultry however given the growing conditions, access to poultry coincided very nicely with the proper staging of the forages. Access to poultry was a bit of a challenge. The problem that this creates is that the forage grasses will become too coarse as they become older thus reducing intake by the poultry. This happened in a portion of the site at El Rosario however it was easily overcome with controlled grazing by cattle. The cattle were restricted to these portions of the site that were becoming overgrown and they were moved frequently to provide the forage with adequate rest. This strategy can be implemented to solve a poultry supply problem as well as a means of utilising excess forage that the poultry is unable to use given the limited number of cages.

The short time period between project approval in March and tree planting in July created difficulties in securing appropriate planting stock from the best tree nurseries. Future planting programs will attempt to secure trees well in advance from the best nurseries now that the Mexican ENGO delivering the program has planted the different stock types.

The trees provided by the Mexican government for this project were from four different nurseries, each with very different growing regimes. Although the quality of the planting stock overall was higher than anticipated, the stock from one of the nurseries had insufficient root mass to support the large, spindly, thin-diameter top. This, in combination with the rocky planting site, is expected to result in poor tree survival at the El Rosario agro-forestry site. (see Fig 19). We expect failures to take place on this site and are planning for a refill plant in 2003.

(D) Lessons Learned and Recommendations for Future Projects

Initial lack of seedlings available from nurseries due to the short time frame between project approval and planting date required the Mexican ENGO delivering the program to lobby the Mexican government and develop an agreement between four institutions (Mexico department of National Defense, Mexico Environmental Secretary, Mexican Federal Forestry Commission, and the State of Mexico) to provide the required amount of seedlings. With this agreement now in place and hopefully more lead time from project approval by CIDA, the second year program will secure the necessary seedlings well in advance.

The tree seedlings were obtained from four different nurseries, the stock from one of which was very poor. With increased lead time in confirming seedling requirements the Mexican ENGO delivering the project will be able to secure their seedling requirements from only the best nurseries. The CIDA intake dates and confirmation of funding time-lines are not conducive to

forest management time-frames. Seedlings are generally planted in the spring and ordered and inspected the previous fall. We understand that CIDA has recognized the problem for NGO's conducting multiple year projects and that the down-time caused by reporting and proposal review requirements can jeopardize programs. Presumably, CIDA will be making changes to their procedures in the near future and this would be welcomed.

We underestimated the costs for travel and support in Mexico particularly the cost of gas and difficult driving conditions requiring constant vehicle repair. Future projects will ensure adequate resources to these aspects.

We underestimated the time and costs involved in communicating with the Mexicans when not in-country. We also underestimated the time involved in administering the project and meeting CIDA reporting requirements. Adjustments will be made in our estimates for future projects in this regard.

It appears from the two agro-forestry sites that the individuals that will be involved in agro-forestry are quite capable of successfully establishing forages given their agricultural background however the concept of rotational grazing is quite foreign to them and a great deal of guidance is required in this area. That being said, the individuals involved are very receptive to learning about plant growth habits as a means of justifying rotational grazing. This provides them with purpose for rotational grazing and I believe this is the best approach to ensure success. This also gives them the tools required to alter grazing strategies depending on weather, forage growth, and livestock.

Establishment of cool season forages appears to be quite successful using many of the same practices as in Canada. Very shallow seeding into warm, moist soil. Many of the cool season grasses appear to perform very well here. The legumes have yet to prove themselves. More attention needs to be paid to the carrying capacity of the site to ensure that it is matched to the livestock expectations. This will prevent overstocking forage and thus jeopardising stands as well as prevent understocking forage and not properly utilising the production.

CPB partners have a better understanding of the typical size of the agriculture reforestation sites being one ha in size not the initially perceived 5 ha size. Based on this lesson it is recommended that budgeting for fencing be reduced and fencing only be established in areas where the Mexican ENGO delivering the project determines that there is a high risk of damage from grazing.

The survival rate of the chickens was 86% at La Mesa and 96% at El Rosario. The mortality at La Mesa was greater because this was the first site where the chickens were introduced. Very cold temperatures occurred the first night killing a number of them. This lesson was imparted to the family at El Rosario and after that the chickens at both sites were moved in doors at night when forecasts indicated cold temperatures would occur.

The Mexican ENGO delivering the project underestimated the importance of fencing to prevent grazing damage on a couple of sites. This situation has helped to stress the need for fencing a larger proportion of the reforestation sites.

(E) Participation and Benefits to Women

Women participated in the project in the following ways –

A woman, Anjara Hara Miranda, was hired as the Assistant Project Manager and assisted with the implementation of the entire project.

A woman, Mirna Domínguez, was hired as an intern under the HRDC program and assisted with the implementation of this project, the development of other community based projects for year 2 and language interpreter for the CPB partner and the Mexican ENGO delivering the project. The tree planting crews were made of four crew bosses and forty-six tree planters. Two of the crew bosses and twenty-three of the tree planters were women. (See fig 11) Women from the families chosen for the establishment of the agro-forestry plots are actively participating in the project. Some absenteeism from female tree planters due to pregnancies but this would not be considered unusual whether in Mexico or Canada given the physical nature of the job. The employment of the women had substantial benefits to them and their families as the income brought in would more than double family incomes. As new tree planting programs and

opportunities come along these women will have the training and experience to make their employment desirable.

(F)Environmental Assessment

There was no environmental assessment conducted on the project since no environmental damage was discovered nor predicted

(G)Public Engagement Activities

Formal ceremonies and visits were conducted at the agro-forestry sites for the local people at both ejidos. Signage has been placed at the project sites acknowledging both the MBMF and CIDA. A number of public meetings were held between the Mexican ENGO delivering the project and the Ejidos of La Mesa and El Rosario. These meetings not only solicited tree planters but also increased the community awareness and understanding of this project. Increased awareness of the effects of deforestation on environmental issues like Monarch butterfly over-wintering habitat, soil erosion, increased drought and global warming were discussed at these meetings.

Presentations have been given in Canada. The project has been recognized and promoted in Manitoba. MBMF received the Sustainable Development Award from the Premier (see Fig. 25). A front page article on the project appeared in a Section of the Free Press (see attachment) and a number of presentations about the project have been given to various interest groups in the province and elsewhere (Manitoba Naturalist Society, Friends of the Conservatory, Manitoba Conservations Deputy Minister and Department Directors and Assistant Deputy Ministers, Lakehead University Student Forum, Minnissotta Forestry officials).

Yet to be produced will be a poster of the project that we hope to display at the World Forest Congress and elsewhere as well as posting a report and pictures of the project on our Web Site. This report will have to be translated into Spanish as well.

(H)Materials Produced and Their Disposition

Materials purchased for this project include fencing materials for exterior fencing of the agro-forestry sites , tree plantations as well as for the portable cages. The fencing is expected to remain in place as long as needed to protect the forage grasses and plantations. If for some reason the project is abandoned the material can be salvaged and used elsewhere by the Ejido. The portable cages will remain at the site as long as proper management is being implemented. If management of the site is considered inadequate, cages could be moved and utilised at another site. Poultry will be purchased, grown, and consumed or sold. A digital camera, software and batteries were purchased and will remain the property of the BMMM. The poster to be produced will remain the property of the MBMF to be used in their displays in Canada.

(I) Intellectual Property Rights

This was not an issue in this project.

(J) Shared Responsibility and Accountability

The MBMF and the BMMM entered into a formal agreement for delivery of the project. It included the responsibilities of both parties. The MBMF was largely responsible for providing advise and instruction to the BMMM staff and local people on such issues as planting and agro-forestry sites, planting stock, plantation maintenance and protection, forage crops, rotational grazing, cage construction, chicken maintenance and fencing needs. MBMF was also responsible for translation services. The BMMM staff and local people were responsible for organizing and delivering the project as advised. A reporting structure was put in place between the two organizations.

(K) MBMF Participation and Benefits

Due to the unique nature of Model Forest organizations in that they accomplish their program objectives through partnerships of volunteers and organizations we were able to provide

well qualified people from Manitoba in the fields of forestry and agriculture. Three experts from Manitoba agriculture and two from Manitoba Conservation have been directly involved in the project. Support from the Manitoba Gov't in providing their staff has been exceptional. Over the course of the project from the exploratory phase to the first year three young Manitoban interns under an HRDC program have been involved by providing on-site guidance, reporting, communications and translation services. The project has been recognized and promoted in Manitoba. MBMF received the Sustainable Development Award from the Premier (see Fig.25). A front page article on the project appeared in a Section of the Free Press (see attachment) and a number of presentations about the project have been given to various interest groups in the province and elsewhere (Manitoba Naturalist Society, Friends of the Conservatory, Manitoba Conservations Deputy Minister and Department Directors and Assistant Deputy Ministers, Lakehead University Student Forum, Minnissotta Forestry officials) . The publicity from the project has significantly raised the profile of the MBMF both within the province and elsewhere and has expanded the mandate of the MBMF to be more relevant over a wider jurisdiction. Our participation in Mexico was recognized and given credit by the Canadian Government in the evaluation of our program. As a result of our participation in Mexico, two of the individuals involved in this project were chosen and sponsored by the FAO to travel to and provide advise to developing Model Forests in Thailand and Philippines.

(L) Sustainability of Results

Once the forage is established and protected by fencing and as long it is properly managed the sites should continue to provide forage for poultry for many years. The tree plantations will be protected by the fencing until the trees are large enough to survive the impacts of grazing animals.

(M) Recommendations to CIDA

An aspect of the CIDA program that has caused some problems is the downtime between the year 1 project and year 2 , the proposal for which will be submitted by April 1, 2003. In the case of tree planting, the preferred time for planting is the spring but notification of the CIDA contribution comes too late in the fiscal year for good planning and organizing . CIDA needs to find a better formula to provide notification of their contribution well before the beginning of the fiscal year and presumably before the end of the first year project. Perhaps you might consider accepting year 2 proposals after receipt of the progress report.